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ABSTRACT

This annual serial issue contains six papers dealing with business education and training. Three approaches to teaching problem solving are detailed in "Teaching Problem Solving for Employment Preparation" (Judith J. Lambrecht). A study to identify the technologies used to manage information in business and industry is reported in "The Use of Technologies and Media in Records Information Management" (Diane C. Davis). A study of the use of communication technologies in business classrooms is summarized in "Surfing in the Classroom: Using Communication Technologies in Education for Business" (Betty S. Johnson, Marsha L. Bayless, Christine M. Irvine). "Case Preparation to Improve Writing Assignments" (Sandra J. Nelson, Laura McLeod, Leona M. Gallion) suggests ways of improving writing assignments in business classes. A study comparing the effectiveness of computer instruction and teacher-directed instruction as methods of helping community college students develop computer competence is discussed in "The Effect of Using a Computer Authoring System on Student Achievement" (Mary Jean White, Bonnie Roe White). "Book Review: 'The Complete Computer Trainer' by Paul Clothier (1996, NY: McGraw Hill)" (Judith J. Lambrecht) reviews a book devoted to methods for teaching students to use applications software. Most papers contain references. (MN)

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EDITOR'S NOTES . . .

The members of the Louisiana Association of Business Educators voted in 1995 to change the title of our Journal from the Louisiana Business Education Journal to the Journal of Business and Training Education, and to adopt a national focus. The Journal is listed in the Cabell's Directory of Pubishing Opportunities in Management and Marketing and will be listed in the next issue of Cabell's Directory of Publishing Opportunities in Education.

With the exception of invited articles, the manuscripts presented in this issue were accepted under a blind review process. Each was read by three reviewers from the Journal's editorial review board.

The sixth issue of the Journal contains articles on a wide variety of topics, beginning with an invited paper by Judith Lambrecht. In a society where change is continuous, we need to assist students in developing the ability to solve problems and to transfer their learning to new settings. Dr. Lambrecht's article on teaching problem solving for employment preparation discusses the different assumptions that teachers have about how students learn and how teachers teach problem solving skills. She examines three different approaches to teaching problem solving.

The impact of technological change on management of information is the focus of the second article, by Diane C. Davis, which reports on the findings from a research study that identified the technologies and media utilized in the management of information by business and industry. Based on the responses of 245 Association of Records Managers and Administrators (ARMA) members surveyed, the author identifies the methods, technologies, and procedures involved in the management of information.

To determine the usage of communication technologies by business educators, Betty S. Johnson, Marsha L. Bayless, and Christine M. Irvine conducted a survey of the National

Association of Business Teacher Educators (NABTE) schools. Based on 196 responses, the authors report on the information technology available to business education faculty, educators' perceptions of competency, and usage of technology in the teaching-learning environment.

In the fourth article, the authors present a teaching method for improving the writing skills of business students. The authors, Sandra Nelson, Laura McLeod, Leona M.Gallion, provide a rationale and an example of a writing assignment case.

Mary Jean White and Bonnie Roe White examine the effects of two teaching approaches on student achievement in a microcomputers introductory course at the community college level. The two methods studied were computer-assisted instruction and teacher-directed instruction.

An in-depth book review is provided by Judith J. Lambrecht on a computer training book that can be used by teachers in public schools and in business/industry. This professional methods book provides practical advice for teaching the following application software: word processors, data bases, spreadsheets, graphics, and e-mail.

Sincere thanks is extended to all authors for their professional contributions to this issue. Appreciation also is extended to the editorial review board and associate editor, Betty Kleen. Acknowledgement must be given to Sandra Cash of Louisiana State University for her patience in keying the Journal and to Davison Mupinga, who performed a variety of tasks necessary for publishing a journal. Sincere appreciation goes to our advertisers for their support.

Donna H. Redmann, Editor

JOURNAL PROFILE

Journal Description

The Journal of Business and Training Education is a national refereed publication published annually by the Louisiana Association of Business Educators. This refereed journal includes articles on various aspects of business and training education dealing with research, theory, trends and issues, curriculum, teaching methodology, technology, and personal/ professional development. Manuscripts are selected using a blind review process. Each issue contains approximately six to ten articles,. The first issue of the journal was circulated in Spring 1991. Volumes 1 - 4 were entitled Louisiana Business Education Journal (available in the ERIC database).

Circulation/Readership

The journal is distributed to all LABE members as part of membership dues and sent free of charge to the NABTE (National Association of Business Teacher Education) institutions throughout the country. The readership is comprised of business teachers, administrators, supervisors, teacher educators, college and university students planning to become business teachers or trainers, and trainers in business & industry.

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CALL FOR PAPERS

The Louisiana Association of Business Educators invites business educators and trainers to contribute articles for publication in the Journal of Business and Training Education, a national refereed publication. Manuscripts should deal with topics of interest to educators (at both the secondary and post-secondary levels) and to trainers in business and industry. Submission of manuscripts dealing with practical topics are encouraged, as are research based or theoretical papers. Occasionally, invited authors' papers will be published. Book reviews are also accepted.

Manuscripts will be selected through a blind review process. Manuscripts should not have been published or be under current consideration for publication by another journal. **Five copies** of the manuscript, including a title page and a 50-100-word **abstract**, should be submitted to the editor. The manuscripts should range from 6 to 15 double-spaced typed pages of 12 pitch type-size, including tables and references. Manuscripts must be prepared using the style format in the Publication Manual of the American Psychological Association, Fourth Edition, 1994 (ISBN 1-55798-241-4). The **title page** is to include the title of the manuscript and the running header. The following information on each author needs to be included on the title page: full name, position title, place of employment, city, state, zip code, telephone numbers and e-mail if available.

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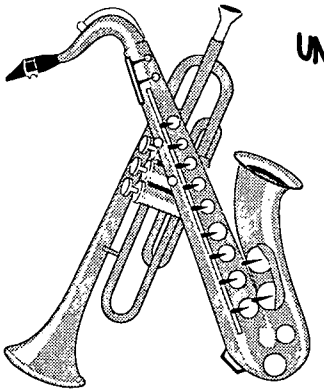

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Journal of Business and Training Education
Vol. 6, Spring, 1997, pp. 17-49.

TEACHING PROBLEM SOLVING FOR EMPLOYMENT PREPARATION

Judith J. Lambrecht

Abstract

Teaching problem solving is important for all teachers because it is both a highly desired job competency and it enables students to continue to learn on the job. This article illustrates how different assumptions about learning and teaching affect how business curricula are organized when teaching problem solving is the goal.

Three different approaches are identified: general approach, infused approach, and immersed approach. Business educators need both to recognize the approaches they have been using and ask whether a different approaches might be more effective. Research from the general education literature can provide guidance in doing this.

Dr. Judith J. Lambecht is a Professor in the Dept. of Work, Community, and Family Education at the University of Minnesota, St. Paul.

Teachers teach problem solving in a certain way based on the assumptions they have about how students learn. Furthermore, what teachers do, and the question they are willing to raise about their practices, are affected by how they believe they themselves learn and how they view the world as knowable. In a society in which change is continually confronting us, we need to identify and confirm as viable those teaching approaches that promise flexibility and responsiveness to the need to continue learning, or, to use a different term, we need to teach in ways that assist students to transfer their learning to new settings.

The purpose of this discussion is to illustrate how different assumptions about learning affect how business education curricula are organized and how these assumption affect the ways in which we students engaged in learning. In the process of examining these assumptions, business teachers will be encouraged to reconceptualize their purposes for teaching, the content for which they are responsible, and their thinking about the contexts through which students can become engaged in learning.

The questions to be raised here come from a need to teach problem-solving skills as a more prominent part of business curricula, and to teach these skills in a way that transfers to use outside of school, primarily to business employment settings. This broad focus is a result of the recurring theme in all of the numerous reform reports to do a noticeably more effective job in imparting to students broad academic and employment skills. These may be called "Basic Skills, Thinking Skills, and Personal Qualities" as in the SCANS report (1991), or they may be called "Domain Knowledge, 'Tricks of the Trade,' Cognitive Management Strategies, and Learning Strategies" as in the publication Solutions by the National Council on Vocational Education (Berryman, 1990-91). The American Society for Training and Development and U.S. Dept. of Labor presents a similar case in the publication

America and the New Economy (Carnevale, 1991). Here, in addition to the academic basics of reading and writing at work, and computation, other essential outcomes of education are described as the following:

- Learning to Learn
- Communication: Speaking and Listening
- Adaptability: Problem Solving and Creative Thinking
- Developmental Skills: Self Esteem, Goal Setting, Motivation, and Personal and Career Development
- Group Effectiveness: Interpersonal Skills, Negotiation, and Teamwork
- Influencing Skills: Organizational Effectiveness and Leadership Skills

More recent research (Stasz, et al, 1996) has organized these broad competencies into the areas of problem solving, communications, teamwork, and work-related dispositions. The topics in these lists are not new to the vocational education or business education literature; they even overlap considerably. These areas continually get reinforced by new surveys and statements about work requirements, such as the those by Resnick and Wirt (1996) in Linking School and Work: Roles for Standards and Assessment, Cappelli and Rogowsky (1995) in Skill Demands, Changing Work Organization and Performance, and Stasz, et al. (1996) in the Rand research report on Workplace Skills in Practice. While these reports broaden our understanding of work place requirements, some people would argue that we have historically included these areas within the domain of business education and that teaching problem solving

is nothing new for us. What may be new, however, is the need to identify more conspicuously the processes and the products of our instruction that yield this valued outcome. This will mean more than relabeling; it may also mean reorganization. It certainly means that we need to establish our place as part of a total school curriculum which values problem solving as an outcome. It means we need to engage in one of the debates that is part of the problem-solving research literature: Why has there been so little transfer from school subjects to other realms of life and work? And which broad model for teaching problem solving could facilitate the transfer of learning?

Transfer of Learning Problem

Business education is fundamentally committed to successfully teaching for transfer. While this is also the promise of other parts of the curriculum -- the academic subjects have long been argued to have wide generalizability -- vocational education explicitly promises to prepare students for an employment world that is separate from the classroom. If what is taught does not transfer to real work settings, the instruction cannot claim to have been successful. But successful transfer outside of school does not always follow from vocational instruction nor from broader academic study.

The transfer of learning question has been a perennial one in the educational psychology literature. Anthropologists and sociologists have recently contributed to the research findings that individuals do not predictably transfer knowledge in any of three situations where transfer is expected to occur. They do not predictably transfer school knowledge to everyday situations. They do not transfer sound everyday practice to school endeavors, even when the school knowledge and out-of-school experience are clearly related. They do not even predictably transfer their learning across school subjects.

The research subjects in these studies documenting transfer-of-learning failures (Resnick, 1987b; Pea, 1987; Perkins & Salomon, 1989; Lave, 1988; Scribner, 1984) have been quite varied:

* workers in a dairy plant making up orders from mixed cartons of milk products, but not able to carry out the same calculations in school-type problems;

* grade school students who view change-making problems as different operations from school arithmetic, and carry them out differently;

* physics students who do not recognize Newtonian physics principles when encountered outside of the classroom;

* students learning statistics who do not recognize practical applications of the concepts learned; and

* programming students who do not apply the planning concepts taught to other contexts where these procedures might reasonably apply.

At a less formal level, all teachers regularly observe instances where students do not recognize without assistance when it is appropriate to apply concepts previously mastered. For example, students may not notice in a new word processing exercise that the recently introduced indent/outdent formatting command could be used, or they may not recognize the location in a new spreadsheet assignment where a lookup table would be a good solution. Noticing appropriate opportunities for transfer of learning ought to be easier in school settings where students might expect such practice. It is a greater problem in

employment contexts when students do not recognize that previous knowledge and skills could be used; their knowledge remains essentially inert, as if it had never been encountered.

Approaches to Teaching Problem Solving

Several strategies are available to address the problem of teaching problem-solving skills in such a way that knowledge remains useful to students -- transfers to intended school, employment, and everyday contexts. To delimit the consideration of solutions, three broad approaches will be examined: General or direct approach to teaching problem solving; infused or integrated approach of teaching problem solving within the context of other subject areas; and immersed or indirect approach of allowing problem-solving skills to develop by focusing in-depth attention on a content area. These three approaches are not often discussed together, though their existence and appropriate use are the source of considerable debate in educational literature (see, for example, Brown,1993, Chapter 8; Bruer,1993, Chapter 3; Detterman, 1993; McKeough, Lupart, & Marini, 1995, Chapter 1; Salomon & Perkins, 1996, pages 118-121; and Tishman & Perkins, 1997, pages 272-273). Before examining the arguments for these different approaches, it is important to provide a definition of problem solving.

