

Table of Contents

Editor's Notes <i>James R. Stone III</i>	97
The Intended Curriculum in Co-operative Education in Ontario Secondary Schools: An Analysis of School District Documents <i>Nancy L. Hutchinson, Hugh Munby, Peter Chin, Karol Lyn Edwards, Karin Steiner-Bell, Christine Chapman, Katherine Ho, and Wendy Mills de España</i>	103
Implementing an Assessment Plan to Document Student Learning in a Two-Year Technical College <i>Sheila K. Ruhland and Jerrilyn A. Brewer</i>	141
What is the Future for Post-Secondary Occupational Education? <i>Jim Jacobs</i>	172
A Case Study in Reform: Integration of Teacher Education in Agriculture with Teacher Education in Mathematics and Science <i>Carol A. Conroy and John W. Sipple</i>	206
American Vocational Education Research Association Members' Perceptions of Statistical Significance Tests and Other Statistical Controversies <i>Howard R. D. Gordon</i>	244

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The Journal of Vocational Education Research

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Editor's Notes

James R. Stone III
University of Minnesota

Change

This issue arrives at a time of change for vocational education, or career and technical education (CTE) as it is now called. The robust economy that we enjoyed for most of the last decade has declined into recession. Layoffs are increasing unemployment rates. With the economy's decline, so too goes the force that brought the "hard to employ" into the American economic community.

These changes increase the importance of workforce education. Economists argue that the relative demand for more highly educated workers is rising, the relative demand for more experienced workers is rising, and the relative demand for highly skilled workers is rising (Bresnahan, Brynjolfsson, & Hitt, 1999). But does this increased demand translate to a dramatic increase in the need for a baccalaureate-trained workforce? Current Bureau of Labor Statistics (BLS) data show that by the Year 2006, approximately 20.6% of the projected job openings will require a bachelor's degree or more, a figure that has remained relatively constant over the past two decades (Silvestri, 1997). Data from the Department of Commerce show that approximately 31% the classes of 1996 and 1997 are completing four-year degrees. This oversupply of baccalaureate prepared individuals might explain the reported rise in degreed students in two-year college occupational programs and in over-educated taxi drivers.

This ought to be good news for the CTE community - suppli-

ers of workforce education -but the data suggest otherwise. Between 1982 and 1998, major shifts in secondary school course taking have occurred in general education (down 16%) and college preparatory (up 30%), with a relatively small decline in vocational concentrators.. Similar declines in post-secondary CTE enrollment are reported by Levesque, et. al., 2000.

Changes in CTE Research Direction

In this time of change, what is the direction of vocational education, especially at the secondary level? A major influence on the direction of CTE is the U.S. Congress through the Perkins vocational education legislation. Not only does Congress influence the direction of secondary and postsecondary programs, but it also influences the vocational education research agenda through its funding of a national research center. While federal funding for vocational education was increased to \$1.3 billion in the current congress, support for research was not increased.

Congress invests only \$2,225,000 in CTE R&D through vocational funding (Perkins III) or approximately 0.00017 of the total budget. This is down from approximately \$4,000,000 invested in R&D in the previous national research center. The National Science Foundation reports that the U.S. spends an average of 2.6% of GDP annually on R & D. Industry spends between 2.8% and 7.8% of its annual budget on R&D, depending on industry sector. Based on these comparisons, one could build a strong argument that vocational education R&D is greatly underfunded.

What is the research direction Congress supports? The previous R&D center, the National Center for Research in Vocational Education (NCRVE), was born at a time of concern over America's declining economic fortunes. The NCRVE agenda was driven by a belief that the presumed failure of our public schools would threaten the U.S. ability to compete globally. (The 1990s suggest that either the schools were not as bad as claimed or that there is little

direct relationship between the quality of public education and national economic performance: it was the “nation at risk” children who gave us the economic boom of the 1990s.)

Thus framed, the research agenda of the NCRVE focused on broad policy questions around new concepts. The NCRVE research uncovered ways in which high schools and technical colleges implemented tech prep, curriculum integration, contextualized learning, career academies, career magnets, and the like. The NCRVE left a rich legacy of developmental research on the process of vocational education and how vocational studies can be connected to high-level academic studies, especially as part of broader school reform efforts. This gave rise to the concept of the “new vocationalism” or what Stone (2001) called “education through work.” This new purpose for vocational education complemented the historic roles of education about work and education for work.

The 1998 reauthorization of vocational education legislation gave Congress an opportunity to reshape the focus of vocational education research. Congress funded research to:

1. develop a knowledge base that would identify academic knowledge and vocational and technical skills required for employment;
2. explore the effect of integration of Vocational-Technical and Academic Instruction;
3. identify effective uses of educational technology to deliver vocational and technical instruction;
4. validate models of pre-service and in-service professional development; and
5. determine effective use of accountability data and to improve local programs and enhance student achievement.

This was the first time that CTE programs were to be held accountable for student academic performance.

Now we have a new federal administration that comes with its

own K-12 education agenda. The mantra “leave no child behind” has been operationalized by the new Assistant Secretary for the Office of Vocational and Adult Education as a set of four pillars (D’Amico, 2001). These are:

1. Closing (decreasing) the achievement gap among ethnic groups, among income groups, and between males and females.
2. Focusing on what works. Identifying research-based education strategies.
3. Increasing flexibility and decreasing bureaucracy.
4. Increasing options and choices for students and parents such as dual enrollment, tech prep, internships/coop programs.

These are laudable goals for America’s K-12 education system. But is this the purpose of secondary vocational education? Some might argue that expecting a business education or welding class to improve algebra or reading scores is a bit like expecting social studies or art classes to improve algebra or reading scores. Despite the ancillary benefit of providing a context in which to apply academic skills, most vocational programs do not include mathematics competencies in their curriculum. If they do, they are limited in scope.

That is not to suggest that vocational classes cannot provide a context for enhancing academic skills. If this is the new purpose of secondary vocational education, teachers will need to be prepared and curriculum will need to be developed for this explicit purpose.

What do these four pillars mean for the vocational education research agenda?

Some in the current federal administration point to the research on how best to teach reading as an example of scientific approaches to improving education, including vocational education. The debate between the “phonics” camp and the “whole language”

camp has raged for years. Only recently, after more than 1,900 studies, a government panel has declared that “phonics” works (National Reading Panel, 2000). The research upon which this conclusion was reached included fewer than 50 experimental and quasi-experimental studies. While many educational scholars debate this conclusion, the current federal administration has declared phonics the scientific way to teach reading (New York *Times*, January 9, 2002).

Applying this model to secondary vocational education assumes vocational education is a pedagogy or, perhaps, a context for teaching academic subjects such as algebra or developing reading skills especially for those who do not prosper in traditional academic settings. The research agenda, it has been suggested, should thus focus on demonstrating how vocational education improves algebra or reading skills and then identify which vocational methods work best to achieve this end.

This is an intriguing notion. It is certainly a change of agenda both for vocational education programs and for vocational education research.

In this issue

We have three studies that examine vocational education issues in a university, a two-year college, and a secondary system. Conroy and Sipple examine the issues confronting a department that integrates academic and vocational faculty in a major university. Ruhland and Brewer followed a two-year college faculty in their efforts to align assessment with student learning outcomes. Hutchinson and her colleagues studied the link between vocational education policy and the implementation of those policies in secondary education. Gordon offers an analysis of the use and misuse of statistical significance testing and the importance of effect size analysis. Finally, we conclude this issue with the last invited paper on the future of vocational education. In it, Jacobs identifies core

issues that must be considered when reinventing vocational education at the post-secondary level.

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**The Intended Curriculum in Co-operative Education in
Ontario Secondary Schools: An Analysis of School
District Documents**

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Abstract

By assuming policy represents curriculum intentions, this paper analyzes policy documents from nine school districts in Ontario, Canada, to track the intentions of work-based education, using co-operative (co-op) education as the case in point. The explicitly stated purpose for co-op education in most school districts was career preparation for students, with frequent references to co-op education as an alternative mode of instruction to obtain credits in academic subjects, which is Ontario Ministry of Education and Training policy. The analysis reveals that documents gave inconsistent policy statements about curriculum intentions in areas like evaluation and remediation. There was little consistent attention to issues of equity and to the qualifications of those teaching co-op education. Although the Ontario Ministry of Education and Training prescribes co-op education as an alternate mode of delivery for academic subject knowledge as well as a means of career

preparation, district policy is shown to focus almost exclusively on career preparation and personal growth of adolescents. This represents a “drift” in curriculum intentions between the Ministry and the school districts.

This paper is from a continuing research program in co-operative (co-op) education. In Canadian high schools, co-op education refers to the practice in which schools and employers co-operate to involve students in extended periods of time at a workplace while they are enrolled in full-time study. Typically, students also engage in classroom orientation to the workplace and in reflective seminars. Co-op education programs appear to be thriving—in Canada, about 10% of secondary school students enroll in co-op education each year (Munby, Cunningham, & Chin, 1998). Although this component of school programs is popular among students, the appeal is not reflected in the amount of research conducted in the area. Our research is aimed at correcting this imbalance. Specifically, we are concerned to address secondary school co-op education as *curriculum* because this allows us to explore a range of issues like intentions, teaching, learning, assessment, and so forth. In this paper, we focus on intentions. Here, we report on the intended curriculum for co-op education in Ontario schools as expressed in a sample of curriculum documents obtained from 9 of the 72 school districts across Ontario, Canada. Our point is not simply to document the intentions, but also to reveal inconsistencies and to mark “policy drifts”—the subtle (sometimes not so subtle) transitions that occur in policy as it is rewritten for readers at lower levels of administrative hierarchies (Conley & Goldman, 1998; Finney & Callan, 1997). This paper, then, is a case study of curriculum policy, the case being co-op education in a sample of Canadian school districts.

Even with the current enthusiasm for work-based curriculum experiences (Bailey & Merritt, 1997), there is not agreement on the

educational goals they are to serve. Stasz (1997) stated that some of the most valuable skills students can gain from work-based learning programs include problem solving, communication, and teamwork. Work-based learning programs can enable students to get a general sense of a career area (Stone & Mortimer, 1998). Stasz (1997) suggested that, through the learning of rules, norms, and professional ethics, students involved in work-based learning programs could enhance their personal and social competence. Others have produced inconclusive data on the effect of work-based learning programs on academic achievement (e.g., Hughes, Moore, & Bailey, 1999; Stasz & Brewer, 1998; Stasz & Kaganoff, 1997).

Our research on co-op education reflects the current situation in Canada, where high school co-op education is a component of the curriculum (Gidney, 1998). It is neither designed to prepare adolescents for entry-level jobs nor to teach specific skills for such jobs; that is, co-op education in Canada is not vocational education as defined by Kliebard (1999). Co-op education provides opportunities for many Canadian adolescents to experience the integral connection between learning in thought and in action (Dewey, 1916) by studying secondary curriculum subjects (e.g., biology, drama, mathematics) in the classroom and in the workplace. For example, in Nova Scotia, the provincial department of education has committed to making co-op education available to every student, including those intending to attend university (e.g., Nova Scotia Department of Education and Culture, 1998). In 1996-1997 in Ontario, the province that is the focus of the current study, over 42% of students enrolled in co-op education were in the academic stream (Ontario Co-operative Education Association, 1998). In a study of students enrolled at Queen's University (the second ranked university in Canada) we found that 34% of those in Nursing had enrolled in co-op education in high school and 33% of those in Education had enrolled in co-op in high school (Chin, et al., 2000).

The stance that co-op education is curriculum has both theoretical and practical support. Theoretically, it is particularly fruitful to

view co-op education as curriculum because then we can apply curriculum concepts to the analysis of co-op education policy and experience. For example, Schwab's (1972) four commonplaces—students, teachers, subject matter, milieu—provide one clear framework for analyzing educational experiences. Also useful are distinctions among different versions of the curriculum: the intended curriculum (in policy documents), the enacted curriculum (in workplace settings), and the experienced curriculum (as learned by students). The intended and unintended curriculum and the overt and covert curriculum are further dichotomies that come from viewing educational phenomena as curriculum. Distinctions like these have been used to show how the knowledge of the co-op curriculum is organized differently from traditional school subject knowledge (Munby, Chin, & Hutchinson, 2000). From a practical viewpoint, co-op education in Canada is treated as curriculum in the policy documents of educational jurisdictions (Hutchinson, et al., 1999). Indeed, in some cases, co-op credits are tied to school subjects so that the credit is a biology credit, for example, even though the subject matter may bear little relationship to the biology offered as part of the in-school curriculum. In our studies of what is learned, we have found students learn in the classroom component about résumés, job interviews, self-awareness, reflecting on their learning in the work placement, safety, unions, the expectations of employers, and biology, drama, etc. (if they are in a subject-specific co-op course). In their workplace component, students learn general knowledge, like the importance of taking initiative and of learning by observing and asking questions; and specific knowledge, like the routines of the workplace (e.g., sterilizing instruments) and the role of these routines in the workplace. They also learn to relate their experience of this workplace to their expectations for career satisfaction and to their self-awareness (Munby, Chin, Hutchinson, & Young, 1999).

Background to the Analyses of the Intended Curriculum

Our recent analysis of curriculum documents in co-op education from all twelve jurisdictions in Canada showed that co-op education is largely viewed as an integral part of the secondary school curriculum (Hutchinson, et al., 1999). In recent reforms of secondary education, co-op education has clearly acquired the appearance of a curriculum subject. For example, in Ontario, British Columbia, and Alberta, the same process was used for curriculum development in co-op as in history and science. Also, required credits in career/co-op education were initiated in each of these provinces, and curriculum documents on the ministry of education websites include curricula for co-op education (e.g., Alberta Ministry of Learning, 1997; British Columbia Ministry of Education, 1999; Ontario Ministry of Education, 1999a).

On the other hand, co-op education differs from all other secondary curriculum subjects in critical ways. One of these differences is that co-op education is predominantly situated in a workplace rather than in a school classroom. Our case study research suggests that each workplace is unique and that the curriculum of the workplace emerges “naturally” as a result of the workplace’s purposes and the student’s interests and abilities (Chin, Young, & Munby, 1998; Munby, Cunningham, et al., 1998). Arguably, the most important of these differences is that co-op education has not undergone a lengthy period of development and discussion in which educators, parents, philosophers, and curriculum developers have debated the fundamental curriculum questions. In science education (e.g., Munby, Orpwood, & Russell, 1980), in mathematics education (e.g., Robitaille et al., 1993), and in all other secondary curriculum areas, there are continuing debates on questions like “What knowledge is most worthwhile? Why is it worthwhile? How is it acquired or created?” (Schubert, 1986, p. 1).

Theoretical writings about the intended curriculum have used an array of terms and arguments. In his discussion of images of curriculum, Schubert (1986) referred to the focus on curriculum as

“intended learning outcomes,” (pp. 28-29) which shifts the focus from means to ends. He suggested that the point of this focus is to be explicit and defensible about what is offered to students. His criticism was that such a focus may draw attention away from the unintended outcomes. To guard against this difficulty, we have deliberately examined the curricula in our sample for unintended outcomes and for the hidden curriculum. Rather than referring to the intended curriculum, Goodlad, Klein, and Tye (1979) referred to the ideological, idea-based, or ideal curriculum and suggested that “One determines the contents of ideological curricula by examining textbooks, workbooks, teachers’ guides, and the like” (p. 60). They wrote that “the formal curriculum could be a collection of ideal curricula” that “has been sanctioned,” and they continue, “One gets closer to what is intended for the schools by examining what is to be studied by students than by examining statements of aims or objectives” (p. 61). Consistent with this perspective, our analyses included searching for straightforward statements of aims but focused primarily on what students were expected to do and learn in co-op education. Robitaille and his colleagues (1993) applied curriculum perspectives to analyses of international curricula and data in the subjects of mathematics and science. They suggested that the intended curriculum is embodied in such documents as curriculum guides, policies, regulations, and other official statements that direct school systems, as well as in textbooks. Curriculum in co-op education is underdeveloped, and the field lacks the series of comprehensive and developmental textbooks that predominate in subjects like mathematics and science. Thus we focused on a sample of curriculum guides and policies provided by school districts in response to our requests.

Context

Writers who address the intended curriculum argue explicitly or implicitly that the intended curriculum is set within both a spe-

cific educational context and the larger context of society. Robitaille, et al., (1993) made the case that the specific educational context includes institutional arrangements for the educational system, such as organizational patterns of schools, teaching assignments, and fiscal and human resource allocations.

The first aspect of the specific educational context consists of the approach taken in Ontario, historically. Our previous papers have described the wide variation in what counts as co-op education across Canada (Hutchinson et al., 1999; Munby, Hutchinson, & Chin, 2000). In the latter paper, we described the general approach to co-op education that has characterized the field since its introduction in Ontario (Ellis, 1992). The two expressed goals in Ontario have always been career exploration and subject-based learning through experience. The 1989 policy, still in force, saw co-op education as a “mode of delivery” for an academic course credit (Ontario Ministry of Education, 1989). The new policy in Ontario for program and diploma requirements suggested that workplace learning will take two forms: (a) development of Ontario’s co-op education program so that the semester-long placements “help students to acquire knowledge and skills and to apply this learning in practical situations” (Ontario Ministry of Education, 1999b) and promote awareness of career opportunities; and (b) work experience referring to one to four weeks of work-study components within regular courses (Ontario Ministry of Education, 1999a). Forty hours of community experience over the secondary career is also going to be required for graduation from Ontario secondary schools (Ontario Ministry of Education, 1999b). Career exploration for all students at all grade levels is prescribed in the policy document *Choices Into Action* (Ontario Ministry of Education, 1999a). In a review of the literature that served as a background paper for curriculum developers in Ontario (Hutchinson, Munby, & Chin, 1997), we recommended that Ontario adopt a developmental approach to co-op and career education, like Alberta and British Columbia. This would involve learning goals of increasing com-

plexity for each year of the secondary program and would use authentic or performance assessment to gauge learning. To date, the released curricula in Ontario suggest the province has not moved this far in its reformed secondary curriculum in career and co-op education.

The second aspect of the specific educational context is the day-to-day life in Ontario secondary schools while these analyses are being carried out. We wrote this paper within the first few months of the year 2000. In the past five years, schools in Ontario have endured the “Common Sense Revolution” of Premier Mike Harris and his Progressive Conservative Party, severe funding cuts, and the greatest curriculum change in the shortest period in the history of Ontario (Gidney, 1999; Jefferson, 1998; McMurtry, 1995). Secondary schools, specifically, have experienced “job actions” (sometimes called strikes), lock-outs, work-to-rule actions, and major reorganization, including the elimination of the fifth year of high school. (Ontario was the only province in Canada to have a five-year high school program.) The new curriculum documents are now available for grades 9 and 10 (Ontario Ministry of Education, 1999c, 1999d), and will be available shortly for grades 11 and 12. Both the community (work) experience requirement and mandatory teacher advisor programs are being phased in (Ontario Ministry of Education, 1999b), and almost every school district has experienced amalgamation. Many amalgamated districts are in the midst of re-writing local curricula and policies for co-op education, and many have re-assigned former co-op education co-ordinators to the classroom, as a cost-cutting measure. Co-op education teacher-supervisors are more likely than in the past to teach other curriculum subjects for part of the day and to have fewer hours available to visit co-op students in their worksites. The specific educational context could be described as unsettled, changing, and under-resourced (Jefferson, 1998).

The larger context of society also situates the intended curriculum. In Canada, there have been increasing and varied pressures on

Hutchinson, Munby, Chin, Edwards, Steiner-Bell, Chapman, Ho, and de España

schools to prepare adolescents for careers. For example, the Conference Board of Canada released the *Employability Skills Profile* (McLaughlin, 1992), which emphasized academic skills, personal management skills, and teamwork skills. The inclusion of community experience in the reformed Ontario curriculum and of work experiences in the British Columbia and Alberta curricula suggests Canadian society values work experience for adolescents. As well, the Council of Ministers of Education of Canada (CMEC) included the link between education and the labor market as one of the five themes in its 1999 research agenda conference (Council of Ministers of Education of Canada, 1999). One of the two CMEC-commissioned papers on this theme was about co-op education (Munby, Hutchinson, et al., 2000).

Another indicator of the social value placed on co-op education is the rate of student enrolment. While it is difficult to obtain accurate enrolment figures for the number of secondary students in co-op education, we used data from *Statistics Canada CANSIM Series* and from the Ontario Co-operative Education Association (OCEA) to make an estimate. We estimate that about 10% of Canada's over 1.55 million secondary-school students enroll in co-op education each academic year (Hutchinson et al., 1999; Munby, Cunningham, et al., 1998). All of this suggests that while the basic curriculum questions may not have been answered for co-op education, and there may be a need for research on the intended, enacted, and experienced curricula, co-op education is an increasingly important curriculum offering in Canadian high schools.

Method

It was necessary to develop a framework for analyzing the curriculum documents obtained from school districts. The research group met four times during the three-week period from October 8 to October 27, 1999 to develop, use, revise, and report on the utility of the analysis framework. Each set of revisions was prompted

by the analyses conducted with the previous draft of the framework. The original framework for document analysis included ten topics and “other” (draft 1, October 12, 1999): workplace entry preparation, academic subject, preparing students for diverse workplaces, equity, reflection, hidden curriculum, career awareness, preparing workplace supervisors, mentors, and personal growth and maturity. Draft 2 (October 15, 1999) consisted of 17 topics plus “other.” The first nine topics were: general features of the document; stated purposes or intents, early in the document; evaluation; general workplace entry preparation; preparation for the specific co-op education worksite; academic subject; preparing students for diverse workplaces; equity; and reflection. The remaining eight topics were: hidden curriculum; career awareness; preparing workplace supervisors; who can teach, supervise; mentors; personal growth and maturity; internal consistency; and goals to sub-goals. Draft 3 (October 16, 1999) appears in Figure 1, with all full topic headings as they appeared, but with the working space for entries removed. There were 16 topic headings grouped into four categories: description of document, kinds of learning, equity and diversity, and qualifications. For two categories (kinds of learning, equity and diversity), entries were made for the presence and nature of evaluation in the document as well as the presence and nature of the topic in the document.

Documents and Analysis

Documents for co-op education were received from nine district school boards in Ontario in response to e-mail, telephone, and mail requests made to 48 boards in the summer and autumn of 1999. Four of these boards were located in metropolitan areas and five in districts containing small cities, towns, and rural areas (*Canadian Global Almanac 2000*, 1999). To ensure anonymity, each district board was renamed with a letter. The four school districts in metropolitan areas were named A, B, C, and D, and the five

Title and source of document (APA style):

Researcher:

Date:

DESCRIPTION OF DOCUMENT

1. General features of the document (# of pages, format, intended audience if explicitly stated):
2. Explicit (stated) intents, goals, purposes under such a heading early in document (if none, say none):
3. Evaluation (kinds of intents that are explicitly evaluated; if none, say none):

KINDS OF LEARNING

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| 4. General workplace entry preparation (e.g. letter of application, resume, appearance, punctuality, attendance, interview, safety) | Evaluation of general workplace entry prep |
| 5. Preparation for the specific co-op ed worksite | Evaluation of prep for specific workplace |
| 6. Academic subject (learning academic content through experience, hands-on, mode of delivery) | Evaluation of academic subject learning |
| 7. Career awareness (enhance awareness of options, diversity of and reality of careers) | Evaluation of career awareness |
| 8. Personal growth and maturity | Evaluation of personal growth and maturity |
| 9. Integration, reflection, review (e.g., on what is experienced, what is learned; self-awareness) | Evaluation of integration, reflection |
| 10. Hidden curriculum (e.g., citizens, workers, compliance; also note attendance, punctuality here) | Evaluation of hidden curriculum |
| 11. Training plan for students (IEP) | Evaluation of training plan |

Intended Curriculum in Co-Operative Education

EQUITY AND DIVERSITY

12. Equity (references to the 4 groups: women, visible minorities, First Nations, with disabilities)	Evaluation that acknowledges equity issues
13. Preparing students for diverse workplaces	Evaluation of prep for diverse workplaces

QUALIFICATIONS

14. Restrictions on students who can take co-op, how many times, etc. and on credits that can be earned:
 15. Preparing workplace supervisor (for which of the above intentions?):
 16. Qualifications, expertise of persons who can teach, supervise co-op ed:
-

Figure 1. Analyzing the intended co-operative education curriculum in documents

school districts in non-metropolitan areas were named E, F, G, H, and J.

The nine documents were analyzed using the above framework and notes were recorded in point-form on the presence and nature of each topic in the document. Then all data from the notes on the first topic of the framework were analyzed for common themes using the method of constant comparison. Discrepant data were noted. This procedure was repeated for each of the 16 topics. The documents were reviewed a second time to ensure consistency in the data across the documents. Any omissions were corrected. The theme analyses were re-written from point form to paragraphs.

**Themes in the Analysis of School District Documents:
Intended Curriculum**

The data are presented for each of the 16 topic headings under the following four categories: description of document, kinds of

Hutchinson, Munby, Chin, Edwards, Steiner-Bell, Chapman, Ho, and de España

learning, equity and diversity, and qualifications. For two categories—kinds of learning, and equity and diversity—we present data about the references to the evaluation of the intended curriculum as well as the references to the intended curriculum. (No page references are given for quotations from the documents because some bore no page numbers.)

Description of Document

(1) General Features of the Document

Length. The curriculum documents showed school districts at various stages of developing or revising the policies and procedures associated with co-op education in secondary schools in Ontario. The documents ranged from incomplete to detailed. The number of pages ranged from 5 to 131.

Format. Each document was presented in sections. Most documents included sections on the administration of co-op education, program management, and insurance or safety as well as information about program components that you would expect in any curriculum document. Documents were often accompanied by a series of handbooks for the groups associated with co-op education: teachers, students, and workplace supervisors. These handbooks included sections on such matters as special considerations (e.g., students with exceptionalities), ethical and legal issues, assessment, and benefits for co-operating workplaces.

