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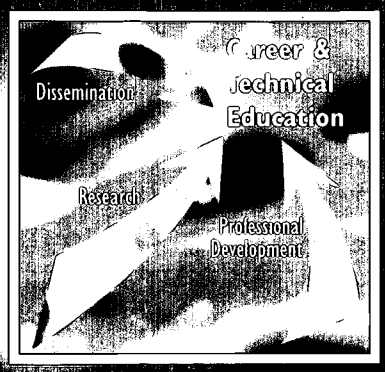
ABSTRACT

Dissemination in career and technical education does not simply disperse information, new products, new practices and materials, and new ideas designed to stimulate local change but does so in ways that promote its use. Federal efforts to promote dissemination of research-based information in education are: (1) deeply indebted to the agricultural extension model; (2) traditionally focused on the dissemination, rather than knowledge use side of the equation; (3) often a set of uncoordinated activities; and (4) a largely top-down, research-to-practice focused, rather than bottom-up, problem solving focused approach. Disseminators may be best thought of as linking agents positioned to move research into practice. Elements of a knowledge use model of dissemination are the following: (1) capitalize on incentives for change; (2) provide knowledge useable for practitioners; (3) create shared understandings of how new ideas could help improve local practice; (4) stimulate increased diffusion of new ideas within and between educational agencies; and (5) combine top-down and bottom-up approaches. As for the knowledge user/educator's perspective on dissemination, a constructivist perspective suggests all knowledge is local, contested, partial, and political. Unresolved quandaries in dissemination and knowledge use are how useable educational knowledge is; how it influences policy; and how contexts for dissemination and use affect the likelihood of success. Implications for dissemination practice and policy are identified. (Contains 67 references.) (YLB)



Dissemination With Impact:

What Research Suggests for Practice In Career and Technical Education

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INTRODUCTION

The purpose of this review is to examine what we know about dissemination, based on both the literature that refers specifically to Career and Technical Education (CTE), and that which is drawn from education and related fields. Ricketts' (1982) literature review indicated that research on the dissemination of vocational education products was "slightly negative to strongly negative," and that "[T]he understanding of dissemination's role in the process of innovation and change is much too weak" (p. 3). After reviewing the published literature in the field, it appears that his assessment nearly two decades ago cannot be easily challenged. Thus, our purpose is to introduce issues that may advance the CTE dissemination field, rather than to validate current "best practice."

Research on dissemination in vocational, career, and technical education is limited. A search of ERIC for all years that included *dissemination* as a keyword produced a list of over 16,562 documents. Of these, only 1,295 also included the keywords *vocational*, *career*, or *technical* education, and many of these are the regular series of government abstracts of research (ARM). Furthermore, most of the research on dissemination in vocational education occurred in the 1970s and 1980s, while it has continued as a stronger theme in education in general. In the past decade, only nine journal articles that mention dissemination have been published in vocational education journals, and in most of these, dissemination is addressed as an implication or minor topic, rather than as central.

Yet, interest in dissemination and knowledge use on the part of federal agencies is increasing, after a period of neglect. Not only is there a funded dissemination center in vocational education, but there is also a dissemination theme in the National Research Center for Career and Technical Education. This increased emphasis is not surprising: The quality and quantity of research in vocational education, as in other educational fields, has increased markedly and has significant implications for practice. At the same time, the public is concerned that career and technical education programs are under-performing, and CTE educators are energetically engaged in efforts to redefine the field to put it at the center of new visions for American education. This review will, as a consequence, be wide-ranging, and will incorporate ideas about dissemination from other fields within education, and occasionally from outside of education.

In all cases, our intent is to provide a link between the state of CTE today, and what is known about how best to get research (or promising programs and strategies that have been validated) into practice in multiple settings. First, we define what we mean by dissemination in order to more clearly identify the parameters of this review. Second, we provide a brief overview of federal efforts to promote dissemination of research-based information in education. Based on these two sections, we turn to the topic of defining some of the roles of disseminators and users. In the fourth and fifth sections of the paper we turn to the relationship between dissemination and knowledge use, and look at some of the empirically tested theories about when and where research gets into practice. The sixth and seventh sections address unresolved quandaries in dissemination and knowledge use that often preoccupy both researchers and disseminators: How useable is "educational knowledge?" How does educational knowledge influence policy? How do the specific characteristics of the settings that are targeted for dissemination and use affect the likelihood of success? Finally, we turn to some implications for dissemination policy and practice.

DISSEMINATION DEFINED

The dictionary defines the verb *to disseminate* as "to scatter or spread widely, as though sowing seed; promulgate extensively; broadcast; disperse." This definition, which reflects the common understanding of the word, does not adequately reflect the underlying assumptions found in 50 years of social science research on the dissemination of *information*. A more recent definition, articulated in a volume dealing with educational change, indicates that:

> Dissemination consists of **purposive, goal-oriented communication** of information or knowledge that is **specific and potentially useable**, from one social system to another. (Louis & van Velzen, 1988, p. 261)

In other words, the intent of dissemination in education is not simply ***to disperse information***, but ***to do so in ways that promote its use***. The goal is improvement and change in educational organizations and systems, and in individual practice. We may see use, innovation, or implementation as possible measures of whether an attempt to spread information was effective. However, it is incorrect to assume that innovation processes and dissemination are equivalent.

The dictionary definition, because it is generic, also ignores a facet of dissemination that is taken for granted in research—what is being sown. Early research in dissemination focused on what happened to new research products—for example, hybrid seed corn or a recently introduced drug. As the research moved into the field of education, however, it was faced with the reality of educational change, which often occurs as a consequence of ideas, rather than as tangible products. One of the first investigations in education, for example, examined the spread of kindergarten programs between districts.

> Thus, when we look at dissemination in career and technical education, we must focus on *new products, new practices and materials, and new ideas* that are designed to stimulate local change.

The social science definition also implies intentionality of human action, and it implicitly focuses on the role of *dissemination professionals* ... any individuals whose job definition includes a responsibility for increasing the flow and use of knowledge between subsystems within the educational system. This definition eliminates a lot of "sowing activities" that may result in changes in behavior, such as routine communication between colleagues, or casual transfer of information that is not explicitly intended to affect knowing or behaving. Nevertheless, dissemination research has increasingly focused on the importance of regular communication channels as a feature of dissemination systems that work.

Probably one of the most important developments in defining a theory of dissemination is the increased focus on the ***social processes related to dissemination***. Huberman and Broderick (1995) argue that "the most hopeful new avenue of inquiry in the D&U literature emerges when dissemination takes place ... through ... sustained interactions between researchers and practitioners" (pp. 3–4), a point that is central to the renewed theory of dissemination. They further explore the conditions under which sustained interaction may result in increased meaning on the part of both creators and users. Central to their argument is the idea of socially shared cognition that dominates the field of individual cognitive development (Brown, 1995).