Problem solving is frequently considered a part of what are generally called higher-order thinking skills or critical thinking skills. Critical thinking skills carry with them an aspect of evaluation that may lead to a judgment about warranted positions, but not necessarily action. Problem-solving suggests the need for a decision that leads to a plan of action. In fact, problem solving may be viewed as focusing on a planning process, while critical thinking gives attention to the evaluation of a existing product or situation.

The problem-solving literature is large, and much attention has been given to defining problem-solving. In essence, however, there are two essential features: a state of doubt or difficulty, and a search for a way to resolve this doubt or difficulty. It is important to notice that the *difficulty* is one that is perceived by the person having the problem. In Dewey's language, "General appeals to a child (or to a grown-up) to think, irrespective of the existence *in his own experience* [emphasis added] of some difficulty that troubles him and disturbs his equilibrium, are as futile as advice to lift himself by his boot-straps" (Dewey, 1991, originally 1910, p. 12). Following this *felt need* or *difficulty*, the search for a solution can involve several stages.

Essentially two broad types of problems can be encountered, again the perception of type being from the point of view of the person having the problem. For one, *well-structured* problems, the end goal is well defined and the procedures to reach that goal can also be clearly specified. There may be only one acceptable end goal and one acceptable route for reaching it. In this case, the situation may more properly be called a "task," an "exercise," or a "puzzle" rather than a problem. A "problem" suggests more ambiguity over either the desired resolution -- the goal -- and/or how to get there. When both the goal and the process of resolution have multiple acceptable answers, the second type of problem is identified as *ill-structured*. Some writers have called these "wicked" problems. Unfortunately, everyday, work-site centered problems are more likely to be ill-structured, even if part of their solution involves using fairly well-specified procedures and sources of information.

It is the ability to deal with ill-structure problems that business educators eventually want to develop on the part of their students. It is sometimes assumed that such problems can only be addressed after students have first mastered lower-level skills and well-structured problems. Teachers have

frequently identified problem-solving activities as instructional outcomes fairly high on the cognitive taxonomy and ones in which primarily advanced students are able to engage. Such is no longer the view of cognitive psychologists. As succinctly stated by Resnick (1987a):

> The most important single message of modern research on the nature of thinking is that the kinds of activities traditionally associated with thinking are not limited to advanced levels of development. ... This assumption -- that there is a sequence from lower level activities that do not require much independent thinking or judgment to higher level ones that do -- colors much educational theory and practice. Implicitly at least, it justifies long years of drill on the "basics" before thinking and problem solving are demanded. (p. 8)

Rather than being inherent at the advanced levels of instruction, problem solving is a process engaged in at all levels of learning. A "problem" is not always easily recognized because the definition must come from the learner.

How can teachers engage students in genuine problem-solving activities? Three broad approaches are generally presented as possibilities -- none of them discretely separable from the others. However, the assumptions inherent in each one make each worth considering separately. Implicitly, teachers who deliberately assume responsibility for developing students' problem-solving skills will find themselves leaning toward one of them.

When visible curricular prominence is to be given to the teaching of problem-solving strategies, a common response has been the creation of courses and programs separate from subject-matter content. Figure 1 illustrates the general approach as one in which the balance between subject-matter

content and problem-solving processes gives greater "weight" to the processes.

General or Direct Approach

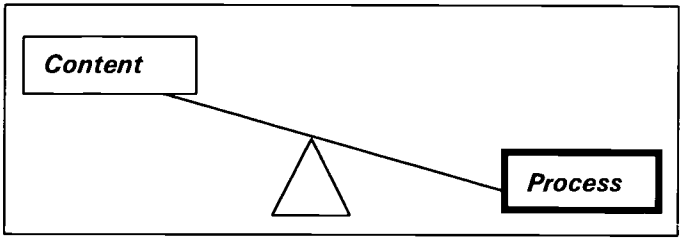

Figure 1: General Approach, Process Dominates

The primary reason for giving explicit attention to the processes is that general heuristics or "rules-of-thumb" are argued to exist and that these need to be made explicit to students, that students will not discover such tactics on their own. Polya's (1957) book, How to Solve It, is a good source of the general problem-solving ideas that have been summarized in many other places since its publication. These include such practices as breaking a problem into subproblems, using diagrams to represent a problem in different ways, asking if aspects of the problem have been seen before, having a plan, checking results, and more. The general characteristics of this approach will be described, followed by some specific examples of its use in vocational education programs.

The general approach is called by different names, depending upon the body of theory used to describe the practices. The "information processing perspective" on curriculum and instruction emphasizes cognitive processes. It makes content materials less important as attention is given to skills that entail knowing, executing and controlling procedures

and steps. From an information processing perspective, "purposes and goals for instruction focus on the acquisition of thinking skills deemed relevant in a technological society, their transfer across content domains to new problems and from the classroom to the real world, and on awareness of one's own cognitive patterns and processes" (Thomas, 1992, p. 24). Jones (1992) applies the name "cognitive strategy instruction" to the instructional design approach that "emphasizes the importance of developing and integrating a repertoire of cognitive and metacognitive strategies in the context of an adjunct course or separate instruction" (p. 166).

General processes of thinking and problem solving are made explicit with two expectations: these processes have wide generalizability to many subject areas, and students will be better able to focus on the processes unencumbered with unfamiliar subject matter. The content for teaching these processes often includes abstract tasks, puzzle-like problems, and informal life situations such as simple consumer purchases with which all students are assumed to be familiar.

Numerous programs are commercially available illustrating the general approach for teaching problem solving. Some of the names are the following (Glaser, 1984; Willis, 1992; Perkins & Salomon, 1989; Tishman, Perkins, & Jay, 1994):

- Problem Solving and Comprehension: A Short Course in Analytical Reasoning
- Instrumental Enrichment: An Intervention Program for Cognitive Modifiability
- The Productive Thinking Program: A Course in Learning to Think
- The CoRT Thinking Program

- HOTS (Higher Order Thinking Skills)
- Philosophy for Children
- Project Intelligence
- The Thinking Classroom

The debate about the value (i.e., transferability of skills) of these programs has raged for years. Exchanges by scholars such as Ennis (1989, 1990) and McPeck (1990) in the Educational Researcher highlight the issues in all their complexity. While a brief summary does not do justice to the topic, in essence Ennis argues that, "[It] makes sense to talk about significant general critical thinking abilities and dispositions, that at least some are not trivially obvious, and that applying an ability in a variety of domains makes it a general ability" (Ennis, 1990, p. 16). In contrast, McPeck would argue, "[There] are almost as many different kinds of critical thinking as there are different kinds of things to think about. The criteria for applying and assessing critical thinking derive from the thing... discussed or thought about at the time" (McPeck, 1990, p. 10). Both these writers have contributed to the continuing debate in The Generalizability of Critical Thinking (Norris, 1992).

This approach may seem removed from the considerations of business teachers who may not be likely to teach a general problem-solving or critical-thinking course. However, we should not exclude ourselves from this domain too quickly. Current research related to employment preparation continues to use the language of general skills and seeks to both identify more fully what these mean and how to teach them. See for example, Teaching and Learning Generic Skills for the Workplace (Stasz, et al., 1990), Classrooms that Work: Teaching Generic Skills in Academic and Vocational

Settings (Stasz, et al., 1992), and Reforming Education for Work: A Cognitive Science Perspective (Raizen, 1989). The general approach is also implicit in the chapter "Developing Problem-Solving Skills" in the 1996 National Business Education Yearbook (Remp, 1996).

Courses in general problem solving sometimes come with different names, and business teachers teach them. Courses in ethics and in study skills are often selected as appropriate courses for business teachers to teach. Such courses may start as business ethics or as a notetaking course that draws upon business teachers' ability to teach shorthand. Then they broaden to go beyond the business focus. The teaching of Ethics begins to look broadly at situations close at hand for students, especially when students lack experience in business settings. In Notetaking classes, the study skills remain when the notetaking system is dropped because developing the shorthand/notetaking skill takes too much class time. Time management and human relations courses are additional examples of courses commonly taught by business teachers from a general, content-free perspective. Getting even closer to home, the teaching of microcomputer applications can also be considered in this category if the use of software is more prominent than the nature of the problems. This is especially the case if the exercises completed by students are not business problems and do not require an understanding of any business principles or procedures. Rather, personal-use applications may be the basis for teaching introductory computing skills.

These courses are based on the presumption that general skills and, particularly, dispositions, can be taught separately from any specific subject matter or employment contexts. Examples are drawn from the daily life and school experiences of students with the expectation that the exercise examples will be understood so that attention can focus on problem-solving processes—general planning examples,

communication exercises, software operation, cases of the application of ethical principles, or finding and organizing information. The assumption made is that students will automatically make the transfer to other settings and that a business context is not initially necessary. Is this true? Are these effective ways to address teaching general skills?

The conflict between the general approach and the need for specific subject-matter knowledge can lead to the compromise of directly teaching problem-solving strategies, but within the context of other school subject areas. Figure 2 shows a balance between subject-matter content and problem-solving processes.

Infusion or **Imbedded Approach**

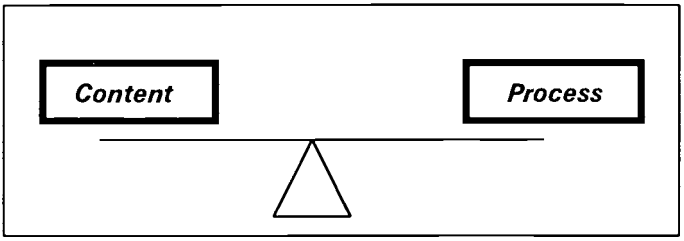

Figure 2: Infused Approach, Balance of Content and Process

Perkins and Salomon (1989) have moved in this direction after arguing that "the more general the method, the weaker the method" (p. 19). While it may be possible to describe general approaches and apply them to relatively knowledge-free problems, respected scholars (Glaser, 1984; Larkin, 1989; Resnick, 1987b, 1989) have argued that there are strong interactions between the structure of knowledge and cognitive processes. Larkin (1989) strongly states that "Although attractive, the notion that transferable knowledge is

a core of general problem-solving skills has been historically unproductive. There is not good evidence that instruction in such skills improves performance" (p. 303). Transfer to meaningful contexts cannot be expected if problem-solving processes are not identified and used within these same contexts.

While this issue is a current one, it is also a persistent one. Dewey addressed this point in his now classic book, How We Think, by the following strong statement:

> Thinking is specific, not a machine-like, ready-made apparatus to be turned indifferently and at will upon all subjects, as a lantern may throw its light as it happens upon horses, streets, gardens, trees, or river. Thinking is specific, in that different things suggest their own appropriate meanings, tell their own unique stories, and in that they do this in very different ways with different persons. (Dewey, 1991, originally 1910, p. 39)

Dewey follows this statement with the conclusion that any subject can be intellectual, intellectual in function, that is, if it serves to start and direct significant inquiry and reflection. Among the domains of subject matter that have this power Dewey identifies "the conduct of business affairs" (Dewey, 1991, originally 1910, p. 39).

The implication for teaching is that the subject matter content is an essential part of the problem-solving experience and that the two must be taught together--not one before the other. The legacy to John Dewey is unavoidable here. Dewey (1991) argued almost a century ago that problem solving means thinking and thinking means learning. They are unavoidable and inextricably linked together. To learn in any content area means to understand the nature of the problems it presents and to come to deal with them successfully.

Other more recent areas of research add support to the argument of making subject matter prominent in order to teach problem-solving skills. Developmental studies with children support the conclusion that thinking is greatly influenced by experience with new information (Glaser, 1984). Comparisons of experts versus novices in different fields of study has lead to the conclusions that "the problem-solving difficulty of novices can be attributed largely to the inadequacies of their knowledge bases and not to limitations in their processing capabilities such as the inability to use problem-solving heuristics" (Glaser, 1984, p. 99; see also Perkins & Salomon, 1989). Glaser extends his arguments through research comparing high- and low-scoring individuals on aptitude tests. As a result of the differences observed between these two groups, he maintains

> Learning and reasoning skills develop not as abstract mechanisms of heuristic search and memory processing. Rather, they develop as the content and concepts of a knowledge domain are attained in learning situations that constrain this knowledge to serve certain purposes and goals. (1984, p. 99)

This same conclusion is stated even more strongly by a Vanderbilt University researcher team (Bransford, Vye, Kinzer, & Risko, 1990): "Overall, the evidence is overwhelming that people's abilities to think and solve problems is affected considerably by the nature and organization of the knowledge that they have already acquired" (p. 384).