Audience. The intended audience for most of the documents containing policies and procedures appeared to be teachers, because the language would be familiar to teachers, and perhaps less so to other audiences. A recurring phrase throughout the documents that suggested teachers were the intended audience was the description of co-op education as a “mode of instruction.” Document D referred explicitly to teachers and B to teachers and administrators. Some documents contained explicit references to a

wider audience, for example, one read “This Handbook will enable all parties involved to promote growth while maintaining excellence and consistency of program delivery” (C) without explicitly identifying the parties involved. As noted above, handbooks for specific audiences sometimes accompanied the general documents.

(2) Explicit Intents, Goals, Purposes

The framework for analysis stated that we were seeking explicit statements of intents, goals, or purposes under such a heading near the beginning of a document and prompted the researcher to note if none were present. The explicitly stated purpose for co-op education in most school district documents was career preparation for students. Other intents included creating links between the school curriculum and community experience, and preparation for future academic study and for the work world. There were also frequent references to personal, affective, and life skills goals for students. Each of the following intents was included in one document: to support and rejuvenate local businesses (F), to provide students with knowledge of cutting-edge technology that schools cannot provide (C), and to support life-long learning (D).

One district school board’s document summarized many of the intents, goals, and purposes in the following way: “The out-of-school component should allow students to develop work-related and problem-solving skills; to acquire knowledge, skills, and attitudes related to the in-school course; and to gain self-confidence and maturity in an adult environment” (A). The same document provided a summary for students under the heading *Benefits to You*: “Co-operative Education ensures that the out-of-school learning enhances your educational experience.” The benefits were elaborated:

Co-operative education: provides assistance in making career decisions; develops confidence and a positive attitude; develops interpersonal and communication skills; facilitates the tran-

sition from school to work; provides references for future employers; increases the opportunity for acceptance into post-secondary school and apprenticeship programs; permits training with equipment not readily available in the school; allows for valuable training by experts in the field; provides an alternative method of earning credits. (A)

(3) Evaluation

The analysis framework prompts the researcher to record the “kinds of intents that are explicitly evaluated; if none, say none.” Most documents devoted little space to specific procedures or policies for evaluation of the range of intents, goals and purposes stated. In two cases, there were no stated methods of evaluation for co-op education programs (H, F). When evaluation was mentioned in other documents, policies were aimed at a range of participants (e.g., instructions for teachers and workplace supervisors), but no document included references to the evaluation of intents by all stakeholders or to evaluation of all components of co-op education. One board recommended continuous program evaluation in the section entitled “Evaluation,” which focused on evaluating student performance in the workplace (A). No procedures were suggested for program evaluation here or in other parts of the document.

The in-school and out-of-school components of co-op education programs represented separate credits in some school districts and, in general, assessments were focused on student performance in both settings. Even in documents that stressed the academic component of co-op education, evaluation policies were aimed almost exclusively at the workplace component of the program. For example, evaluation was based on “three formal, written performance appraisals per individualized training plan.” The final grade also included results from “students’ weekly logs and journals; tests; assignments; preplacement orientation; teacher’s observations, anecdotal and monitoring reports” (A). Tests and assignments might have referred to the academic portion of the program,

but these were not linked directly to academic intents stated in the document. Most documents included references to specific workplace performance-oriented evaluation forms (e.g., “employability profile”). It is not clear how such forms of evaluation address stated intents like enhancing career decisions; rather, it appears they evaluate only student attitudes and workplace skills.

Three documents contained fundamental contradictions about the purpose of and responsibility for evaluation (A, G, D), and these contradictions were implied in other documents. The challenge appeared to lie in assessing learning in co-op experiences flexibly to honor differences in workplaces while maintaining consistency with evaluation in other curriculum subjects. On one hand, teachers could develop “individual evaluation procedures” for students in co-op education. Yet “The procedure for the evaluation of the achievement of Co-operative Education students must comply with the school’s existing policy for evaluation of the achievement of all students, including requirements regarding methods and frequency, and must be stated before the program begins” (A). Similar confusion appeared about who was responsible for evaluation: “while the students’ performance at the training station must be evaluated by the teacher in conjunction with the training station supervisor, it is the teacher who is responsible for the student’s final mark” (A). These contradictions in evaluation policies raise questions about the relative importance of the competing intents suggested in the previous section, and raise concerns about whether school officials and other parties have clear purposes for co-op education.

Kinds of Learning

(4) General Workplace Entry Preparation

Under this heading, the analysis framework prompted the researcher to seek examples of learning about the letter of application, résumé, appearance, punctuality, attendance, interview skills,

Table 1
Summary of Analysis of Curriculum Documents in Co-operative Education

Aspect of Curriculum	School District Documents which Included Aspect or Summary of Analysis
Description of Document	
(1) General features	Varied, e.g., length ranged from 5 to 131 pages
(2) Explicit intents, goals	Most common: career preparation
(3) Explicit evaluation of goals	A, B, C, D, E, G, J; Contradictions in: A, G, D
Kinds of Learning	
(4) General workplace entry prep	20 hour orientation: A, B, C, D, E, F, G
(5) Preparation for specific worksite	None
(6) Academic content by experience	A, B, C, D, E, G, J; Learning outcomes for subject: D, G
(7) Career awareness	
(a) Self-awareness	A, B, C, D, E, F, G, H, J
(b) Career exploration	A, B, C, D, E, F, G, H, J
(c) Future employ/educ	A, B, D, E, G, H, J
(8) Personal growth and maturity	A, B, C, E, F, G, J
(9) Reflection on what is learned	Integration sessions: A, B, C, D, E, F, G, H, J
(10) Hidden curriculum	
(a) Attendance	A, B, C, D, E, F, G, H, J
(b) Prep for citizenship	None
(11) Training plan	
(a) Indiv training/learning plan	A, B, C, D, E, F, G, H, J
(b) Reflects acad course goals	B, D, E, F
(c) Reference to IEP	B

Intended Curriculum in Co-Operative Education

Table 1 (continued)

Summary of Analysis of Curriculum Documents in Co-operative Education

Aspect of Curriculum	School District Documents which Included Aspect or Summary of Analysis
Equity and Diversity	
(12) Reference to equity groups	
(a) Gender	A, B, H
(b) First Nations	None
(c) Racial minorities	A, B, G
(d) Exceptional learners	A, B, E
(e) Students at all levels	A, B, C, D, G, H, J
(13) Preparing for diverse workplaces	G
Qualifications	
(14) Of students in co-op education	A, B, C, D, E, H
(15) Prep of workplace supervisor	A, B, C, D, G
(16) Of co-op teachers, dept heads	
(a) Co-op ed courses	A, C, F
(b) Acad course knowledge	B, D, E, F, G
(c) To monitor worksite	H

and safety. Seven documents described a pre-placement orientation with a minimum of 20 hours (A, B, C, D, E, F, G) to take place in the school before the students began work in their co-op placement. The pre-placement orientation included topics such as: health and safety, self-assessment, job readiness skills, labour unions, confidentiality, ethics, and school and workplace expectations.

Our analysis showed that two districts (E, G) evaluated general workplace entry preparation completed in the school before students were accepted into the co-op placement: to gain acceptance into the co-op placement students were recommended by teachers based on the students' maturity, work habits, ability to learn, lead-

ership qualities, and educational background. Document A stated workplace entry preparation was evaluated through weekly log sheets, anecdotal reports, and interviews. Document C included a sample of a student interview evaluation. The other five documents in the sample did not include evaluation of this component.

(5) Preparation for the Specific Co-operative Education Worksite

In addition to the general workplace expectations, each adolescent in co-op education probably enters a specific workplace with unique expectations for learning. There was no mention of specific worksite preparation in the school district documents we analyzed. However, all school district documents in our sample referred to individual training plans that would be developed for each student. There was insufficient information to judge how “individualized” these plans would be. They could include further preparation for specific worksites.

Three documents referred to evaluation of the preparation for a specific co-op education worksite (D, F, G), while the other documents made no reference to evaluation (A, B, C, E, H, J). Document D included a form for the workplace supervisor to evaluate the interview, and Document F included a list of criteria (for the worksite entry interview) under the headings of interview arrival, interview behavior, conclusion of interview, personal characteristics, communication, cover letter, and résumé. Document G stated that evaluation of this component should take place, but did not elaborate.

(6) Learning Academic Content Through Experience

Although seven of the school district documents (A, B, C, D, E, G, J) encouraged students to participate in co-op education as a mode of delivery for all school subjects, only two (D, G) made specific reference to the learning outcomes for the academic subject

area and connected these learning outcomes to the co-op education learning. Eight of the documents (all but F) discussed the importance of combining classroom learning with practical experience to allow students to “explore careers, gain valuable work experience, strengthen employment skills and improve qualifications for future employment” (E). Thus students in Ontario are granted academic credits for co-op education (Ontario Ministry of Education, 1989), while the school district documents we analyzed stressed personal growth and career development above subject knowledge. Only four documents referred to evaluation procedures for learning of academic content—A contained a reference to meeting in- and out-of-school course objectives, B said evaluation must follow the school’s existing policies, D stated “relevant content to each unit is the responsibility of each subject writing team,” and G suggested that individual training plans should include individual evaluation criteria.

(7) Career Awareness

Self-awareness. The framework for analysis provided the following examples for this topic: enhance student awareness of career options and of the diversity of and reality of careers. Three main themes emerged from the analysis of career awareness. The first theme, providing opportunities for personal awareness, emphasized enhancing self-confidence and self-reliance, exploring personal interests, aptitudes, abilities, and values, and focused on fostering the learner’s emotional, social, physical, and moral development. The documents suggested that when students increase self-awareness they are better prepared to make career choices and to engage in careers in the future. This theme was apparent in all the school district documents sampled.

Career exploration. The main concepts within this theme of facilitating students’ career exploration were (a) providing resources about potential careers, (b) providing opportunities for exploring diversity and options in career choices, and (c) assisting

Hutchinson, Munby, Chin, Edwards, Steiner-Bell, Chapman, Ho, and de España

students make wise career decisions. Although this theme was emphasized consistently across all the school district documents, there were no explicit descriptions of how this kind of learning was to be assessed.

Helping students achieve future employment or education. This theme focused on strengthening personal and employability skills that would assist students attain personal goals for both future employment and higher education. This third theme in career awareness was not strongly emphasized but was suggested in seven of the school documents (A, B, D, E, G, H, J).

Only two documents specified how career awareness was evaluated: student assessment on the basis of in-class assignments, co-op writings, and positive participation in class (B); feedback from parents and students on enhancing career awareness, and learning new skills for future employment and education (G).

(8) Personal Growth and Maturity

Enhancing personal growth and interpersonal skills was a main theme in seven school district documents (all but D and H). These seven documents referred frequently to co-op education providing opportunities for students to improve self-confidence, maturity, and attitude, as well as to develop leadership skills. Three documents emphasized this theme throughout (C, E, G). Personal growth and maturity specific to preparing students for successful entry to the world of work were discussed in two documents (C, J). These documents included discussion of developing employment skills and knowledge, as well as appropriate expectations and attitudes for entering the workplace shortly after the co-op education experience.

Evaluation of personal growth and maturity included the assessment of the quality and quantity of work completed in the workplace, job skill development, interpersonal skill development, flexibility/adaptability, attitude, attendance, and reliability. These

assessments were usually conducted by workplace supervisors and less frequently by the co-op education teachers. Rating scales and anecdotal comments were the most common formats for these evaluations.

(9) Integration, Reflection, Review

The framework recommends that the researcher look for evidence that students were asked to engage in integration (a term used in many documents), reflection, and review about what they were experiencing and learning and to show self-awareness of their learning. All school district documents sampled emphasized the use and importance of “integration sessions” for linking work experiences with classroom instruction. A minimum of 15 hours (E) and of 10 hours (D) of integration sessions per credit were required in two documents. Four documents specified a minimum of 5 hours for “integration sessions” (A, B, C, G). The classroom experience that was linked to workplace experience was focused on career preparation rather than the academic subject in which the credit was earned.

Reflective learning, defined as “the process by which students become introspective” (C), was discussed in eight documents (A, B, C, D, E, F, G, J). Reflective learning was expected to facilitate learning and personal growth, and to encourage students to share and analyze their work experiences with teachers and peers. Three documents (A, F, J) mentioned the importance of teamwork among teachers, workplace supervisors, parents, and students. Communication between teachers and students was encouraged to ensure students were informed about and were reflecting on their progress in the program.

Evaluation of integration and reflection was based primarily on students’ journals and reflective writing assignments, portfolios, group discussions, and group presentations. The documents suggested that workplace supervisors and teachers jointly assessed stu-

dents in these areas, although journals, reflective writing assignments, and portfolios were submitted to teachers while group discussion and presentations were held in integration sessions at the school.

(10) Hidden Curriculum

Our analysis of the nine school district documents for co-op education suggests that what we usually consider to be the “hidden curriculum” forms, for this curriculum subject, a large part of the “intended” or explicit curriculum. Within schools, the overt curriculum concerns subject matter and the hidden curriculum is typically associated with compliance, attendance, and punctuality. All the school district documents sampled made explicit references to mandatory attendance by the student at the co-op placement. Six emphasized that it was the student’s responsibility to notify the workplace and school prior to an absence from the placement (A, B, C, D, E, H). Four documents (A, B, D, E) included attendance, appearance, co-operation, reliability, ability to follow instructions, and health and safety issues in the pre-placement curriculum, the integration activities, and the individual learning plans. There were no explicit references to co-op education as preparation for citizenship.

Logs of workplace attendance, performance reviews, and other forms of monitoring at the workplace were the principal modes to evaluate the learning of the hidden curriculum. Interestingly, student difficulties in the workplace were described (in documents for C, D, E, G) as resulting from lack of interest, lack of initiative, or poor attendance rather than from lack of specific knowledge or skill, or from insufficient academic background. The strategies recommended for dealing with these workplace problems were increased monitoring and counseling and, if necessary, removing the student from the placement. Remedial teaching in the curriculum subject for which the credit would be granted was not mentioned in any of the documents. Surprisingly, the typically “intend-

ed” curriculum of the classroom—academic or subject area knowledge—is suggested but *never* assessed and does not appear in the discussion of student learning difficulties in co-op education.

(11) Training Plans for Students

All documents in our sample referred to individual training or learning plans. There was considerable variety in the specificity of these references. Four documents (B, D, E, F) stated that the generic learning or training plan should reflect the course objectives stated in the curriculum guideline for the academic credit to be earned. These four documents (B, D, E, F) also specified that the following must be included in the Individual Training Plan: name of Ministry document on which course is based, course code, credit value of course, grade and level of difficulty, out of school objectives, evaluation practices, tasks to be completed, and time allotments for these tasks. Four documents required that students be monitored and appraised regularly: three times per credit, once every 40 hours of the placement, or at three-week intervals (B, C, D, E). Two required that teachers holding qualifications, in the subject area of the credit granted, participate in developing the learning plan (B, E). The individual training plans or learning plans were not described thoroughly in these documents and there was little to identify what made them *individual*.

The analysis framework contained a specific prompt for references to Ontario’s Individual Education Plan (IEP), because the *Individual Education Plan (IEP) Resource Guide* (Ontario Ministry of Education, 1998) now requires an individual transition plan for any exceptional, secondary student, in addition to the student’s IEP. Our previous analysis of the provincial and territorial co-op education documents (Hutchinson et al., 1999) suggested that only about half of them contained explicit references to the need for equitable co-op education for exceptional students. While all documents in our sample of nine from Ontario school districts referred to training plans for students in co-op education, usually calling them indi-

Hutchinson, Munby, Chin, Edwards, Steiner-Bell, Chapman, Ho, and de España

vidual training plans, only one (B) referred to IEPs for students who had been identified as exceptional students. This document (B) described the process that should be followed to choose these modifications, based on the student's IEP. Some of the other documents included sections on modifications for exceptional learners but did not include references to the IEP, and these are discussed under the topic of equity, below. Because the IEP had only been mandated in Ontario a year before this analysis of documents began, it is not surprising that there were few references to the IEP. However, this will become a major concern if amalgamated school districts continue to use existing co-op education documents, or make minimal changes to existing documents to reflect only new policies in co-op education, without incorporating changes from other documents like the *IEP Resource Guide* (Ontario Ministry of Education, 1998).

Equity and Diversity

(12) Equity

The framework for analysis referred to the four equity groups that have been the focus of equity issues since the passage of the Canadian Charter of Rights and Freedoms (Government of Canada, 1982)—women, visible minorities, First Nations, and persons with disabilities. These four groups were also the focus of our analysis of provincial and territorial documents on co-op education (Hutchinson et al., 1999). Three boards (A, B, G) made general statements that “all students...must receive equal encouragement and support without regard to race, ethnicity, or faith...and programs must avoid stereotyping and type casting” (B). Strategies to help remove these barriers appeared in two documents (A, G). Only two school district documents made no reference to equity issues and did not mention adaptations or special considerations for any of the four groups (D, F). None of the documents named students from First Nations specifically. Three documents (A, B, H) empha-

sized the need to remove gender barriers and to encourage male and female students to explore non-traditional career options in and out of school. “The equal availability of all courses in schools to female and male students is a high priority of the Ministry of Education...every effort should be made to stimulate the participation of both female and male students in non-traditional occupational areas” (B). Document B also listed resources for the pre-placement and integration components of co-op education courses on the topics of women and minorities in the workplace.

Seven documents (A, B, C, D, G, H, J) stated that co-op education courses should be available to students working at all levels of difficulty. Exceptional students are frequently placed in the lower streams. One document (G) suggested co-op as an option for potential drop-outs in grades 9 and 10. Document A included a general statement about encouraging adult learners to take co-op education and about the possible need for adaptations to their program. The only equity group mentioned with reference to program modifications in co-op education was exceptional learners (in documents A, B, E). These three district boards required adaptations to the objectives, supervision, monitoring, and training of exceptional students for the in-school and out-of-school components of co-op education. Two of these documents (B, E) specified that students with special needs could be placed within the home school for co-op education. Only Document B referred to IEP’s and students identified through the formal IPRC process (Ontario’s set of steps for identifying exceptional students is called IPRC or Identification, Placement, and Review Committee).

There were few references to evaluation processes that acknowledged equity issues (only documents A, B). For example, Document A advised, “Teachers should be sensitive to the needs of both sexes when preparing students for placement selection and when working with community employers and training station supervisors,” and B stated, “A variety of evaluation techniques should be considered” for exceptional students in co-op education.

(13) Preparing Students for Diverse Workplaces

Writers and educators (Cox, 1993; Gardner & Tysck, 1994) have suggested that participation in co-op education and workplace learning might help students from homogeneous neighborhoods and schools to prepare for the diverse workplaces they are likely to experience as adults. The sample of school district documents we analyzed did not refer to preparing students for diverse workplaces, although four school districts were in metropolitan areas that could be expected to have high cultural diversity in many of the workplaces for co-op education. The exception was Document G, which came from a district of small towns and rural communities. It suggested, "Resources that provide strategies for dealing with equity issues should be used in pre-placement orientation and integration activities." There were no references to evaluating the preparation of co-op education students for diverse workplaces.

Qualifications

(14) Restrictions on Students Participating in Co-op Education

The framework for analysis named restrictions on who can enroll in co-op education, how many times a student can enroll, and how many credits can be earned. Most documents included the requirement that students reach their sixteenth birthday prior to enrolling in co-op education. Four documents stated that there was no limit on the number of co-op credits that could be earned (A, C, D, H), although one recommended a maximum of six credits (H) and another suggested students should maintain a balance between co-op education courses and other courses (C). Four documents stated that OAC (fifth year of secondary school which is being phased out in Ontario) credits could not be earned through co-op education, but that OAC curriculum could be used to design a training plan (A, C, D, E).

Some school district documents included criteria for selecting

students to participate in co-op education. Two documents said schools determined whether or not students had the necessary educational background and maturity (B, E). Document D listed criteria for selecting students to participate in co-op education that included motivation, understanding of subject area, dependability and initiative, level of self-discipline, attendance, punctuality, deportment, performance, or teacher references.

(15) Preparing Workplace Supervisors

While teachers receive professional education in university settings to prepare them for working with students, how are workplace supervisors prepared to work with co-op education students, and for which of the above curriculum intentions are they prepared? Four documents in our sample made no reference to the preparation of workplace supervisors (E, F, H, J). Five documents included a supervisor's manual (A, B, C, D, G). The emphasis for workplace supervisor preparation was on legal issues, safety, and reporting accidents (A, B, C, D). However, the responsibilities of the workplace supervisor included evaluation of the students (A, B, D, G), developing training plans (A, B, C, D), monitoring students (B), and guiding learning (B, D). It appeared that workplace supervisors were well informed about the legal and technical aspects of their responsibilities, but the manuals included in this sample of co-op education documents did not prepare workplace supervisors for the mentoring, guiding, and evaluating roles many school districts expected them to assume.

(16) Qualifications, Expertise of School Personnel who Teach and Supervise Co-op Education

The documents in this sample showed large differences in qualifications for teaching co-op education. Three school district documents (A, C, F) required co-op education teachers to complete the Ontario Ministry of Education Continuing Education courses in co-operative education (minimum, Part 1 of this three-part qualifica-

Hutchinson, Munby, Chin, Edwards, Steiner-Bell, Chapman, Ho, and de España

tion). Two documents (A, C) stated that the co-op education coordinator for a school district must have specialist qualifications (that is, have completed the three-part qualification). Knowledge of the Ontario Ministry of Education (1989) document, *Co-operative Education* was required in document J, and two documents (E, G) required teachers to have knowledge of co-op education. Knowledge of the subject area in which credit would be granted was required of co-op teachers in five documents (B, D, E, F, G), and a teacher qualified to monitor students' performance at the job site was required in one (H). One document suggested that co-op teachers should be members of a co-op education association (B).

Discussion

Read individually, each document gives a rather unsurprising account of a particular school district's intentions for its co-op education opportunities. But when taken together, a careful document analysis rewards the reader by going beyond the particulars and by identifying internal consistencies and inconsistencies. The analysis also allows us to detect policy drift as policy at one level is recast for use at lower administrative levels.

Issues of Internal Consistency and Inconsistency

Attendance, workplace safety, and legal issues were consistent themes within and across this sample of documents. In contrast, several inconsistencies emerged from the analysis. For example, descriptions of teaching and of learning experiences were vague, while considerably more detail was given in descriptions of evaluations: sample evaluation forms or lists of skills, attitudes, and knowledge to be evaluated were provided when information about teaching and learning was not. Similarly, the set of documents contained few distinctions between general preparation for students' entering workplaces and specific preparation for a student entering a unique workplace. However, students received individualized

Intended Curriculum in Co-Operative Education

training plans with learning outcomes that were described as specific to the student and to the workplace in which that student was placed. Again, descriptions of these individualized training plans were not consistent with descriptions or samples of evaluation forms that were used for all students in co-op education within a jurisdiction. Policy also seems to break down in areas that would appear crucial to successful implementation: there is almost indifference to equity issues and to the expertise one might wish of those who teach and supervise co-op education.

Policy Drift

All nine documents echoed the emphasis of the Ontario Ministry of Education (1989) that co-op education is an alternate mode of delivery for academic courses in the secondary program. For example, one document described co-op education as “subject-based, appropriate for all subject areas” and this connection between workplace learning and academic content guided the choice of workplace (D). But, in three ways, this policy emphasis is found to drift away from the Ministry’s intent toward something else in the more local policy documents. First, it was found that the documents’ discussion of reflection or integration sessions contained nothing to suggest how academic learning in the workplace (e.g., a veterinary clinic) might be related to academic course content (e.g., biology). Instead the focus was on relating what was learned in the out-of-class component (workplace learning through experience) to what was taught in the in-class component: general workplace preparation (e.g., interviews, safety, communication skills). Second, the evaluation forms and descriptions emphasized compliance, attendance, communication, co-operation, and some knowledge of the job (e.g., using equipment), but showed no examples of evaluating subject knowledge. And third, the difficulties experienced by co-op students were described in terms of truancy, or poor attitude, and not in terms of lack of subject knowledge. Furthermore, the local documents’ recommendations for resolving

these difficulties included increased monitoring of these aspects of personal growth and counseling, rather than remediation of inadequate subject knowledge. Overall, specific academic content does not appear to be stressed in the learning experiences of the students despite the Ministry's policy commitment to co-op education as an alternate mode of instruction for academic content. Thus the Ministry's policy emphasis on academic outcomes has drifted to outcomes associated with career education in the district policies.

Conclusion

The social value of co-op education is evident in recent curriculum changes in Ontario, Alberta, and British Columbia (Hutchinson et al., 1999) and in the *Employability Skills Profile* of the Conference Board of Canada (McLaughlin, 1992). Three of the nine sampled documents contained value statements about co-op education that reflected the value placed on workplace experience for secondary students. Two documents (C and G) went so far as to urge promotion and expansion of co-op education. Importantly, neither statement was accompanied by reasons describing the intended curriculum in co-op education, a circumstance that parallels the motive for our curriculum approach to this area.

By construing co-op education as curriculum, we have been able to analyze policy documents for their inherent curriculum intentions. In addition to consistencies and inconsistencies, our analysis shows that Ministry policy intentions have drifted as school district policy is created so that the subject matter potential of co-op education is underplayed in district policy.

As we pursued the document analysis, we were struck by the large number of references in our notes to the *form* of co-op education and by the relatively few references to the *content* that is taught and learned in co-op education. We are aware that many schools have developed curriculum packages that teachers use in teaching co-op education, and that these include specific teaching

and learning activities. Analyzing this type of curriculum document would supplement the analyses we report in this paper on the intended curriculum of co-op education in Ontario. Equally important will be further detailed observational studies of the co-op education curriculum in the workplace itself. Our preliminary case studies (e.g., Munby, Cunningham, et al., 1998) have suggested that there is much to the co-op education curriculum that warrants close attention.