> Individuals learn best when they interact with peers and relate new ideas to an existing core of shared knowledge.

Peers challenge each others' assumptions and encourage one another to rethink their ideas. However, the learner must reach a minimal level of understanding of the content to make peer interaction processes effective in knowledge sharing. While Huberman and Broderick do not note this, it also assumes that the group has certain characteristics—that there is a shared "culture" at some level, and that there is a level of familiarity that permits communication of challenges in ways that are not excessively threatening. Their perspective draws on Vygotsky (1986), who argues that ***inter-personal*** processes must be translated into ***intra-personal*** processes before learning can be said to have occurred. Thus, their emphasis is largely on the way in which individual researchers and practitioners enter into relationships with one another that cause them, as individuals, to change their assumptions and even their behaviors.

The notion that thinking is "irreducibly a social practice" implies that dissemination and utilization are best thought of as a process of reflection, in which people with different but overlapping knowledge and culture meet to consider their common concerns (Huberman & Broderick, 1995, p. 21). Arguably, dissemination and utilization not only encourage reflection, but the two components are so closely linked that we cannot have one without the other. Just as students master concepts more effectively when they teach others, researchers (or those who operate on the edge of applicable knowledge) gain greater clarity about their own work through direct dissemination to practitioners.

ADDRESSING DISSEMINATION: A BRIEF HISTORY OF MAJOR FEDERAL PROGRAMS

In the 1970s, the United States experimented with a number of dissemination and knowledge utilization projects that were designed to help schools improve and innovate (Clark, Lotto, & Astuto, 1984; Dentler, Louis, Kell, Corwin, & Sieber, 1980; Miles, 1978). Since then, although federally funded dissemination and knowledge utilization systems have been maintained, they have not been expanded either in form or in operations, and there have been no new national dissemination efforts except for federal support for the implementation of systemic school-wide reform models (such as the R&D Utilization program of the mid-1970s, or the focus on "General Purpose Dissemination" strategies of the late-1970s). Dissemination practitioners might very well feel that their potential contribution to the current reform wave has been ignored in favor of bully pulpit exhortations that call for leadership and vision. In the United States, we also have a tendency, when pushed to answer questions about problems in the dissemination and knowledge utilization system in all fields, to reply in a largely technocratic way (House, 1981). The federal government funds considerable educational research, but this research is not being fully used. Educators have questions for which they want answers, but they do not ask experts— in education or in any other fields. The experts' knowledge is not "useable" in current forms and must be molded, translated, or developed in order to make it applicable. The key assumptions of a technocratic perspective is that, if schools had more expertise at their fingertips, change efforts would be more potent, longer lasting, and more effective in producing stronger results. Federal dissemination policies emphasize that research goes from federally funded R&D centers and regional laboratories to schools. This excludes movement from schools to R&D centers and labs as exemplified in the recent (but canceled) Request For Proposals for a U.S. Department of Education-funded R&D center that focuses on dissemination and knowledge utilization. CTE dissemination programs, although more active in the 1970s and 1980s, were largely linked to the overall educational dissemination efforts.

The underlying assumption of the CTE approach has been that knowledge is a "thing" that simply needs to find a good home in schools. Nowhere is this bias more apparent than in the worthy effort to define dissemination as consisting of four activities—spread, exchange, choice, and implementation. This definition, first proposed in the mid-1970s (Smink, 1985), improved on the previous assumption that the primary purpose of dissemination was to cast knowledge out into the world of practice, under the theory that a good idea would ultimately be used. The later approach incorporated ideas about communication as a two-way process and extended the dissemination role to include support for actual changes. It nevertheless embodies the belief that knowledge comes in definable, useable units that can be arrayed in front of the practitioners who will choose something that will "solve their problems." U.S. federal policies and the dissemination system that they support reflect this assumption.

Another example of the proliferation of parallel dissemination systems in education is the tendency for each federally funded categorical program to develop its own dissemination plan. This leads to a major competition in federal dissemination and knowledge utilization policies between *general purpose dissemination* (largely funded by the National Institute of Education) and *special purpose dissemination* (largely funded by Office of Education programs such as Title

I/Chapter I, desegregation funds, and bilingual programs).[1] The *assistance centers* funded by the latter programs provide technical help and information regarding the special needs of recipients of program funds. Because they are sponsored by the individual programs rather than by a single dissemination agency, coordination between them is limited-to-non-existent. The following section describes the dissemination models established within various federal programs.

The Land Grant Extension System Model

The United States pioneered the role of research as a means of improving practice when the federal government established the land grant college system that included a link between funded institutions with the needs of state agricultural and rural communities through *extension services.* The notion that research knowledge can be used to answer specific questions of practice was, for a long time, a peculiarly American phenomenon. The extension system model operates, of course, on the belief that there is a need for intermediate, locally available offices responsible for increasing communication between the university and "the field." Extension agents answer questions raised by individuals through consulting both research findings and researchers located at the state's land grant university. Researchers use extension agents as a vehicle through which new, applied findings can be rapidly communicated to the field.

While it has left us with a system of universities and a model that has proven, over the years, to be highly effective, the extension model has also constrained the way in which we think about dissemination and knowledge utilization. The extension system, until recently, has been set up largely to serve the needs of individuals; the problems of education, however, are invariably associated with the functioning of schools as organizational units. In addition, because schools exist in highly politicized environments, the constant independent streams of actors, problems, competing solutions, and crises (March & Olsen, 1974) complicate the elegant simplicity of extension's technology transfer model.[2]

The Development of the Educational Resources Information Centers (ERIC)

The ERIC system was developed in response to the deeply held (and accurate) belief that one of the problems with the low levels of research utilization in education that were routinely discussed in the 1950s and early-1960s was the inaccessibility of research. However, ERIC was developed without any corresponding thought given to how educators would actually use the system. ERIC, as designed, was not, and is still not, "user friendly." But, since so much was invested in creating it, the need to build ERIC into any dissemination policies was unquestioned. Indeed, the first efforts of the federal government to launch more active dissemination strategies (the Pilot State Dissemination Project, designed in the late-1960s and funded from 1970–1972) was specifically intended to focus on improving ERIC's use for teachers and administrators. The

[1] The distinction between general purpose and special purpose dissemination was articulated in a Request For Proposals to study dissemination activities in states and regional laboratories funded by the National Institute of Education. The RFP was issued in 1979, but the authors regret that they are unable to locate a copy of it.

[2] It is important to emphasize that, as the state extension systems confront major changes in the nature of farming and rural populations, their structure and purposes have also changed and have become more complex.

need to justify and maintain ERIC still drives dissemination policy. This has an unintended consequence of skewing dissemination policy in general toward a knowledge-base driven approach, rather than a problem solving approach.