The distinguishing characteristic of the infused approach to teaching thinking skills or problem solving is that a balance is attempted in which about equal attention is given to both subject-matter content and thinking processes. Of particular importance is attention to metacognitive or executive-control thinking processes and critical evaluation of prior judgments or decisions. Of the three approaches, the infused approach currently receives the greatest implementation effort. Examples

of the use of this approach for business subjects include business management, business communications, business mathematics, and business computing applications. Parallel attention to business content is considered as important as teaching general problem-solving processes related to management, communications, mathematics, and computer use.

Within general education areas as well as vocational education subjects, the term "cognitive apprenticeship" has been applied to a wide range of instructional activities directed to higher level, more transferable learning outcomes. The National Council on Vocational Education (1990-1991) in its Solutions publication has provided strong endorsement for this model that balances teaching content and thinking processes. (See also Berryman & Bailey, 1992; and Grubb, 1995a, 1995b). Some of the employment-related arguments that have supported this integration are reviewed below.

The importance of subject matter and real-world contexts is particularly important when program goals include preparing students for employment. In the context of preparing students for real-world participation, Resnick (1987b) has identified discontinuities between education as practiced in school and its application in daily life and work which hinders potential transfer. Glick (1995) has provided a similar set of contrasts between school and work. These discontinuities as described by Resnick (1987b) are briefly summarized below, and the last in this list, situation-linked skills and knowledge, implies the importance of context in problem solving.

* School - Individual performance
  Nonschool - Socially shared performance

* School - Unaided thought during testing
  Nonschool - Use of cognitive tools, such as references, calculators, and computers.

* School - Symbolic thinking
  Nonschool - Objects and situations

* School - General skills/knowledge
  Nonschool - Situation-linked skills/knowledge

Difficulty obtaining evidence for the transfer of general problem-solving skills (Frederiksen, 1984; Salomon & Perkins, 1987, 1989) has heightened the need to specify the nature of the subject-matter or the situation-specific context in which problem solving is to occur. Pea and Kurland (1987), whose research has focused particularly in teaching computer programming skills, share this view. They maintain that, "In most problem-solving tasks, it is impossible to apply the supposed context-free skills without initially having essentially domain-specific knowledge" (p. 155) and, further, "Cognitive scientists have found that extensive knowledge is necessary for expert-level performance in solving problems in every content area studied" (Pea, 1987, p. 134).

In business education and other vocational fields, use of the infusion approach would argue for making business content prominent in the teaching of problem-solving skills. This implies asking students to consider specific business cases as settings for problems and, to provide even more fidelity to business contexts, asking students to work in business settings (simulated or real) as they learn to solve business problems.

The third broad approach to developing problem-solving skills, the immersion or indirect approach, may be viewed as shifting the balance of emphasis to the content or subject-matter with less explicit attention to thinking processes. The importance of content or subject matter and context is made even stronger than in the infusion approach.

Immersion or Indirect Approach

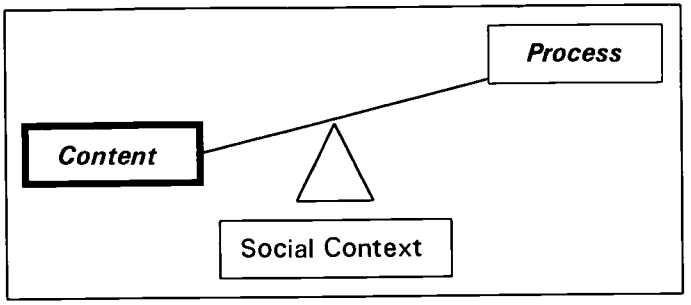

Figure 3: Immersion Approach, Content Dominates

This approach does not appear to have received any specific consideration nor support within business education literature. In fact, it has probably been rejected from consideration in the Business Education Forum article which stated bluntly, "Learning how to think is not an automatic by-product of studying a subject" (Chalupa, 1992, p. 21). Before exploring the nature of this shift to greater subject-matter emphasis, more attention needs to be given to what is meant by subject matter, by ideas, and by context.

The breadth of the meaning of the terms "context" or "content" needs to be explored. While Ennis (1989) is critical of the ambiguity of the concept of subject-matter domains, he acknowledges the intuitive first reaction of teachers to think of content as being related to school subject matter. But context is more than traditional school subject matter. As was suggested by Resnick (1987b) in describing the discontinuities between in-school learning and out-of-school application, situation-linked skills imply the social context of the problem as well as the topic or subject-matter domain.

The above conclusion about the importance of social context from a well-know educational psychologist is parallel to

the conclusions being drawing from research in anthropology and sociology. For example, anthropologists Rogoff and Lave (1984) maintain that, "Thinking is intricately interwoven with the *context* of the problem to be solved. The *context* includes the problem's physical and conceptual structure as well as the purpose of the activity and the social milieu in which it is embedded" (p. 2). Further, "Evidence suggests that our ability to control and orchestrate cognitive skills is not an abstract context-free competence which may be easily transferred across widely diverse problem domains but consists rather of cognitive activity tied specifically to *context*" (p. 3).

The sociohistorical psychology of Vygotsky (1978) has been the influential theoretical source of this broader definition of content by incorporating it in the social setting or context. Rogoff and Lave (1984) describe the social context as follows:

> The social *context* affects cognitive activity at two levels, according to Vygotsky. *First*, sociocultural history provides tools for cognitive activity (e.g. writing and calculators) and practices that facilitate reaching appropriate solutions to problems (norms, common mnemonic devices, scripts, frames for interpreting events). *Second*, the immediate social interactional context structures individual cognitive activity. Information regarding tools and practices is transmitted to children and other novices through interaction with more experienced members of society. In practical situations the *context* provides information and resources that facilitate the appropriate solutions of the problem at hand. (p. 4)

Prawat (1991), another respected educational psychologist and an advocate for the immersion approach, has built on this thinking regarding context in developing the following concept of transfer of learning. He argues that

> When a concept or idea is used in a particular situation, it is recast, acquiring new meaning it did not possess before. The situation thus becomes part of the meaning of the concept (p. 10).

The concept of "situated cognition" (Brown, Collins & Duguid, 1989) maintains that the context for real-life problems includes the culture in which the problem occurs, or "the activities of a domain are framed by its culture" (p. 34). If concepts take on different shades of meaning in different contexts or situations, then transfer is enhanced by encountering a concept in a variety of settings in order to experience "various representations".

In the immersion approach the primary focus of instruction is not problem-solving processes, but subject matter or content ideas. In addition, the context of the learning is as important as the content taught and the processes used. Even researchers who argue that workplace competencies can be described as generic skills and dispositions also maintain that skills are "a feature of the workplace as a social system, and not just features of individuals or jobs" (Stasz, et al, 1996, p. 7). Transfer of learning is the result of extensive involvement with concepts such that their application is recognized in several contexts and in connection with other ideas. Carrying out complex, multiple-stage reasoning in a given content area, but in a new context, is judged to have two preconditions: possession of an attitude of freedom by students to pursue knowledge, and possession of the necessary intellectual "tools" (concepts or ideas) to allow them to do so (Prawat, 1991).

Given that students have the freedom to pursue ideas and that they have the prerequisite background to do so, there may be several reasons why focusing directly on problem-solving processes may be counter-productive. First, if the subject area is new to students, focusing both on content and one's own thinking processes may be an unreasonable

expectation. Attention cannot be given to both, and the subject matter cannot be avoided since it is integral to recognizing problems and proposing solutions. A similar argument is raised in support of the general approach, but the conclusion is the opposite: focus attention on processes by choosing well-known or artificial subject matter.

A second reason for giving preference to a subject-matter or idea focus is that even if the subject matter is well understood, one's problem-solving processes may not be readily apparent. Even experts have difficulty explaining why they took certain actions or made certain judgments. When processes have been automated, it may, in fact, be impossible for experts to reconstruct the process or rules which were originally involved. Examination of one's own thinking processes may necessarily be an after-the-fact activity, a rationalization of what one thought should have happened rather than what one really did.

Dewey argues for the difficultly of anticipatory specification of problem-solving processes when he maintains that, "The method that is employed in discovery, in reflective inquiry, cannot possibly be identified with the method that emerges *after* the discovery is made" (1991, originally 1910, p. 112). In elaborating on this difficultly, Dewey continues:

> As a matter of fact, the development of *an unconscious logical attitude and habit* must come first. A conscious setting forth of the method logically adapted for reaching an end is possible only after the result has been reached by more unconscious and tentative methods.... (p. 113) [emphasis in the original]

Dewey considered the "conscious setting forth of the method" to be valuable only when a review of the method that achieved success in a given case would throw light upon a new, similar case. Transfer is definitely an expected outcome of students'

efforts to reflect upon problem situations and develop their independent solutions and understandings. However, these understandings are constructed by the student, not provided by the teacher. A desire to provide explicit direction by the teacher, however, is difficult to resist. Eighty years ago, as is true now, Dewey noticed that

> because teachers find that the things which they themselves best understand are marked off and defined in clear-cut ways, our schoolrooms are pervaded with the superstition that children are to begin with already crystallized formulae of method. (p. 113-114)

The third difficulty with focusing directly on problem-solving processes is related to Dewey's observation about "an unconscious logical attitude and habit." If many of our important understandings are in fact tacit or hidden processes (Collins, et al, 1989), such reflection may be an impossibly time-consuming task to carry out regularly.

A fourth and perhaps even more fundamental reason for rejecting the expectation of transfer as a result of giving attention to broadly generalizable thinking processes lies in the social-cultural context for learning and applying skill and knowledge. The issue is not just the distraction and difficultly of becoming aware of one's thinking processes. More important is the possibility that the thinking processes themselves change in response to the settings in which they are used and in response to the problem-solver's familiarity with the current setting. (See Luszcz, 1989). Experts use different processes from beginners and novices. Different contexts call forth different processes. Which model should be held up for emulation?

Thinking processes are likely to change with increased knowledge and skill. They may also change for the same skill with a change in the setting in which the skill is used. The

social setting can be described as a "community of practice," such as the community of business education teachers within a school, the office support staff within a corporation, or the CPA's employed in an accounting firm. Understanding the community of which one is a part, or would like to become a part, affects both how a problem is perceived and the manner in which it is approached. For example, how one approaches the writing task of film critique will be different from the approach taken to write a law brief, or to write a memo in response to a customer complaint.

The necessity for understanding the cultural setting or the community of practice of which any activity is a part is the basis of the concept of "situated cognition." The processes involved in approaching situations are not generalized processes, but framed by the context and the tools used to accomplish work in that setting. With particular reference to the tools of a profession (of which business education has several, computers being a particularly important one), Brown, Collins, and Duguid (1989) make the following statements:

> Learning how to use a tool involves far more than can be accounted for in any set of explicit rules. The occasions and conditions for use arise directly out of the context of activities of each community that uses the tool, framed by the way members of that community see the world. The community and its viewpoint, quite as much as the tool itself, determine how a tool is used. Thus, carpenters and cabinet makers use chisels differently. Because tools and the way they are used reflect the particular accumulated insights of communities, it is not possible to use a tools appropriately without understanding the community or culture in which it is used. (p. 33)

While the immersion approach does not ask for continual awareness of and assessment of thinking processes,

it does ask for examination of ideas. It is similar to the general approach with respect to requiring a considerable amount of discourse-centered teaching. This means an approach that may appropriately be described as Socratic rather than discussion. In the general approach, the focus of the dialogue is the thinking process; in the immersion approach, the ideas and main concepts inherent in subject matter are the focus. With regard specifically to the immersion approach, the "reciprocal teaching" model has been presented as one which alters classroom structure and subject-matter in a way that directly involves all students in developing a "community of learners acquiring and sharing a common knowledge base" (Brown & Palincsar cited in Prawat, 1991, p. 9). Such intense involvement with ideas is also suggested by current research exploring interactive multimedia technology as a means to engage students in rich interactional opportunities for learning conversations (Pea & Gomez, 1992).