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Implementing an Assessment Plan to Document Student Learning in a Two-Year Technical College

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Abstract

During the past several years, reports have indicated the inadequate skills of graduates and the changing demands of the workplace. This has prompted the need to develop assessment plans to determine if students have mastered the knowledge, skills, and abilities required to meet the needs of business and industry. This research study describes a process to engage faculty and administration in the development and implementation of an assessment plan to document student learning in a two-year technical college setting. The college's assessment plan emerged with faculty involvement and was not driven solely by administration. Student learning outcomes and assessment measures were identified for 55 associate degree and technical diploma programs at Western Wisconsin Technical College. The most common student learning outcome identified by faculty for 25 of the 55 programs at Western was "demonstrate effective communication skills." The most common assessment measures identified by faculty included performance tasks, portfolio, and checklist.

As a result of increased calls for institutional accountability in general and continuing emphasis on assessment of student learning

in particular, higher education, including 2-year technical colleges, has been actively engaged in focusing its efforts to implement effective assessment programs. Student learning outcomes are rapidly taking center stage as the principal gauge of higher education's effectiveness. Student learning outcomes are measures of how a student's college experience supported their development as individuals (Frye, 1999). Outcomes include the knowledge, skills, and attitudes that determine what students know now that they didn't know before their college experience. Assessing student learning outcomes denotes any process used to gather data in order to make a judgment about student learning (Glatthorn, 1999). Ewell (2001) suggests, "assessment of student learning outcomes is most appropriately defined...as the processes that an institution or program uses to gather direct evidence about the attainment of student learning outcomes, engaged in for purposes of judging (and improving) overall instructional performance" (p.7).

Assessment measures are designed to determine whether student learning outcomes have been achieved. Academic units use a variety of assessment measures. The measures identified reflect differences within program areas, faculty members and their experiences, and constraints within a department or college. In the case of two-year technical colleges, the need to identify student learning outcomes and assessment measures comes partly from policymakers, who believe it is essential to measure the degree to which students have mastered the knowledge, skills, and abilities necessary to obtain successful employment after graduating from a two-year college program (Stecher, et al., 1997). "Employers and elected officials have never been clearer in their demand that the graduates of America's colleges and universities should possess an increasingly specific set of higher order literacies and communication skills" (Ewell, 2001, p.1).

Purpose and Research Questions

This research study describes the process Western Wisconsin

Technical College (Western), a two-year, Associate Degree-granting institution, undertook to develop and implement an assessment plan designed to document student learning. The assessment plan's key components included three phases: identification of student learning outcomes for each program; identification of appropriate assessment measures and criteria by which student learning could be judged; and use of the assessment information to improve programs.

College leaders believed that identifying measurable student learning outcomes, identifying and using multiple measures to assess those outcomes, collecting and interpreting data from those instruments, disseminating the information about the results in structured feedback loops, and using the information derived from the assessment of student learning to make pedagogical and curricular changes could improve the quality of student learning at Western, thereby enhancing the college's commitment to student success. Two essential elements of this assessment plan included administrative support and faculty involvement. Assessment of student learning was considered an integral component of the college's continuous quality improvement process and a strategy to meet the College's goals.

The process researched in this study aimed to address the third criterion the North Central Association of Colleges and Schools Commission on Institutions of Higher Education (NCA) requires for accreditation: "the institution is accomplishing its educational and other purposes" (North Central Association of Colleges and Schools Commission on Institutions of Higher Education, 1997, p. 65). For the purpose of this study each criterion is examined by patterns of evidence. The patterns are areas of institutional activity or concern related to the satisfaction of each criterion. Within this criterion, colleges are to document the assessment of appropriate student learning in all its programs. Three kinds of student evidence are required:

Implementing an Assessment Plan to Document Student Learning

1. Proficiency in skills and competencies essential for all college-bound adults;
2. Completion of an identifiable and coherent undergraduate level general education component; and
3. Mastery of the level of knowledge appropriate to the degree granted. (NCA, 1997, p. 65)

Specifically, this research study attempted to address the following research questions:

1. How did Western engage faculty and administration to develop and implement its assessment plan?
2. How were student learning outcomes identified within divisions and across all four divisions at Western?
3. How were assessment measures identified within divisions and across all four divisions at Western?

Literature Review

Student Learning Outcomes

Focusing on student learning outcomes creates a paradigm shift from a teacher-centered model to a student-centered model. According to Glenn (2000) a student-centered focus means “creating objectives that identify what students need to *do* to demonstrate learning rather than ones that identify what they need to *understand*” (p. 12). A student-centered environment involves letting go of traditional structures that have been in place in higher education. To do this Cross (1998) suggests “students and their learning should become the focus of everything we do...from the instruction that we provide, to the intellectual climate that we create, to the policy decision that we make” (p. 1).

Developing student learning outcomes requires outcomes that are clearly stated so students know what is expected of them and what they will be able to *do* as a result of the activities completed

that were designed to achieve the learning outcomes. The key word do requires the use of action verbs when developing learning outcomes. Outcomes encompass a range of student activities and abilities and are written in the cognitive, affective, and psychomotor domains (Bloom, 1956).

There are many benefits to identifying learning outcomes. Jenkins and Unwin (1996) assert that learning outcomes:

1. Help students learn more effectively. They know where they stand, and the curriculum is made more open to them.
2. Make it clear what students can hope to gain from following a particular course or lecture.
3. Help instructors to design their materials more effectively by acting as a template for them.
4. Help instructors select the appropriate teaching strategy.
5. Help instructors more precisely to tell their colleagues what a particular activity is designed to achieve.
6. Assist in setting examinations based on the materials delivered.
7. Ensure that appropriate assessment strategies are employed.

The *League for Innovation* identified 21st century skills that students will need to acquire on graduation (Wilson, Miles, Baker, & Schoenberger, 2000). These include: (a) communication, (b) computation, (c) community, (d) critical thinking and problem solving, (e) information management, (f) interpersonal, (g) personal, and (h) technology. The authors argued that community colleges should define student learning outcomes and assessment measures to certify skill attainment.

Copa and Ammentorp (1997) identified learning expectations for two-year institutions that could be written for the college or written as student learning outcomes for a specific program. The

Implementing an Assessment Plan to Document Student Learning

learners exiting from a two-year institution would have competencies in the context of work, family, and community including: (a) function in a diffuse and complex environment, (b) work independently and collaborately, (c) make decisions, (d) use information, (e) communicate ideas, (f) solve problems and take advantage of opportunities, (g) produce results in an area of endeavor, and (h) manage one's own continuous learning.

For the purpose of this study, student learning outcomes are defined as a culminating demonstration of learning as applied in the workplace, and what is expected of the learner who successfully completes all of the course work and learning experiences as part of a technical program (Ruhland, Samson, Brewer, & Hague, 1997). Student learning outcomes are: (a) identified by faculty, (b) validated by employers and advisory committee members, (c) communicated to students, and (d) assessed at program completion (Ruhland, 1998).

Assessment Measures

Following the development of student learning outcomes, the next step is to identify appropriate assessment measures to determine if students have achieved the outcomes. Identifying these measures requires faculty to work together, set common goals and standards, devise methods of assessment, interpret the results, and use the results to improve and coordinate teaching (Holyer, 1998). Assessment has been interpreted as a means to improving (a) student learning; (b) accountability for the quality of learning; (c) traditional and authentic measures of student learning; and (d) measures that show students have mastered the knowledge, skills, and abilities essential for employment.

In 1995 Bragg identified outcomes assessment practices in two-year postsecondary institutions. Bragg defined outcomes assessment as an "evaluative process that determines the results of education at any level, i.e., student, program, or institutional" (p.

23). The primary outcomes assessed were “academic attainment, work skill attainment, and employer satisfaction with the job performance of current students or graduates” (Bragg, 1995, p. 30). Bragg found the most common assessment measures and methods identified included portfolios, capstone (senior projects), exams, and faculty and student surveys.

Using direct and indirect assessment measures and methods enables teachers to determine if students have achieved the student learning outcomes. From a student’s perspective, assessment measures tell learners whether or not they have mastered the knowledge, skills, and abilities that hold students accountable for achievement of student learning outcomes. Assessment measures range from written tests to performance tasks to cumulative portfolios (Stecher et. al., 1997). Direct assessment measures of student learning include:

1. Tests (e.g., commercial; standardized; locally-developed; oral examinations; and national licenses, certification or professional examinations).
2. Competency-Based Measures (e.g., performance appraisals and simulations).
3. External Reports (e.g., senior projects, student exhibitions, performances, interviews, portfolios capstone experiences, and classroom observations). (Assessment Measures and Methods, n.d.; Christopher Newport University, n.d.)

Tests may be given at the beginning of a course or program (pre-test) or at the completion of a course or program (post-test). Tests are a common method of assessing student learning since they take little time to administer, and results are simple to report and understand. Competency-based measures are a form of assessing demonstration of acquired skills. This type of assessment measure is appropriate for “professional training programs with well-defined skill development” (Christopher Newport University, n.d., p. 3). Performance appraisals and simulations provide external and

internal validity of skill assessment. External reports are comprehensive and provide feedback for both student and program evaluation. External reports are examples of alternative or authentic measures. “These assessment measures require students to ‘perform’ in some way—by writing, demonstrating, explaining, or constructing a project or experiment” (What are promising ways to assess student learning, 1996, para. 1).

Archival records, surveys and questionnaires, and interviews are indirect assessment measures. Indirect assessment measures often gather data about a student’s educational experience rather than the knowledge, skills, and abilities acquired from participation in or completion of a degree. Examples of archival records are retention rates, graduation rates, and transfer rates. Surveys and questionnaires can obtain feedback from stakeholders regarding the institution. Interviews provide immediate feedback and are useful when obtaining sensitive information. Indirect measures are sources that “enhance the information gathered from direct measures of a student’s academic achievement” (Assessment measures and methods, n.d., p. 1).

It is important for faculty to understand the different types of direct and indirect assessment measures before they identify the measures that will be used to collect data to report if student learning outcomes have been achieved. “The best assessment at the classroom level generally consists of a combination of several different types of measures that capitalize on the strengths and compensates for the weaknesses of each measure” (VanHuss, 1996, p. 9). Academic units within a college will use different assessment measures. These differences are due to the kinds of knowledge, skills, and abilities students will master and the variations among programs.

Forces Driving Assessment Planning

Assessment Planning

Most institutions of higher education still struggle with creating an assessment plan that works. The assessment plan should demonstrate the quality of education the institution is providing. Students today want a learning experience that is relevant and stimulating. The California State University (CSU) at Chico implemented a student learning outcomes assessment plan in 1995 (Jacob, 1998). “We came to see assessment as an important tool for measuring the success of student learning in our units, and hence the quality of our programs, as well” (p. 4).

A college’s assessment plan should emerge with faculty involvement and not be driven solely by administration. Three questions formed the basis of CSU’s assessment plan:

1. What does it mean to be a in a major, and what should a student in this major know?
2. To what learning processes should the student be exposed to learn those things?
3. How would you assess whether or not the student learned those things? (Jacob, 1998, p. 6).

As a result of the three questions, program faculty refined learning objectives, submitted curriculum changes to support the learning objectives, and identified appropriate assessment measures related to the desired student learning outcomes. CSU’s assessment plan invited faculty members and departments to take ownership of the assessment process and recognize the value that student learning outcomes would bring to the programs. According to Jacob (1998):

The most successful assessment plans are those, which are dynamic in nature. They should include “feedback loops” that identify problems based on measured results, and implement corrections. The assessment plan should remain one in the process of

ongoing change and improvement. (p. 9)

Accrediting Agencies

Regional accrediting agencies continue to encourage the development and implementation of student learning outcomes and assessment measures. In 1989, NCA-approved an assessment initiative for its member institutions to submit plans for assessing student learning (Lopez, 1997). Institutions affiliated with NCA began to develop assessment plans to meet this initiative. The North Central Association of Colleges and Schools Commission on Institutions of Higher Education (1997) states:

The program to assess student learning should emerge from and be sustained by a faculty and administrative commitment of excellent teaching and effective learning; provide explicit and public statements regarding the institution's expectations for student learning; and use the information gained from systematic collection and examination of assessment data both to document and improve student learning. A strong assessment program is founded on a plan that is widely accepted and routinely updated, it is ongoing, and it is related to other planning budgeting processes. (p. 42)

Lopez (1998a) contends that assessment of student learning is key to (1) improving student learning, (2) enabling an institution to verify that it is being accountable to its internal and external stakeholders, and (3) documenting to the general public and interested parties the value of investing in higher education. Lopez suggests that three levels of implementation characterize an institution's assessment plan: Level One: Beginning Implementation of Assessment Programs; Level Two: Making Progress in Implementing Assessment Programs; and Level Three: Maturing Stages of Continuous Improvement. Each of these levels represents an institution's developmental approach to implementing an assessment plan which focuses on the assessment of student learning.

With this policy statement and subsequent requirement by NCA that institutions assess their quality by *directly* assessing student learning, higher education leaders began working with faculty. Professional development opportunities were provided to assist faculty identify student learning outcomes, measure student learning of the outcomes, and use the results for improvement purposes.

Other regional accrediting bodies have responded to sustained public dissatisfaction with higher education by increasing their emphasis on *indirect* institutional integrity and accountability as conditions of accredited status. The Middle States Commission on Higher Education (1996) developed a framework for outcomes assessment, which is reviewed as part of the accreditation process. The framework explains purposes and contexts for the assessment strategies institutions may choose. The New England Association of Schools and Colleges (NEASC) (2001) has eleven standards for accreditation. Standard Four, Programs and Instruction, requires (a) academic planning and evaluation to enhance the achievement of program objectives, and (b) all existing programs include an assessment of their effectiveness and continued need (p. 6). NEASC requires institutions to have a student outcome assessment plan aimed at assessing student achievement. Results from the plan are used for institutional improvement. The Southern Association of Colleges and Schools (1997) has institutional effectiveness as one of six criteria for accreditation. “Each member institution is expected to document quality and effectiveness by employing a comprehensive system of planning and evaluation” (p. 17). The institutions must develop guidelines to evaluate the quality of student learning and employ a variety of assessment methods. Standard Three of the Western Association of Schools and Colleges (n.d.) addresses institutional effectiveness. Within this standard, Section C: Institutional Outcomes Assessment requires institutions to have (a) outcomes and clear documentation of their achievement, (b) planning activities to communicate quality assurance, and (c) review evaluation processes to determine ongoing utility for assess-

ing institutional effectiveness (p. 3).

Faculty at institutions of higher education were given the task of developing strategies to assess student learning on completion of a program. NCA found that faculty and academic administrators typically have needed considerable encouragement, training, and assistance in the following components (Lopez, 1998a):

1. Developing measurable objectives of student learning;
2. Identifying and utilizing multiple measures of student learning to assess those objectives;
3. Collecting and interpreting the data from those instruments;
4. Disseminating the information about the results of assessment in structured feedback loops that provide faculty and administration with timely and useful information on which to base recommended changes; and
5. Using the information derived from the assessment of student learning to ascertain desirable pedagogical and curricular changes and to introduce and evaluate the effectiveness of the changes. (p. 5)

Each of these accrediting agencies has developed criteria based on experience, research, and consultation with member institutions. These initiatives will place pressure on accredited institutions to demonstrate that students have learned what is promised or implied by the catalog's descriptions of academic programs and that continual improvement of student learning has become an institutional priority (Lopez, 1998b). Ewell (2001) suggests, "a range of other forces have stimulated...accreditation's interest in examining student learning outcomes. Foremost among them are rapidly changing modes of instructional delivery and a burgeoning competency movement in corporate training" (p. 3).

Workforce Development Skills

In addition to regional accrediting agencies, researchers have produced numerous reports that define and discuss the skills students need for the workforce and jobs of the future. Skills identified go beyond the technical skills—which continue to be important. Employers are expressing concern from an increasing need for workers with problem-solving, decision-making, and teamwork skills (Conrad, 1999). Educational institutions need to partner with business and industry to ensure that future employees have the essential skills required for today's workforce.

The Secretary's Commission on Achieving Necessary Skills (SCANS) (1991) examined the changes in the world of work and the implications for learning. Five competencies and a three-part foundation of basic and thinking skills, and personal qualities were identified for students preparing for work. The five competencies included: (a) resources, (b) interpersonal skills, (c) information, (d) systems, and (e) technology (Secretary's Commission on Achieving Necessary Skills, 1991). The eight components were considered integral to every student's school life. The competencies and foundations can be used when developing student learning outcomes, and when measured will determine if the student has acquired the knowledge, skills, and abilities required in today's workplace.

Imel (1999) conducted a review of research related to workforce preparation. Skills mentioned most frequently included: knowing how to learn; competencies in reading, writing, and computation; effective listening and oral communication skills; adaptability; self-esteem and initiative; interpersonal skills, ability to work in teams; leadership; and basic technology skills. Recognizing the importance of the skills desirable in workers at all levels of employment contributes to the need for student learning outcomes and assessment measures in two-year colleges across the United States.

Conceptual Framework

The development and implementation of an assessment plan at Western was based on a broader conceptual framework grounded in the theory and practice of Continuous Quality Improvement (CQI). The concept of CQI is connected to the principle of Total Quality Management (TQM). “TQM views outcomes assessment as having a place in determining quality” (Bryce, 1991). TQM focuses on improvement and looks at the effectiveness of the whole system. By looking at assessment measures from student learning outcomes, data can be fed back into the system for overall improvement.

Inherent in CQI theory and practice are certain basic principles that Western already practiced: strong administrative leadership; institutional support for identified priorities; faculty leadership and involvement; and collaborative decision-making. These essential components served as the impetus and provided the focus for implementation of the college’s assessment plan and for faculty and administrative involvement. Because the college had been engaged in CQI efforts for over ten years, faculty did not view implementing the assessment plan as additional work. They saw assessment as part of the commitment they make to student success and to continuous improvement.

Identification of student learning outcomes supports overall program effectiveness, and documents student learning. Essential for any CQI process is a commitment to continuous improvement at all levels of the organization. Western used as its conceptual framework for assessment a model that delineated different levels of effectiveness (see Figure 1). These levels include institutional effectiveness, program effectiveness, course effectiveness, and classroom effectiveness. Central to the successful implementation of an institution’s assessment plan is the belief by faculty and administrators that assessing student learning is not an “add on” but that it is an essential component of the teaching/learning process. Appropriate assessment measures can directly examine and judge a

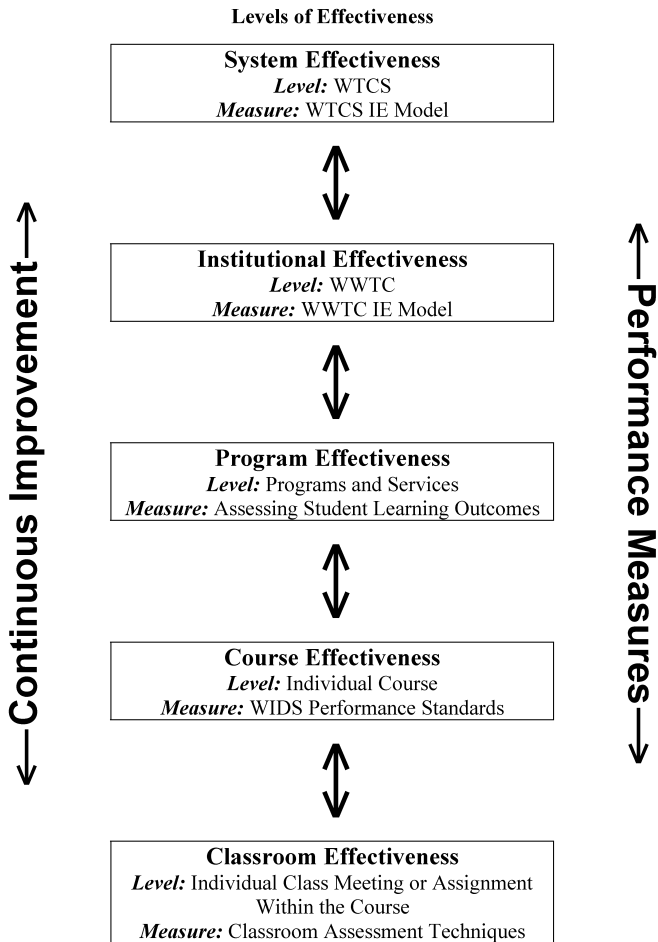


Figure 1. Levels of effectiveness

student's actual performance on significant and relevant tasks.

Methodology

The research methodology used in this study was a case study

that included “multiple units of analysis” (Yin, 1994, p. 39). Data for this study were collected using direct observation and document analysis. Documents along with observation of individuals can be used in a case study (Fraenkel & Wallen, 1993).

Western is one of sixteen publicly funded technical colleges in the Wisconsin Technical College System. Its main campus is located in La Crosse, Wisconsin, and it has five extended campuses that are located in smaller communities throughout the Western district. A follow-up of graduates from 1998 reported 97% of the graduates were employed within six months of graduating, of which 79% were employed in a program-related field. The college offers 37 associates of applied science degree programs; 18 technical diploma programs; 4 certificates; and 7 special certificate programs. Western serves approximately 3500 full-time equivalent students and employs approximately 200 full-time faculty. Faculty are represented by a collective bargaining unit. The College has been preparing students for the employers of the District since 1917. Western has been actively involved in continuous quality improvement efforts since 1987 and has a high level of faculty involvement in decision-making and work teams.

Faculty and administrators participating in Western’s college in-service programs were observed, and documents were analyzed from the 55 associate degree and technical diploma programs. Programs were representative of Western’s four divisions and included 15 Business programs, 5 Family and Consumer Science programs, 18 Health and Human Services programs, and 17 Trades and Industrial Education programs. Faculty teams from each of the program areas identified the student learning outcomes and assessment measures and subsequently provided feedback about program improvement and curriculum changes as a result of Western’s assessment plan.

Procedures

Multiple observations and document analysis were used to collect data for this study. (Yin, 1994). Using multiple methods established construct validity and reliability. Direct observation was used at the College's August 1998 in-service. Researchers observed participants within each program team on how faculty were responding to the activity, their understanding of the student learning outcomes, and how engaged they were in the overall process. At the College's January 1999 in-service, the researchers observed the program teams to listen to the conversations and decisions as to which assessment measures would be identified for each of the student learning outcomes. The direct observation was chosen since this method would least likely affect the actions of the program teams being observed. Direct observation provided data for research questions 1, 2, and 3.

Documents analyzed included: (a) Western's assessment plan, (b) agendas and minutes from assessment committee meetings, (c) agendas, handouts, and minutes from the college's August 1998 and January 1999 in-services, and (d) 55 program documents that identified student learning outcomes and assessment measures. An analysis of each program document provided the common student learning outcomes and assessment measures for research questions 2 and 3.

Results

The first research question aimed at provoking an answer as to how Western engaged faculty and administration in the process to develop and implement an assessment plan. Initial development of the assessment plan was a direct response to NCA's mandate that an assessment plan be submitted. However, the approach used to engage faculty and administration in the process was consistent with Western's approach to all its major initiatives: strong administrative leadership and broad faculty involvement. These two essen-

tial components made implementation of the assessment plan seem like a natural outgrowth of previous work the faculty had engaged in to enhance student success—a critical emphasis of the College.

To begin the process, Western formed an assessment steering committee representing faculty from each of the four divisions within the college—Business, Family and Consumer Science, Health and Human Services, and Trades and Industrial Education. The committee was composed of 12 faculty members and four administrators. The Dean of Business and the Dean of General Education co-chaired the committee. NCA states in the *Handbook on Accreditation* that “the program to assess student learning should emerge from and be sustained by faculty and administrative commitment of excellent teaching and effective learning” (NCA, 1997, p. 42). To embrace the assessment plan early on, faculty needed to be engaged in the process to ensure its legitimacy.

The assessment steering committee met during Spring 1998 to identify Western’s core abilities. Western defines core abilities as broad student learning outcomes, skills, or purposes that are addressed throughout a course and are essential skills for students to succeed both in the classroom and on-the-job. The purpose of identifying core abilities at Western would allow program faculty to focus on student learning outcomes specific to their program. The six core abilities identified included:

1. Demonstrate technical and other occupational skills needed to obtain employment and be successful in the workplace.
2. Demonstrate literacy skills essential to the requirements of the workplace.
3. Demonstrate mathematical skills essential to the requirements of the workplace.
4. Think critically in solving problems and applying knowledge.

5. Demonstrate self awareness and interpersonal skills needed to be a good citizen and work collaboratively with a diverse range of people.
6. Use information technology effectively.

Following this task, the committee began planning the college's August 1998 all day in-service. Western uses an in-service approach to provide additional education, training, and workshops for its faculty and staff. This format is familiar to staff and has been used successfully when the College needs blocks of time to involve faculty and staff in activities. Such was the model used to implement the College's Assessment Plan. Time was set aside to work on assessment during in-service days and during division meetings in the 1998-1999 academic year.

Infrastructures had been developed that facilitated the on-going work of the Assessment Steering Team—release time for faculty to work on assessment activities; use of in-service days to provide training and assistance to faculty; and support for the entire effort provided by one department. This combination of factors and a collaborative environment helped implement the assessment plan.

The second research question focused on determining how faculty and administration identified student learning outcomes for each of the 55 programs at Western. This process also identified the common student learning outcomes within divisions and across all four divisions. The college's August 1998 in-service had two major outcomes: (a) to identify student learning outcomes for Western's 55 programs, and (b) to identify methods to validate the student learning outcomes. The college in-service agenda included: (a) an introduction to and definition of student learning outcomes, (b) examples of student learning outcomes, (c) overview of the validation process, and (d) an activity to engage faculty and administration in developing student learning outcomes. Members from the assessment steering committee facilitated the work groups. A template was provided to list the student learning outcomes for each

program area.