The Regional Laboratory System

The regional laboratories initiated in the mid-1960s were intended as a mechanism to renew education through development. Inherently intended as research-utilizing agencies, the regional laboratory system became the backbone of the general purpose dissemination system of the federal government—i.e., dissemination activities that serve the broad needs of schools, rather than the special needs of a targeted program. Nevertheless, despite their central position, they have been systematically bypassed in a number of the most critical knowledge utilization and school improvement experiments—including the Pilot State Dissemination Project, the R&D Utilization Program, the National Diffusion Network, and others. This isolation of the regional laboratories from other federal thrusts in school improvement is typical of the tendency of federal policies to promote competition and experimentation, rather than integration, of activities to support improvement. The emphasis in federal policy on the "with and through" role of labs—that they are not to work directly with schools in most instances, but to work with other agencies, such as state departments of education, to provide services—additionally underscores their position as providers of knowledge, rather than as activists in reform.

Special Purpose Assistance

One of the major competitions in federal support policies is between *general purpose dissemination* and *special purpose assistance*—the latter being funded out of programs such as Title I/Chapter I, desegregation funds, bilingual programs, and OVAE. These programs have often funded *assistance centers* that provide technical help regarding the special needs of program recipients.

In CTE, the National Network for Curriculum Coordination in Vocational and Technical Education (NNCCVTE) was established in 1972 by the Office of Education, with six regional curriculum coordination centers (CCCs).

These centers were founded to:

- Develop and disseminate curriculum
- Provide training and assistance
- Field-test and evaluate new curricula
- Link practitioners and curriculum developers through state curriculum representatives (SLRs)
- Exchange information about curriculum (Smink, 1985).

One of the major characteristics of special purpose dissemination centers was isolation from both broader strands of school improvement legislation, and from each other. Because these dissemination efforts were (are) funded by specialized programs or agency divisions, coordination between them was (is) non-existent. Rather than promoting overall school improvement, they

contributed to the fragmented character of many change strategies in U.S. high schools. This is not to fault the centers: It is federal policy that has generally promoted specialized assistance to specific groups rather than a broader dissemination strategy that is focused on improving all students' performance and learning.

Summary

These brief background remarks are intended to illustrate a number of characteristics of the emergent U.S. support system:

1. The U.S. system is deeply indebted to the extension model developed in the agricultural tradition.
2. It has traditionally focused on the dissemination side of the equation, rather than on the knowledge use side.
3. It has become a set of uncoordinated—and even competitive—activities.
4. The resulting approach is largely top-down, research-to-practice focused, rather than bottom-up, problem solving focused.

Smink (1985) reports findings from a series of federal dissemination studies. He indicates that there were, at that time, many operational problems with dissemination, including

- Poorly identified target groups
- Poor content and form of information
- A reliance on one-way communication
- A limited structure for between-group sharing
- Weak incentives for use among practitioners
- Insufficient evaluation of the quality of information
- Limited local development and training.

He continues:

> Most vocational education researchers will agree that most present research is higher quality—better designed, conducted, analyzed, and reported—than that completed in the past. ... (but) Administrators and instructors at all levels need assistance in using research—interpreting research findings, undertaking developmental activities, and designing and implementing research-related activities. (p. 1)

Smink also pointed out that "although promising educational practices and products are increasingly available, relatively few have been implemented by intended users" (p. 6). Federally

funded dissemination efforts have declined dramatically since the 1980s, there is little reason to expect that his observation is outdated.

Smink sets out a proposal for dissemination—

- "What should be developed and disseminated?
- Who is the target audience?
- Why is the dissemination activity needed?
- How should the dissemination activity be designed?
- When and where should dissemination activities occur?"

Many of these issues will be treated below, along with others that have emerged as significant since the mid-1980s.

WHO DISSEMINATES? TO WHOM?

Our description of dissemination as an intentional social process of communicating materials, products, and new ideas, implies that there is a person who disseminates. While we have referred above to "dissemination professionals" as a class, we also know a great deal about what makes a good disseminator. There is considerable agreement, based on network studies, that disseminators may be best thought of as *linking agents* (Junge, 1986; Rogers, 1992) or *boundary spanners* (Harrison & Debs, 1988)—individuals or groups that are able to move between one social system to another. These roles may be formally assigned (as they are in some large companies between, say, research and marketing departments), or they may accrue to individuals who are naturally placed to be effective in the role.

The only feature that linking agents have in common is that they are positioned to move research into practice. They may be appointed *individuals* with formal dissemination responsibilities as their primary function (Junge, 1986; Louis & Kell, 1981; Turnbull, 1994;), *influentials* (Louis & Dentler, 1988), or *gatekeepers* (Klobas & McGill, 1995; Ricketts, 1982) who are perceived as experts to whom others turn for reliable information. Those in rural or underdeveloped areas have attempted to capitalize on local influentials by designating them as key actors in knowledge dissemination. Efforts, for example, to increase the use of contraception in less developed countries work more effectively if the person communicating the information is a "wise woman" of the village, rather than a fresh-faced, unknown nurse. Dissemination systems in educational reform have also targeted individuals of influence. For example, it is well known that in almost all countries, principals have a great deal of influence over the "outside information" that teachers attend to (Stegö, Gielen, Glatter, & Hord, 1987). Thus, researchers who want to influence practice on a large scale may be more likely to target principal networks as an audience—at least to raise awareness.

DISSEMINATION (AND KNOWLEDGE USE)

In the career and technical education literature, knowledge use occurs when a "decision maker considers the findings of a study or a group of related studies for near-term resolution of a probing problem" (Ricketts, 1982, p. 8). Use is typically defined as the application of research results to a decision that is relevant to improving the functioning of the CTE system. It is important to understand how disseminated knowledge is implemented (or rejected). Weiss's (1980, 1982) work focused on this issue. Many argued that dissemination is ineffective because the knowledge is "not useable." (Lindblom & Cohen, 1979). Accordingly, a great deal of attention was paid to how disseminators should present information that is more "user friendly." While the effort to move beyond the research report to alternative modes of presenting results was overdue in education (and led to major revisions in the operations of the ERIC database), it addressed only one part of the dissemination definition discussed earlier. Louis and Dentler (1988) argued that dissemination systems that are designed to spread information as widely as possible (to promote awareness) may be rather different than those that are intended primarily to encourage use:

> A school improvement strategy based on dissemination and knowledge use is conditioned by research about the circumstances under which educators at policy and practice levels will attend to and act on new information that is made available to them from the outside. ... a knowledge use strategy assumes that there are many positive incentives for educators to change and improve the ways in which they do things. (p. 36)

The main elements of a knowledge use model of dissemination are:

- Capitalize on incentives for change—which usually, but not always, come from outside the school in the form of pressure to change, but may also appeal to individual interests;
- Provide knowledge useable for practitioners—take advantage of momentum and the typical need for relatively rapid action;
- Create shared understandings of how new ideas could help to improve local practice—encourage potential users to discuss the information and how it can best be used;
- Stimulate increased diffusion of new ideas within and between educational agencies—the more that (useable) information flows back and forth regularly, the more likely it is that new ideas from a trusted source will be attended to;
- Combine *top-down* and *bottom-up* approaches—dissemination does not need to be either top-down (where the determination of what is a promising practice is made by policy or a dissemination agency) or bottom-up (research is collected to respond to the unique needs and situations of the school). Instead, the most effective form of dissemination combines some of both.