How one engages students in Socratic discussions and involves them in problem solving activities that ask for the development of "big ideas" is yet to be fully developed for business classes. It is likely that such activities are interdisciplinary problems that raise "real-world" problems from community situations, major business decisions, or global problems that come from the interdependencies among people living and employed around the world. Such theme-based or project-oriented curricular approaches are becoming common in efforts to integrate academic and vocational education (Grubb, 1995a, 1995b). Theme- or project-oriented proposals respond directly to the criticism of fragmentation of curriculum, of separation of school work from community work, and the separation of academic from vocational content. Such efforts also suggest major changes in the way schools are organized, the way teachers are prepared, and the way they teach. The goal remains that of preparing students who can think independently, recognize and solve real-world problems, and who can continue to learn after they leave formal education.

SUMMARY

The need to examine the effectiveness of instruction in the business education field requires that we address the fundamental questions being raised in teaching and education as a whole. As full participants in the educational reform initiatives of recent years, business educators cannot avoid the question of whether their instructional programs actually prepare students for employment—both initial employment and advancement on the job. The need to address the transfer of learning problems imposed upon all participants of a dynamic, information-based society and economy is particularly poignant for programs with vocational preparation objectives.

Business educators have historically been sensitive to the need to clarify what they intend to accomplish with regard to two broad aims: specific employment preparation and broader preparation for economic citizenship. The issue today is to describe these outcomes in language that satisfies the need for generalizable outcomes while recognizing that general outcomes might not be taught best when approached directly. General outcomes may, in fact, not exist.

The above discussion has presented three approaches for teaching transferable knowledge and skills and provided some of the theoretical rationale that allows their differentiation. The general approach places primary attention on problem-solving processes with the expectation that if these are understood, they will transfer to many other places, in school and out of school. The infusion or integrated approach argues that transfer of learning is not automatic and that the subject matter is an essential part of the problem-solving process. Both should be taught together. The immersion approach accepts the importance of the subject matter and extends the idea of content to more strongly focus on the social context and the importance of the given community of practice for learning. It further argues that problem-solving process are inherently

individual and differ from context to context and person to person, particularly from novices to experts. While it may be possible to talk in general about problem-solving processes, they must be experienced and reflected upon by the learner--they cannot be directly taught. Teaching should be approached through big ideas or problem-solving themes that immerse students in meaningful (to them) activities.

The intent of presenting this differentiation of ideas about teaching problem solving has been to provide a conceptual basis for raising questions that could direct further inquiry by business educators. The conceptual bases found in the broader psychological literature need to be appropriated and applied to advance understanding within the contexts that concern business education and training. The requirement for business educators is twofold: first, to clarify what actual business contexts imply in the way of content; and, second, to ask how students can best be engaged to become full participants in these contexts as learners, as business employees, as managers, and as citizens in business settings that are constantly evolving.

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THE USE OF TECHNOLOGIES AND MEDIA IN RECORDS INFORMATION MANAGEMENT

Diane C. Davis

Abstract

The purpose of the study was to identify the technologies and media utilized in the management of information by business and industry. Findings were based on 245 responses from members of the Association of Records Managers and Administrators. The technologies of micrographics, computer output microfilm, and computer assisted retrieval were used by a majority of the respondents. Paper and magnetic disks were the types of media used by the largest number of respondents. Records managers ranked the development of a records management program; records inventory, retention and disposition; and classification of records as the top three content areas to emphasize in the curriculum.

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With the continuing increase of information, businesses are finding they must have organization-wide planning, design, implementation, and management of all information systems within the organization. Personnel within individual offices, units, and departments must work together to control the management of records and information systems. Various systems must be integrated to control costs and improve the overall effectiveness of the organization.

Although new methods and technologies related to storing and retrieving information are continuing to develop, and increased emphasis is being placed on accessing information on the Internet, paper is still the most widely used type of medium of professional communication for many reasons (Phillips, 1995). Two of the reasons are the limited training and few resources that are required for the use of it. Because paper is very familiar to everyone, "The dream of the paperless office may never come true, but thanks to several technologies, more and more documents are being created, distributed and stored on personal computers, even if they are eventually printed on paper" (Cook, et al., 1994, p. 50). "The long-term goal of every organization should be to develop a total information system by integrating all of today's separate information systems, such as data processing, electronic imaging, OCR and electronic mail" (Avedon, 1995, p. 26). Once the technologies within the systems and subsystems have been integrated, the organization can look at workflow and all the business processes.

Related Literature

In the records and information management (RIM) industry, it is clear that there are many new technologies, but there is also persistence of those that have been around for years--paper as well as micrographics. Although some predicted that electronic imaging and magnetic media might quickly replace micrographics, the benefits of micrographics are

still obvious. Economically, micrographics is still the most stable and cost-effective method of meeting record-retention demands for long-term storage of information. Some of the benefits, however, may have been hidden by the attention that has been given to electronic imaging and the new technologies associated with it.

Electronic imaging, which converts paper-based documents to digital images that can be stored electronically and retrieved by the computer, does have the ability to deliver documents directly to a desktop (on-line) and no special equipment (such as a microfilm reader) is necessary to access it, but it is still somewhat expensive. It is used more for short-term business needs. As a company moves toward a daily use of imaging, it may still be necessary to store archival files on film. Although the playback life of electronic media, such as compact disks (CD-ROM), is often cited as 10 to 30 years, no archival standard exists because they have not been in existence long enough to verify any projections of longevity (Landau, 1990).

Microfilm and CD-ROM are both excellent media to use for wide dissemination of information; but with CD-ROM, the information can easily be accessed through a network such as a local area network (LAN). Several people can simultaneously retrieve a scanned document without having to make additional copies of the image as required for paper files or microforms (Zaben, 1996). The main disadvantage of microfilm in the past is that it has not lent itself to quick, user-friendly search and retrieval. However, over the last few years, microfilm has advanced and become a more sophisticated type of storage medium as it has integrated well with computers and related technologies. "The trend is to integrate microfilm records with digital scanners that digitize microfilm for electronic processing" (Minton, 1994, p. 44). According to James Quinn, chairperson of ARMA's Industry Specific Group for Microfilm, microfilm technology continues to hold a significant presence in the

imaging field, which is growing at six percent annually (Dykeman, 1996).

An important point is that most companies will use a variety of types of media depending on the company's needs as well as the retention period of the record. One of the most important parts of a RIM function is records retention (Dymtrenko, 1996). In fact, "the record's retention is the major component that influences the choice between COM [computer output microfilm] and electronic storage" (Ward & Cole, 1995, p. 5). One advantage of computer output microfilm is that it eliminates the process of printing the record on paper. A disadvantage is that it costs more initially; however, the cost is fixed for the rest of the duration of the record whereas electronic storage requires migration to a new system and storage media every few years. "Data is migrated to avoid the loss of information due to media deterioration and system obsolescence" and so records with very long or permanent retention periods benefit from the use of COM (Ward & Cole, 1995, p. 5).

Purpose and Problem of the Study

The proliferation of technology that has affected business and industry has also had a major impact on education. Because of the changes taking place in technology, it becomes imperative for educators to assess the technologies and methods currently used in the work place in order to better prepare students for the world of work. Therefore, a study was undertaken to contribute to a better understanding of the methods, technologies, and procedures involved in the management of information by acquiring a basic knowledge of information management systems used in business and industry with implications for curricular improvement. Specifically, the study identified the characteristics of records information management (RIM) programs in business and industry, the technologies and media utilized by these businesses, and the

perceptions of records managers regarding content areas to be included in the RIM curriculum.

Research Procedures

In an attempt to identify technologies incorporated in the work place and to enhance course curricula, a research study was undertaken during the 1994 school year. The target population of the study was members of the Association of Records Managers and Administrators (ARMA). A random sample of 500 ARMA members was taken by the Systems Applications Coordinator of ARMA. A survey instrument was developed and mailed with a cover letter and a return envelope to the 500 randomly selected ARMA members. Of the 500 survey instruments, 249 were returned for a response rate of 50%, and results were compiled from 245 fully completed surveys. The responses were coded onto a computer sheet for optical scanning, and analyses were completed using the Statistical Analysis System, Version 6.07.

Findings of the Study

Almost 50% of the respondents of the survey had the job title records manager; and most of the others had related titles including records officers, records specialists, and records center supervisors. With regard to age, 37% indicated they were 41 to 50 years of age. The next largest group consisted of individuals 51 to 60 (30%). An almost equal division of gender was apparent; of those who answered the question, 52% were females and 47% were males. Forty-seven percent of the respondents indicated they had 11 to 20 years of experience in the records management profession. With regard to the respondents' highest level of education, 38% of the respondents had a bachelor's degree; 25% had a master's degree.

Research Question No. 1

What are some of the general characteristics of the records information management programs in business?

Size and Type of Company. When asked to indicate the total number of individuals employed by the company at that address, 57% indicated their company employed over 500 employees; of those, 22% employed over 2000 employees. Those employing fewer than 100 employees were 23%, and those employing 101 to 500 were 19%. In regard to the classification (type) of the company in which the respondents were employed, there was great variation as might be expected. The largest group of the respondents (25%) indicated they worked for some type of governmental agency; 11% for consulting firms; 9% for communications or utilities; and 7% for financial services (real estate, banking, and insurance).

Records Management Programs. When the ARMA members who completed the surveys were asked if their company had an established records management system/program, 215 (87%) responded yes. Of the 215 companies who indicated they had an established program, 78% said they had a separate department or division for records management; 22% said they did not have a separate department. Of the 165 companies that had a separate department for records management, 45% had 1 to 5 employees; 23% of the companies had 6 to 10 employees in the records management department.

Eighty-nine percent of the respondents indicated their company had a records retention program, and 85% indicated they had a records disposition program. Sixty-six percent of the respondents had a records security program, 62% had a vital records program, 56% had an archives program, 54% had a disaster recovery program, and 49% had a disaster prevention

program. Seventy-four percent of the respondents indicated that their company had a written records management manual.

Research Question No. 2

What are the information and image management technologies utilized by businesses?

The respondents were asked to mark all of the technologies that were utilized within their organizations. Of those listed, micrographics was the one utilized by the largest number of respondents (78%). This technology was the one most widely used, but it was not the technology that was ranked as high as others (such as electronic imaging) as one that should receive as much emphasis in the curriculum. Table 1 (Davis and Gonzenbach, 1995) shows the technologies listed on the survey instrument and the number and percent of respondents using each.

Table 1

Technologies Utilized by the Companies

Technology	Number	Percent[a]
Micrographics	192	78%
Computer Output Microfilm	145	59%
Computer Input Microfilm	28	11%
Computer Assisted Retrieval	128	52%
Desktop Publishing	126	51%
Electronic Document Imaging	94	38%
Optical Character Recognition	62	25%
Bar Code Indexing	100	41%
Computer Output Laser (Optical) Disk	50	20%

[a]Number does not sum to 245 nor percent to 100 because respondents were asked to mark all that apply.

In regard to types of media used by the companies, the largest number of respondents (87% and 86% respectively) indicated they used hard disks and floppy disks. Two types of microforms (microfiche--79% and roll film--78%) were also used by over three quarters of the companies. Table 2 shows types of media and the number and percent of companies using each.

Table 2

Types of Media Utilized by the Companies

Type of Media	Number	Percent[a]
Roll Film	190	78%
Microfiche	194	79%
Microfilm Jackets	144	59%
Aperture Cards	99	41%
Ultrafiche	14	6%
Holofiche	4	2%
Floppy Disks	211	86%
Hard Disks	214	87%
Tape Reels	153	62%
Compact Disks	98	40%
Write Once Read Many Disks	75	31%
Erasable Optical Disks	27	11%
Other	16	7%

[a]Number does not sum to 245 nor percent to 100 because respondents were asked to mark all that apply.

The largest group of respondents (93%) indicated paper was the media used the most by assigning it a ranking of one. The next largest group of respondents (57%) ranked floppy/hard disks as number 2 indicating that it was used the most next to paper. The percent of respondents that marked each ranking

for each type of media is shown in Table 3 (the 0 indicates the percent who gave no ranking for that type of media).

Table 3

Ranking of Media Used The Most Within the Company

Type of Media	Percent Assigning Each Level of Ranking					
	0	1	2	3	4	5
Paper	1.3%	92.5%	3.5%	1.3%	1.3%	0.0%
Microforms	14.2%	2.7%	25.2%	26.5%	29.2%	2.2%
Floppy/Hard Disks	6.2%	3.5%	56.6%	23.5%	8.8%	1.3%
Tape Reels	23.5%	0.0%	10.2%	30.1%	30.1%	6.2%
Optical Disks	26.0%	0.4%	0.9%	4.5%	4.5%	63.7%

In an attempt to analyze respondents' perceptions to the future use of these types of media, respondents were asked to rank the five types of media again based on what they felt would require the most attention in the workplace in the 1990s. This time only 55% ranked paper as number one (compared to 93%). The percentages ranking optical disks higher increased greatly as can be seen in Table 4.