Faculty obtained copies of Bloom's (1956) taxonomy of educational domains. Emphasis was placed on writing student learning outcomes at the most complex level. These levels are covered by the top levels of verbs in each domain (e.g., evaluation, internalization, origination). The cognitive domain includes verbs categorized as application, analysis, synthesis, and evaluation. The affective domain includes the verbs valuing, organization, and internalization. The psychomotor domain includes guided response, mechanism, complex overt responses, adaptation, and origination. Using action verbs from the top level ensures students moving from the most basic to the most complex type of learner action. Following the college in-service, program teams had until October 1998 to identify and submit for review, their student learning outcomes to the assessment steering committee.

After the student learning outcomes were reviewed by the assessment steering committee and discussed with each program team, validation meetings were scheduled to be completed by June 1999. The validation process involved program advisory committee members and employers who met to discuss the student learning outcomes and to make additions to or deletions from the existing list. Following the validation, student learning outcomes were communicated to Western's stakeholders.

The total number of student learning outcomes varied within each of the four divisions and 55 programs at Western. The Computer Information Systems (CIS)—Microcomputer Technician, and the Diesel and Heavy Equipment Technician diploma programs each reported six student learning outcomes. The Human Resource-Business Administration associate degree program reported 20 student learning outcomes. The average number of student learning outcomes by program in each division included (a) 15 student learning outcomes in the business division, (b) 16 in the family and consumer sciences division, (c) 10 in the health and

Table 1
Common Student Learning Outcomes by Division and College

Student Learning Outcomes	B %	FCS %	HHS %	TI %	College %
Demonstrate effective communication (oral and written) skills.	73	100	39	12	45
Demonstrate use of computer tools, software, and appropriate applications.	67	40	11	6	27
Apply legal and ethical principles to personal, social, and professional behavior.	67	40	11	6	27
Function as a team member.	47	0	12	6	20
Establish a safe work environment, adhere to safety procedures.	0	0	17	47	20
Think critically in solving problems and applying knowledge	27	0	17	12	16
Exhibit professionalism.	0	0	11	35	15
Formulate a professional development plan.	33	20	6	0	13
Apply mathematical skills.	7	0	0	22	9
Demonstrate effective presentation skills.	27	0	0	0	7
Apply effective leadership skills.	27	0	0	0	7
Use time management techniques effectively.	20	0	0	0	5

Note. “B” is Business, N = 15 programs; “FCS” is Family and Consumer Sciences, N = 5 programs; “HHS” is Health and Human Services, N = 18 programs; “TI” is Trade and Industrial Education, N = 17 programs; and total college programs N = 55.

human services division, and (d) 11 student learning outcomes in the trade and industrial education division.

Of the total student learning outcomes reported, only 12 were reported as common for the 55 programs at Western. Table 1 lists the common student learning outcomes, by division, and for the 55 total programs. Student learning outcomes are reported in order of

Implementing an Assessment Plan to Document Student Learning

frequency for the total college. Student learning outcomes identified by only one program are not reported.

“Demonstrate effective communication (oral and written) skills” was the most common student learning outcome for business programs (73%), family and consumer sciences programs (100%), and health and human services programs (39%). “Establish a safe work environment, adhere to safety procedures” was the most common student learning outcome for trade and industrial education programs (47%). “Demonstrate effective communication (oral and written) skills” was the most common student learning outcome identified by 45% of Western’s programs.

Some divisions did not report as frequently student learning outcomes that may be interpreted as important for the programs within that division. Only 39% of the health and human services programs and 12% of the trade and industrial education programs reported “demonstrate effective (oral and written) communication skills” as a student learning outcome for programs within their division. The lower percentage may be due to Western’s core abilities that were developed and would be addressed throughout a course. Perhaps faculty felt that “oral and written communication skills” was addressed in the core ability, and therefore did not see the need to include it as a separate student learning outcome for their program.

Programs within a division not reporting any common outcomes may reflect the specialization of those programs. This could be interpreted as the case where the student learning outcomes expected of students who complete an Accounting program (Business division) will not be the same for students completing the Interior Design (Family and Consumer Sciences division), Health Unit Coordinator (Health and Human Services) or Mechanical Design Technology (Trade and Industrial Education) programs. At the college’s August 1998 in-service, faculty was encouraged to identify the student learning outcomes that culminate demonstra-

tion of student learning specific to their program. The validation of the student learning outcomes, likewise indicate specialization by program, thus most program would not have common program outcomes identified.

The ability to “demonstrate effective written and oral communication skills” was the most common student learning outcome reported by the 55 programs at Western. This finding is consistent with the national reports identifying the skills students need (Copa & Ammentorp, 1997; SCANS, 1991; Wilson, et. al., 2000). Of the 12 common student learning outcomes identified, four of the student learning outcomes align with the SCANS three-part foundation: (a) basic skills—demonstrate effective communication skills, and apply mathematical skills; (b) thinking skills—think critically in solving problems and applying knowledge; and (c) personal qualities—apply legal and ethical principals to personal, social, and professional behavior. Four of the student learning outcomes aligned with three of the five SCANS competencies: (a) resources—use time management techniques effectively; (b) information—demonstrate use of computer tools, software, and appropriate application, and (c) interpersonal skills—function as a team member, and apply effective leadership skills.

Results from the third research question describe how faculty and administration identified assessment measures for each of the 55 programs at Western. This process also identified the common assessment measures within each division and across all four divisions at Western. A January 1999 in-service day was scheduled to inform faculty and administration about types of assessment measures and to identify assessment measures for each of the student learning outcomes previously identified during the college’s August 1998 in-service. The college in-service agenda included: (a) an update of student learning outcomes for Western’s 55 programs, (b) examples of direct and indirect assessment measures, and (c) an activity to engage faculty and administration to identify assessment measures for each student learning outcome.

Implementing an Assessment Plan to Document Student Learning

Faculty and administration were reminded that effective assessment measures inform students how well they have mastered the knowledge, skills, and abilities and hold them accountable for achieving learning outcomes. Assessment measures discussed included types of tests, competency-based measures, and external reports. Discussion focused on portfolios as a form of authentic assessment. Faculty already using authentic assessment measures presented examples they used in their classroom. Copies of the authentic measures were placed in 3-ring notebooks and placed in the college library for future reference following the January 1998 in-service. Program teams had until May 1999 to identify assessment measures for each student learning outcome.

Responses to identified types of assessment measures varied within the four divisions and across the 55 programs. Assessment measures are listed alphabetically (see Table 2). Two of the 22 assessment measures identified were indirect measures. Employer survey (17%) and graduate follow-up survey (28%) were indirect assessment measures reported by programs in the health and human services division. Of all the assessment measures identified, a majority of programs within the divisions reported use of at least one authentic assessment measure (e.g., checklist, instructor observations, performance tasks and student exhibition, portfolio, practicum teaching, or simulation).

The most common assessment measure by division was “checklist (lab/performance)” reported by 67% of the business programs and 60% of the family and consumer sciences programs; “professional association/ licensure exams” reported for 56% of health and human services programs; and “performance tasks and student exhibition” reported for 82% of the trades and industrial education programs. “Performance tasks and student exhibition” was reported as the most common assessment measure by 58% of Western’s programs.

Table 2
Type of Assessment Measures

Division Assessment Measure	B %	FCS %	HHS %	TI %	College %
Accreditation exam	0	0	6	0	2
Capstone/clinical experience	13	20	28	35	25
Case analysis/presentations	40	0	6	0	13
Checklist (lab/performance)	67	60	22	18	36
Clinical evaluation forms	0	0	39	0	13
Competency performance sheet	0	0	28	12	13
Employer survey	0	0	17	0	5
Graduate follow-up survey	0	0	28	0	9
Instructor observation	40	20	28	23	29
Internship	7	20	0	6	5
Journals	7	0	6	0	4
Paper-and-pencil test (written exam)	53	40	28	18	33
Peer/self evaluation	7	0	6	0	4
Performance tasks and student exhibition	53	60	44	82	58
Personal interviews	0	0	6	0	2
Portfolio	53	40	33	35	40
Practicum teaching	0	40	0	0	4
Professional association/licensure exam	0	0	56	18	24
Program exit exam	0	0	0	6	2
Simulation (project)	40	20	0	6	15
Student completion of program requirements	0	0	6	0	2
Technical report/project (written)	47	40	6	0	18

Note. "B" is Business, N = 15 programs; "FCS" is Family and Consumer Sciences, N = 5 programs; "HHS" is Health and Human Services, N = 18 programs; "TI" is Trade and Industrial Education, N = 17 programs; and total college programs N = 55.

Summary and Implications for Further Research

The results of this study support accreditation agency requirements for colleges to implement an assessment plan that includes the identification of student learning outcomes.

At the college's August 1998 in-service, time was allocated to engage faculty and administration in a process to have the 55 pro-

Implementing an Assessment Plan to Document Student Learning

grams at Western identify student learning outcomes. At the college's January 1999 in-service, faculty and administration engaged in a process to identify the assessment measures for each of the student learning outcomes that were identified at the August 1998 in-service. The assessment measures would be used in the future to collect data regarding student learning. It was this process that engaged faculty and administration at Western to develop and implement an assessment plan and fostered the identification of student learning outcomes.

Results from Western's assessment efforts over the past three years also identified assessment of student learning at Level Two: Making Progress in Implementing Assessment Programs (Lopez, 1998a), as discussed in the "Accrediting Agencies" section above. Faculty identified measurable student learning outcomes and assessment measures, and in the future they will evaluate the achievement of the student learning outcomes. Level Two is supported by administration and recognizes faculty efforts to implement an assessment plan. Feedback loops are being developed at Western to ensure results of assessment are used to improve student learning. Continued assessment efforts will move the college to Level Three (Maturing Stages of Continuous Improvement), resulting in changes in pedagogy and curriculum, and linking the assessment results to academic program review. The assessment plan is reviewed and updated on an annual basis. When data have been analyzed for all programs, the next step will be to create benchmarks for comparison purposes. It will be imperative to provide documentation of program improvements and the resources needed to continue this effort.

Findings from this study indicate that faculty are moving towards implementing authentic assessment measures to assess student learning outcomes, but common assessment methods consistent with Bragg's (1995) study were also identified in this study. Paper-and-pencil tests were used by 33% of the faculty. However, faculty were using authentic assessment measures—including per-

formance tasks (58%), portfolios (40%), and checklists (36%) to assess student learning outcomes. When using authentic assessment measures, faculty can directly examine and judge the student's actual performance on significant and relevant tasks.

This study focused on describing the process of engaging faculty and administration in the implementation of an assessment plan. Specifically, the study focused on the process used to help faculty identify student learning outcomes and assessment measures. It is recommended that further research concentrate on two different areas. The first area pertains to the feedback received related to the achievement of student learning outcomes, and the second area is to determine what pedagogical and curricular changes have been implemented as a result of the assessment of student learning.

Additional research should be conducted to compare the assessment results with the college's employer satisfaction survey results to determine the degree of alignment between faculty and employer perceptions of student success. In addition, program advisory committee members should be surveyed to determine their perceptions about students achieving the student learning outcomes. It is also recommended that research be conducted to collect student learning outcomes and assessment measure data from other technical colleges to compare and contrast findings on a state level.

Developing student learning outcomes and assessment measures should be a central part of a teacher's professional ethics. As Holyer (1998) argued and this study substantiated, the assessment process requires more than faculty time and additional committee work. It also will involve structural changes in American higher education and the professional self-understanding of faculty.

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What is the Future for Post-Secondary Occupational Education?

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In May 2000, the U.S. Department of Education's Office of Vocational and Adult Education convened a group of community college administrators and practitioners to discuss future trends in post-secondary vocational education (PSOE) programs. Within 15 minutes of the meeting's outset, we reached consensus on two important—and apparently contradictory—conclusions. First, we agreed that one of the core missions of community colleges is workforce development—the preparation of all community college learners for the world of work. A second consensus also quickly emerged that the traditional design concepts of vocational education, while still commonplace on community college campuses, have grown outmoded. Ignoring fundamental changes in the structure of the American industrial economy, traditional vocational education continues to structure itself around “terminal” programs directed at preparing young people for entry-level work. These programs, it was agreed, neglect any connection with those liberal arts classes that develop essential critical thinking skills. Moreover, they fail to provide a seamless curriculum culminating in admission to, and completion of the growing number of career-specific, four-year degrees. Vocational education, observed one participant, “remains the land of the dinosaurs.”

Mounting evidence indicates that community college leaders no longer believe that PSOE programs neither fulfill the workforce development mission of their institutions nor meet the needs of their students and regional employers. In their recent report, *The*

Knowledge Net (American Association for Community Colleges & the Association of Community College Trustees, 2000), ostensibly the chief national voice of the community college, the AACC completely ignores vocational education. While large numbers of the community college administrators attending the AACC's 2000 convention filed panels devoted to future trends in customized training, employer use of the internet, and even the Department of Labor's *Workforce Investment Act*, not a single panel discussed the current state of Tech Prep, and just one or two panels any more than passing reference to the Perkins Act. Clearly, even though most assessments of the skill demands of the 21st century American economy reveal that a prerequisite to high skill-high wage jobs will be a post-high school occupational education, the influence of vocational educators with community colleges appears to be on the wane. Reflecting this trend, many community colleges have created such positions as Vice President for Workforce Development to focus their activities, often by-passing the occupational dean, who remains within the traditional instructional part of the institution.

While this evidence may be too impressionistic to substantiate the declining position of post-secondary occupational education within the community college curriculum, there is little evidence to suggest that traditional vocational education—the preparation of young people for entry-level workplace occupations—is a very strong component of community college offerings. This is disturbing situation. This paper will argue that, both in substance and as a learning system, vocational education should be a significant mission of the modern community college. Moreover, despite the dismal landscape of traditional vocational education, there are small pockets of creative “new” occupational programs on which a future can be developed. Some of the new programs in emerging information technology occupations, allied health, and high-end manufacturing are important to the shape of future community college curricula. In addition, many of the adult education and continuing education programs directed at older individuals reentering the

What is the Future for Post-Secondary Occupational Education?

workforce are important parts of this new system of post-secondary vocational education.

However, if they are to emerge as more than “boutique” offerings, there will need to be a significant change in the present view of vocational education. The main barriers lie within the present organizational conceptualization of the discipline. In brief, vocational education needs to capitalize on the growing consensus that higher education, no less than secondary vocational education, must prepare its students for work. There is a distinct niche for post-secondary occupational education within the workforce preparation area, not separate from it. Post-secondary occupational education must “reinvent” itself—learning the lessons of these programs—if it is to retain its central place in the life of the community college.

There is the conventional wisdom within the vocational education community, viz. that post-secondary occupational education is similar in form and content to secondary vocational education, differing only in the complexity of the material to be mastered by the student. This assumption is simply groundless. The expectations of the market for graduates of post-secondary vocational education differ so fundamentally from those facing secondary education graduates that their traditional relationship—which has contributed in large measure to much of the suspicion and feuding over state and federal resources that has damaged both—must be set aside. In its place, we must come to more fully appreciate both the marked differences (especially the market for program graduates) balanced by their shared goals—e.g., breadth of skills, flexibility, and self-direction. It is these differences that necessitate many of the fundamental pedagogical differences that distinguish secondary and tertiary forms of vocational education and necessitate differences in the form, content, and delivery of instruction.

This paper assumes that most post-secondary vocational education is concentrated in the nation’s approximately 1200 commu-

nity colleges. While the 1998 Perkins Act makes it easier for four-year institutions, proprietary post-secondary institutions, union-run apprenticeship programs, and other forms of post-high school education to receive federal support for vocational programs, the bulk of Perkins support for post-secondary vocational education is still channeled to community colleges. Grubb (in press) reports that of the post-secondary students in vocational education, 78.5% of these students were enrolled in community colleges. And, while 8.3% were enrolled in four-year colleges, these were typically in separate, two-year divisions (as was the case in West Virginia and Ohio). Independent colleges enrolled 11.1% of Perkins eligible students, with the balance enrolled in area vocational schools, many of which are in the process of being reorganized as community colleges.

Increasing Market Heterogeneity for Post-Secondary Occupational Education

When compared to secondary vocational education, the condition of PSOE programs can appear quite sound. As the last National Assessment of Vocational Education (1994) concluded:

Vocational education is a relatively large and stable part of the postsecondary education system, accounting for two-thirds of all students in sub-baccalaureate institutions. Vocational enrollments have been increasing at about the same pace as postsecondary enrollments in general, in spite of rising attendance costs and a declining cohort of college-aged students. (p. 9.)

Furthermore, the NAVE study found that employers had a positive view of post-secondary education and that there was some empirical evidence that PSOE completers received higher wages than community college program completers who failed to complete a vocational program.

At the same time, it should be noted that these generally posi-

What is the Future for Post-Secondary Occupational Education?

tive findings were based on a comparative study of completers of PSOE vocational programs with those who went no further than a secondary-level vocational education. When the educational outcomes of vocational students are compared *within the context of a single institution* to their peers enrolled in transfer programs or customized training and workforce preparation programs for adults, the effects of PSOE programs appears far less positive.

In the 1990's, for example, PSOE program completers have declined despite the considerable growth in post-secondary education. Of all community college students, the portion majoring in occupational education programs decreased from 54% to 49% between 1990 and 1996 (National Center for Education Statistics, 2000). This decline has come despite a significant increase in a general demand for post-secondary education among all American youth over these six years. Whereas, in 1960, 45% of high school graduates entered some form of post-secondary institution right after high school graduation, by 1993 the percentage had increased to 63% (National Center for Education Statistics, 1998).

This shift also reflects an overall change in the studies pursued by students while in high school. From 1982 to 1988, academic or college preparation subjects increased by four Carnegie units, comprising 72% of all the units accumulated by public school graduates. Within the same period, there was an absolute decline in the Carnegie units taken in vocational courses. Wonacott (2000), for example, noted a decline of fully 9%—from 34% to just 25%—among vocational education concentrators (those graduates taking three or more courses in a single vocational program) between 1990 and 1994 (2000). Even more, the diminishing number of post-secondary vocational completers demonstrated a major shift in interest, rejecting programs in trade and industry and business (primarily office-skill curricula) for childcare and education, health care, food service and hospitality, and technology and communications. In general, some form of post-secondary degree is required for admission to this second set of careers (National Center for

Education Statistics, 2000).

About 50% of all college students are enrolled in community colleges. The proportion of associate degrees as a percentage of all post-secondary degrees has increased in the last 30 years from 16.2% to 25%, the largest growth of any post-secondary degree for this period (Wonacott, 2000). Given the increased number of high school graduates who have elected to enter college and chosen the community college as their gateway, it would seem that the future of occupational programs at the post-secondary level is bright. However, the heterogeneity of enrollment patterns among community college students represents major challenges for post-secondary occupational education. In contrast to secondary system, which serves students from diverse backgrounds but of similar ages and with shared educational goals; post-secondary vocational education enrolls students of diverse backgrounds, different ages (and, thus, different life experiences), and a broad range of educational goals. Moreover, while secondary students are united by a shared interest in attending college, Adelman (1992) has found a pronounced diversity in the reasons that bring these students to the community college.

The consequence of these factors is that post-secondary occupational education is required to serve multiple markets, with widely varying objectives. To attract recent high school graduates, community colleges will need to fashion programs that leave students employable should their four-year degree aspirations prove unattainable. At the same time, there needs to be highly defined programs for those adults who are returning to school even though they already hold degrees and are employed. In both instances, the traditional view—inherited from the secondary system—of post-secondary education, characterized by large numbers of full time students marching lock step through graduated programs simply fails as a viable model.

Going further, this traditional view of the community college

What is the Future for Post-Secondary Occupational Education?

curriculum rests on a neatly, and no longer valid, bi-modal distribution of programs. Implicit to this curricular vision is the notion that occupational programs lead directly to employment, while transfer programs lead to four-year degrees. In fact, a growing number of community college students believe that their ultimate educational goal is the completion of a four-year degree *as a means of obtaining a stable, good paying job*. In 1982, less than 50% of community college students expected to obtain a four-year degree. Within a decade, that percentage has increased to almost 70% (Schneider & Stevenson, 1999). A national sample of 100,000 community college students, conducted by the AACC and ACT, found that 60% of the respondents stated their main reason for taking classes was to fulfill occupational requirements (Phillippe & Valiga, 2000). Yet few vocational courses are universally popular. Adelman (1998) analyzed credit class enrollments in the top 25 course categories out of a universe of 873, and found that accounting was the sole occupational course among the top 10 classes, and it enrolled just 2.7% of all students. Further, according to Adelman, only 7 of 25 courses could be truly classified as “occupational.”

On the post-secondary level, changes in the occupational courses taken by community college students have changed based on a number of factors, chief of which is their altered perception of the labor market and its demand for credentials. Between 1990 and 1996, for example, enrollment in allied health programs increased slightly, but the number of majors in business, marketing, computers/data processing, and engineering technologies declined slightly. These trends suggest that despite some of these subjects being in “high demand” fields, students nevertheless believe that a degree or certification from a community college will fail to secure long-term employment in the field. As more occupations in business and information technologies require four-year degrees, students take these programs at these higher education institutions (National Center for Education Statistics, 2000). These national trends suggest that post-secondary vocational education cannot be positioned

as a terminal program if it is to remain relevant to the majority of students who want the flexibility of continuing their education if that is needed to obtain a high paying job.

Yet, despite the evidence that indicates community college vocational students intend to earn baccalaureate degrees, relatively few of them realize their initial intention. Nationally, less than 30% of all college students obtain a four-year degree, and the proportion of community college students who complete a baccalaureate is even less. In his review of community college student transcripts, Adelman (1998) found that as many as 40% of them actually completed fewer than ten-credit hours. Millions of community college students are inconsistent in their attendance, attending classes for a few semesters, and then leaving school for a period of work, only to return to school. Many of these students would be well served by occupational programs, yet, because of the length and requirements of these programs, rarely complete them. Regrettably, there are very few national studies of this “stop-out” phenomenon, to a great degree because the data are difficult to collect and verify and because there is no consensus among academic scholars for defining key terms. For example, how many years must pass before a “stop-out” student should be classified a “new” student? Most community college researchers focus solely upon the number of students who do not complete a degree or certificate and then fail to re-enroll in the next semester. But at Macomb Community College, we recently found that while 25% of the regular student body who failed to return from one semester to the next, over 60% responded in a telephone survey that they intended to re-enroll in some future semester

In the same vocational classroom, today’s community instructor is also likely to encounter other students with very different aspirations and motivations. Many older, already working adults return to community colleges with no other purpose than to complete a limited number of courses that would improve their relative position within the workforce. Many are extremely motivated to

What is the Future for Post-Secondary Occupational Education?

succeed, but, because of deficiencies in their previous formal schooling, often lack basic academic skills and the equally important knowledge of how to successfully access essential campus services, from counseling and child care, to financial aid and tutorial programs. Interestingly, rather than integrate these students into the life of the campus, often they are programmatically marginalized. Programs funded through the Workforce Investment Act, for example, sponsor some of these students, or other governmental programs sponsor some of them. Many of these programs have a work-based component. Most of these programs are maintained outside of the traditional vocational programs, and students are never linked into the traditional programs to continue their job training after they find a job. Institutions find that traditional occupational programs cannot easily deal with the needs of these individuals and establish them as separate entities within the community college (Jacobs, 2000a).

There are individuals who come to community colleges only for vocational courses, but they generally are not younger people in search of their first career. This growing group of community college students have been termed “reverse transfers,” individuals who already hold a college degree but are attending a community college solely to acquire specific occupational skills (Quinley & Quinley, 1998). Yet, most of these individuals attend non-credit classes in part because the tradition credit programs are inflexible to their specific needs. The previously cited ACT-AACC survey of 100,000 students is the first to attempt to collect evidence on continuing education students. It found 28% of the non-credit students attending community colleges already had earned bachelors, masters, or doctoral degrees. Little attention has been paid by traditional vocational education to this growing group of students (Phillippe & Valiga, 2000).

In brief, post-secondary vocational education has been unable to capitalize on the growing number of individuals—both from the secondary schools and older adults—who have elected to return to

school, even though their intentions differ. For the secondary students, the object is eventual employment in occupations that require a four-year degree—and they will therefore tend to by-pass traditional, terminal post-secondary occupational programs that fail to prepare them for that degree. The object of the returning adults, by contrast, is the acquisition of specific skills in the shortest possible time. They have little interest in vocational education's structured degree programs. Because post-secondary vocational education has been unable to successfully address the needs of these two groups, it has been unsuccessful in increasing its enrollments. This is particularly disturbing because for both of these groups, the real interest in post-secondary education has been to increase income—which post-secondary occupation education does appear to deliver. From both national studies and from state and local studies carried out with new data sets, the evidence is that individuals with associate degrees earn from 20 to 40% more than individuals with high school diplomas; even those with certificates earn perhaps 5 to 20% more than high school graduates (Grubb, 1999).

Workplace Changes and Vocational Education

The other student market that has eluded post-secondary occupational education is incumbent worker training. One major trend in the “new economy” is significant growth in company-sponsored tuition programs and specific training and education programs (Osterman, 1999). Many companies have turned to community colleges because of their proximity and flexibility. Post-secondary vocational education has only marginally benefited from the enormous growth in incumbent worker training. Survey data indicate that over 90% of all community colleges engage in customized training (Grubb, 1996). In some industries, firms have developed a regular pattern of using customized training programs at community colleges (Dougherty & Bakia, 1999).

Many of the customized training programs use traditional com-

What is the Future for Post-Secondary Occupational Education?

munity college vocational instructors; however, in most cases these programs are designed and developed by administrative units that operate independently from traditional vocational education divisions. They are often reflected on organizational charts by such titles as “Customized Training Services” or “Continuing Education,” and they work closely with the local business community. Often, the staff assigned to these units have high visibility within the private sector community and maintain the ties between the institution and the local private sector. The development of these units has been documented many times—including their lack of sustained ties with traditional post-secondary vocational education (Grubb, Badway, Bell, Bragg, & Russman, 1997). As a result, not only are program enrollments adversely affected, but also the transmission of leading technology issues, implementation issues, and individual corporate contacts are made readily available to the faculty within a community college’s traditional program.