Some of the findings from a study of dissemination activities among the regional educational laboratories have significant implications for the design of dissemination systems. First, ***incentives tend to be synergistic in their effects on the use of knowledge***. State mandates and

negative incentives alone have produced relatively low levels of knowledge use. When mandates permit choices and are combined with positive personal incentives (either material or professional), use is very high. If information is proffered in a situation where individual empowerment or significant professional development is promised, significantly greater personal incentives are mobilized. Mandates may stimulate strong personal incentives under certain conditions—namely, that professional rewards are visible, concrete, and personally meaningful.

Second, ***use implies action of some sort, and once information has been obtained, individuals and groups must digest it, comprehend it, and decide what to do with it.*** Decision-making involves assessing and analyzing whatever information happens to be available to the individual or group making the decision. Decision-making often occurs in a social context where there is some social processing of the information. Through assessment and social processing, people "transform information by customizing and personalizing it for local use." Research on knowledge use shows that many people who receive potentially useful information do not remember it at all; those who did recall information were also engaged in some degree of social processing; and almost all said that the discussions that they had were instrumental in their decisions about how to act on the information. Social processing appears to be important because it helps to build or affirm commitment to information use (Louis, 1982).

Third, ***social processing was more likely to occur when the relationship between the agency communicating the information and the recipient was characterized by some intensity.*** In the world of busy practitioners, information that does not appear to have immediate relevance or applicability is unlikely to be passed on with the strong endorsement that is typically required for an indirect strategy to be effective. Some interpersonal contact as part of providing information increases the likelihood that people will pay attention to it and begin the next level of social processing that engages people in the possibility of change.

KNOWLEDGE USE (AND DISSEMINATION)

In the previous section, we looked at knowledge use from the perspective of a disseminator; now we turn to the knowledge user's perspective on dissemination. Early findings on dissemination research identify relevance as key to knowledge use (Louis & Dentler, 1988; Louis & Perlman, 1985). If practitioners see a match between their perceived needs and the information provided, the probability that some use will occur is very high. Much of the information available from computerized retrieval bases—such as ERIC—offer very little in the way of "action implications" for the practitioner. The manpower needs required to screen information thoroughly make impossible demands of retrieval staffs and field agents (i.e., the practitioners).

Following the lead of the well-regarded Rand change-agent study (Berman & McLaughlin, 1978), much of the early dissemination research focused on implementation Thus, the nature of knowledge was buried in implementation studies. This approach is well-reflected in the career and technical education literature in a seminal article by Ricketts (1982):

> Educational research is of value primarily when it can be adapted or used by educators to assist students in the learning process. (p. 9)

As dissemination research increasingly moved toward examining use, as well as the spread of information, however, tensions arose around the nature of knowledge and how it affects use. These tensions continue to define how many career and technical educators (and others) view dissemination.

A constructivist perspective—increasingly popular among educators (Garrison, 1989)—suggests that (a) all educational knowledge is "local"; (b) all educational knowledge is contested and partial, and there is no clear way to differentiate whether one knowledge claim is better than another; and (c) all educational knowledge is political and influenced by the interests of those who develop and/or use it.

- ***All knowledge is local.*** Local knowledge is a key feature of the landscape of change, but most would agree that there is important knowledge that is not local. Knowledge created elsewhere must, according to all theories, be compatible with existing belief structures, diffuse rapidly throughout the organization field so that it becomes legitimized, have utility in local sites, and be processed in ways that make it fit with local preferences. Although a great deal of important knowledge may come from outside the organization, this information is always combined with local knowledge (Geertz, 1983).

- ***All knowledge is contested and partial.*** This feature of postmodernism is supported by most of the new theoretical advances. At the cognitive learning level, for example, the contesting of knowledge is central to the learning process. The contested nature of knowledge is a key element of political theory, and the primary element that leads many (see Vickers, 1994, and Weiss, 1980) to conclude that there are numerous ways of using knowledge, depending on the degree to which it is "solid"—e.g., meets truth and utility tests.

- ***All knowledge is political.*** Insofar as the newer theories address power, there is a tendency to follow Mulkay's (1974) assumption that "knowledge is power" and that the creation of knowledge creates powerful settings (including constraints). None of the perspectives reviewed here adopt, however, the critical postmodernist perspective, in which the power associated with knowledge is viewed as an instrument of oppression. Cognitive learning psychologists, for example, do not find that children who temporarily have knowledge that others lack use this power to dominate. Nevertheless, political contexts are critical to understanding knowledge use, as is demonstrated by the analysis of knowledge utilization among policy makers, and observations that knowledge use is constrained as the organizational field becomes defined both by internal norms or patterns and by external expectations or regulation.

A "non critical theory" approach might differentiate between *knowledge* and *information*: Information can be easily transferred, but until it is interpreted, either by the individual or the group, it does not become useable knowledge (Louis, 1994). This position is consistent with a long line of mainstream sociological research that emphasizes the importance of socially constructed frames of reference that make learning at both the individual and group levels possible—a position that predates the current wave of postmodernist thinking by several decades (Berger & Luckmann, 1966). The separation between knowledge and information is what drives some dissemination models discussed later in this paper.

While these reviewed perspectives are consistent with some of the basic tenets of postmodernist views of knowledge, they also assume that knowledge has some "real" or "true" qualities, and individuals who have not created it can use it. The use process is complex and difficult to predict, but messy cannot be equated with impossible. In fact, we may draw some lessons for dissemination and knowledge use from Bordieu and Wacquant (1992) in this regard:

> [T]here exists, within the social world, and particularly within the academic world, a whole nexus of institutions whose effect is to render acceptable the gap between the objective truth of the world and the lived truth of what we are and what we do in it. ... It is this *double truth*, objective and subjective, which constitutes the whole truth of the social world. (pp. 254–255)

In other words, we cannot reasonably expect that the overpowering truth and utility of our best research, no matter how attractively it is formatted, will always (or even often) strike most practitioners or policy makers. In order to transfer knowledge, the dissemination professional must also have some understanding of the subjective truth of the potential user(s) (Blunden, 1999a, 1999b).