Research Question No. 3

What are the perceptions of information managers regarding the amount of emphasis educators should place on specific information management content areas and technologies at the university level?

Table 4

Ranking of Media for the Most Attention Expected in the Rest of the 1990s

	Percent Assigning Each Level of Ranking					
Type of Media	0	1	2	3	4	5
Paper	2.3%	54.5%	11.3%	15.3%	8.1%	8.6%
Microforms	11.3%	5.0%	14.4%	15.8%	32.0%	21.6%
Floppy/Hard Disks	6.3%	16.2%	41.9%	19.8%	12.6%	3.2%
Tape Reels	13.1%	1.4%	9.5%	20.7%	21.6%	33.8%
Optical Disks	9.9%	21.2%	18.5%	21.2%	11.3%	18.0%

Respondents were presented with ten general records and information management content areas and asked to rank these content areas (from one to ten) in regard to the amount of emphasis they felt they should receive in the overall information management curriculum. The content areas that ranked number one, two, and three were: (1) development of a records management program; (2) records inventory, retention, and disposition; and (3) classification of records. The mean ranking of all ten areas can be seen in Table 5 (Davis and Gonzenbach, 1995).

These findings support the trend toward greater emphasis on technologies associated with electronic imaging and optical disks but with continued use of traditional methods of paper and microfilm. Only 20% of the respondents indicated they used computer output laser disk technology, and only 10% gave optical disks a ranking above five in regard to type of media presently used within the company. However, when asked to rank the media (Table 4) in regard to the most attention expected in the future, 72% ranked optical disks above a five and 40% of those ranked it as one or two. The

Table 5

Content Areas to be Emphasized in the Curriculum

Content Area	Mean Ranking	Std. Deviation
Development of a Records Management Program	1.97	1.78
Records Inventory, Retention and Disposition	2.70	1.65
Classification of Records	3.68	2.37
Vital Records and Disaster Recovery	5.04	1.84
Databases	5.90	2.28
Electronic Imaging	6.68	2.24
Archival Records	6.78	2.37
Micrographics	6.83	2.12
Networks	7.34	2.26
Forms Design	8.12	1.90

respondents indicated the importance of the development of the RIM program and records inventory, retention, and disposition as the areas that should receive the most attention in the curriculum. This supports the statement that "records retention programs are one of the most important parts of an RIM function" (Dmytrenko, 1996, p. 70).

Conclusions and Recommendations

Based on the findings of this study, the following conclusions and recommendations can be made:

The technology utilized by the largest number of respondents was micrographics. The types of media most

widely used were paper and disks. The respondents predicted that paper and disks would continue to require the greatest attention during the remainder of the 1990s.

Over three-fourths of the companies had an established records management system or program. The majority of companies also had a records retention program; a records disposition program; and records security, vital records, archives, and disaster recovery programs/ procedures. The development of a records management program; records inventory, retention and disposition; and classification of records are content areas that should receive emphasis in the curriculum.

Educators should help students develop an understanding of the technologies involved in records information management and prepare students to accept change and engage in lifelong learning. "As technologically savvy as we have become, we still cannot anticipate the full value and complexities of emerging technologies until we explore their potential" (Kizzier, 1995, p. 23). More research needs to be conducted to identify the specific skills needed by individuals for the technologies that will be used in the future. Individuals in business should work with educators and vice versa to provide opportunities for collaboration in order to provide a better quality workforce. Educators have a great opportunity and a challenge to identify changing skills required and to empower students to pursue the process of lifelong learning.

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SURFING IN THE CLASSROOM: USING COMMUNICATION TECHNOLOGIES IN EDUCATION FOR BUSINESS

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Abstract

Accessibility, proficiency, and classroom usage of communication technologies were investigated in a study of business educators. The study, with a return rate of 60.9 percent, was conducted by surveying 194 National Association of Business Teacher Educators (NABTE) schools.

Over 90 percent of the respondents had access to the Internet and electronic mail, with other communication technologies such as voice mail, World Wide Web, and electronic news groups/bulletin boards being less available.

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Technology has created numerous opportunities and challenges in the business education curriculum. Business educators have an established record in teaching software applications and have been known as experts in teaching in the area of computers and technology. Today, however, many different technologies are available, and most disciplines are using some form of technology as a teaching or learning tool. Using technology as a teaching tool poses a new challenge for business educators (Wallace, 1996).

The emphasis in business education has shifted from the use of technology as an educational outcome to the use of technology as a tool to access information leading to other educational outcomes. Kizzier (1995) identifies two ways technology may be used as a teaching tool: students use the technology as a vehicle to learn skills and concepts beyond the technology itself, or the teacher uses technology to enhance or support teaching.

Technologies which pose significant opportunities as teaching tools include electronic mail, electronic news groups/bulletin boards, information access (such as Gopher, Archie, etc.), voice mail, the Internet, and the World Wide Web. Wallace (1996, p. 113) states that "the Internet has become the most widely used tool of technology in recent years."

The Internet

The use of communication technology, specifically the Internet, as a teaching tool has been supported by numerous researchers (Bayless & Irvine, 1994; Dieckmann, M. 1996; Flatley & Hunter, 1995; Kizzier, 1995; North, Hubbard & Johnson, 1996; Smith & Minnick, 1996; Stevens, M. 1995; Stout & Thompson, 1995; Sutton, 1995; Zeliff, Hull & Koger, 1995). In fact, the Internet permits students to interact with the world around them and promotes inquiry-based skills such as

critical thinking, problem-solving, and research (North, Hubbard & Johnson, 1996). "The academic lives of students and professional lives of business teachers are greatly enhanced by connections to the world via the Internet." (Zeliff et. al., 1995, p.19).

The Internet is one of the fastest growing communication technology resources. Dieckmann (1995) reports that the Internet has over 20 million users and continues to grow at a rate of 130,000 new users each month. Shah (1994) indicates that the Internet was used in over 70 countries. In testimony before the U.S. House of Representatives' Committee on Space, Science, and Technology, Vinton Cerf, one of the creators of the Transmission Control Protocol and the Internet Protocol (TCP/IP), predicted that the Internet will have over a hundred million regular users by 2003 (Shah, 1994).

Business teachers should continue to be the pacesetters in technology instruction by incorporating Internet activities in their classes. Accessed through a variety of software packages, the Internet provides electronic mail, electronic news, information access, Gopher search and retrieval, and World Wide Web options. Navigating the intricacies of the Internet is simplified through software such as Netscape (Sprout, 1995). The need, however, still exists to provide at least limited instruction in the use of specific technologies as a foundation for their use. After students acquire necessary Internet competencies, the instructor can use Internet technology as a teaching tool (Kizzier, 1995).

With the rapid increase in demand for and the use of technology applications in all courses, business educators' continued quest should be to provide students with the knowledge and skills needed for workplace success in the 21st century. According to Herschel and Andrews (1997, p. 161)

"nothing has changed communication in organizations more dramatically than advances in technology." A concern for business educators and for corporate trainers would be to use communication technologies in the most effective manner.

The Internet is now more available to the general public with access in public libraries, schools, universities, government, businesses, and the home (Soriano, 1997). While an institution may be connected to the Internet, all classrooms may not be connected to this information resource (Matyska & Zeliff, 1996). It is important, therefore, to determine the extent to which business educators have access to communication technologies.

Purpose

The purpose of this study was to investigate the use of communication technology by business educators. Specifically, the following questions were addressed: 1) What information technologies are currently available to business education faculty? 2) How do business educators perceive their competence with communication technologies?, and 3) Which communication technologies do business educators incorporate into the teaching-learning environment? The study focused specifically on three areas of the Internet: electronic mail, electronic news, and information access, including the World Wide Web and other information bases.

Procedures

A survey instrument was developed to ascertain the availability of information technologies to business education faculty. Specifically, the instrument was designed to determine the availability of information and communication technologies to business educators in their homes, their offices, and their classrooms. The application of these technologies for personal

use, professional activities, and instructional purposes was explored. Emphasis was placed on the purpose and intended audience of electronic communication.

The survey instrument was examined for face validity by a panel of five computing and communication faculty members. Based on their responses and suggestions, the initial instrument was modified.

The survey was mailed to National Association of Business Teacher Educators (NABTE) school representatives from the 194 institutions listed in the December 1994 issue of the *Business Education Forum*.

Findings

Of the 194 surveys sent to NABTE institution representatives, 2 were returned for incorrect addresses. The number of usable returns was 117 for an adjusted return rate of 60.9 percent. Because of the positive response rate, no follow-up of the survey was conducted.

Demographic Data

Although more than a third of the respondents were from the Southern region of the National Business Education Association, the other regions were well represented in the study. The regions were represented with 35.8 percent (42) from the Southern region; 20.5 percent (24) from the North Central region; 17.1 percent (20) from the Mountain Plains region; 13.6 percent (16) from the Western region; and 12.8 percent (15) from the Eastern region.

The institutions of all sizes were well represented in the study. The largest group had under 5,000 students (35 or 29.9 percent), followed by those institutions with 5,001 to 10,000

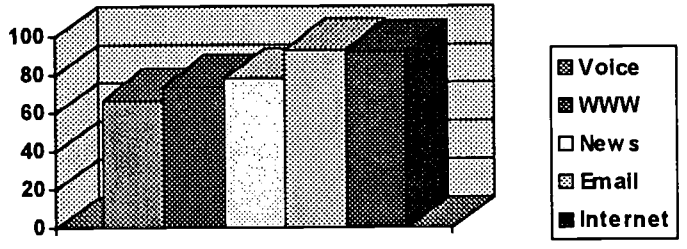
students (28 or 23.9 percent), and those with more than 15,000 students (28 or 23.9 percent). Universities with 10,001 to 15,000 comprised 22.2 percent (26) of the respondents.

In terms of professional rank, 58.1 percent (68) of the respondents indicated they hold the rank of Professor; 23.1 percent (27) hold the rank of Associate Professor; and 14.5 percent (17) reported the rank of Assistant Professor. The remaining 4.2 percent were in the Instructor or "other" category.

Available Communication Technologies

Respondents were asked about the availability of various communication technologies including Internet access, local electronic mail, electronic news groups/bulletin boards, the World Wide Web, and voice mail. As shown in Figure 1, over 90 percent of the respondents had access to local electronic mail and the Internet while fewer had access to the other communication technologies. Respondents had the least access to voice mail (less than 70 percent).

Figure 1
Access to Technologies



Proficiency with Communication Technologies

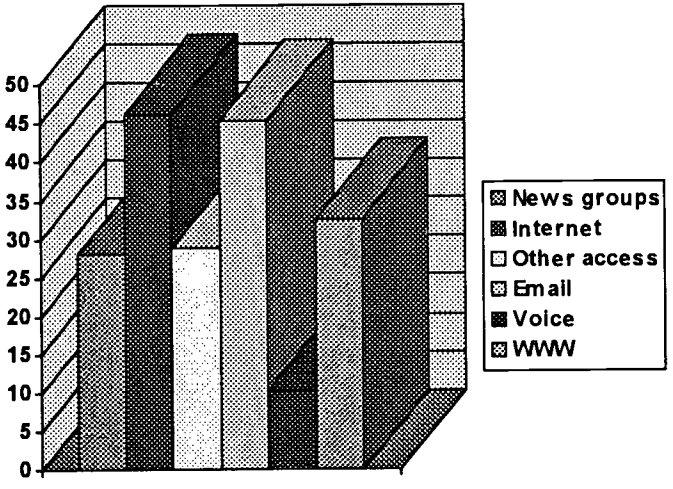
When asked about their proficiency with communication technologies, 44.4 percent (52) of the NABTE representatives marked themselves at the midpoint of a 1-5 rating scale. While only 5.9 percent (7) felt that their proficiency was at the highest ranking of most knowledgeable, 27.3 percent (32) rated themselves as less proficient but above average. In contrast, 8.5 percent (10) indicated they were least knowledgeable, while 13.6 percent (16) indicated that their proficiency was slightly higher but still below average.