It is unlikely that large numbers of incumbent workers will be attracted to traditional vocational programs. Incumbent workers are unlikely to be attracted to introductory courses of the community college programs. While they sometimes need cross training or specific skills training, they are normally attracted back to school to increase their understanding of specific competencies or to further specialize in particular areas that are often beyond the capacity of traditional vocational programs designed to prepare students for entry level work.

However, the problem is not simply the growth of customizing training units outside of traditional vocational education. Increasingly, employers are demanding new curricula that include skill standards and perhaps even vendor-specific certifications that are not typically included in traditional curricula. These employers simply do not trust the traditional, faculty-developed curriculum will meet their needs. Especially in the area of information technology, these certification programs have become important new forms of occupational education for thousands of adults seeking

career changes (Adelman, 2000). The National Skill Standards Board (1999) release of the manufacturing skills standards also underscores the desire of employers to encourage the development of curricula responsive to their own needs, not waiting for educational institutions to develop programs.

The impact of these new forms of credentials is only beginning to be felt at community colleges. But they call into question not only traditional occupational programs and courses, but who bears responsibility for producing the curriculum and the role of the faculty in the assessment processes. The traditional model of the faculty developing the curriculum and assessing student progress with tests of their own design, leading to the award of a degree or certificate is being substituted for one in which industry develops the skill needs and even the certification test—which becomes the standard for the job. In this approach, faculty teach to the standard and “coach” students through an externally developed test. They are not part of curriculum development or validation process. It will require a different perspective for vocational education—not entirely foreign, since many parts of allied health programs have used this approach. National post-secondary occupational organizations have recognized this trend and are attempting to develop institutional alternatives, but the bulk of the curriculum process is embedded in more traditional concepts (Carter, 2000).

Finally, there is the dilemma of how well post-secondary education is tied to its secondary counterparts. On the one hand, there is little recognition on the secondary side that a tie should exist, let alone the understanding that post-secondary’s role with industry might place it in a position to give information and direction to the development of secondary vocational programs. Especially at the state level, many secondary vocational educators appear determined to maintain as much control over Perkins Act funds and as a consequence appear oblivious to the need for a post-secondary component in most all of their occupational programs. Perhaps because of this, ties between the two subsystems are fragile, at best.

What is the Future for Post-Secondary Occupational Education?

Tech Prep programs and some School to Work programs have served to encourage such connections, but their impact has been extremely limited. One of the hallmarks of these programs has been articulation agreements where normally some credits are granted by the post-secondary institution for high school work. National studies of even the most effective Tech Prep programs revealed little actual use of these agreements by students (Bragg, et al., 1999; Hershey, 1998). Still, Tech Prep may be providing the first institutional framework in which entrenched barriers between secondary and post-secondary systems can be broken down, offering great promise for the future (Jacobs, 2000a).

In part the problem is the lack of secondary vocational students because much of that education has been targeted to the “non-college bound.” Thus, secondary vocational education students do not move into complimentary post-secondary programs.

On the other hand, many post-secondary educators remain aloof and isolated from their secondary counterparts, refusing to notice the changes and developments within the secondary system. While programs such as Tech Prep have improved the situation, the two subsystems remain far too separated, with little recognition that many of the students overlap. Without these feeder systems, post-secondary Tech Prep cannot easily appeal to young students within community colleges and is left with an adult market.

A New Occupational Education?

The picture of post-secondary occupational education is not entirely without success stories. One bright spot in this dismal landscape has been in the allied health and nursing areas. Adults, many single heads of household, return to school, master complex math and science classes, and then take a demanding health care program. If they are successful in getting admitted to the program (many of these programs are in such high demand that enrollment is restricted) and complete it, there is an over 90% certainty that

they will pass the state-administered comprehensive nursing examinations and be licensed to practice. Anyone who questions the value of post-secondary occupational education in the lives of people should attend the nursing pinning ceremony at a local community college. These are moving testimonials to the success of community colleges in providing valuable job skills for people. These programs provide entire nursing staffs for many communities in the United States—over 60% of the new nurses in the United States have received their education at a community college (National Council of State Boards of Nursing, 1999).

Similar programs can be found in many other specific areas. Automotive service technician programs designed to combine the interests of automobile manufacturers with labor demands of local dealers can qualify many young people for employment and establish them in a career pathway for high-skill, high-pay work. Moreover, these programs are successful in combining secondary and post-secondary degree programs and a seamless transition into the world of work. They also have a strong business-led organization—Automotive Youth Educational Systems (AYES)—that aids in guiding the process for most dealership programs (Automotive Youth Educational Systems, 1999).

Another major trend has been the growth of “special programs or projects” within community colleges that maintain the characteristics of the “new vocationalism.” These programs promote academic and vocational integration, emphasize student success in careers, and provide individualized counseling. Many leave open the baccalaureate option and develop a curriculum that reflects input from the private sector. Many of these programs are in such highly specialized areas as biotechnology, environmental sciences, high-level computer aided design, and information technologies. Some have been funded not by Perkins funds, but through the innovative Advanced Technology Education (ATE) program administered by the National Science Foundation. While many of the “new vocationalism” programs are extremely costly to maintain, and

What is the Future for Post-Secondary Occupational Education?

often receive some criticism from their institutions for draining off funds from the “regular” programs, they do result in students getting jobs in highly skilled, well-paid occupations. Many of these require a four-year college degree, and are the envy of the rest of the institution. (Grubb, et al., 1997).

Another significant area for post-secondary occupational administration are the cooperative education and apprenticeship training programs. Institutions can capitalize on their relationships with local firms and obtain not only work-based learning experiences for students, but often establish long term employment pipelines into firms. Both young and mature students are attracted to these programs because students specifically learn to do jobs. These programs maintain good enrollment, particularly during periods of relatively high unemployment. In addition, cooperative education programs have close ties with four-year institutions that practice cooperative education; thus making it possible for students to simultaneously achieve the twin goals of securing a high-paying job and a four-year degree. However, the programs are often considered costly to maintain by community colleges and therefore often not supported adequately.

In many of these new programs, there is recognition of the impact of pedagogy on the delivery of good post-secondary vocational education. Within the occupational areas of community colleges are some of the finest teachers who can interrelate classroom and practical hands-on learning experiences. As Grubb (1998) notes, “occupational teaching is rich and complex. It incorporates a greater variety of competencies than academic instruction, and it takes place in more varied settings including workshops with a bewildering variety of activities” (p.137). Many students, particularly those that did not do well in traditional lecture programs, can flourish and develop in courses that use hands-on learning. However, few community colleges, even those committed to curriculum integration concepts, have supported those teachers’ occupational teaching styles or attempted to use them as models of stu-

dent success for all teachers to follow. This may be a glaring “missed opportunity” in the area of post-secondary education.

Disciplines Within Vocational Education?

What holds back post-secondary occupational education? Why, in the past two decades of community college growth and expansion, have post-secondary vocational education programs stagnated or declined? Moreover, what can it be done that will aid in the process of restoring this important component of community colleges?

Part of the decline in relevancy for post-secondary vocational education rests in its failure to adopt an academic model to organize its knowledge. This has become a barrier to rapid changes in curriculum that can reflect the continuous changes in the work process. While the various academic disciplines—philosophy, economics, biology, etc.—are founded on permanent bodies of knowledge which claim no particular linkage with a specific vocation, the vocational disciplines—welding, accounting, machine tools, etc.—are particular technologies linked to an occupational process. As the process of work organization is altered, the specific technologies must change. Thus, the specific skills of welding not only change, but also the relationship of welding to the process of metal forming, even to the general production of the final good, might also be altered through new inventions and applications. The skills associated with the area are necessary to be learned and mastered, but whether these skills will lead to employment is altered by factors beyond the control of the learning institution. Thus, in the business area, shorthand remains a useful skill but *as a condition for obtaining a clerical job*, has almost disappeared.

Because academic disciplines have never claimed mastery is related to a specific practice of work, they often escape any need to define their relevance in terms of preparation for occupational achievement. That is not the case for occupational programs that

What is the Future for Post-Secondary Occupational Education?

justify their existence as relevant to students in obtaining an occupation. Thus, shifts in work processes and technology much more profoundly affect these areas. In brief, vocational education as a discipline is continually challenged to sort and re-sort its subject matter based on *an external standard: mastering these skill sets will lead to a job*. It is not timeless knowledge, but linked to specific process and technical change.

Furthermore, it is not simply mastering the technology that is important to vocational education students, but incorporating the particular processes embedded within the work organization of a firm. Computer Aided Design (CAD) is used in design, machine tool operations, film making, and other areas, but it is used differently within these industries. Thus, to learn CAD is to learn CAD as a particular tool with particular processes of work-based implementation that is necessary to master. To learn about the technology is also to know about the specific use of that technology within a particular cluster of firms or business organizations (Arnsdorf & Jacobs, 1990). The recent Perkins Act use of the term “all aspects of the industry”—which has often meant that students in the construction trades might take courses about meeting environmental issues within construction—does consider this approach. However, only a small minority of programs are actually using this approach in the development of programs (National Assessment of Vocational Education, 1994).

Some emerging technology areas such as informational technology complicate the issue further. It is common within this industry to find communication devices and computer protocol software that is unique to specific applications and increasingly controls the specific processes used at the workplace. It is certainly possible to master the skills of a computer operating system, but it makes almost no sense to learn this process unless one learns Windows or Microsoft Word. In other words, the wall between training and education becomes permeable when specific licensed vendor applications replace or control the general system (Adelman, 2000).

Different companies adopt these vendor products and then search for individuals who have mastered the technology. Thus, for a community college to teach CAD programs that will be successful in developing the skills students will need to work within the auto industry, they must refer to the specific systems that are used by the Original Equipment Manufacturers of General Motors, Ford Motor, and DaimlerChrysler. While learning one application establishes the basis for learning the other, it very difficult to get a job unless an individual masters at least one vendor-specific software package. For community colleges it means maintaining more than one set of equipment and instructors capable of teaching different systems further complicating the delivery of occupation education. Not only are technologies implemented differently *within* individual firms, but also much technology is dependent on process and implementation within the parameters of a specific industry. A characteristic of private capital is for firms to distribute themselves within clusters of firms who develop and utilize similar products and implement similar processes to make products for their customers. These “clusters” of firms develop their own labor markets, with specific skill set demands and even occupational names and titles. For example, an electronics technician within the informational technology industry in northwest Washington will be asked to undertake different tasks than an electronics technician working in the hospitality industry in the South (Rosenfeld, 2000). Thus, relevance of subject matter has an important community or spatial dimension. Those who fashion a vocational curriculum must understand what are the commonly agreed on local private sector distinctions in the use of technology. For post-secondary occupational education, the issue must be relevance within a specific local industry or local process, since it is reasonable to assume that most students are being educated for jobs within their communities. Thus there is an often-overlooked distinction between vocational education and many traditional forms of liberal arts education. The specific “body of knowledge” to be mastered in vocational education

What is the Future for Post-Secondary Occupational Education?

is far more transitional and dependent on specific contextual situations than non-vocational programs. More importantly, while the academic disciplines control the body of knowledge they teach, the vocational curriculum is determined by the demands of stakeholders outside of the institutions —firms, students, and professional associations. The rapid and continuous change in technology requires considerable effort to maintain currency within the specific skill sets to be mastered, the implementation paths selected by the industry, and the individual vendor offerings. This is not an easy task. Yet, in almost all post-secondary institutions the organization of vocational education departments mimics their academic counterparts. Thus, a community college may maintain departments of welding, floral design, or marketing, giving the false illusion that the knowledge contained within them is somehow as stable and under faculty control as it is the case in academic departments.

The fact that vocational curriculum is externally dictated makes the issue of “maintaining relevance” central to the success of post-secondary occupational education, even more so than that of secondary education, which can claim only to teach some introductory or basic fundamentals. At the post-secondary level there is the belief, maintained widely by teachers, administrators, and students, that mastering of this information should lead to a job. Few people take advanced welding classes so they can increase their capability of making welded Christmas presents for their relatives. Thus, unlike the academic area, it is essential that whatever be taught meets a relevance test that is externally validated.

In summary, the disciplines of post-secondary vocational education suffer from two overriding problems. The first is how vocational education is structured within the traditional community college. As described here, post-secondary vocational education differs from post-secondary academic education in its need to be relevant and to develop specific occupational skills. Yet, post-secondary vocational education operates within an overall administrative structure that limits its ability to be nimble and adaptable to the

needs of the marketplace because it is expected to behave and function like the academic program areas.

Because vocational education programs are embedded in a traditional education bureaucracy, it is difficult to make the rapid changes required if these programs are to be kept current with industry. Many programs simply cannot keep up to date. One result is the continued offering of courses and programs for which there is little industry demand even though there may be significant occupational openings. For example, there are well known shortages of electronic technicians, but enrollments in electronic programs continue to decline. Machining programs are being terminated in many community colleges while firms are hiring college degree individuals with computer skills and teaching them to become CNC programmers. While many colleges struggle with low demand and low enrollment programs, demand for industry specific training in emerging industries is growing. This limits the capacity of post-secondary occupational education to adapt and meet the needs of industry and students. Effective occupational education program development requires the capacity to specialize forums and focus on the core competencies to fit the local labor market needs.

The second overriding problem facing post-secondary vocational education is maintaining administrative and faculty curriculum currency. Faculty need to continually update their industry skills and knowledge, and they need the time to do it. Administrators need to know the technologies sufficiently to manage the development of these areas. Presently, most post-secondary vocational teachers do this on their own time or through extremely intensive use of their work time, and many simply cannot keep up. Administrators rarely receive any specific training in how to manage occupational programs except for in-services on Perkins Act requirements.

Thus, the specific demands on occupational education to be rel-

What is the Future for Post-Secondary Occupational Education?

evant and specific are unlike their academic counterparts. Yet, deployment of teachers and departmental structures are always similar. Time is needed to continually update skills and knowledge of the industry. Moreover, it may not be wise to maintain many programs where it will be difficult to keep pace with industry changes. Thus, why should multiple levels of vocational courses be taught—each given the same weight—in areas where there are few jobs or private sector demand? There is every indication that demand for industry specific training in newly defined functional categories will grow, not diminish. The lack of capacity to cope with these changes is the fundamental reason why vocational education on the post-secondary level continues to decline and become even more irrelevant. It lacks the institutional ability to specialize and develop, maintain, and change its core competencies to respond to constantly evolving local labor market needs.

These pressures have always existed in post-secondary education, but there are two important trends, which are exacerbating the problem. First is the commitment made by community colleges to be comprehensive institutions of learning. Not only has this meant the ability to provide enormous breadth of instruction programs to students and the community, but colleges take on extensive functions and missions—such as economic development—which strain resources and result in institutional conflict (Bailey & Averianova, 1999). For post-secondary education this has meant offering many programs—in health, business, and manufacturing—that require a vast amount of specific knowledge, technical equipment, and high maintenance costs. In large community colleges, there may be 50-75 separate occupational programs to staff and maintain. The occupational dean is forced into the unenviable position of continually dividing up scarce resources among growing numbers of programs, resulting in community college offerings which are unfocused, undefended, and unattractive to the local demand. The strategic response, taken by many thoughtful deans, has been the development of more “partnership” programs with local business and

industry—permitting their needs to drive program changes (Petty, 1999). Yet, this is a demanding strategy in staff time and energy. The price paid for comprehensiveness is very steep in post-secondary occupational education.

Compounding these problems is the growing call for accountability. Occupational educators are now forced to justify their programs within newly developed standards that are producing stress and concern (Mitchell, 1999). Especially in programs sponsored by the Workforce Investment Act and the Temporary Aid to Needed Families (TANF) legislation, the demands on programs to produce job placements and the maintenance of jobs are bringing about enormous strain among the post-secondary units. The debates over accountability have exposed the weakness of the comprehensive approach—and present post-secondary administrators with a stark choice: either they can refuse to undertake some of the activities or concentrate on fewer programs and utilize resources to support them. With these programs not only is the curriculum developed and controlled from the outside; so, too, are program measurement and the process of instruction.

The Emergence of the Sub-Baccalaureate Labor Market

For occupational educators at the community college level, the central area of concern are those occupations which require more than a high school degree but less than a four-year degree: the sub-baccalaureate labor market (Grub, 1996). Most of the national literature on education and training change tends to reflect the demands of the “information economy” or the “high performance workplace” (Capelli, et al., 1997). However, there are particular characteristics which are important to understand among firms that principally hire individuals with sub-baccalaureate backgrounds.

Most importantly is the sub-baccalaureate labor market, which is extremely local in its skill needs, hiring and assessment practices, and wage structures. With the exception of the health care indus-

try—which is heavily licensed—or large unionized industries—where there may exist pattern bargaining contracts that define skill requirements—the sub-baccalaureate labor market is characterized by highly differentiated practices of a number of firms. Employers have skill needs which are highly specific to their industry and the labor market they face. Much of this is learned on the job and within the sector, not outside of it. As a result, management of these firms is much more likely to start a worker at a low wage and advance them when “they see how they perform” within the system. Management depends on references from friends and families for their employees, have recently used contingent workers and employment agencies to screen workers, or hire from each other. Generally, the firms are small and have modest needs for workers. They cannot afford human resource departments nor do they conduct internal training, yet they often need highly skilled, specialized workers. (Grubb, 1996).

A second important dimension of the sub-baccalaureate labor market concerns the validation of the skills for future employees. These firms are particularly concerned that any employee has a knowledge base that can be demonstrated on the job—they are particularly suspicious of degrees or other academic standards. Even for those who have earned a community college associate degree, there is an issue of relevance. How does the firm know that the students have mastered relevant skills? For groups of these firms, educational measurements of success may be less important than some demonstration of competence through a certificate or assessment test. Since they are local, references from particular instructors and other firms become an important way to qualify these individuals. Learning on the job is assumed, but there must be some skilled credentials to know what people can do. It is these firms that have often provided a major impetus to the use of such non-degree certifications as industry based skill standards.

Especially in this sub-baccalaureate labor market, employers want to hire workers with basic skills. Workers will start at lower

wages, but if they succeed in the workplace, there is a fast track for advancement. This may entail further schooling and promotions as the firm continues to advance the worker. But the initial job is often modest, and the employer wants to “look at” how the employee can perform on the job. Thus, there are many very specific and important things that workers can learn only on the job; the issue is, how can the classroom work of vocational education mesh with the learning acquired at the worksite and good liberal arts skills? Outside the allied health and nursing programs, while college programs can determine some forms of placement, the majority of the vocational programs have little real placement to show students.

The failure of vocational education to have a strong work-based component is very damaging to the acceptance of the courses of study by employers and the willingness of employers to hire students with certificates and degrees from these institutions. Thus, outside the apprenticeship programs and cooperative education programs, it is not clear as to the precise economic significance of a vocational education degree for students or employers. Unless individual teachers maintain specific ties with specific firm owners—in a real sense continually marketing their programs and their students—there is little recognition for their graduates.

Some of the concepts of “new” post-secondary occupational education have been developed to tie specific programs to the needs of these sub-baccalaureate firms. Working with firms, some community colleges have designed their programs so that students may “exit” the program and enter firms at different levels in the firms. These have forced the institutions and the firms to develop intermediary organizations to coordinate the activities (Jacobs, 2000b). Others have conducted some innovative work with new forms of college portfolios and comparable forms of assessment that can document for these employers what students have been learning on the job (Mathias, 2000). New curriculum arrangements such as the Associate Degree in Applied Science permits a student to exit into the sub-baccalaureate labor market with a degree, which

can subsequently provide the basis for a future four-year degree (Mundhenk & Burger, 1999). The more community colleges pursue these relationships, the more they appear better able to develop programs that meet the needs of firms while obtaining jobs and careers for their students.

What is to be Done

If these are some of the problems, how do we arrive at solutions? First, it is necessary to recognize that the context of the activity demands specific programmatic strategies, while broader changes need to be undertaken. While it is tempting to call for “systemic change” and propose fascinating new “paradigm shifts,” within the present policy climate such temptations are not only too expensive but also unworkable. Thus, the following assumes major institutional players; present funding streams, and federal priorities remain the same.

Within this context, some short-term steps include:

Concentrate and focus on local sub-baccalaureate labor market needs. There should be a concerted effort within post-secondary occupational education to develop niche market programs rather than comprehensive programs. The niches will be determined by the particular makeup of the local community served by the institution. This may not correspond to the specific service district area, but more closely approximate the regional labor market. Technical training and specialization should only occur within these easily identified clusters of firms, and, if possible, with their direct involvement in the process through a work-based component. Anything less is simply unacceptable for the institutions. The present “disciplines” should be repackaged and reconfigured along the specific needs of the industries, relying on industry developed skill standards within these disciplines.

In all these cases, care should be taken to ensure that critical

thinking competencies, communication, and math are thoroughly integrated within the course perspectives. These will be necessary for those students who wish to pursue a baccalaureate degree.

If at all possible, with the aid of the local industry, career pathways need to be constructed which permit students to advance into a four-year degree consistent with their occupational interests. The goal of the program is to prepare students not for entry-level work within a cluster of firms, but a career that could include advanced degrees. Students may choose not to continue, but the pathway needs to be in place.

The goal is also to distinguish post-secondary occupational education from its secondary counterpart. The task for the post-secondary component is technical competence within a career pathway. It is assumed that some basic orientation to those careers is part of secondary level education. This will free secondary vocational education to be a broader to work processes and occupational goals—and not saddle these institutions with narrow advanced technical training. But this approach means incorporating a far greater skill set within the post-secondary curriculum and the concentration of job-related technical skills.

There are two exceptions to this orientation. First, adults reentering the labor market or coming to post-secondary education as a “second chance” system should be able to use the expertise of post-secondary education to get work. Programs may be non-credit but very targeted at getting a job. Post-secondary administrators in institutional units far more related to specific firms and their needs should maintain these programs. Students who have found jobs can be candidates for regular degree programs, but the goal of these initial programs is entry-level work not requiring any particular college credit.

The second exception is program development for institutions that either do not serve a particular labor market or are in rural and urban settings with very fragile and small labor markets. In these

What is the Future for Post-Secondary Occupational Education?

situations, it is perhaps more useful that post-secondary vocational education become a place where broad orientations to work are taught and mastered rather than a narrow job focus.

Integrate activities within broader workforce development focus. Recognition that post-secondary vocational education plays a role within a broader category of workforce and economic development is needed. Workforce development, in the broadest sense, is the process of preparing the human capital for productive work within a community. In the present application it means community colleges preparing individuals for work under federal programs such as the Workforce Investment Act and the TANF legislation. Vocational education is preparation of individuals with specific occupational skills. It is the specific role of the community college to develop its community workforce and economy. Programs include those that serve specific firms, train incumbent workers (customized), provide counseling (One Stop Centers), or target specific groups such as workers with disabilities. Individuals with very specialized skills often develop these programs within institutions. These are functions for which post-secondary vocational education can provide resources but which they should not attempt to lead because these programs require specific administrative skill sets and organizational positions that would dilute their main mission. Post-secondary education needs to provide the knowledge base of what the local firms want and support the development of these targeted program.

Within this suggestion there is an important formulation. Vocational education is part of workforce development—a particularly important subcomponent. Workforce development increases the performance of individuals at the workplaces. This entails a variety of other activities targeting both individuals and companies. Knowledge of the job is an important component and that is the task of vocational education.

Maintain ties with secondary vocational education. One of the

most important strategies for post-secondary education to add value is through close ties with secondary school systems, and, specifically, with secondary vocational programs. Tech Prep would appear to be a natural program to broaden and expand. However, instead of attempting to articulate programs in broad “disciplines,” i.e., accounting, machining, etc., it might be more useful to structure relationships around real careers within the specific industries found within the community. The knowledge gained by the post-secondary educators’ close interaction with the local firms can then be used to reformulate the secondary programs. It may be possible to add a work-based component to the programs so that high school students and their parents will see a real pathway into the world of work. The combination of secondary and post-secondary systems will then be available to penetrate the labor markets and develop a career path for students who follow a specific program. This would make these programs extraordinarily more attractive. Part of building this relationship is the recognition of specific responsibilities and roles for secondary and post-secondary vocational education. In large measure, the goal of secondary vocational education is to provide entry level and foundation competencies for broad career pathways within local industries. The post-secondary component should build on these with more specialized courses that, if possible, should include a work-based component. This formulation of courses means that the two parts of the system need to target their activities: secondary needs to be broad, emphasizing foundation skills; post-secondary needs to be advanced, teaching skills which lead to real career pathways in local industry.

Understand the importance of college completion. The success of any program is a result of meeting customer needs. If most young students attend post-secondary education because they want a four-year college degree as a means of obtaining a secure job, it is critical to consider this motivation when designing programs and courses in vocational education. It is not wise to build programs around the assumption that a college degree doesn’t matter as much

What is the Future for Post-Secondary Occupational Education?

as skills—something many vocational educators believe. Many post-secondary vocational educators undermine the value of the liberal arts and four-year, degree programs to their students, evidently insensitive to student aspirations. Sometimes this occurs in a very crude fashion when vocational instructors will advise their students not to take the mandatory liberal arts programs until after they have completed their technical course requirements. Rather than disparage liberal arts education, vocational educators ought to help students see how their vocational education program fits together with liberal arts for a coherent program of study.

In most business programs, completion of a four-year degree is mandatory to achieve any form of career pathway. The programs should be designed and marketed with that in mind. Thus, in these areas the issue of articulation is really with a four-year university or college. This orientation should also mean more rapid adoption of curriculum integration tactics and techniques, and perhaps even lead to the realization that the teaching skills of the vocational instructors have a specific place within the programs of study.