RESEARCH AS PRACTICAL KNOWLEDGE: AN UNEASY RELATIONSHIP

The need for disseminators to understand the subjective truth of the user is explicitly applied to career and technical education (Frantz, 1991). There is no shortage of researchers who lament their lack of influence over policy makers. Schultz (1989) argues that one consequence of the changing assumptions about knowledge is that CTE policy makers rely *even less* on research than they did previously. Moreover, Rosenbaum's (1996) analysis of school-to-work programs in the United States finds that policy makers ignore fundamental research-based results. An analysis of the recent TAFE (Technical and Further Education) policies in New Zealand suggests that public opinions determined policy, which were then resistant to empirical evidence (Ryan, 1999). In other words, in spite of the relatively close relationship between career and technical education and employment policies in most countries, policy makers are apparently not seeking out the work of noted scholars to influence their decisions.

The use of social science research in policy-making is a subset of the broader problem of dissemination knowledge utilization—a field of study that has a 60-year history; several dedicated scholarly journals; and an increasing emphasis on the effects of knowledge on policy and practice. While the early work in education focused on questions such as how and why kindergartens spread through a decentralized system (Mort, 1963), the issue of how educational research relates to state and federal policy has been addressed since the early-1970s (see, for example, Rist, 1970). In general, scholars who wrote about the topic tended to view the problem through an engineering lens, which reflected concerns about the limited inclusion of research-based knowledge in the design of key educational policies. The engineering lens creates a battlefield in which competing understandings of knowledge clash. The key components of these tensions mirror the concerns of constructivist perspectives on knowledge use discussed above.

Educational research is more applicable, according to most current theories of knowledge use, when it

1. Is compatible with existing belief structures,
2. Diffuses rapidly throughout the organization's field so that it becomes legitimized,
3. Has *prima facie* utility in local sites, and
4. Is processed or discussed within the potential user group in ways that make it fit with local preferences.

One problem with this model is that as widely diffused knowledge becomes legitimated and shared within the field of policy makers, sites, or other members of the culture, divergent voices tend to be crowded out. This "silence," rather than overt bias, may account for the absence of minority scholar voices in CTE policy discussions (see Way & Rossmann, 1994).

But convergence does not always take place, and the contested nature of knowledge is a key component of Weiss and Bucuvalas's (1980) well-known political theory of knowledge use. Where research-based knowledge remains contested, it can be used in many ways, depending on the degree to which it is solid (e.g., can we trust this research?) and usable (e.g., can this be applied here?).

ALTERNATIVE VIEWS OF THE INTERSECTION OF RESEARCH AND POLICY

The *politics of research use* can be conceptualized as both ***intentional*** (explicit use of knowledge as power, or approaches to knowledge creation as a political tool) and ***inadvertent*** (the absence of voices, the use of traditional methods and samples, etc.). Not surprisingly, given the typical attention in the politics of education to both the manifest and latent functions of political events, many authors cover both. However, the emphasis of most contributions lies primarily in one of these categories.

Another dimension of analysis underlies the differences among scholars who look at knowledge use. Some focus primarily on the *politics of production* or the institutional constraints, individual assumptions, and cultural norms that help to determine what is investigated, how it is investigated, and how the results are presented. Other authors place more emphasis on the politics of use, or the *post-production politics,* which focus on how research that is already available comes into play in the policy-making process.

Intentional politics of production: Research on the politics of production arose as a critique of standard social science as the handmaiden of the status quo (Dahrendorf, 1967), and it grew with the rising concerns in the sociology and philosophy of science about the flawed assumptions of objectivity in inquiry (Mulkay, 1974). Although the basis for discussing the values of investigators in determining the research process was established early, studies of the effects of funding agencies and broader social contexts on knowledge production came later and are empirically less well-developed. In early investigations, it was assumed that "hard sciences" were immune to the problems of politics of production due to the high level of consensus around what constitutes the core and the frontier of inquiry. Social and behavioral sciences, in contrast—particularly those concerned with applications such as education—were assumed to be rife with potential for political influence. Empirical investigations suggest that epistemological uncertainty is more similar than different between "hard" and "soft" sciences (Cole, 1992; Knorr-Cetina, 1981). Debates about sampling for the census, which pit scientists and politicians on opposite sides, with the Bureau of the Census in between, provide instructive reminders that educational researchers are not alone. While this emerging information gives no real solace to educational scholars concerned with policy influence, it does suggest that the issue of the politics of production remains an important topic of investigation. Politics of production in any field, including CTE, are most likely to be found in areas of controversy. There is relatively little research on this topic in CTE in the United States, but the issue seems far more prominent in countries with centralized educational policy systems, such as New Zealand and Australia. This does not mean, of course, that politics are not a component of the research that is funded (or not) in the United States, but it does suggest that politics in U.S. educational research may be more subtle.

Inadvertent politics of production: Scholarly commentaries on the inadvertent politics of research often sound like habituated whining. Overt discrimination against minority scholars in CTE research is no longer the main issue. Rather, we ignore scholarship that finds expression (and publication) outside the mainstream of "standard" vocational education journals. The problem of inadvertent politics lies squarely in the structure of our research communities. Careless ERIC searches and inattentive efforts to assist non-traditional scholars to find publication outlets in mainstream journals sustain the traditionally limited access to policy influence. Recent searches of ERIC suggest that mainstream U.S. CTE journals are not

publishing large numbers of critical theory articles—whether this is a result of editorial policy or conformity in the field is unclear. Where few articles are published, dissemination systems are generally held as not guilty of discrimination, although research-to-practice journals are, in most educational fields, a component of the national dissemination system.

Relationships between production and consumption of research: This representation contrasts with the field of dissemination and knowledge utilization, in which perhaps more than 50% of the research focuses on research(er)-user relationships. Bedard (1999) and Louis and Perlman (1985) treat an issue that has been covered unsystematically for some time—the structured interactions between those who commission research and the researchers. These authors note that commissions typically generate literature reviews and even research by noted scholars, but typically do not use it fully unless there is a great deal of interaction between the scholars and commission members. Cibulka (1999) raises issues that are central to current studies of research utilization but are rarely systematically investigated—the politics of research funding and subsequent use—an issue of particular relevance to CTE, where research funding sources are largely limited to federal agencies with mature policy agendas that reflect the tendency of the federal government to pursue marketing strategies to promote knowledge use. Existing research in this cell suggests additional profitable arenas for inquiry. Huberman (1994), for example, lays out a theory of relationships between producer and consumer that are premised on the power of *sustained interactivity.*

> If we wish policy research to be used,
> we need to spend time working with potential users.

The nature of knowledge and information that is disseminated is critical in determining use. Any information that is transmitted has different characteristics, depending on the context in which it is inserted because, as we argue, knowledge has meaning only when it is interpreted through the human mind. Knowledge is used because it is engaging or compelling, and because the person presented with it can imagine how it would apply to him or her.