Classroom Usage of Communication Technologies

In addition to the technology available to the faculty, a number of institutions have communication technologies available in the business education classroom. The most available communication technology in the business education classroom is the Internet, with 56.4 percent (66) respondents indicating its presence. Internet access, however, was closely followed by electronic mail access with 52.1 percent (61) of the respondents indicating its availability. Less than half of the NABTE representatives had access to the following technologies in the classroom: electronic news groups/bulletin boards, 46.2 percent (54); World Wide Web, 42.7 percent (50); and voice mail, 12.8 percent (15).

When the respondents were asked if they used any one of the mentioned communication technologies in their classes, nearly 70 percent indicated that they did use at least one form of technology in classes. As shown in Figure 2, the Internet and electronic mail were used most frequently. Voice mail was used least frequently.

Figure 2
Technologies Used in Class



The respondents were asked to share their plans for incorporating communication technology in business education. Over a third of the respondents have access to the Internet and use it regularly in classes as shown in Figure 3.

When the NABTE representatives were asked to indicate if their institutions offered a World Wide Web site, 60.6 percent (71) indicated that their institutions did have a web site. Of the 71 respondents, the available web page levels were as follows: 87.3 percent (62) had a university page; 52.1 percent (37) had a college or school page; 45.1 percent (32) had a department page; and 7 percent (5) had a class page.

Figure 3
Classroom Usage of Communication Technologies
in Business Education

Usage	Percent	Number
Have access to Internet, World Wide Web; use regularly in classes	35.0	41
Have access to Internet, World Wide Web; plan to integrate in classes	27.3	32
Hope to add Internet, World Wide Web access; plan to include in classes	18.8	22
Have no plans to include Internet, World Wide Web in classes	11.9	14
No response	6.8	8
	99.8	117

Conclusions and Recommendations

From the findings, the following conclusions can be drawn:

1. The Internet and electronic mail are accessible to the majority of the respondents, with over 90 percent having such access.

2. Over three-fourths of the respondents rated their proficiency in communication technologies as average or above, while approximately nine percent rated themselves as least knowledgeable.

3. Although the majority of business educators expressed proficiency with communication technologies, less than half of the respondents indicated that they were using the Internet and electronic mail in their classes.

4. While only one third of the respondents regularly use the Internet and World Wide Web in the business education classroom, nearly half of the respondents have plans to integrate such technologies in the future.

5. As voice mail was the least available communication technology in the formal business education program, trainers may find trainees have greater needs for training in the use of voice mail.

Based on these conclusions, the following recommendations can be made:

- Business education curricula should be modified to incorporate communication technology as a teaching and learning tool.

- As communication technology becomes more available in the business education classroom, training opportunities should be provided for faculty in order to increase their proficiency with the technology and to promote its effective use in the business education classroom.

- This study should be replicated to determine the extent to which corporate trainers utilize technology as teaching and learning tools.

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CASE PREPARATION TO IMPROVE WRITING ASSIGNMENTS

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Abstract

Writing assignments in business classes can be improved by including more information on the reader and the context of the situation. This article presents a rationale and an example of one such assignment.

Business people and educators are concerned about the writing skills of graduating business students. While deans of schools of business and corporate chief executive officers, among others, ranked oral and written communication skills as the most important learning area (Harper, 1987), many students

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graduate with major writing deficiencies. For example, Davison, Brown, and Davison (1993) surveyed personnel officers to determine their opinions on the strengths and weaknesses of business graduates. Writing effectiveness was ranked among the top five areas in which the greatest dissatisfaction existed.

In addition, Souther (1980) charged that reader, context, and purpose were often ignored in writing classes. One way business professors can help students develop more effective writing skills is by providing improved writing assignments. In this article, the case approach to writing assignments is suggested as an improved method of giving writing assignments. Case assignments are described and discussed. Furthermore, audience analysis is discussed as an important part of the case content. Finally, a case example is provided.

Case Approach to Writing Assignments

In the case approach students are given in-depth information concerning a situation. There are several advantages to providing in-depth information in case form. This type of assignment gives students practice writing letters and memos, which are frequently written in business. In addition, the case method offers the following other advantages (Eitington, 1989):

1. Uses typical business situations making assignments more practical and realistic.
2. Encourages students to think since cases require analysis, interpretation, and decision making.
3. Forces students to use specific facts rather than general situations.
4. Provides students with the opportunity to work cooperatively in a group situation where they can

develop more effective interpersonal communication skills.

5. Increases the probability of retaining concepts, since students apply textbook theories and principles to real-world problems.

Cases are included in many business textbooks, and casebooks are available from publishers. However, many of these cases have shortcomings. A major shortcoming is that often cases are oversimplified and lack contextual information. While an effort is made to describe the organization and the situation, often cases do not sufficiently cover information about the people involved in the situation.

Audience Analysis Information in Cases

Audience analysis is a step in pre-writing where the writer considers characteristics of the reader and adapts the content, organization method, and writing style of the message based on this information. The purpose of audience analysis is to preserve the audience's goodwill and to create a favorable impression for the writer's organization, product, or service. Moreover, the reader's acceptance of recommendations provided is often dependent on the writer's successful adaptation of the message content based on pertinent reader characteristics. Stated simply, it's not just what you say, it's how you say it based on the person you are saying it to. Therefore, the ability to analyze and adapt messages to the reader is an important skill for students to develop, and sufficient background should be included in case assignments to permit in-depth analysis.

Business teachers could include the following types of information in a case to permit the students to conduct an audience analysis. First, the following questions need to be answered concerning the information needs of the reader.

1. How many persons are assumed to be the readers of the report?
2. What does the reader know about the topic?
3. What does the reader need to know?
4. What reader questions can be anticipated about the topic?
5. What information will be of interest to the reader?

Next, demographic information should be identified to describe the reader. This information could include age, gender, education, and job title. The message content can be adapted more effectively to the reader if this information is considered.

A third type of audience analysis information that should be included in cases relates to the psychological needs of the reader. The following questions are answered during this step:

1. What relationship does the writer have with the reader?
2. How does the reader perceive the writer?
3. What preconceptions or misconceptions might the reader have about the topic?
4. How will the reader react to the message?

The answers to these questions will help the writer adapt the appropriate writing style and tone and present the information in an effective order to get the appropriate reaction. Also, with this information the writer can incorporate the "you" attitude where the reader's interests and preferences are addressed when presenting the message.

Methods of Presenting Case Information

Writing assignment cases can be presented in various ways to encourage more effective audience analysis. The

following creative methods are likely to help the students visualize the reader and put themselves into the position of the writer.

One way to present the information of a case is to provide letters or memos summarizing written exchanges made between the authorizer and writer. One of the major advantages of this method is that students become aware of "who knows what" through the facts presented in the written correspondence.

Another method of presenting information in a case is through the incident process. This method puts the responsibility for gathering the facts of the case on the students. The instructor provides a short account of the case in written form and students question the instructor to gather more specific information.

The methods of presenting case information described thus far require information to be presented in written form. To gather even more information, an audio-visual presentation could be presented after the students have had time to read a written case assignment. From the audio-visual presentation, students gather verbal and nonverbal background information from hearing the dialogue and observing the interaction of the participants.

Another method of presenting the information in a case is role playing. The instructor could play the role of the report authorizer and a student volunteer could play the role of the employee being given the writing assignment.

A third way that the dialogue between the report authorizer and writer can be illustrated is by presenting the script in written form. This method may not be as interesting or entertaining as other methods but presents the facts of the

case effectively. The script content will allow students to identify the reader's education level, vocabulary, personality, and sense of humor. Also, a case in script form would clarify the type of working relationship that exists between the two employees.

Business instructors are encouraged to use the case approach for giving writing assignments. However, instructors may need to revise cases given in textbooks or write their own cases if they want to provide sufficient information so that students can conduct an audience analysis. This effort should result in higher quality business messages written by the students.

Case Assignment Example Containing Information for Audience Analysis

The example of a case assignment includes two documents which are provided at the end of this section. The first document is a letter from a high school accounting teacher to a practicing accountant. The teacher is asking the accountant to give a presentation to the teacher's accounting students. The second document is an e-mail to the accountant's administrative assistant requesting that he research careers to help the accountant prepare for her presentation.

The two documents directly or indirectly provide the three types of audience analysis information. The accountant's information needs are clarified in the second paragraph of the letter when the teacher suggests topics to cover in the presentation. However, students should consider the accountant's present knowledge of accounting careers when making decisions concerning the content of the report.

Also provided in the two documents are indications of a few basic demographic facts about the accountant. More important are the psychographic facts that become apparent by analyzing the writing style and content of the two messages. It is obvious that the accountant and teacher have established a friendship over the years since she graduated from high school. However, more important is the relationship between the accountant and her assistant. The assistant is new to the job, and this is his first research assignment from the accountant. Therefore, a more formal writing style would be appropriate for the report.

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Document 1--Letter from Teacher

May 10, 19XX

Ms. Leah Richards, CPA
234 South Main Street
Small City, MO XXXXX

Dear Leah:

It's time for payback for the year you tested my patience as a student in my accounting class. What has it been--15 years since you finished my class with an A?

My students are showing signs of boredom so I need to give them a change of pace. Would you please make a visit to my class and give them some information on accounting careers. Some topics you could cover are types of employers, job positions, responsibilities, qualifications to be hired, salaries, and national demands. Add anything else you think would be appropriate. Beggars can't be choosy!

Please give me a call (234-5678) so I'll know if I can count on you to do me this favor. Also, we can agree on a date and time over the phone. I look forward to hearing from you.

Yours truly,

Samuel Reynolds

Document 2--E-mail from Accountant
to Administrative Assistant

May 11, 19XX

To: J. Andrews, Administrative Assistant

Subject: Accounting Careers Presentation

Yesterday, I received a letter from an accounting teacher at the high school. He wants me to give a presentation to his accounting class on careers in accounting. I would like you to gather some information to help me prepare for this presentation. Public speaking is not something I am comfortable doing. Samuel Reynolds taught accounting to me when I was in high school, and we have become friends over the last ten years. I want to impress him by giving a presentation his students will enjoy.

This should be an appropriate first research assignment for you as a new employee in the department. Mr. Reynold's letter is in my out basket and the letter will provide additional information. Gather the information Mr. Reynolds wants, and use your own judgment in adding other relevant information that you find when doing your research.

I would like the report on my desk by Monday so I can prepare for the presentation.

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THE EFFECT OF USING A COMPUTER AUTHORING SYSTEM ON STUDENT ACHIEVEMENT

Mary Jean White
Bonnie Roe White

Abstract

The purpose of this study was to determine if community college students receiving computer instruction (developed using a computer authoring system) exhibited higher computer competence than those receiving a teacher-directed method of instruction. Variables investigated included sex, educational level, major, computer experience, retention rate, computer anxiety, and their selected interactions.

Students enrolled in Introduction to Microcomputer courses were randomly assigned to either computer-assisted instruction (CAI) or teacher-directed instruction (TDI). Each of the 112 students completed a demographics questionnaire, computer attitude survey, pre-test, and post-test. Findings indicated that CAI produced comparable to higher success than TDI.

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Dr. Bonnie Roe White is Associate Professor and Head of the Department of Vocational and Adult Education at Auburn University, Auburn, Alabama.

Community college instructors have been involved traditionally in the development of new educational programs to meet the divergent needs of the community they serve. Community college instructors have been exploring the use of computers to address their students' varied learning styles. The computer is seen as a teaching tool that offers alternative learning styles to students and has revolutionized the way teachers teach.

Related Studies

Kulik and Kulik (1991) reported that computer-assisted instruction (CAI) enhances learning experiences in terms of motivation, achievement, and time. They concluded earlier (1987) that the only way to determine the most effective method of teaching is to compare the performance of students who have learned with computer instruction to the performance of those who have learned without it.

CAI is one avenue that may offer alternative learning styles to students who may not succeed in the traditional classroom or who may come to the classroom lacking a computer background. Yang (1992) concluded that the use of computers in instructional settings can be an effective tool to motivate students and to facilitate students' learning.

Rachal (1993) in a review of 12 research studies reported that in 10 of the studies, CAI instruction was at least as effective as traditional instruction. CAI aided retention, self-confidence, privacy, feedback, and faster learning.

Purpose of the Study

The purpose of this study was to determine if community college students who received CAI (developed using a computer authoring system) exhibited higher computer

competence than did those students who received teacher-directed instruction (TDI). Three research questions were formulated: (1) Do instructional methods, educational level, major, sex, experience or their two-way interactions sequentially account for student achievement in a community college Introduction to Microcomputer course? (2) Is the class retention rate better for the CAI or TDI method? (3) Does the use of the CAI method or TDI method change students' computer attitudes, as measured by a computer attitude instrument, between the beginning and ending of a community college Introduction to Microcomputer course?