Staff development of post-secondary administrators. One aspect of the organizational problems confronting post-secondary vocational education is the lack of local administrative and faculty leadership to manage the process. If there is a difference between vocational education program management and the traditional liberal arts programs as maintained in this article, then how are administrators trained to understand that they must focus their energies on serving local firms in the community? In general, state Perkins requirements call for vocational education administrators to be certified, but that normally means to have a vocational background. This may be necessary, but not sufficient for the new demands of program management and alignment that now will be part of administering these areas. Post-secondary vocational administrators come up from the ranks with little appreciation of these dilemmas. Who will train the vocational administrator of the future? Since many schools of education have virtually ceased supplying

any post-secondary vocational instructors, they are probably not good sources. It is more likely that the training and education practices of leading companies may be potential models for the administrators to follow. Firms that have successfully redefined their organization and culture are models for post-secondary vocational education, their human resource departments and related divisions sources of insight and information for community college PSOE programs.

Conclusion

These are some of the core issues that must be considered in reinventing vocational education on the post-secondary level. What has been disappointing is how little any of these have been taken up by those in the field—either in the occupational education or community college leadership. In a period when knowledge and skills are important competitive assets—post-secondary education has a vital role in developing a knowledge chain of educational institutions relating to the local firms they serve. Post-secondary occupational education can and should be in the lead, forging this new relationship. Fighting over the small amount of money from the Perkins Act and attempting to offer large numbers of unfocused programs does not help post-secondary occupational educators deal with this priority. It is only when vocational education leaders can shed their academic orientation and see their role in the development of human capital will there be a future for post-secondary occupational education. Let's hope others realize this before it is too late.

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A Case Study in Reform: Integration of Teacher Education in Agriculture with Teacher Education in Mathematics and Science

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Abstract

Integration of vocational and academic curricula at the postsecondary level provides faculty a means to present content in the way that many students learn best—hands on learning, including the application of abstract concepts. Factors such as organizational structure, power relationships, frames of reference, and individual motivators may allow for but may also inhibit efforts at such integration within universities. This case study examines a formal effort at such integration through the eyes of individuals working directly within the recently created Teacher Education in Agriculture, Mathematics, and Science (TEAMS) program at Cornell University, Ithaca, NY. This study details both programmatic and administrative aspects of the merger of two previously separate teacher education programs. In doing so, we investigate the driving forces and obstacles behind the merger. While the agriculture, education, and mathematics/science programs have been formally merged, the culture of the two worlds remains distinct, and disagreements continue as to the role of teacher education faculty in the 21st century.

Purpose and Objectives of the Study

The purpose of this study is to understand how and why the merger of the Teacher Education in Agriculture (TEA) and Teacher Education in Science and Mathematics (TESM) programs at Cornell University took place, with a focus on the perceptions of individuals involved in the merger. In carrying out this study, we set out the following objectives: 1) analyze the extant documentation and the relevant theoretical and applied literature, 2) interview faculty, staff, administrators, and others associated with the merger, and 3) determine if perceptions of the merger and its processes differed by frame of reference of participants.

Background

Integration of vocational education with academic programs at the secondary school level has been a priority since the passage of the Perkins Act in 1985. Initiatives such as Tech Prep or High Schools That Work demonstrate that large-scale changes can be implemented and successful (Gray, 1993). Success at the postsecondary level, just as in grades K-12, depends on collaboration and change based on a shared vision and blueprint for where the changes can and should lead (Thompson, 1995). The theoretical framework for this study draws on literature from education, psychology, and organizational studies and attempts to shed light on the complexity of integrating two programs with divergent histories, constituencies, and cultures. We review three conceptual areas with which to analyze our case: 1) organizational theory with respect to organizational change, 2) collaborative efforts, and 3) frames of reference.

Organizational Theory and Change

Decades of analyses of organizations have led to an enriched understanding of how they function and change. Alternatively, and often as important, researchers have begun to comprehend why

organizations can be immutable in the face of concerted and meaningful reform efforts to change. Analyzing these two sides of the same theoretical coin (i.e., change and permanence) is central to the discussion of the merger investigated in this study.

At the most basic level, university departments are organizations within a hierarchy of larger units (college and university). This nested structure of autonomous faculty within larger organizational units, often with competing and conflicting goals, spurred Cohen, March, and Olsen (1972) to refer to universities as “organized anarchies.” Typically, the different disciplines within teacher education are found in different departments or even colleges. The department of interest in this study is not atypical in that it is made up of faculty, a Chair, support staff, and students, all using common space in a single building. The difference is that the agriculture and mathematics/science faculty were all housed within the same department and physical space prior to any serious effort towards merger. At its most basic level, the proposed merger was intended to alter the organizational chart within the department and foster more efficient operation of teacher education programming. The merger of agricultural education with science/math education would result in one coherent and seemingly more efficient program in that many administrative functions could be combined. The unique organizational structure of the Department of Education at Cornell—with all education disciplines housed in the same department—permitted early discussions about a potential merger, giving individuals time to reflect on what it may involve.

Meaningful and lasting change requires an understanding of the histories of participating agents, the complexity of the existing and proposed organizational units, and a sense of the environment(s) in which the organizations have and will function. Educational organizations function as dynamic, open, and social systems with inputs and internal processes that transform the inputs into outputs (Hoy & Miskel, 1996; Scott, 2000). These internal processes include four core systems that produce the intended (or

unintended) organizational outcomes as discussed below:

Individuals within organizations all have needs, values, interests, and goals. They each possess personal histories that form schemas and taken-for-granted ways of understanding the world around them as well as their own interests. Their interests focus on immediate day-to-day tasks, career goals, and personal lives outside of the workplace (Morgan, 1997). Uncovering individuals' interests and identifying their schemas and norms of understanding will go far in helping to identify biases and difficulties in joining two programs.

Serving to organize the interactions and relationships within an organization is the *structure* of the organization. The structure for educational organizations consists of the organizational chart plus the schedule, supplies, budget, and the formal curriculum to be taught. While structure seems to be the most frequent target of change, altering structure alone is rarely successful (Elmore, 1995). Elmore (1995) explained the popularity of structural change in that such change frequently involves "highly visible" components, is easier to implement than other forms of change (e.g., firing staff and hiring anew), and represents important cogs in the larger organizational machine.

Not unrelated to organizational structure and individuals are the sources and sinks of *power*. Identifying who has the authority to make which decisions and who has the power to support or defeat the decisions is critical. Weber (1978) described three mutually nonexclusive ways to secure authority: traditional, rational-legal, and charismatic. Traditional forms of authority are granted to individuals who occupy positions that have long enjoyed authority. In deferring to tradition, authority is granted based on the sanctity of the traditions within any organization. Conversely, the rational-legal authority is granted to those who are in command as a result of the established normative and regulative rules. Charismatic authority, as a result of one's actions and character, is granted (or

more often earned) as a likely response to frustration with the inadequacy or unresponsiveness of the first two forms. Scott (1992) described characteristics of the charismatic leader as the “uncommon gifts of spirit and mind” (p. 39).

Finally, each organization has a *culture* that serves to either welcome or rebuff individuals, shape and/or reinforce power relations, and establish firm, if unspoken, norms of behavior, speech, and decision making. The cultural system represents the taken-for-granted ways of knowing and functioning prescribed and enforced by dominant members within the organization. It is worth noting that new members often enter organizations with different schemas and habits of mind. They may conceptualize multiple (or different) options for decisions and/or actions where longstanding members can think of no other way to operate (Scott, 2000).

The individual, structural, political, and cultural systems function together in inextricable ways. Attempting to understand and explain change without analyzing each system and how it relates to the others results in an incomplete picture of the organization. Researchers must also pay attention to the subtle and the obvious influences and constraints from the environment.

There is a well developed literature that stresses and explains the impact of the environment on organizational behavior. Meyer and Rowan (1977, 1978) suggested that organizations that match the socially prescribed templates and rituals for behavior in the environment earn valuable legitimacy in the eyes of their constituents. Such gains in legitimacy are a prerequisite for organizational survival. In other words, organizations that mirror the accepted practices and organizational forms are more likely to survive than those organizations that create new and novel forms and practices. DiMaggio and Powell (1991, 1983) further criticized the traditional view of organizational success that more efficient organizations are more likely to survive and thrive. They emphasized the examination of the content of environmental beliefs and practices,

and argued that the more successful organizations are those that become isomorphic with the socially determined expectations and templates—often at the expense of efficiency.

The implications of this theoretical lens on the present study are substantial. The merging of any distinctly different programs into one involves not just the internal (departmental-level) processes and personalities, but external ones as well. This merger involves meeting the needs and expectations of two distinct environments. The agricultural teacher education component of TEAMS serves and responds to a different set of environmental expectations than does the science/math component. The faculty in each discipline belong to different professional organizations, serve different components of the public education system, and have quite different constituencies on and off campus and in broader academe. Without attending to these environmental pressures, one can easily overlook (with negative consequences) the possibility that one or both of the programs (agriculture teacher education and science/math teacher education) could lose legitimacy in their respective environments, causing them to lose valuable support and decrease the chances of organizational survival.

Collaborative Efforts

Collaboration to effect reorganization requires time, effective communication, and mutual adaptation between organizations and professionals (Fox & Faver, 1984; Rothman & Schwartzbaum, 1971). People who actively engage in collaborative efforts believe that the resulting separation of tasks and the joining of specializations lead to increased efficiency and improve the quality of work (Fox & Faver, 1984). Fox and Faver (1984) also stated that collaborations have associated costs in the time required for negotiations, but more importantly in the personal and socio-emotional costs incurred to develop and maintain good relationships. Collaborations between individuals with very different backgrounds may be stalled when members of the group develop dif-

ferent conclusions when judging the same evidence (Knutson, 1967). This situation can easily arise when the collaboration is mandated or imposed by an administrative authority.

University administrators often seek to identify departments or programs with common disciplinary bases that could operate as one unit. Rothman & Schwartzbaum (1971) found that mergers have the potential, though, to disrupt formal and informal structures in the separate entities as well as weaken the power and status of individuals and groups within them. Historically, research has shown that people's response to change is a factor of their perceptions of the costs and benefits of change (Asch, 1952; Muzafer & Sherif, 1953; Rothman & Schwartzbaum, 1971), developed as a function of their frames of reference.

Frames of Reference or Schemas

The term "frame of reference," or schema, refers to the "structure of a situation which tends to orient the direction of an individual's initial response regarding something perceived or judged" (Knutson, 1967, p. 107). Frame of reference includes both the psychological structures we bring to a situation as well as environmental factors. It can be reasoned that greater group variability would yield a wider range of frames of reference, resulting in more viewpoints, more information, easier identification of areas of controversy, and livelier interactions. It is likely, though, that these benefits to diversity would be offset by more difficulty in interpretation and understanding, problems with communication, and more disagreement on what is significant.

Knutson (1967) identified three significant factors in how frames of reference influence communication: 1) the meaning that the listener gives to a communication, 2) the relevance the communication has for the listener, and 3) the validity the listener assigns to the communication (p. 114). Congruence between intended and perceived communication occurs when the communi-

cation contains facts that conform to the listener's knowledge or concepts of truth, or to the listener's paradigm out of which he/she operates. Change (or learning) involves a change of concepts or notions that may then be reconciled with the facts as they are communicated.

In summary, it is reasonable to assume that a strong relationship exists between frames of reference and conceptions/misconceptions held about any person, place, or thing. Obstacles to collaboration that result from misconceptions must be addressed through presentation of new knowledge in a meaningful way and the development of common frames of reference. New knowledge and common frames of reference are both necessary to realize the meaning, relevance, and validity of communications identified as critical to establishing collaborative relationships and implementing change such as the merger in this study (Fox & Faver, 1984; Katz, 1954; Knutson, 1967; Rothman & Schwartzbaum, 1971).

Methods and Procedures

This case study employed qualitative data collection and analysis techniques (Patton, 1990; Seidman, 1991). The population for the study was the set of individuals employed in Cornell University's Department of Education during 1999 who were involved with the 1996 merger of the TEA and TESM programs. All 12 individuals were invited to participate (four agricultural education, four science education, two math education, one social foundations, and the Department of Education Chair). Nine of the 12 individuals participated: the Department Chair; an assistant dean (agricultural education); one curriculum specialist (agricultural education); one extension specialist responsible for field placements and certification (science education); one doctoral student (science education); two agricultural education faculty; and two science education faculty.

A review of documents obtained from the Department Chair

was used to better understand the context in which the merger occurred. They included the executive summary of the *Understanding Agriculture: New Directions in Education* report (National Research Council [NRC], 1988), recommendations for the agricultural education program from a 1994-95 study group, written comments on the recommendations from a senior member of the Department (educational psychology), and a position description for two new faculty hires. These documents assisted us understand the climate that existed when discussions of a proposed merger were occurring.

The nine semi-structured interviews lasted approximately one hour each and occurred between April 1 and July 1, 1999. The interview protocol focused on participants' beliefs about the intent of the merger, initial and current barriers to the merger, status of the merger, and benefits to faculty and students. Each interview was audiotaped, transcribed, and coded (Patton, 1990). In addition to analysis by the a priori theory reviewed above, we documented emergent themes or constructions of meaning in a matrix format based on the interview protocol. Triangulation of the data through the use of document review and interviews, as well as cross-member checks to review participants' respective interview transcripts, ensured validity.

Results

In 1994-95, the two remaining agricultural education faculty members in the Department were getting ready to retire. A study group was formed to investigate agricultural education and identify needed changes in the existing program. The study group collected documents related to national strategic planning for agricultural education and interviewed faculty at one two-year postsecondary agricultural and technical institution. Objective 1 was met through an analysis of the documentation collected from this study group. This analysis revealed that the Department was visionary in

its approach to agricultural education, developing recommendations based on current labor market data for the agriculture industry, the *New Directions* report (NRC, 1988), and discussions with various stakeholders that focused on needed industry and educational changes. Both the agricultural educators and science educators admitted, however, that retiring agricultural education faculty and existing staff were not a part of these discussions. The following statement reflects the group's dilemma in thinking about filling the agricultural education positions:

We believe that the knowledge, skills, and experience required for an innovative approach to this transformation of agricultural education may well be found outside the traditional pool of people with degrees in Agricultural Education... While there is no reason to preclude people so trained from applying... there is a reason to cast a wide net in the search and to be willing to hire a person who has not come out of that tradition.

There are two possible explanations for this conclusion about the available pool of potential applicants. First, while the study group appeared to be visionary in its outline of what the agricultural education program would involve, this statement about the available pool of potential applicants may reflect a lack of understanding of the culture and traditional constituencies of agricultural education. In steering a new direction for agriculture, the new movement appeared to not be hindered by the traditional ties to the local agricultural education communities in the public schools.

A second explanation can also be offered. The emphasis on finding a new faculty member outside of agricultural education may represent the notion that *not* doing so would potentially constrain the alteration of the existing teacher education program, possibly undercutting the new intent at reforming the Department's agricultural education efforts. We found the interpretation to be largely a function of backgrounds and professional ties. Non agricultural personnel with ties to the math and science communities

and the agricultural education faculty and staff more likely to see the statement as reflective of a lack of understanding of their field.

The only agricultural education personnel working in the Department by the time the searches commenced were non-tenure track and unable to vote on faculty hire decisions. The first hire, effective January 1996, was made within the context of finding someone outside traditional agricultural education and without the influence of voting faculty in agricultural education—since they had all retired. This hire came after a search that had already been aborted because the candidates were perceived to be too “ag eddy and behavioristic;” in contrast to the constructivist leanings of the non-agriculture personnel. This decision to hire someone outside traditional agricultural education threatened to undermine support from the traditional agriculture constituencies, though at the same time served to increase legitimacy and support from those promoting reform in agricultural education and a closer alignment with current views of science and math education.

The documents obtained from the study group do not mention a “merger” of the TEA and TESM programs, but it was written that the preservice TEA program should be better integrated with TESM. Goals established by the study group were (a) mutually supportive relationships between the two faculty groups, (b) a learning community for students to interact, (c) involvement of TESM faculty in the agenda of agricultural education and vice versa, (d) shared teaching, and (e) emphases on dual certification. These stated outcomes became a basis for discussions of the merger, initially to streamline administrative tasks such as placement of student teachers. This was to be in place by the time the second agricultural educator was hired in July 1996. We should also mention that both new hires, the second of whom is co-author of this article and primary interviewer, came on board with an understanding that a “merger” was desired, even though the term “merger” was not used in any of the documents. In fact, the Department Chair insisted during the interviews that there was never talk of a

merger, explaining the discrepancy in a subsequent conversation:

I did have a sense of the ‘coming together’ as what needed to happen coupled with a further sense of needing to be careful about getting too far out in front of the faculty. This was also coupled with a further sense that the word ‘merger’ is a loaded term and was sure to raise the hackles of those involved. You need to keep in mind that [retired Agricultural Education faculty member] was still in the picture and it was important at the early stages to move gradually with a faith that the logic of the ‘coming together’ would gradually become apparent to all concerned.

Analysis of the Interview Data

Objectives 2 and 3 were met through a series of semi-structured interviews, using 10 questions (see Appendix) to guide the discussions. The following three questions are representative of the interview protocol:

1. Can you think back to the first discussions about the merger of the two teacher education programs? What were your perceptions at that time as to what the merger was proposed to include?
2. What barriers do you see that exist to implementation of a complete merger of the programs?
3. What do you see as the benefits of the merger, to students and faculty?

Interview data were analyzed using a matrix to categorize responses based on interview questions and concepts that evolved from responses. We were able to identify four emergent themes: (a) initial perceptions of why the merger was being proposed were consistent across all interviewees, but impressions of “how” it would occur differed significantly with each individual’s background; (b) the data suggest that deep philosophical differences between members of the two programs resulted in differing per-

ceptions of whether a merger would work, and what barriers to implementation might exist; (c) all parties have converged in their thinking at the time of the interviews and believe the merged program to be beneficial to both faculty and students, and see few, if any, obstacles to continuing the new organizational structure; and (d) working together has resulted in an awareness among science educators of the uniqueness, or differentness, of agricultural education as well as recognition of a need to rethink the total structure of the merged program.

Initial Perceptions of the Purpose of the Merger

All participants agreed that initial discussions were informal and held only among TESM faculty and staff. A need to provide an economy of scale by combining administrative functions and some instruction was the reason noted by most participants. Once early conversations between TEA and TESM groups occurred, however, the two groups differed as to what the merger would involve. Science educators believed the existing structure of TESM should remain. The merger would add two faculty in agricultural education to help co-teach core courses, and there would be no loss of content from existing science education curriculum. Conversely, agricultural educators did not feel positive about the merger and believed the science educators felt “ag students can take courses we have already established.” Lack of ongoing formal discussions among faculty and staff in both TEA and TESM led to different perceptions about various individuals’ willingness or intent to create an integrated program, as illustrated by the following comments. (Notations following quotes designate background of individual, i.e., SE indicates science educator and AE indicates agricultural educator. The number denotes the code number.)

Actually, it was [Social Foundations Faculty member] who was one of the forces behind a merger...Some of his arguments were that agriculture subject matter gives really wonderful application...but, it was the existing ag ed faculty that had

always done things a certain way and did not want to talk.
(SE3)

If we say anything, they discount it...the perception is that if you're an aggie, you're treated like a second-class citizen.
(AE2)

Analytically, domination of “negotiations” by science educators stemmed from the power differential present at the time. The only voices representing agricultural education were retiring faculty and new, untenured faculty. The science educators were all tenured and in the primes of their careers; and external pressures were strong and direct on the science educators and distinctly different from those facing the agricultural education faculty. This kept pressure on the science educators to maintain their traditional roles and program. This was the basis of their professional support outside the department. Any change to the practices and affiliations had the potential to undermine the established reputations of the science educators.

There was full agreement that no formal discussions occurred about the merger, and informal discussions occurred between various faculty and staff within the two groups, often casually over coffee or as “side notes” to discussions during meetings called for other purposes. The agricultural education staff perceived that “political power” held by science educators would mean that existing methods courses in agricultural education would be cancelled and important elements of discipline-specific instruction would be lost. Science education faculty were not even aware of a need for discipline-specific instruction in agricultural education (e.g., management of FFA chapters and Supervised Agriculture Experiences [SAE] projects) and, as a result, couldn't conceptualize a need for additional methods courses beyond what was already offered by the science and math teacher preparation program.

Science education faculty believed that agricultural education students could be integrated into the existing TESM courses and

adaptations made in the set of readings and examples they presented. They also hoped new agricultural education faculty would share teaching responsibilities with them in existing classes. There were no discussions, however, about competencies or exit outcomes for students in the program. In fact, these discussions were not possible due to perceptions the groups had about each other. Agricultural educators were perceived by science education to be operating out of a behavioristic paradigm, and the word “competency” held certain meanings. In fact, one science educator said he “had convulsions at the very mention of [competencies].” In short, the values associated with the language used by the two groups varied greatly. Competencies were valued and used in agricultural education, but ostracized by the current community of science educators. The two groups were not able to discuss what it is that graduates of a merged program would be expected to know and do.

Colliding Frames of Reference and Barriers to Implementation

The differences in underlying philosophies of faculty at the time of the initial discussions led to perceptions that an integrated program might be difficult to implement. Differences also fueled the fears of agricultural education that it would be “swallowed up” by science education. One agricultural educator also perceived that science educators had the attitude that “one group (science education) was intellectually superior to another.” One science educator confirmed these perceptions:

There were concerns that the agricultural education students would be less prepared or less able to participate at the same rate and pace than the science and math students could. (SE4)

Another science educator viewed the situation as a “clash of cultures” and stated, “our students (science/math) would have a great deal of difficulty with it, that we were just trying to unite two different worlds.” This “two different worlds” statement is a strong and prophetic metaphor for the two distinct environments (profes-

sional organizations, academic norms, public school constituencies, university partners, etc.) within which each group operated.

Most people agreed that cultural differences and lack of knowledge about other programs kept the two groups from having meaningful discussions about a merger even though there were attempts made by the TESM group to discuss a merger with agricultural education faculty:

We did meet as a faculty with the emeritus professors in ag ed who were living locally and talked with them about what they saw as the pros and cons of this effort...there was resistance by that group (of emeritus professors). (SE4)

We certainly had conversations with [retired agricultural educator]...He was so steeped in it (tradition) that he couldn't really leave it behind...couldn't take an idea and divorce it from the package. (SE6)

I thought it (the merger) would all likely depend on finding new faculty with whom we could finally communicate...and their willingness to try to do things in concert instead of quite independently. (SE5)

Agricultural educators believed they were also willing to discuss the merger and felt the "other side" was preventing discussions from moving forward:

You have to remember that back then there were different ag ed faculty members and the perceptions that they were following...more of a vocational agriculture model. I say those folks (agricultural education faculty) felt like they were more than willing to meet people more than half way on the merger. (AE2)

I think [agricultural education faculty] were more than willing...I think it's a perception more than reality of why we

wouldn't merge...it also had to do with personalities...Like oil and water, they didn't mix very well. (AE2)

It is also important to note that there were additional conflicts and differences that emerged between the existing agricultural education staff and new agricultural education faculty.

Philosophical differences also created problems and concerns as each group viewed the content of the other's course offerings within the context of integrated instruction. The TEA program included classes in teaching methodologies in the competency-based tradition and was viewed as behavioristic by the science educators. In comparison, TESM operated out of a constructivist paradigm, and coursework focused on theoretical perspectives of knowing and learning. For the science educators, traditional methods such as lesson planning, delivery strategies, and assessment were only addressed in a two-week pre-student teaching seminar. Perceptions about the potential of the merger were influenced by these differences:

The ag ed program was largely behavioristic...so, I can remember talking about the student teaching seminars and [an retired agricultural educator] wheels out this 10-page thing of...write legibly on the chalkboard, all of these things that are not unimportant, but are certainly not what I consider the focus of teacher ed. (SE5)

It was pretty hard, I think, because they ignored anything we do. One example, I thought you needed a strong methods course...it doesn't matter about reflecting, everything else if you aren't given skills to be effective in the classroom. (AE2)

The depth of the differences was a major obstacle. Participants did not articulate and perhaps were unaware of the normative and cognitive pressures and expectations derived from their respective academic disciplines and professional practice (Scott, 1995). They were, nevertheless, initially unwilling or unable to grant legitimacy to others' perspectives and practices, mostly due to an inability to

separate departmental history from the issues of professional difference. The mistrust only masked the underlying epistemological chasm between the groups. For any successful merger, this chasm must be bridged.

In spite of the difficulties, the integration of the programs occurred. Three factors influenced how the merger of TEA and TESM actually evolved: (a) the lack of coordination of the merger, (b) one semester following the retirement of agricultural education faculty in which there were no TEA faculty to handle responsibilities for courses, and (c) changes that forced the Department to seek accreditation through the National Center for Accreditation of Teacher Education (NCATE).

As an immediate consequence of retiring faculty, four agricultural education students enrolled in a TESM course during spring 1997. One of the new agricultural education faculty co-taught the course, but there were no changes in planning or materials to accommodate agricultural education students or faculty. The following year, the second new agricultural education faculty co-taught this course, with responsibility for the lectures; the former instructor (science educator) handled the laboratories, which focused on adaptation and instruction of existing environmental science lessons. Again, there was no joint planning or changes in the laboratory to coincide with the materials covered in the lectures or vice versa. Students were confused at the sometimes-conflicting information between the classroom and lab meetings.

As an example, the agricultural educator spent considerable time focusing on the importance of planning to effectively manage instruction. The information was presented in a non-behavioristic, research-based manner that the co-author believed to be an appropriate approach and in consonance with the philosophy of the program. At the same time, the science educator was telling students that lesson plans were not important and superfluous to the instructional process (as witnessed by the co-author).