CONTEXTS FOR USE

Much of the dissemination research in career and technical education focuses on instances when a decisionmaker considers findings of research to solve problems (Ricketts, 1982). But, it is important to acknowledge that most decisionmakers can't afford to be systematic knowledge users. Organizational and systemic problems arise, and often need to be solved, in short order. The "popping up" of long-ignored knowledge makes most instances of research use appear, on the surface, as inadvertent. Decisions, particularly at lower levels in an organization, are often driven by research-to-practice decisions made earlier. As Weiss (1980) argues, the impact of research on practice or policy is often very subtle:

> When decisions accrete through small, uncoordinated steps taken in many offices—by staffs who have little awareness of the policy direction that is being promoted or the alternatives that are being foreclosed—there is scant opportunity for deliberate application of research information to the task. (p. 382)

The nature of decisionmaking, itself, within the contexts of schools, districts, and government agencies, also plays a part, according to Weiss:

> Many problems and issues are dealt with simultaneously, and consideration of each one goes on over a protracted period ... each person takes some small step (writes a memo, answers an inquiry, edits the draft of a regulation) that has seemingly small consequences. But over a period of time, these many small steps foreclose alternative courses of action and limit the range of the possible. Almost imperceptibly, a decision has been made, without anyone's awareness that he or she was deciding. (p. 401)

In addition, people in educational settings have many different motivations for using knowledge, and they look for knowledge from outside of their own experience for a similarly divergent set of reasons. These may include (but are certainly not limited to)

- **New situations**: CTE educators at all levels may encounter problems or issues that perplex them. Even before a decision needs to be made, most people seek information to help them clarify the true nature of the issue or problem. This form of knowledge-seeking and use is typically referred to as *enlightenment.*

- **Decisions**: New situations sometimes require decisions. When they do, and the decision maker(s) feel that the situation is novel, they are more likely to seek information.

- **Needs assessment**: When faced with a new situation where there is limited information or experience to guide a decision, active information seeking often occurs—particularly when it is not clear that a change would be beneficial.

- **Lack of expertise**: In general, people prefer to rely on local sources of expertise—the most local of which is oneself. When decision opportunities cannot be addressed locally, the costs of not making a decision are high, and experts are easily available, most people look for advice.

- **Need for authoritative support**: An overlooked, but important, stimulus for knowledge use is to justify decisions. Many decision opportunities create unanticipated controversy, and decisionmakers need to bolster their preferred solutions with research. This motivation is more likely than the above situations to provoke a thorough search of research knowledge.

Field reports suggest that most (clearly not all) secondary schools tend to be bureaucratic, politicized, and isolated from the most up-to-date information about educational innovations that may improve educational opportunities—particularly for disadvantaged children. This isolation, in turn, makes them less able to adopt and implement innovations (Natriello, Pallas, & McDill, 1990). Here we focus not on the characteristics of schools serving a large majority of career- and technically-oriented students that may make them less effective for children (see Cibulka, 1992), but only on those that may affect their ability to become effective knowledge users.

Socioeconomic Conditions and Dissemination or Knowledge Use

The socioeconomic status (SES) characteristics of communities have significant implications for issues of knowledge use and reform. In a study of a federally funded Research and Development Utilization Program, Louis, Rosenblum, and Molitor (1981) found that the larger the proportion of disadvantaged students in a school, the less effective were the school's capacities to engage in an effective problem-solving process. Wealthy communities have a richness of intellectual and social capital that supports education, while less wealthy communities frequently lack such resources. Pallas, Natriello, and McDill (1989) observe that schools are not the sole educators of children, and that communities, as well as families, vary in terms of the educational experiences they provide to supplement what is learned more formally. This assumption is corroborated by research in Scotland, which shows that children in low-income communities perform less well than similarly disadvantaged peers who live in higher SES communities, even when the SES composition of the school is controlled for (Garner & Raudenbush, 1991).

The consequence of the SES factor for CTE cannot be ignored by anyone in the field who is interested in the improvement of opportunities for all students. The majority of students who could be beneficially affected by the implementation of the best research are located in lower income communities—the very communities that often fail to serve their students well through innovation. There is little research in CTE that looks at the socioeconomic divide in educational resources. Yet the man on the street in virtually any country can describe the inequity of "who gets what."

The context of schooling also raises another important factor that was previously discussed—incentives for use. Clearly, in today's policy environment, most schools have a strong incentive to meet (or exceed) the state standards for school performance. Public humiliation or praise or, in many states, the potential exodus of students from schools that do poorly on state examinations, cannot be ignored. While specialized CTE schools often do well on such rating schemes, comprehensive high schools with weak results may think that a de-emphasis of CTE programs is a quick fix. This strategy ignores, unfortunately, the long-term solution of integrating academic and vocational subjects that is typically advocated by scholars in CTE. The accumulating evidence shows that this strategy may be very solid. The disjuncture between research and practice is probably nowhere more evident than in this area.

Organizational Learning and Knowledge Use in CTE

The organizational learning perspective, popularized in business settings (Senge, 1990) and rapidly diffusing into education, argues that we need to look at how schools (i.e., organizations) use knowledge—which may be different from the ways in which individuals use knowledge. Organizational learning begins with a social constructivist perspective: Knowledge is not useable at the local site until it has been "socially processed" through some collective discussion and agreement on its validity and applicability (Louis, 1994). Organizations that are more effective in using knowledge have certain characteristics—for example, they have more closely linked internal communication networks, and more individuals serve in boundary-spanning roles where they legitimately bring in new ideas from the outside (Daft & Huber, 1987; Senge, 1990). Conversely, organizations that don't learn—even from information that they request—are characterized by internal boundaries, competition, excessive individual entrepreneurship, and lack of continuity in personnel (Corwin & Louis, 1982).

Three features of school culture and practice—memory, knowledge base and development, and information distribution and interpretation—can also have a big impact on teachers' ability to sustain openness to learning (Louis, Kruse, & Raywid, 1996):

- ***Shared memory*** consists of collective understandings that are developed in an organization over time. Positive shared memories from previous learning situations create an openness to future learning; conversely, memories based on bad experiences act as barriers to new learning efforts. In CTE, shared memory can be a constraint; i.e., faculty members may remember a "golden age" when CTE programs were central in comprehensive high schools, and want to recreate the past (Louis & Miles, 1990).

- ***Individual knowledge***: CTE teachers possess knowledge about the curriculum and their own instructional methods, but they do not always have a common language or the skills to engage in serious conversations about their practice—particularly across programs. Furthermore, research suggests that CTE teachers are somewhat isolated from other teachers in many comprehensive high schools, which means that their knowledge and expertise about teaching has less influence than it should (Little, 1995a, 1995b). Thus, to create a dynamic learning environment in school, we usually need more than individual knowledge—a major issue in CTE where core and technical programs sometimes appear to be competing for student enrollment.