Methodology

This study was conducted over a period of one academic year (three quarters) and involved six community college classes of Introduction to Microcomputers.

Classes

A morning class and an afternoon class were offered each quarter. Study effects related to time of day were controlled by switching the experimental and control class times from quarter to quarter. Students enrolling in the class had no knowledge whether they would receive CAI or TDI.

Students

Sixty students were enrolled in the CAI classes, and 52 students were enrolled in the TDI classes. Students' major areas of study were Accounting, Office Administration, Data Processing, Radiography, Drafting, and Other. Students' prior computer experience ranged from no experience to more than one year of experience. They ranged in age from less than 22 years to over 55 years. High school was the lowest educational level completed (either high school diploma or graduate

equivalency diploma). The highest educational level achieved was a master's degree. Students' previous computer experiences included keyboarding, application software classes, computer programming classes, use at work (application programs, programming, and data entry), and computer use at home.

Materials

TDI and CAI materials were taken from the course textbook DOS 5 Fundamentals by Gillay (1992). Detailed lesson plans for both the CAI and TDI methods were formulated to ensure that the instructional emphasis was constant. One unit of instruction titled Microcomputer Systems, Hardware, Software, and the Operating System was taught to the experimental group by the CAI method and to the control group by the TDI method.

The CAI unit was prepared using the Linkway Ver. 2.01 computer authoring system. The unit included diagnostic branching which detected student difficulties and presented corrective activities. No formal training was needed by the instructor to use the Linkway system.

The achievement of the two groups was measured by the differences in their pre-test and post-test scores. The jointly dependent variables were student achievement and student attitude. The independent variables were educational level, major, sex, and previous computer experience. The pre-test and post-test scores were reported as the percentage of fifty items answered correctly, and students did not have knowledge of their pre-test scores.

Demographic data were collected at the beginning of the study, and an attitude instrument designed by Loyd and Gressard (1984) to assess computer attitudes was completed

by both groups at the beginning and ending of the study. The instrument was designed to assess computer attitudes on three subscales--computer anxiety, computer confidence, and computer liking (coefficient alpha reliabilities: .86, .91, .91, respectively).

Classroom Procedures

Students in both the CAI and TDI groups viewed a video and received computer concept articles. In addition, subject content was consistent between the groups, and both groups were taught by the same instructor.

After directions about using the computer and the program, instruction in the CAI group was individualized. Students had one week to complete the unit. No limits were imposed on the amount of class time or lab time they could use to master the computer concepts. The instructor's role was one of facilitation. Diagnostic procedures and corrective feedback were built into the computer program based upon seven years' experience teaching introductory computer classes. The instructor was available to offer assistance in using the program and the hardware.

Computer concepts were presented by lecture to the TDI group. Transparencies were used to present illustrations equivalent to those scanned into the Linkway-based CAI program. Students were encouraged to ask questions. Question-and-answer sessions provided feedback to diagnose instructional difficulties. Corrective measures were then prescribed by the instructor. In the TDI method, students used the computer at the direction of the teacher. All work done by students outside of class was in the form of homework assignments. Homework assignments consisted of reading the unit and answering the unit review questions.

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Results and Discussion

Three research questions were formulated to assess the effectiveness of the TDI and CAI methods of instruction.

Research Question 1. Do instructional methods, educational level, major, sex, experience or their two-way interactions sequentially account for student achievement in a community college Introduction to Microcomputer course?

Using the Type I MANOVA model (Table 1), computer pre-liking (PRE-LIKE, 0.042), major course of study (MAJ, 0.003), previous computer experience (EXP, 0.012), and sex by experience (SEX*EXP, 0.014) were found to account sequentially for student achievement. An explanation of the difference between the scores on the pre-test of computer knowledge for Office Administration (32.0) and Data Processing (49.5) majors may be the prior computer interest level of Data Processing students. Furthermore, all students in the Office Administration major were females. This point is important because although females may have entered the class with less computer knowledge than males, they were able to close the gap in knowledge by the end of the course. Females (Table 2) overall had lower pre-test scores (35.3) than males (48.6). Although, after treatment the mean post-test scores of females (64.7) compared favorably with the mean post-test scores of males (69.1).

The interaction of Experience by Sex (Table 2) was found to be significant. Experience refers to the amount of previous computer usage students had upon entering the class. The pre-test difference between males and females with computer experience of less than one week (males 43.3, females 27.7) and more than one year (males 58.0, females 38.8) was significant. These differences were leveled on the post-test and not significant.

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Table 1

Type I Model Sequential Analysis of Variance for Pre-Test and Post-Test - Wilk's Lambda

Source	Value	Exact F	Num df	Den df	Pr > F
PRE-ANX	0.957	2.860	1	64	0.096
PRE-CONF	0.998	0.104	1	64	0.749
PRE-LIKE	0.937	4.320	1	64	0.042*
MAJ	0.744	3.677	6	64	0.003*
SEX	0.990	0.658	1	64	0.420
EXP	0.820	3.518	4	64	0.012*
GRP*SEX	0.968	2.103	1	64	0.152
EDL*SEX	0.957	0.954	3	64	0.420
MAJ*SEX	0.924	1.307	4	64	0.277
SEX*EXP	0.825	3.385	4	64	0.014*

*$p < .05$.

Although the Type I MANOVA did not reveal a significant difference in education level, the Scheffé post hoc procedure brought forth a significant difference on the pre-test of computer knowledge between the high school and bachelor's degree. The difference was not significant on the post-test. Thus, the treatment leveled out the knowledge gap between high school graduates and college graduates in the area of computer knowledge.

Table 2

Descriptive Statistics for Levels of Experience by Sex

Exp	Male				Female			
	Pre-test		Post-test		Pre-test		Post-test	
	n = 27		n = 20		n = 85		n = 60	
n	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1 (24,17)	43.3	17.8	71.3	18.2	27.7	11.6	68.1	10.3
2 (13,10)	44.0	4.0	78.7	4.2	36.0	24.8	69.0	20.0
3 (22,16)	49.0	26.1	57.8	38.3	37.2	20.2	65.7	23.8
4 (17,12)	38.5	21.7	78.5	9.0	36.3	12.7	62.8	32.4
5 (36,25)	58.0	20.3	65.2	29.7	38.8	15.3	61.0	26.6
	48.6		69.1		35.3		64.7	

Note. 1 = < 1 week; 2 = 1 wk. - 1 mo.; 3 = 1 - 6 mo.; 4 = 6 mo. to 1 yr.; 5 = 1 yr. +.

Note. Parenthesized values indicate Pre-test, Post-test values.

Research Question 2. Is the class retention rate better for the CAI or TDI method?

The study was conducted over a period of three academic quarters. Of the 112 total students, 32 stopped attending class before the end of the quarter in which they were enrolled, for an overall retention rate of 71 percent. Of those 32 students, 14 were in the CAI group and 18 were in the TDI group, a 77 percent retention rate and a 65 percent retention rate, respectively.

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Research Question 3. Does the use of the CAI method or TDI method change students' computer attitudes, as measured by a computer attitude instrument, between the beginning and ending of a community college Introduction to Microcomputer course?

In Canonical Correlation analysis, the higher the correlation, the greater the consistency of the ordering of performance from pre-treatment scores to post-treatment scores. The lower the correlation, the more inconsistent the ordering; that is, more change occurs. For example, the CAI squared Canonical Correlation of .052 (Table 3) indicates only a 5 percent overlap between pre-anxiety and post-anxiety scores. That is, the ordering of pre-treatment scores and post-treatment scores was not the same. Generally, Raw Canonical Coefficients indicated that students with higher scores on pre-anxiety had lower post-anxiety scores (pre .382 and post .129). Computer confidence (pre .276 and post .303) and computer liking (pre .018 and post .105) scores also indicated change from pre-treatment to post-treatment.

The Canonical Correlation analysis was also applied to the TDI group (Table 4). The .314 correlation coefficient is important. Squaring .314 produces a 10% overlap between pre-anxiety and post-anxiety scores indicating that computer anxiety did not change significantly from the beginning to the ending of the course.

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Table 3

Canonical Correlation Analysis for CAI

	Canonical Correlation	Adjusted Canonical Correlation	Approx. Standard Error	Squared Canonical Correlation
1	0.228	0.041	0.123	0.052
2	0.143		0.128	0.020
3	0.059		0.130	0.004

Multivariate Statistics and F Approximations

Statistic	Value	F	Num DF	Den DF	Pr > F
Wilks' Lambda	0.925	0.474	9	132	0.890

Raw Canonical Coefficients

	ALLPOS1		ALLPRE1
PRE-ANX	0.382	POST-ANX	0.129
PRE-CONF	0.276	POST-CONF	0.303
PRE-LIKE	0.018	POST-LIKE	0.105

In addition, the Raw Canonical Coefficients for pre-like (0.459) and post-like (0.434) are similar, indicating that the degree of computer liking did not change significantly from pre-treatment to post-treatment. Apparently, students who did not like computers at the beginning of the class still did not like them at the end of the class. This lack of change in computer liking could be due to the TDI method of instruction which relied on student-initiated corrective feedback from the instructor versus the CAI method which relied on automatic computer-initiated feedback. Students, therefore, spent more

Table 4

Canonical Correlation Analysis for TDI

	Canonical Correlation	Adjusted Canonical Correlation	Approx. Standard Error	Squared Canonical Correlation
1	0.314		0.126	0.098
2	0.283		0.129	0.080
3	0.029		0.140	0.000

Multivariate Statistics and F Approximations

Statistic	Value	F	Num DF	Den DF	Pr > F
Wilks' Lambda	0.828	1.00	9	112	0.443

Raw Canonical Coefficients

	ALLPOS1		ALLPRE1
PRE-ANX	0.081	POST-ANX	0.169
PRE-CONF	0.167	POST-CONF	-0.592
PRE-LIKE	0.459	POST-LIKE	0.434

time in direct computer use in the CAI method versus the TDI method.

Conclusions and Recommendations

The overall outcome of this study indicates that the CAI method, developed using the Linkway 2.01 computer authoring system, produced higher student achievement than the TDI method in community college Introduction to Microcomputer courses. An apparent advantage of CAI is that once the instructional unit has been prepared, the teacher is free to

assist individual students. In addition, hands-on computer time appears to be used more effectively in CAI classes.

Community college computer classes serve students enrolled in fields of study in which computer use is not emphasized. CAI is effective for teaching all students regardless of their field of study. Likewise, CAI is especially effective for teaching females who may come to class with fewer or less meaningful computer experiences than males.

Teachers who invest their time in preparing a computer-authored unit of instruction may find that their students' attitudes toward computers improve. In this study, students taught by a CAI unit, developed using a computer authoring system, left the class liking computers more than those students taught by the TDI method. This finding could be important for recruiting students as well as motivating students to enroll in advanced computer-related courses.

Individualized instruction is especially important at the community college level because it is often difficult to motivate students with different personal and educational backgrounds. In addition, the community college's unique role is to respond to the educational and training needs of the community. Authoring systems are an educational tool that allows business teachers to design and implement flexible instructional units. Business education teachers are encouraged to explore the use of computer authoring systems to develop individualized instructional components.

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Review: The Complete Computer Trainer by Paul Clothier (1996, NY: McGraw Hill Companies)

Judith J. Lambrecht

Many teachers in both the public schools and in industry are engaged in teaching students how to use applications software--software such as word processors, data bases, spreadsheets, graphics programs, and e-mail. Even so, there are surprisingly few professional methods books directed specifically at questions about how to teach in this area. This absence is especially stark when compared to the number of books available for learning applications software itself--books which are plentiful and appear on bookstore shelves as quickly as new software versions. Paul Clothier's book, The Complete Computer Trainer, has the promise of providing useful insights for many applications software teachers and of leading them to more effective teaching practices. He partially succeeds in this goal, if one is truly part of the audience of computer trainers that he has in mind. His writing is engaging, and both his biographical sketch and his teaching anecdotes support the assumption that he is an effective teacher and successful in the field of computer training.

Dr. Judith J. Lambecht is a Professor in the Dept. of Work, Community, and Family Education at the University of Minnesota, St. Paul.