A Case Study in Reform

The next academic year, the agricultural educator was given full responsibility for the instruction of the course, representing a shift in thinking as the course contained science and math education students, as well as agricultural education students. It is unlikely that prior consideration would ever have been given to having an agricultural education faculty member assume responsibilities for a course in which science/math education students were enrolled, particularly a course focused on instructional methods. The change in personnel has been largely responsible for this change in operations as expressed by all participants:

Well, I think the new faculty we hired have a new paradigm in their minds, how to be effective, where we need to go in agricultural education (AE2)

I was not encouraged about who would apply for (this) position. I did not think we could get people who could rethink what it means to do ag education. (SE6)

The new faculty members were either giving in to the pressure to conform or were involved in an academic community that was different from their predecessors. Understanding this background is important to the discussion of the following emerging themes from the analysis, as this change has permitted individuals to work together more closely than before.

Convergent Thinking

The merger has been in place since January 1996, with ongoing emphases on combining administrative functions. At a summer 1999 retreat, faculty and staff discussed the need for programmatic changes as well. All individuals agreed that the benefits of the merger outweigh the problems on multiple fronts (programmatic and administratively) and for the individuals involved. The Department Chair looked at the merger from a different perspective than faculty and staff directly associated with it. In his opinion, the main benefit has been that doors have been opened so that “people,

focused in one area, see the strengths that exist in the other area.”

1. What is the meaning of the changes? Has progress been made? Three questions are important to answer:
2. Programmatically, what has changed due to the initial merger?
3. Do the changes allow for a better instructional program and experience for students?
4. What are impacts on faculty?

Programmatically, all participants believe that progress has been made, largely through the efforts of the new agricultural education faculty to change the TEA program. Based on these shared experiences, some faculty also believe that the informal process used to implement the merger—using existing courses and program requirements—might now need to be made more formal:

I think we’re making progress, but we have avoided coming to the table and settling issues, for whatever reasons... We haven’t had enough face-to-face meetings to say, okay; these are the commitments we are going to make. (SE3)

We need to incorporate more into the TEAMS curriculum, we haven’t done enough to change the curriculum for the whole program to incorporate what are the absolute strengths of ag ed such as leadership and experiential learning. (AE5)

So many of our ideas about the TESM program were mapped out and we fit ag education into it...in terms of give and take it was mostly ag ed that had to give. We’ve created boxes for ourselves...we need more discussions about issues and how to create something different, change the boxes. (SE6)

This change represents a major philosophical shift toward convergent thinking that has evolved over the time the merger has been in place.

A Case Study in Reform

The major benefits cited for students are the ability for them to work together, and how their perceptions of one another and themselves have changed:

The students, it is of great benefit for the students to work with each other...I've had a couple say to me "I'm going to think differently about the ag teacher. I am going to look for a school where I can work with an ag teacher." (SE3)

I think the science and math students have a lot to learn from the agriculture students, especially if they've come up through the ranks as agricultural education students, themselves, including the experiential, the leadership, other areas. (SE6)

This change in perception doesn't just apply to the science and math students. Faculty also believe that the agricultural education students benefit from the enhanced prestige of being in the program with the science and math students and being able to perform equally to them:

Student benefits...I think it's prestige. I think that it helps the agricultural education people to have interaction with others who are in science and math education because, at least the culture around here has sort of relegated the ag ed students to secondary status...they can hold their heads up high and say that they take the same classes and do the same things that other students do. (AE5)

One science educator who teaches a curriculum analysis class said he notices the effects of the merger on students and himself. He stated that, for the first time, he has had biology and agricultural education students teaming up on projects, and he didn't know "which was which...so I thought it was remarkable. That has never happened before." Participants cited several other benefits to the merger for faculty including a greater appreciation of agricultural education through knowledge rather than false assumptions, the opportunity to work with a wide range of students and to learn from them, and improved access to resources. From the perspective of

the co-author, there has been a professional gain in that she was able to secure a National Science Foundation Career Award to study the merger and develop a replicable model.

Changing Perceptions and Lessons Learned

Remarkable changes have occurred in the science/math education faculty's view of agricultural education. As noted above, the change in how the integrated program should be structured also represents a major philosophical shift. This contrasts with the agricultural education faculty who, to a certain extent, have been "plugging along attempting to make the merger work, while also ensuring their students were well-prepared to enter the field," according to a college administrator. While the agricultural education faculty agreed that it has not been easy, they also feel a certain level of satisfaction at this point.

Science educators uniformly agreed that the process has been enlightening for them and that effective communications can accomplish a lot:

From what I have heard from friends of mine in science ed, there is a culture difference between ag ed and science ed...those are very deep so that efforts to bridge those gaps are going to involve lots of talk...It gets down to some of the substantial notions of what it means to teach and to learn. (SE3)

I think we went at this kind of backwards...just made the decision to merge without looking at what the *model* (program) should look like...other groups should think seriously about what the model means to their departments. (SE4)

Both of these statements are significant in that these same science educators also acknowledged that the types of conversations they are suggesting would not have occurred during the days prior to the implementation of the merger. One other science educator indicated that his thinking about the ability of the students to work

together well, and his initially perceived barriers to an effective merger—focused on philosophies and personalities—have changed drastically. He believed that the students would not be able to cope well with one another and that the barriers were insurmountable. He stated he no longer feels that either of these areas remain an issue for him. This same individual had some interesting thoughts about re-thinking the program:

I think a lot of the things we are doing (from the TESM model) are probably a little archaic now and I'm not sure they are really appropriate...I would say we need more open discussions about fundamental issues...have retreats once a year and use them only for trying to understand each other better, rethink our program...step back from what you're doing, not step into it and I think what we've been doing is stepping into it more.
(SE6)

These changes in viewpoints about programmatic shifts and needs for communication are significant. The science/math faculty had always believed that their existing courses were uniquely resistant to a need for change. The shift also shows the benefits of learning through ongoing and repeated exposure to new knowledge, ways of doing things, or philosophies.

The influence of the decision to seek NCATE accreditation, when viewed as a form of bureaucratically imposed restructuring, cannot be discounted in the analysis of the merger. The decision to seek NCATE accreditation to satisfy requirements for recertification led to discussions of requirements, several of which involve articulation of programmatic inputs and outputs: a conceptual framework, articulated curriculum, competencies, and where met, exit outcomes, etc. One of the agricultural education faculty developed a draft list of competencies and presented it to TEAMS faculty and staff; this list was met with appreciation and enthusiasm. Plans for future meetings include discussions of how these competencies will be met (in which classes) and assessed—a dramatic shift in operating philosophy. The question must be asked: how

much of this shift is due to the externally mandated accreditation process and how much is due to the shifts in philosophies as a result of the ongoing processes of the merger, itself? According to the Department Chair

My idea all along is that there ought to be some common, crosscutting non-subject specific teacher education activities, courses, onto which would be grafted the subject specific pieces... We've made some progress, but we're not as far along as I'd hoped we would be... I'm hopeful the NCATE review is going to prompt us to wrestle with this and come up with what is the best of both.

The Department Chair also agreed that deadlines imposed by NCATE will help move the integration process along. Because it generates an externally imposed deadline—not the Chair's or the Dean's—it is “just something we're all living with, it's our common challenge, ” a notion supported by several faculty on both sides:

Like that list that was circulated this morning (of competencies)...people are looking at it within the context of the NCATE review and saying, yeah, we really need to do this...Gee, I might have to revise my course...that is a type of discussion we could not have had three years ago. (AE1)

I think the NCATE is a good opportunity...it is a little hard to think out of the box...If it ain't broke, don't fix it, but I think there are things about it (the program) that are broke...but you shouldn't have it (NCATE) hanging over your head to discuss fundamental questions. (SE6)

In summary, the interview data analysis shows shifts in attitudes and perceptions from the time of the initial discussions about the proposed merger to the present. Faculty with very strong biases have begun to work together in ways previously thought impossible, and have embraced the concept of integration. Both student and faculty groups are now viewed differently, due to regular expo-

sure to one another, but perhaps also due to the bureaucratically mandated NCATE review. Conceptually, some of the taken-for-granted notions of program, instruction, and the motives of the “other side” were broken down and are in the process of being reestablished. This local phenomenon of intra-departmental integration exemplifies the “different worlds” in which the two groups had operated. The following discussion will relate this evolution to the literature on organizational behavior, collaboration, and frames of reference.

Discussion and Conclusions

The situation that forced individuals from different academic disciplines to work together—the retirement of agricultural education faculty, leaving students with no course options other than one of the science education courses—began a series of events in which faculty and students were exposed to one another in meaningful and substantive ways. The strong desire for gaining economies of scale was the impetus to combine students in courses beyond the situation created by faculty retirement. Figure 1 provides a chronology of events that occurred between the initial discussions of an integrated program in teacher education (1994-95) to the present. It also conceptualizes the impact of incremental opportunities for exposure of individuals (i.e., faculty, staff, and students) to one another on the evolution to convergent thinking about the success of the merger, benefits to faculty and students, and thoughts about the future.

Organizationally, this study highlights the importance of understanding the many facets of university academic departments when attempting significant change. It also recognizes the significance of external constituencies. Earlier, we reviewed the four internal systems in all organizations: structural, individual, political, and cultural. The merger of the TEA and TESM programs entailed more than simple alterations to the organizational chart.

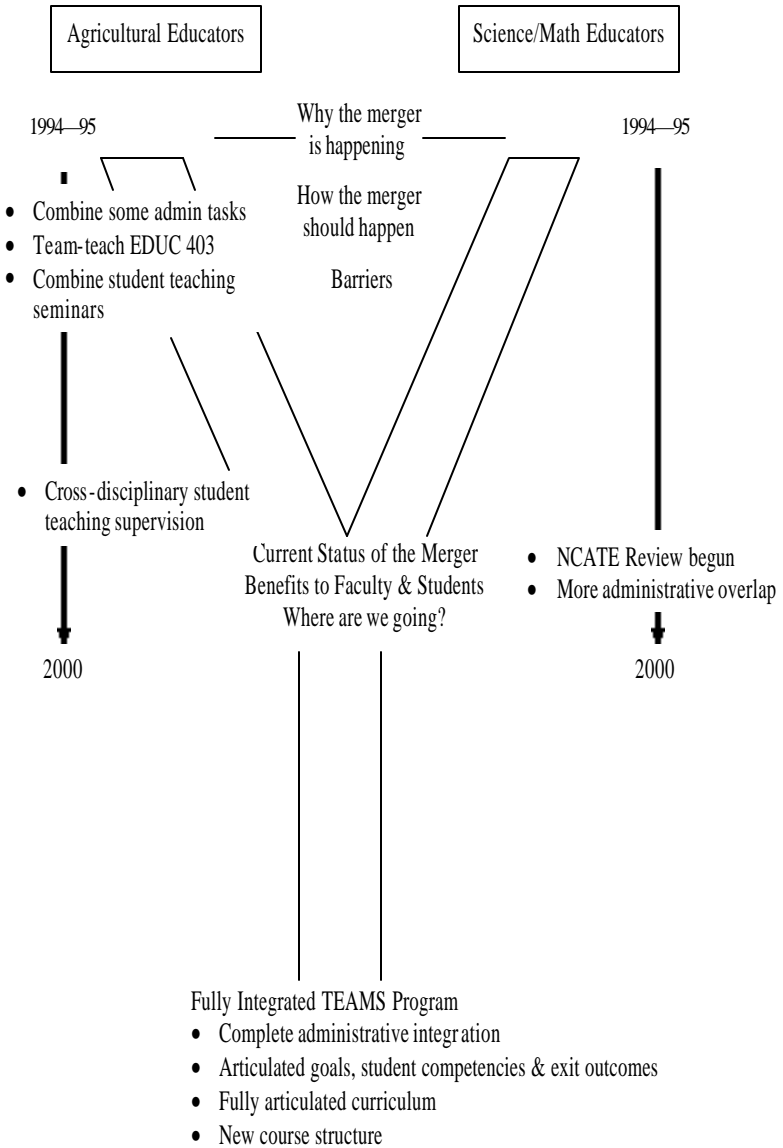


Figure 1. An evolution to convergent thinking.

The merger challenged individual schemas (frames of reference), departmental politics, and the take-for-granted notions of what the teacher education programs were trying to accomplish. There were distinct differences in the experiences, knowledge base, conceptions of power, and cultures of the individuals affected by the movement to merge the two programs.

Beginning with their own personal experiences, the perspectives of whom the different parties were serving, why they were serving them, and how best to do it were in stark contrast. Tradition played a large role in agricultural education, while breaking from tradition was the centerpiece of the science and math program. Tradition (or breaking away from it) narrowed the language and strategies available to either program. Agricultural education viewed the word “competency” as a proper focus whereas the word made the science educators’ skin crawl.

There was also a distinct power differential, real or perceived, between the two groups. An interesting note on the power differential must be made. Whereas the agricultural educators complained that they were viewed as “second class citizens,” the Department resides within a College of Agriculture and Life Sciences and possesses considerable power due to the strong links to the farming and agricultural community. We argue that one of the causal factors for the merger was the need for the Department (and hence the science/mathematics teacher education program) to further align itself with the agricultural mission of the college. Hence, the question of which group had power over the other is more complex than either group suggested.

The cultural differences were stark, likely as a result of the relative isolation of each program from the other in the previous years. Prior to the merger (and it may continue today), each program was staffed by individuals with different academic preparation, served a completely different constituency, and was guided by different norms of research, teaching, and applied practice in high schools.

Any idea that a merger of the constituencies would take place is misguided. The distinct constituencies and ties to the external environment are such that they will continue to tug the programs in different directions. These differences help explain the difficulty of what was undertaken.

We want to highlight the relationship between the social systems within the Department and the professional associations and links outside the Department. Within the University, the associations of faculty differ markedly. The agricultural education faculty and students interact primarily with individuals in Cornell Cooperative Extension, and in the animal and plant sciences. The science educators interact with faculty in environmental science, biology, chemistry, and mathematics. These associations include both professional activity and student committees. There is also no overlap between the professional associations and annual conferences that the faculty attend. We suggest that these different linkages present the faculty with distinctly different norms of professional behavior and reflect different academic foci and standards.

Despite these differences that lead to faculty living in “different worlds,” we found what may seem like remarkable progress toward a more integrated program for teacher education. One explanation is that both sides achieved a greater understanding of the other faculty including the demands on and expectations from constituencies. The increased understanding and appreciation resulted in a greater tolerance for differences between programs and an increased ability to work together. A second, more plausible explanation is that the faculty realized the whole would be greater than the parts; the joint program would be stronger than the two individual programs. The merger would benefit the science educators in that it would strengthen their political standing within the College while allowing them to continue providing the New York state with high quality science and math teachers. Moreover, the science educators recognized the strengths of the agricultural education students and their experiences. Examples include public

speaking learned through participation in FFA and their abilities to inform the science students how content knowledge is actually used in practice, such as the biology of why fruit tree grafts work. The agricultural education faculty benefit from the linkage to a broader constituency on campus and the reflective practice model emphasized by the science educators. Now working collaboratively and in a seemingly mutually beneficial set of circumstances, the two sets of faculty and students are able to carry out what they had always done—prepare teachers for their respective disciplines—but now in a more effective and supported way.

This study supports prior research on motivation for action within organizations in that individuals were able to begin the process of the merger because there was at least one perceived positive outcome—the streamlining of administrative functions (Robbins, 1993). Other outcomes were perceived as negative or positive depending on the respective participants' frame of reference. Agricultural education faculty feared the merger and believed it would have a negative effect on the TEA program and its students. Science education faculty believed that the merger would “finally get the ag ed program in line with science ed,” which was where they perceived agricultural education needed to be at the time. Superficial and incremental changes occurred over time, and each led to more changes as participants experienced the benefits of the integration efforts. When the decision was made to seek NCATE accreditation, there was a necessity to examine the program through an external viewpoint. There is now a desired outcome for the integrated program—the NCATE accreditation—and everyone recognizes that it must be achieved. Because all parties desire this outcome, everyone accepts that there are procedures that are necessary to achieve the common goal. Enough time has passed, with positive shared experiences, that individuals are willing to discuss a reform of the total program curriculum, course offerings, and course content.

This study also supports historical research on the influence of

frames of reference on analyses and perceptions of the same events (Knutson, 1967). Prior to the merger, shared experiences of the respective groups were often viewed negatively. Science educators perceived the agricultural education faculty as too behavioristic, resistant to change, and less scholarly. Agricultural educators believed science educators didn't provide their own students with the proper tools to be successful teachers, relegated agricultural education students to the status of "second class citizens," and wanted nothing more than to do away with agricultural education. This viewpoint existed in spite of the very well articulated and visionary documents that were produced as a result of the department's study of agricultural education in 1994-95.

The respective philosophies of each group on the fundamental aspects of the teaching and learning process, and how those philosophies should be operationalized in a teacher education program, created a situation in which there appeared to be no common frames of reference. It is interesting that the shared experiences over the past four years have led to what can now be considered a "new frame of reference" for everyone involved in the program (Figure 2). Perceptions of activities, events, faculty, and communications are now being formed by both the science/math and agricultural educators based on this common frame of reference. More often than not, the perceptions are the same. Even if perceptions differ, the shared experiences have resulted in a respect and collegiality among individuals that was not part of the past. As one of the more dogmatic science educators remarked one day to the co-author when they encountered an area of disagreement, "Oh, this is okay. I don't worry about you, we're on the same page!"

The literature on integration of academic and vocational education calls for a very organized and sequential process to be undertaken (Edling & Loring, 1997; Kisner, 1996; Lankard, 1992; Lee, 1997). Among other things, there is the need to establish a "design team" to identify areas of the curriculum for redesign, and there must also be agreed-upon assessment tools and strategies for each

outcome. Accepted strategies for integration could not have worked in 1996 as the deeply rooted philosophical differences of individuals within the respective groups would have prevented any discussions of curriculum redesign, student outcomes, and assessment. In this case, where common frames of reference did not exist, incremental changes that created opportunities for exposure were necessary to engender new, common frames of reference. While this was not a planned-for outcome of the merger, it has implications for the way these processes are undertaken in the future.

Recommendations

As a result of this study, we wish to provide both recommendations for future mergers and a framework for understanding the differing levels of programmatic integration. Several recommendations can be made about how integration or merger of seemingly disparate programs can be implemented. First, there must be recognition that individuals within the respective groups have different frames of reference and may indeed live “in different worlds.” Thus, individual backgrounds will influence their perceptions of the same events. Understanding the true constituencies of each party is essential for fruitful progress toward actual integration. Second, it is important to identify areas of administrative overlap (e.g., record-keeping, single contact for information, budget alignment) where a merger can occur prior to any activity. Third, the programmatic integration should begin in the least controversial context; and any integration efforts should occur incrementally. Fourth, the best timeframe for introduction of a bureaucratically imposed restructuring is after a sufficient period of time has passed for individuals to gain a deeper understanding of what drives the other program and to also foster new and common frames of reference. Collectively, these will increase the chances that the participants approach the restructuring with similar understandings of benefits and consequences of the merger as well as a common value

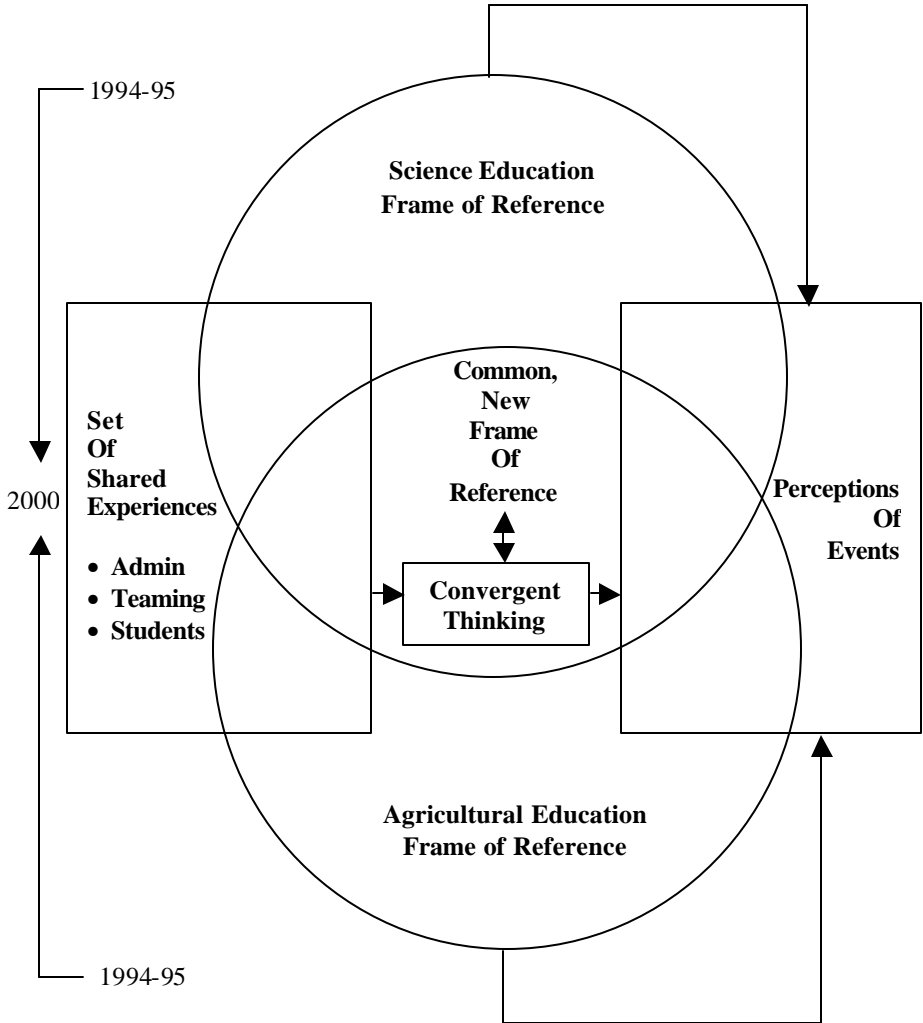


Figure 2. Formation of common, new frames of reference through shared experiences.

system related to the benefits of the outcomes.

The merger of the two programs at Cornell University benefited from a unique organizational arrangement. In trying to understand the relative success of this merger, the reader should be familiar with the relationship of the two programs before the merger. Three decades prior to the merger, the School of Education at Cornell University was moved into the College of Agriculture and Life Sciences and made a department. The housing of the “regular” teacher education program in the same department and the same college as the agricultural teacher education provided a close, though not necessarily amicable, working relationship. In stark contrast to most other universities, where the two programs are typically in different buildings and different colleges, these faculty shared common office space, a common department, and a common college. Whereas typical teacher education programs are quite large and consist of an array of subject matter and grade level foci, these programs were both quite small (5-15 students each) and focused, respectively, on either secondary agricultural education or secondary science and math education. The small size of each program raised the specter of gaining economy with growth, while the disciplinary nature of the non-agriculture program focused narrowly on science/math education in a college of Agriculture and Life Science. To bystanders, or college administrators, the merger seemed to make sense.

Proximity, size, and related academic discipline, however, do not tell the whole story, so we offer a framework for understanding the various levels of integration. Merger can be carried out along a continuum ranging from the superficial sharing of common space to complete integration of goals and philosophies. For example, a merger could simply imply a sharing of course offerings where students from one program sit in the same class as those from the other. This has taken place at Cornell and certainly takes place elsewhere. A step up in the degree of integration is jointly planned faculty offerings designed by the respective parties. The disciplines

remain distinct, but planning takes place to reduce duplication and to offer a degree of coherence to the various programs. A third level of merging two programs consists of jointly organized and administered programs. For instance, the two programs now jointly recruit, teach, and supervise the field experiences of students. Mutually supporting and reinforcing behaviors are common among both students and faculty, though the professional lives (in terms of research and outreach or service) remain distinct. This is the level the Cornell program has achieved.

Finally, we envision a fourth level, in which the faculty all possess common and mutually reinforcing goals for teaching, research, and service to the community. While this is seemingly the ideal toward which all mergers should strive, the realities of traditional academic and university ties may provide a large obstacle to overcome. In this case, the traditional constituencies of agricultural education are quite distinct from those of science and math education. This holds for both “outreach” activities and research agendas. Being an effective member of a university faculty may mean very different things to the respective constituencies. The generation and publication of new knowledge in what some call arcane academic journals may be prized or ridiculed. The provision of public service to local community leaders may also be treasured or belittled. The problem with this dichotomy is not only that it is false, but also that it tends to generate resentment and unhealthy expectations for faculty. To truly merge two programs, for the benefit of students, faculty, and the constituents they serve, merged programs must have similar professional expectations for the respective faculty and students. Maintaining two distinct definitions of “productive” faculty time results in animosity and mutual mistrust. The ideal, we argue, is to reject the false dichotomy of research versus practice and create a stimulating environment where new knowledge is generated, shared with students and colleagues, and disseminated to the relevant constituents; whether these constituents are other academics, teachers, or community leaders. It is only when such com-

mon and mutually supporting professional goals are practiced that true integration takes place.

In sum, the experiment at Cornell University to merge two heretofore separate and distinct teacher education programs into one remains unfinished business. Classes are integrated, students engage with each other, and a single administrative structure organizes both programs. Yet, disagreements and debate continue. This debate is not unlike the broader argument-taking place in most universities across the country. Higher education is striving to make itself useful and relevant while also maintaining its unique position as the incubator for new ideas. Can it do both? The future of universities depends on it as does the future of teacher education.

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Appendix

Interview Protocol Questions

1. Can you think back to the first discussions about the merger of the two teacher education programs? What were your perceptions at that time as to what the merger was proposed to include?
2. What did you identify, at that time, as barriers to the merg-

- er? Any fears or concerns?
3. Where do you think we are at this point in the process?
 4. Where do you see we are headed with the merger?
 5. What barriers do you see that exist to implementation of a complete merger of the programs?
 6. Have there been any surprises?
 7. What do you see as the benefits of the merger, to students and faculty?
 8. Are there any “down” sides?
 9. What have we learned in this process to make future similar endeavors work more smoothly?
 10. How are your thoughts about the merger changed as we have undertaken the process?