- ***Knowledge distribution systems***: An information base is not enough. Teachers must also interpret and distribute information before it becomes knowledge that is applicable across classrooms. Joint efforts to interpret information must provide a foundation for challenging existing beliefs about the school, or previous views of teaching and learning remain unchanged (Brown, 1995). A genuine understanding of an innovation or the basis on which it rests is necessary if teachers are to apply the new information in the classroom.

The organizational learning perspective is critical when we consider the relationship of dissemination and improvement theories in education. It suggests that the possibility for reaching a school with new knowledge is not dependent on where the knowledge comes from or the linkage mechanism, but on social characteristics of the school and its ability to process information. While sustained interaction with a researcher might enhance utilization, it cannot produce it in the absence of the structures and culture that encourage the development of a shared knowledge base that will guide collective action. In this respect, Huberman's (1994) focus on school characteristics as a factor mediating knowledge use intersects clearly with emerging ideas about school development and improvement.

A recent article in a management journal suggests that many corporations that claim to be learning organizations are obsessed with information, but they don't know how to learn from it (Macdonald, 1995). Instead of gathering useable knowledge that would help them improve their importance, they establish vast empires of data, which has little relevance to the quality of their core products. This is particularly problematic for CTE students' learning outcomes, which are often articulated poorly in state school performance measures.

Based on existing theory and empirical data, organizational learning is best thought of as a conceptual tool for helping schools or other organizations focus on both the core objectives and the ways of organizing how to get there. According to the early organizational theorists (based on decades of research in human relations, cybernetics, management by objectives, and many other trends), the primary barriers to becoming more effective lie in the domains of

1. qualitative and structural aspects of communication systems;
2. information processing; and
3. availability of high-quality, relevant information about performance.

These problems are not newly identified, but earlier responses to them have often been oriented to shop-floor technical problems of organizations—in the common language, how to get factory workers to participate in producing a better widget through minor modifications of existing organizational practices. Alternatively, they examine issues that are largely human relations problems that involve issues of morale, climate, and other preconditions for success. Organizational learning theory, in all its forms, casts these problems into a different form: How do we get knowledgeable, well-educated professional people to cooperatively obtain, share, and act on information that will enable them to function effectively in an increasingly uncertain and chaotic future?

The above is a rather long introduction to our basic assumption: **Schools do not focus on how to use knowledge about student development and learning because they have**

- limited and ineffective communication systems;
- poor procedures and strategies for getting information that will help them in their core goals;

- poor procedures for dealing with good and poor information that they do acquire; and
- inadequate processes for involving key constituencies—sources of information and support—in all of the above functions.

These problems of organization, which prevent collective focus on student learning, constant attention to classroom processes, and effective means for dealing with the many organizational problems of schools, have become particular barriers to creating success in high schools for all students. Thus, it is important for CTE professionals to understand the organizational barriers that impede their ability to use research to improve instructional practices.

Relationships between Production and Use

As Havelock (1969) notes, previous research led to the conclusion that there was no simple, direct line between knowledge production and utilization. Huberman (1994) notes the many challenges to a rational model of knowledge use but chooses to review the subtleties of the existing paradigm as it has emerged in the 1980s and early 1990s. To summarize his arguments (which have been elaborated above in reference to CTE), he argues that five factors, at least in education, have demonstrated strong empirical relationships with knowledge utilization. These include

1. The context of research, including characteristics of the knowledge base and the motivation of the researcher to disseminate to practitioners;
2. The user's context, including factors ranging from perceived needs to the
3. perception of the value of the research information;
4. Formal mechanisms to link knowledge with intended users;
5. The impacts of context and linkages on the resources, including attention, time, and acceptability of the research; and
6. The amount of effort expended, creating an appropriate environment for use, which includes both the amount and quality of the dissemination effort, the usability of the knowledge, and the quality of planning and execution in the using site.

Huberman's perspective is consistent with the main lines of dissemination and utilization research, which emphasize the dispersion of knowledge to multiple sites of practice. Huberman notes that researchers and practitioners may have a reciprocal influence on each other, and suggests that the need for sustained interactivity to promote research and knowledge utilization is consistent with some elements of the contemporary constructivist approach to teaching. The latter asserts that teachers' practitioner knowledge is constructed, largely by individuals, through both reflective practice (Schön, 1983) and through more disciplined inquiry, such as action research (Carr & Kemmis, 1986; Mooney, 1999). This perspective is more consistent with emerging ideas about dissemination and utilization that are associated with school improvement research—an emphasis on the uniqueness of schools, on the importance of local development activity, and on the centrality of school culture and leadership to improvement (and even effectiveness) (Newmann & Associates, 1996).

Weiss and Bucuvalas (1980) were among the first to propose that knowledge produced through more-or-less rigorous inquiry needs to pass two types of tests before it is used: There is a *truth test*, which helps the individual or group looking at the information to decide whether it is a reasonable approximation of "reality," but there is also a *utility test*, by which the same groups determine whether or not it can be applied given a set of constraints, which could range from financial to potential negative consequences not considered in the research. Thus,

> generalizations and ideas from a number of studies come into currency indirectly—through articles in academic journals and journals of opinions, stories in the media, the advice of consultants, lobbying by special interest groups, conversation of colleagues, attendance at conferences or training programs, and other uncatalogued sources. (Weiss, 1982, p. 622)

According to Weiss (1982), assumptions about use have five major constructs in the popular and academic pictures of decision making:

- ***Boundedness***—"decision-making is, in effect, set off from the ongoing stream of organizational activity. It involves a discrete set of actors who occupy authoritative positions, people who are officially responsible for, and empowered to make, decisions for the organization." (pp. 624–625)

- ***Purposiveness***—"they [decision makers] are expected to have overt criteria for what is good enough and to seek a decision that promises progress toward attaining their purposes." (p. 625)

- ***Calculation***—"Decision makers are expected to generate (or have generated for them) a set of alternatives....Their calculation will often be informal and intuitive rather than systematic, as they proceed on the basis of experience, informed judgment, or gut feeling." (p. 625)

- ***Perceived significance***—"A decision marks a step of some moment. People who make the decision perceive the act as consequential (i.e., having consequences)." (p. 625)

- ***Sequential order***—"The sequence is regarded as beginning with recognition of a problem. It proceeds to the development and consideration of alternative means of coping with the problem, goes next to assessment of the relative advantages of the alternatives, and ends with selection of a decision." (p. 626)

> Alternative routes to policy and practice—reliance on custom and implicit rules; improvisation; mutual adjustment; accretion; negotiation; move and countermove; a window for solutions; and indirection—are the most common ways that schools and technical colleges approach the imposition of research results on their organization settings. Research is often viewed as 'a device of control' rather than a source of help. (Weiss, 1982, p. 630)

Weiss argues that decision accretion obviates the usual assumptions about how research affects policy and practice. She implies that *blockbuster effects* from research are outside of the norm:

> It may still turn out that research leaves few ripples behind, but it is premature to make that judgment without a long-term and close-up view of the issue arena. (p. 633)

In other words, it is only in an ideal model that research ideas are presented to practitioners or policy makers and have a major impact. The research utilization process is "unorganized, slow, wasteful, and sloppy" (pp. 635–636). In CTE research, Ricketts (1982) points out a contributing factor—practitioners do not perceive a relationship between research and "real problems."