The fact that the field of practice is called "computer training" is possible evidence of the restricted portion of the teaching field that Clothier addresses in this book. He is talking to industry trainers, not public school teachers. This audience of industry trainers may work for a single company, for a dedicated computer training institute or organization, or be private consultants, but they all have two key traits in common that differentiate them from public school teachers: their content is generally chosen for them by their clients, and they see their students for short periods of time in courses with pre-set, intensive sessions--one eight-hour day up to perhaps three eight-hour days. The learners are apparently largely comprised of persons employed by the company/client which has hired the trainer. So prevalent is this format of training that its existence as the primary frame of reference is neither made explicit, nor is this model examined for its impact on the training effectiveness itself. This is one of several unexamined assumptions in this book of generally useful advice about teaching applications software.

Practical Teaching Advice

Several sections of the book make it worth reading for anyone teaching computing applications. It is full of practical advice--the kind of advice that can come only from teachers who have had considerable experience teaching a subject they love and reflect on what has been effective for the learners and what has not. Paul Clothier cares about the learners and respects their presence in his class as students. He is respectful of their learning attempts and their questions, and he wants them to leave his training sessions with the in-depth understanding of software procedures that will transfer to later job applications and to learning other software. He advocates what could be labeled as a constructivist approach to teaching--an approach largely comprised of questioning and encourage independent thinking by the learners. He believes, in essence,

that "By stopping and inquiring, trainees become engaged in thinking about the logic of the program--the key to learning any software" (p. 2).

His chapter on "Encouraging Independence" is particularly good. It is full of useful examples of different types of questioning techniques and little snippets of anecdotes from his files of actual teaching situations. He is no advocate of excessive "telling," nor is he a fan of the kind of instructional materials which lead students through software procedures step-by-step, but do not lead to understanding--the kind of instructional materials that keep everyone busy, minimize questions, but leave students wondering later how they actually did what they saw on their screens. His focus on questioning and encouragement of student speculation leads to the strong admonition to never touch a student's keyboard, nor to allow another student to do so. He is a strong advocate of developing broader concepts about software, followed up by the explicit procedures and the vocabulary that accompany these concepts and procedures.

This preference for student freedom to question and explore is especially evident in the chapter on "Teaching Windows Programs." While this chapter reinforces ideas introduced early in the book, it is almost the last chapter--perhaps an afterthought. It is not clear why chapters are sequenced as they are. Nevertheless, the GUI environment unavoidably asks students to use their intuition about what is possible and provides three or four ways for accomplishing the same task--not an environment for expecting uniform class progress. A particularly helpful section of this chapter is the identification of twelve typical problems that users have when learning Windows programs, such as not selecting text or graphics before choosing a function, or not being able to use the scroll bars. This is the type of pedagogical knowledge that teachers must have, but which can only be gained through

teaching, observing students' difficulties, and talking with them. This is especially true if teachers/trainers have not had these problems themselves. Here, again, the goal is not necessarily to help students avoid these common problems, but rather to help students understand why the problems occurred as they correct them.

Another strong chapter is that on "Training Delivery," where reinforces with numerous examples the four-step model of providing the conceptual and procedural overview of a topic, providing an assisted exercise, then an unassisted exercise, and finally ending with a review, clarifications, and questions. This chapter has specific suggestions for computer classroom setup, for visual aids--diagrams that help students visualize software concepts, and for actual delivery of presentations by the trainer. With regard to classroom setup, there is no explicit discussion of the assumption that there will be one computer per student; this is considered to be self-evident. Even with this assumption, though, discussion is given to the importance of student interactions and to the possibilities of paired learning activities.

While not labeled as such, Clothier argues for a functional context for learning, allowing learners to see the big picture before moving into the technical detail of accomplishing a task. He talks at length about the power of analogies or metaphors for the concepts learners need to master, and he provides several good examples (such as avoiding the error of selecting a section of text by starting in the middle by viewing the text as a floor to be painted; one would need to start in one of the corners!). Selecting good metaphors can be very group, software, or student-generation specific. Teachers will appreciate the hint that a good way for a trainer to learn about effective analogies or metaphors is to ask learners how they would explain a given concept to a co-worker.

The chapter on "The Character of the Trainer" follows in a similar style of student-centered teaching. Throughout this chapter there is further evidence of respect for the learners, the slow ones, the fearful ones, and the ones who answer questions in error. It is in this chapter that Clothier's language changes from that of "delivery" and "training"-- terms that otherwise drive this book--to that of "teaching" and "coaching." The specific recommendations for teaching practices are coupled with the admonition to "be oneself"-- to reflect a genuine enthusiasm for one's subject and to use humor only as it fits naturally into one's personality.

Another strong chapter that follows the tone of those already mentioned is that of "Dealing with Difficult Learners," a chapter that will be appreciated by any computing teacher who has encountered the types of personalities that emerge when people try to master computers. This and other chapters are full of suggestions on how to provide for differences in abilities, how to set ground rules so that break times and ending times are used appropriately, and how to varying teaching practices in order to keep both students and teacher interested and engaged.

Other positive aspects of this book that computer teachers will find valuable are the lists of resources for computer trainers -- books, magazines, professional organizations, and a wealth of Internet resources. Contemporary topics, such as distance learning, just-in-time-training, use of multi-media, and electronic performance support systems receive brief discussion. Candid comments are made about the limitations and merits of classroom instruction. The essentially social nature of learning is recognized as the compelling need that keeps classroom teaching viable.

Can Learning be "Delivered"?

For all its wealth of practical information, there are some omissions in this book that would prevent it from becoming a single course textbook for teacher preparation, should one be looking for such a textbook, as I frequently am. There are numerous unexamined assumptions and a generally narrow conception of computer education in *The Complete Computer Trainer*. Clothier seems to experience teaching as a holistic, social enterprise in which adults make meaning out of the computer exercises by linking these activities with prior experiences and understandings. He describes a very functional context for teaching and makes frequent constructivist assumptions about how learning takes places. Together with this, however, he is compelled to use the strong language of "training," "delivery of instruction", and even "delivery of learning". His brief ending chapter on "How We Learn" presents an information-processing orientation to learning with a model of information transfer into short-term memory followed by integration into long-term memory. This is in contrast to an earlier section on "Accelerated Learning" which contains more explicit descriptions of functional context learning (thought not labeled as such) in which meaningful learning goals are established with the learners, discovery learning is encouraged, and verbalization of concepts by students is recommended to encourage conceptual reorganization. Clothiers seems to want to claim allegiance to the strong systems approach which generally characterizes computer systems development while, in contrast, his own experience as a teacher wants to suggest a more holistic, less predictable and more socially sensitive learning environment. He does not recognize the conflict.

Perhaps the weakest chapter in the book is the one on "Evaluating Computer Training." This brief chapter is at least candid in recognizing that frequently organizations never know the outcomes of planned, course-based instructional

experiences. At best, detailed evaluation checklists completed by the trainees may reveal the topics about which the learners thought they learned the most. At best, on-the-job performance may indicate that skills have increased and other intangible benefits have been gained, such as increased confidence, feelings of comfort with the technology, and an interest in acquiring further skills. But there is no real discussion of measuring performance outcomes. Perhaps this is because the model of all-day or multiple-day, intensive training sessions is accepted and time is just not available to evaluate actual learning outcomes with real work samples. While Clothier makes regular reference to the need to related in-class training exercises to the trainees' actual work needs, the demand for intensive, away from the work setting, whole-class instruction makes this very difficult. But the model is not questioned. Intensive 4-, 6-, or 8-hour class sessions designed to "cover" a certain number of software features is the industry norm.

Performance testing is not part of the portfolio of teaching practices of corporate computer trainers. Neither are concepts such as "distributed" versus "massed" practice of skills, nor "transfer of problem-solving skills" to other contexts. Issues of "reliability" and "validity" of evaluation instruments are also absent from the discussion. In fact, with regard to validity, the on-the-job work context is not recognized as markedly affecting what will actually be accomplished with applications software once a trainee returns to work. While Clothier recognizes the need to support the development of independent learning skills, the context in which these skills will either be nurtured or discouraged is not discussed. The framework for teaching does not allow it. The constraints are built in.

This may be why the chapter about "Designing Instruction" is very brief. Also, contrary to normal instructional design practices, the chapter on "Designing Instruction" *follows*

both of the chapters entitled "Evaluating Computer Training" and "Courseware and Documentation." This unusual sequencing may imply that certain decisions have already been made about what is possible, so asking fundamental questions, as a designer, about instructional needs and evaluating actual outcomes could move into territory that questions the whole enterprise.

The Role of the Computer Trainer

Computer training is a fairly new teaching field--perhaps twenty years old as most. The profession is comprised largely of persons such as Paul Clothier and other trainers he describes who come into training because they are good at using applications software. They may have been the office computer guru who helps everyone else figure out how to use the software that other persons have mandated as the company's software choice. They move into training as something they think they would like to try, and they do--they are "natural born teachers." One result of this informal selection process is that some of the broader concerns that generally are thought to accompany formal, professional teacher preparation are not present. Applications software training is accepted as a narrow enterprise of teaching software use--even though using software *well* unavoidably means understanding the logic of the software and how given business tasks can be expedited by its use.

In the world of the "complete computer trainer" there is no attempt to ask trainees to look more broadly at computer use in general, their place in the organization as software users, and their own potential for growth in the field. Trainees are seldom asked to critique software and make software choices. In fact, Clothier has a sympathetic description of teaching a class in which the trainees are persons who have reluctantly been asked to give up a well-learned software package to move

to a newer versions or to a different brand of an application. But in this case, the role of the trainer is to be sympathetic to the situation and not to criticize the old, well-loved software. There is no time in the intensive training sessions to ask trainees to question corporate decisions about software selections, even though the trainees may be in the best positions to offer suggestions about how work might be done more effectively using given technology. Nor are any attempts made to ask trainees how they would like to learn to use software and whether the intensive all-day sessions really allow them to apply applications to areas of their work that could benefit from such software tools.

Perhaps one of the most telling sections of this book with regard to the differentiated roles of computer users and the different types of training that, thus, might be made available is a brief section on "Technical Training" in a chapter called "More Training Suggestions." The area of "Technical Training" is not the same as "Applications Training." This book is concerned largely with "Applications Training." But "Technical Training" is a higher-level enterprise. Unlike training on word processors, e-mail, spreadsheets, etc., technical training focuses on higher-end products such as operating systems, networking systems, and CAD products. It is not as procedurally oriented as applications training. The users are more experienced and can figure out the procedures for themselves. There is less "hand-holding" and more focus on concepts, more lecturing, more technical content to master, and generally higher expectations. What Clothier does not say, however, is that the audience for technical training is probably male, while the audience for applications training may be predominantly female. While there are exceptions to this generalization--as in Clothier's example of the attorneys who needed to learn spreadsheets--there is no doubt that the preponderance of administrative support workers who use applications software are mostly women, and the

preponderance of technical support staff who administer networks are mostly men.

Why do computer-related career options continue to be so stereotyped? Why are applications software users not asked to see their employment opportunities more broadly or to value their work experiences more highly--to see that they have understandings about the needs of their work settings that would contribute to corporate planning and design or selection of computer software and not to be passive recipients of decisions made by others? Such role consequences are not discussed by the "complete computer trainer," though a more complete computer education would unavoidable need to look more broadly at these career options. What is available, who can pursue it, and what education or training can lead to these wider options?

Conclusion

A person need not be a corporate computer trainer in order to enjoy Paul Clothier's writing, his practical advice, and the genuineness of his concerns for his students'/trainees' learning. This perspective is important as more people, in school and already out, need to learn about applications software. Using such software is likely to be part of many persons' jobs, unless they have support staff to whom they can delegate such skilled responsibilities. People will need to taken advantage of organized group learning opportunities as well as need to know how to learn independently as software continues to change and evolve in its capabilities. Teaching beginners well will enable this sought-after learning independence, and such independence is Clothier's clear and unambiguous goal.

While this book lacks the structure of a consistent conceptual framework and may be limited by the assumptions inherent in the intensity of short, highly concentrated industry-focused training sessions, it has a clear message. Even teachers who can get to know their students better and work with them for longer periods of time need to remember that teacher-student rapport must be earned. Such rapport is essential for effective teaching because ultimately students themselves determine what they learn. Teachers or trainers, however they wish to label themselves, can be most supportive of this learning process when they respect the student/trainee role, the apprehensions of making one's ignorance and accomplishments public, and the inevitable need to approach computing software from the perspective of one's past experiences and the expectations of the settings in which the software is to be used.

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