SOME IMPLICATIONS FOR DISSEMINATION IN CTE

This review has been deliberately wide-ranging because its intent is to stimulate critical thinking about dissemination in CTE, rather than to simply document what has worked until now. We will briefly summarize some of the implications for dissemination practice:

- Research knowledge generated in universities or research institutes is only one source of knowing, and its ***use must be negotiated during a dissemination process.*** This fluid relationship—and even interdependence—between research and practice must be acknowledged, and researchers must be prepared to be open to involvement in the development process at the user level. If this is true for "gold standard" science, it is particularly true for social science and CTE research, which are less likely to be gold standard. Much of the best practice in education is not generated by scholars in laboratories, but by teachers and school leaders in actual settings.

- ***In addition to the advancement of knowledge by practitioners, the spread of new ideas in education is frequently aided by researchers*** who may codify and extend practice-based knowledge as well as make independent contributions to it. In many cases, researchers may not be as well-equipped to engage in field-based development over long periods of time (they have students and new research projects to carry out), but may fulfill this function *if* they have a deep understanding of the emerging nature of the negotiated knowledge.

- ***The main barriers to knowledge use***, at least in CTE, are not at the level of individual resistance, but ***lie in*** the ***rigidities induced in institutionalized organizational fields, organizational designs that do not foster learning, and political agendas that are not consistent with the information.*** Changing these interorganizational rigidities in the short run may be extremely difficult. The motto under these circumstances is not to engage in Sisyphysian efforts, but to try again another day, because contextual circumstances change for reasons that have nothing to do with research or educational policy.

- The barriers to knowledge utilization are often to be found in organizational design. This suggests that ***redesigning the school or technical college should be part of any effort to engage in sustained interactivity*** around research utilization.

- ***Some forms of useful knowledge will spread with little dissemination effort***—due to organizational field compatibility or because the field develops an infrastructure to assess and legitimate the type of knowledge. We do not always need elaborate infrastructures or sustained interactivity to ensure the incorporation of new ideas in practice.

- ***Utilization and impact can only be assessed over the long haul.*** Short-run efforts to foster major utilization are likely to appear shallow and hegemonic to practitioners, and to fail to disrupt the interorganizational rigidities of the field. Policy makers and disappointed researchers are likely to view these efforts as failures, and to pronounce schools as impossible to change. Thus, research-based efforts to create school reform must be conducted on an extended timeline.

- ***Creating sustained interactivity is not the only solution to the dissemination and utilization problem, but, if it becomes a norm, it may well increase the scholarly impact because it enlarges the field of CTE communication systems.*** We should not limit the idea of sustained interactivity to the relationship between a "knowledge producer/ researcher" and "knowledge consumers/practitioners," but focus also on formal and informal networks for transmitting knowledge between units. These networks, to be successful, must involve "practice templates" that combine research knowledge and practice knowledge.

- There is a latent demand for research information among practitioners that is potentially very great. ***Dissemination activities can be highly consistent with a bottom-up approach to school improvement, and they can also support mandated changes.*** To effectively mediate between mandates and local initiatives requires a flexible management structure that emphasizes (a) communication and facilitation among all parts of the system and (b) negotiation of complex short-term adaptive relationships with multiple audiences to achieve longer-range goals.

Our review also suggests some implications for dissemination policy in CTE:

- ***Coordination between knowledge producers (universities) and potential knowledge users (schools and technical colleges) needs continued policy attention.*** There have always been laments about the gap between the university and the schools, and problems of spanning differences in culture, language, and goals are viewed as contributing to the problem of utilization. Recent research (Huberman, 1994) suggests that this is not inevitable, and that if schools are involved in faculty research throughout its conduct, the chances of utilization are greatly increased, as are the probabilities of future collaboration and exchange. Of particular interest in this study is that *spillover effects*—long considered in the industrial technology-transfer literature to be critical to economic development—are strongly related to sustained linkages during the research.[3]

- ***Use of technology*** has been a major focus of many recent efforts to link CTE information and schools (Budke, 1989). Much effort has been focused, for example, on career education databases that are designed to help students determine what kinds of CTE programs are valuable to them personally. Unfortunately, *many advocates of dissemination by technology also support the marketing approach that was prominent in the late-1970s and early-1980s*, which focuses on assessing the quality of dissemination efforts by criteria such as the number of "hits," inclusion in ERIC, and objective assessments of the quality of the

[3] Professional development/professional practice schools are an example of a particular type of university-school collaborative that has become relatively common. The relationships, initially conceived of as a way to improve teacher training and deliver staff development, are sustained through mutual benefits beyond this limited goal. Unfortunately, CTE programs have often been junior partners in the professional practice school movement, which has focused on training and professional development of teachers in "core subjects." As a consequence, CTE teachers in universities and schools have benefited less from the resources that have gone into these endeavors, or have operated in isolation from their colleagues in other disciplines.

materials, and does not emphasize the importance of changes in practice and educational improvements in schools. Policies supporting technology-based dissemination should not ignore the evidence of the human factor.

- ***The U.S. CTE dissemination system has been almost exclusively producer-driven.*** Consideration should be given to developing systems that include practitioners as partners, action research, and other forms of constructivist-based dissemination.

- ***The CTE dissemination system, like the rest of the educational field, is not only complex, but also not well-organized, and is, therefore, not user-friendly***. Special-purpose and general-purpose dissemination are disconnected from one another; significant elements of the general-purpose system (e.g., regional laboratories, ERIC, and various whole-school model programs) operate out of different government auspices than the specialized CTE systems, and there is no formal expectation for coordination. Although most parts of the system draw on ERIC, the dependence is not reciprocal. The result, from the users' perspective, is vast confusion over where (or even whether) to enter the system to get help.

- ***The best-designed dissemination systems will fail in the absence of incentives for knowledge use that can be stimulated through policy***. Negative incentives (fear of failure on standardized tests) provide insufficient motivation for knowledge use, although it clearly changes educators' behavior. In addition, knowledge use occurs in a problem-solving context that is stimulated by an initiative, a program, an idea, or professional knowledge.

- ***Dissemination and its outcomes are virtually impossible to micro-manage from the policy level.*** Dissemination is so dependent on the ability of those at lower levels to create the appropriate environment for competent communication that its outcomes cannot be directed easily from above. Even in a highly centralized system, complete control over knowledge dissemination and use among a broad population is an ephemeral goal.

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