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American Vocational Education Research Association Members' Perceptions of Statistical Significance Tests and Other Statistical Controversies

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Abstract

The purpose of this study was to identify AVERA members' perceptions of statistical significance tests. A simple random sample was used to select 113 AVERA members for participation. The Psychometrics Group Instrument was used to collect data. Two-thirds of the respondents were males, 93% had earned a doctoral degree, 67% had more than 15 years of experience in educational research and 82.5% were employed at the university level. There was general disagreement among respondents concerning the proposition that statistically significant tests should be banned. Respondents in the study were less likely to realize that stepwise methods do not identify the best predictor set of a given size. The study also revealed that studies with non-significant results can still be very important.

Historically, vocational education (career and technical/work-force education) at the secondary and postsecondary levels has suffered from a "second-class citizen" image. This image has carried over into higher education. Departments of vocational teacher education at the university level have not always been held in the highest esteem. Whether merited or not, this stigma has been attached to research in vocational education. Research conducted in vocational education at the university often has been viewed as less than

first-rate. According to Moore (1992), “We place too much emphasis on statistical significance and not enough emphasis on practical or applied significance of the research. We need to pay more attention to selecting problems for study” (p.11).

Educational research is an ongoing process, which starts at the determination of the problem, followed by execution of research procedures (Gay, 1996). The subsequent stages of the process, including statistical analysis, are logically influenced by the nature of the research problem and the methodological strategy of a study.

During the past two decades, there has been an increase in vocational education research. The growth in vocational education research has been accompanied by an increase in the use of statistical techniques, with both positive and negative results. In a 1981 study by Oliver, some of the positive effects are described as: (a) more complex problems are being investigated, (b) the information produced is becoming more meaningful, and (c) the efficiency of the research is increasing. The negative effects primarily are that some problems and issues have arisen. Oliver (1981) noted that “statistical techniques are being used in cases where the assumptions are not being met and there is generally a failure to distinguish between statistical significance and practical importance” (p.9).

Conceptual Framework and Related Literature

The empirical-analytic paradigm of research in vocational education heavily relies on the use of statistics (Smith, 1984). The impact of statistical methods on vocational education research was recognized by many researchers in the field (Cheek, 1988; Oliver, 1981; Warmbrod, 1986; Zhang, 1993).

The use of statistics in educational research can be traced back as early as 1901 when Edward L. Thorndike published his *Notes on Child Study* (Walker, 1956). However, it was around 1949 that “the era of empirical generalization” finally arrived in educational

research (West & Robinson, 1980). In spite of frequent calls from many researchers in vocational education to broaden paradigms for inquiry (Zhang, 1993), quantitative research still prevailed in the field during the 1980s (Hillison, 1989; Lynch, 1983). Several studies concurred that ANOVA, correlations, *t*-tests, regression, chi-square tests, and multivariate techniques were among the most frequently used techniques in educational research (Zhang, 1993). The use of variations on statistical significance tests was popularized in the social sciences by Sir Ronald Fisher, Jerzy Neyman, and Egon Person (Huberty, 1987). Today, most researchers implicitly employ some hybrid of the logics suggested by these three figures (Thompson, 1996).

The etiology of the propensity to conduct statistical significance tests can be traced to two dynamics. The first involves an unrecognized error in logic when consciously trying to be scientific, whereas the second dynamic occurs as a frankly irrational process. These two dynamics undergirding continued emphasis on statistical tests must be understood if reform efforts are to be effective (Thompson, 1996).

Statistical significance testing has existed in some form for approximately 300 years (Daniel, 1998) and has served an important purpose in the advancement of inquiry in the social sciences. The controversy about the use or misuse of statistical significance testing that has been evident in the literature for the past 10 years has become the major methodological issue of our generation (Kaufman, 1998).

Bracey (1988) reminded us that “statistical significance has nothing to do with meaningfulness” (p.257). Kupfersmid (1988) observed that a “problem related to the meaningfulness of ‘statistically significant’ findings is that what is ‘significant’ in a meaningful sense may be contradictory” (p. 636). Tests of statistical significance are overused and misused in an attempt to make a poor or mediocre study appear good (Moore, 1992).

Why do educational researchers place such emphasis on statistical significance? Soltis (1984) provided a clue.

Much of the social and behavioral sciences have developed their present forms by consciously seeking to imitate the methods and forms of the natural sciences, many educational researchers have tried to travel the same royal road to knowledge, legitimacy and status. (p. 6)

Shaver (1992) maintained that educational researchers insist on tests of statistical significance because they “provide a façade of scientism in research. For many in educational research, being quantitative is equated with being scientific...despite the fact that some scientists and many psychologists...have managed very well without inferential statistics” (p. 2).

Few researchers understand what statistical significance testing is, and what it is not, and consequently their results are misinterpreted. Even more commonly, researchers understand elements of statistical significance testing, but the concept is not integrated into their research (Thompson, 1994a). For example, the influence of sample size on statistical significance may be acknowledged by a researcher, but this insight is not conveyed when interpreting results in a study with several thousand subjects. Because statistical significance tests have been so frequently misapplied, some reflective researchers (Carver, 1978; Meehl, 1978; Schmidt, 1996; Shulman, 1970) have recommended that statistical significance tests be completely abandoned as a method for evaluating statistical results.

Biskin (1998) argues that practical or clinical significance can be noteworthy even when results are not statistically significant. Conversely, he argues that even results are or would be statistically significant, at least in some such cases “the researcher’s prime consideration should be effect size.” Vogt (1999) provides the following definitions of effect size:

(a) Broadly, any of several measures of association or of the

strength of a relation, such as Pearson's r or eta. Effect size often is thought of as a measure of practical significance. (b) A statistic, often abbreviated D or delta, indicating the difference in outcome for the average subject who received a treatment from the average subject who did not (or who received a different level of the treatment). This statistic is often used in meta-analysis. It is calculated by taking the difference between the control and experimental groups' means and dividing that difference by the standard deviation of the control group's scores-or by the standard deviation of the scores of both groups combined. (c) In statistical power analysis, effect size is the degree to which the null hypothesis is false. (p.94)

By contrast, tests of the null hypothesis only allows you to conclude that a relationship is significantly larger than zero, but they do not tell you by how much. Effect size measures do. Thus, the effect size is an estimate of the degree to which a phenomenon is present in a population (Vogt, 1993).

Reporting effect sizes has three important benefits. First, reporting effects facilitates subsequent meta-analyses incorporating a given report. Second, effect size reporting creates a literature in which subsequent researchers can more easily formulate more specific study expectations by integrating the effects reported in related prior studies. Third, and perhaps most importantly, interpreting the effect sizes in a given study facilitates the evaluation of how a study's results fit into existing literature, verbs the explicit assessment of how similar or dissimilar results are across related studies, and potentially informs judgment regarding what study features contributed to similarities or differences in effects (Vacha-Haase, Nilsson, Reetz, Lance, & Thompson, 2000).

Biskin (1998) reported that as a research area matures, effect size should be deemed more important than statistical significance. Recent empirical studies of articles published since 1994 in psychology, counseling, special education, and general education suggest that merely "encouraging" effect size reporting (APA, 1994)

has not appreciably affected actual reporting practices (Vacha-Haase & Thompson, 1998). Kotrlik (2000) proposed that authors should report effect sizes in the manuscript and tables when reporting statistical significance in the *Journal of Agricultural Education* (the only career and technical/workforce education journal with this requirement).

Numerous effect sizes can be computed. Useful reviews of various choices are provided by Kirk (1996), Olejnik and Algina (2000), Rosenthal (1994), Snyder and Lawson (1993). Although there is a class of effect sizes that Kirk (1996) labeled “miscellaneous” (e.g., the odds ratios that are so important in loglinear analyses), there are two major classes of effect sizes for parametric analyses.

The first class of effect sizes involves standardized mean differences. Effect sizes in this class include indices such as Glass’ D , Hedges’ g , and Cohen’s d . For example, Glass’ D is computed as the difference in the two means (i.e., experimental group means minus control group mean) divided by the control group standard deviation, where the SD computation uses $n-1$ as the denominator. When the study involves matched or repeated measures designs, the standardized difference is computed taking into account the correlation between measures (Dunlap, Cortina, Vaslow & Burke, 1996).

However, not all studies involve experiments or only a comparison of group means. Since all parametric analyses are part of one linear model family, and are correlational, variance-accounted-for effect sizes can be computed in all studies, including both experimental and non-experimental studies. Effect sizes in this second class include indices such as r^2 , R^2 , and δ^2 . For example, for regression, R^2 can be computed as the sum-of-squares explained divided by the sum-of-squares total. Or, for a one-way ANOVA, δ^2 is computed as the sum-of-squares explained divided by the sum-of-squares total (Vacha-Haase, et al., 2000).

Cohen (1988) provided rules of thumb for characterizing what effect sizes are small, medium, or large. He emphasized that the interpretation of effects requires the researcher to think more narrowly in terms of a specific area of inquiry. He emphasized that the evaluation of effect sizes inherently requires the researcher's explicit personal value judgment regarding the practical or clinical importance of the effects. According to Wiersma (2000), assigning descriptions of magnitude to effect sizes is somewhat subjective. Effect sizes from .05 to .20 are quite small. An effect size approaching 1.0, say .75 to .80, indicates a powerful effect. Effect sizes from .25 to .70 are considered moderate to substantial. Seldom do effect sizes exceed 1.0, though such effect sizes are possible (Wiersma, 2000).

Tyron (1998) reported the following:

The fact that statistical experts and investigators publishing in the best journals cannot consistently interpret the results of these analyses is extremely disturbing. Seventy-two years of education have resulted in minuscule, if any, progress toward correcting this situation. It is difficult to estimate the handicap that widespread, incorrect, and intractable use of a primary data analytic method has on a scientific discipline, but the deleterious effects are doubtless substantial. (p.796)

Several empirical studies have shown that many researchers do not fully understand the statistical tests that they employ (Mittag & Thompson, 2000; Nelson, Rosenthal, & Rosnow, 1986; Oakes, 1986; Rosenthal & Gaito, 1963; Zuckerman, Hodgins, Zuckerman, & Rosenthal, 1993). In their AERA study on statistical significance tests, Mittag and Thompson (2000) recommended that other national research associations conduct similar studies to resolve conflicting views related to the use of statistical tests.

At present, there is a dearth of information in the literature about the perceptions of career and technical/workforce education researchers toward statistical significance tests. The significance of

this study is to serve as a framework for promoting further discussion of controversial statistical issues among career and technical/workforce education researchers.

The primary purpose of this study was to establish baseline information regarding AVERA members' perceptions of statistical significance tests. The following objectives guided the study:

1. To explore current perceptions of AVERA members regarding statistical significance tests.
2. To determine perceptions of AVERA members regarding selected statistical issues, such as score reliability and step-wise methods.

Method

Population and Sample

The population consisted of current AVERA members ($N = 160$) during the 2000-2001 school year. Due to the lack of available resources and other restrictions, the decision was made to use a probability sample instead of the total population. A simple random sample is also the single best way to obtain a representative sample (Gay & Airasian, 2000). The AVERA membership directory was used to identify the population. Using a formula suggested by Krejcie and Morgan (1970), a sample size of 113 AVERA members was needed, based upon a 5% degree of accuracy and a 95% confidence level. A simple random sample was selected from the population using the random number generator in Microsoft Excel.

Instrumentation

The Psychometrics Group Instrument (Mittag, 1999) was used to determine participants' perceptions of statistical significance tests and other statistical issues. The core of the instrument (part II) contains 29 Likert-type items with a 1-5 response scale (1 = disagree, 2 = somewhat disagree, 3 = neutral, 4 = somewhat agree, and

AVERA Members' Perceptions of Statistical Significance Tests

5 = agree). The instrument has a reliability coefficient of .90 (Mittag & Thompson, 2000). Content and face validity for the adapted instrument were established by a panel of five faculty members in adult and technical education at Marshall University. The Likert-type scale items were pilot-tested for reliability with a group of 12 AVERA members not included in the sample. The reported reliability coefficient of the pilot study was .89. The completed study had a reported reliability coefficient of .83. Appropriateness and permission for the use of this instrument was discussed with the author. Some items were reverse-worded so as to minimize response set influences. Mittag and Thompson (2000) recommend the recoding of reverse-worded items, so that higher scores have a consistent meaning.

Data Collection

Elements of Dillman's (2000) mail and internet surveys were utilized to achieve optimal return rate. Data collection began in October and was concluded in December, 2000.

To control nonresponse error and maintain validity, early and late respondents were compared statistically (Ary, Jacobs, & Razavieh, 1996). Research shows that nonrespondents are often similar to late respondents (Miller & Smith, 1983). A late respondent was classified as one who returned his or her questionnaire during December. Statistical tests revealed no differences between respondents. Respondents' data were compiled, yielding a total response rate of 35%.

According to Kerlinger (1986, p. 380), survey mail response rates are often about 30%. The critical question when such response rates are realized is whether the respondents are still representative of the population to which the researcher wishes to generalize. Mittag and Thompson (2000) reported that "response profiles should be analyzed to provide at least some insight regarding the issue(s)" (p. 15). Although the results of this study may not be gen-

eralized to the entire population of American Vocational Education Research Association members, the results can still provide valuable information for career and technical/workforce education researchers.

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS Version 9.0 for Windows). Descriptive statistics were used to organize and summarize the data.

Findings

Demographic Characteristics

Sixty-seven percent of the respondents were males. A majority of the respondents (93%) had earned a doctoral degree. Sixty percent of the respondents revealed that they had over 15 years of experience in educational research. The respondents' work settings were as follows: university (82.5%), school district (7.5%), business (5.0%), and other (5.0%).

Perception Clusters

The 29 items evaluated nine clusters of perceptions. Table 1 presents responses to the first five items, which measured *general perceptions* and the ongoing significance controversy.

Respondents were in general agreement ($M = 4.47$, $SD = .60$) that this controversy is likely to continue for many years in the future. The respondents also agreed ($M = 4.25$, $SD = .87$) that researchers should use the phrase "statistically significant," rather than "significant," to describe their results. There was general disagreement ($M = 1.70$, $SD = .88$) among respondents concerning the proposition that statistical significance tests should be banned.

Table 2 shows means and standard deviations of respondents' perceptions of the *General Linear Model* (GLM). Respondents

AVERA Members' Perceptions of Statistical Significance Tests

Table 1

AVERA Members' General Views Regarding Statistical Testing

No.	Perception Statement/Item	M^a	SD
1.	Controversies regarding the use of significance tests have existed for many years in the past, and will doubtless continue for many years in the future.	4.47	0.60
2.	It would be better if everyone used the phrase "statistically significant" rather than "significant," to describe the results when the null hypothesis is rejected.	4.25	0.87
3.	Most studies are conducted with insufficient statistical power against Type II error.	3.41	0.85
5.	All that significance means is that the researcher rejected the null hypothesis.	3.02	1.44
4.	Science would progress more rapidly if tests of significance were banned from journal articles.	1.70	0.88

^aNote. Response scale: 1 = disagree, 5 = agree.

Table 2

AVERA Members' Perceptions of the General Linear Model

No.	Perception Statement/Item	M	SD
26.	It is <i>not</i> possible to use regression to statistically test the null that means of different groups are equal.	3.70	0.88
12.	All statistical analyses (e.g., <i>t</i> -tests, ANOVA, <i>r</i> , <i>R</i>) are correlational.	2.37	1.17

Note. For item 26, after recoding, 1 = agree, 5 = disagree.

For item 12, 1 = disagree, 5 = agree.

slightly disagreed that regression could be used to test hypotheses about means. As reported in Table 2, respondents also slightly disagreed that all statistical analyses are correlational.

Participants were asked whether *stepwise methods* identify the best variable set, and whether the results can be used to infer vari-

Table 3
AVERA Members' Perceptions of Stepwise Methods

No.	Perception Statement/Item	M^a	SD
13.	In regression and other analyses, stepwise methods can reasonably be used to identify the best subset of predictors of a given subset size.	3.55	0.95
20.	When researchers do stepwise analyses, the order of the entry of the variables (1st, 2nd, etc.) provides one useful indication of the importance of the variables.	3.47	0.98

^aNote. Response scale: 1 = disagree, 5 = agree.

able importance. As reported in Table 3, these two views were perceived by respondents as neutral to slightly agreeable ($M = 3.47$ to 3.55).

Table 4 shows respondents' perceptions of *score reliability*. Respondents were slightly in agreement with item 23 ($M = 3.62$, $SD = 1.12$). Item 23 addressed the influence of poor reliability of data on "effect sizes".

Table 4
AVERA Members' Perceptions of Score Reliability

No.	Perception Statement/Item	M	SD
23.	Poor reliability of data in a given study will tend to lower or attenuate the effect sizes that are detected.	3.62	1.12
28.	Reliability does <i>not</i> directly affect the likelihood of obtaining significance in a given study.	3.45	1.21
7.	On its face the statement, "the reliability of the test," asserts an untruth, since reliability is not a characteristic of a given test.	2.85	1.18
19.	Testing the significance of a reliability of validity coefficient with null hypothesis that $r^2 = 0$ is not useful or productive.	2.80	0.99

Note. For items 7, 19, and 23, 1 = disagree, 5 = agree. For item 28, after recoding, 1 = agree, 5 = disagree.

AVERA Members' Perceptions of Statistical Significance Tests

Table 5

AVERA Members' Perceptions of Type I and II Errors

No.	Perception Statement/Item	<i>M</i>	<i>SD</i>
22.	It is possible to make both Type I and Type II error in a given study.	3.37	1.21
17.	Type I errors may be a concern when the null hypothesis is <i>not</i> rejected.	2.72	1.19
29.	Type II errors are probably fairly common within published research.	2.52	1.01
9.	A Type II error is impossible if the results are statistically significant.	2.27	1.10

Note. For items 17, 22, 29, after recoding, 1 = agree, 5 = disagree. For item 9, 1 = disagree, 5 = agree.

Table 6

AVERA Members' Perceptions of Sample Size Influences

No.	Perception Statement/Item	<i>M</i> ^a	<i>SD</i>
16.	Every null hypothesis will eventually be rejected at some sample size.	3.15	1.29
25.	Significance tests are partly a test of whether the researcher had a large sample.	2.87	1.18
10.	Statistically significant results are more noteworthy when sample sizes are small.	2.37	1.31

^a*Note.* Response scale: 1 = disagree, 5 = agree.

Views regarding *Type I and Type II errors* are reported in Table 5. Respondents reported a mean rating score of 2.27 for item 9 (a Type II error is impossible if the results are statistically significant).

Perceptions regarding the *influence of sample sizes on statistical tests* are reported in Table 6. Respondents disagreed ($M = 2.37$, $SD = 1.31$) that “statistically significant results are more noteworthy when sample sizes are small.”

Table 7 shows respondents' perceptions of whether *statistical probabilities are exclusively measures of effect size*. A mean rating of 3.82 was reported for item 14 (failure to obtain statistical signifi-

Table 7

AVERA Members' Perceptions of Effect Sizes

No.	Perception Statement/Item	<i>M</i>	<i>SD</i>
14.	If a dozen different researchers investigated the same phenomenon using the same null hypothesis, and none of the studies yielded statistically significant results, this means that the effects being investigated were not noteworthy or important.	3.82	1.19
11.	Smaller <i>p</i> values provide direct evidence that study effects were larger.	3.27	1.17
24.	The <i>p</i> values reported in different studies cannot be readily compared, because these values are confounded with different sample sizes across studies.	3.15	1.23

Note. For items 11 and 14, after recoding, 1 = agree, 5 = disagree.
For item 24, 1 = disagree, 5 = agree.

Table 8

AVERA Members' Perceptions of p Values

No.	Perception Statement/Item	<i>M</i>	<i>SD</i>
27.	Unlikely results are generally more important or noteworthy.	3.50	1.06
6.	Finding that $p < .05$ is one indication that the results are important.	2.80	1.41
18.	Studies with non-significant results can still be very important.	1.45	1.19

Note. After recoding 1 = agree, 5 = disagree.

importance means that results were not noteworthy or important).

Perceptions of *p* values are summarized in Table 8. Respondents agreed that “studies with non-significant results can still be very important” ($M = 1.45$, $SD = 1.19$).

Finally, participants were asked about whether *p* values evaluate population parameters and result replicability. As revealed in

AVERA Members' Perceptions of Statistical Significance Tests

Table 9

AVERA Members' Perceptions of p as Replicability Evidence

No.	Perception Statement/Item	<i>M</i>	<i>SD</i>
8.	Smaller and smaller values for the calculated <i>p</i> indicate that the results are more likely to be replicated in future research.	3.05	1.21
15.	The <i>p</i> values that are calculated in a given study test the probability of the results occurring in the sample, and <i>not</i> the probability of results occurring in the population.	2.82	1.33
21.	Significance tests evaluate the probability that the results for the sample are the same in the population.	2.22	1.09

Note. For items 8 and 21, after recoding 1 = agree, 5 = disagree.

For item 15, 1 = disagree, 5 = agree.

Table 9, respondents' perceptions were slightly agreeable to neutral ($M = 2.22$ to 3.05).

Discussion, Conclusions, and Recommendations

It appears that AVERA members who were most comfortable with and interested in statistical issues (quantitative methods) may have been most likely to respond to the survey. AVERA members' general views regarding statistical testing appeared to be consistent with previous research (Carver, 1993; Mittag & Thompson, 2000; Thompson, 1996).

Respondents were more likely to slightly disagree with the two views pertaining to the General Linear Model (GLM). These findings contradict a previous study reported by Mittag and Thompson (2000). In their study, respondents were basically neutral on: (a) the point of whether all statistical analyses (e.g., *t*-tests, ANOVA, *r*, *R*) are correlational, and (b) respondents agreed that regression could be used to test a hypothesis about means. Statisticians have argued that parametric methods are part of a single family, and that all are

correlational (Cohen, 1968; Knapp, 1978; Mittag & Thompson, 2000; Thompson, 1991). One important implication of the GLM is that r^2 analogs can be reported as effect sizes in all analyses (Mittag & Thompson, 2000).

The two views pertaining to stepwise methods were more likely to be perceived as acceptable for identifying the best variable set and importance. These findings suggest that some AVERA researchers are not aware that stepwise methods do not identify the best predictor set of a given size (Cliff, 1987; Huberty, 1989; Thompson, 1995). In a recent study by Thomas (2000), over 70% of AVERA members indicated a need for adequate workshops on emerging statistical techniques and research methods. Future researchers in the field may consider additional preparation in statistics so as to comprehend some of the advanced techniques which are used in current research literature in career and technical/workforce education.

Stepwise methods are especially problematic when statistical significance tests are invoked to determine stopping positions, because the methods have several problems associated with conventional statistical significance applications (Carver, 1987; Cohen, 1994; Thompson, 1993, 1994a, 1994b, 1994c). As a general proposition, there are readily available software programs to assist with appropriate variable selection efforts. Thus, stepwise analyses should be eschewed in favor of programs such as those offered by McCabe (1975), the Morris program distributed within Huberty's (1994) book, or SAS procedure RSQR. Regarding interpretations involving the origins of explained variance (i.e., variable ordering), a useful alternative is simply to consult standardized weights (beta weights) and structure coefficients (Thompson & Borello, 1985).

Overall, views regarding score reliability appeared to be neutral. These findings are consistent with a similar study reported by Mittag and Thompson (2000) for the American Educational

Research Association. It is important to remember that a test is not reliable or unreliable. Reliability is a property of the scores on a test for a particular population of examinees. Thus, authors should provide reliability coefficients of the data being analyzed. Interpreting the size of the observed effects requires an assessment of the reliability of the scores (Wilkinson & The APA Task Force on Statistical Inference, 1999, p. 596).

Views pertaining to Type I and Type II errors appeared to be neutral. Examination of these findings revealed a mixed perception of the definition of a Type I error. By definition, a Type I error can only occur if results are statistically significant (Oliver, 1981).

Respondents were more likely to have a neutral perception regarding (a) whether “significance tests are partly a test of whether the researcher had a large sample,” and (b) “every null hypothesis will eventually be reflected at some sample size.” Mittag and Thompson (2000) reported similar findings. Several factors can influence the size of the sample used in a research study, but with the exception of cost, information about such factors is often incomplete and it becomes difficult to set an exact size (Wiersma, 2000). Hinkle and Oliver (1983) discuss estimating necessary sample size based on certain characteristics.

Studies with non-significant results can still be very important. Tyler (1931) pointed out that “differences which are statistically significant are not always socially important. The corollary is also true: differences which are not shown to be statistically significant may nevertheless be socially significant” (pp. 116-117). Meehl (1997) characterized the use of the term “significant” as being “cancerous” and “misleading”(p. 421) and advocated that researchers interpret their results in the terms of confidence intervals rather than p values. Moore (1992) noted,

We as vocational educators should be proud of our improving process as “research technicians”. I am not advocating we do away with statistical testing. However, I am cautioning that we

must not get caught up in the misguided belief that having statistically significant things makes our research significant. (p.5)

These findings suggest that it is critical that research in career and technical education be meaningful and of value. "Progress has no greater enemy than habit" (McCracken, 1991, p.303). As a profession we must break out of the habit of simply describing relationships and differences between and among groups. The explanation of the phenomena must be our goal.

Issues raised in this study may be applicable to other disciplines. Joint efforts between career and technical education and other fields of education should be considered in offering statistics courses at all levels due to the similarity in the use of statistics techniques across the fields.

For further study, it is recommended that research be conducted to determine AVERA members' perceptions of qualitative research and its impact on career and technical education.

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6. Finding the $p < .05$ is one indication that the results are important.
Disagree 1 2 3 4 5 Agree
7. On its face, the statement, "the reliability of the test," asserts an untruth since reliability is not a characteristic of a given test.
Disagree 1 2 3 4 5 Agree
8. Smaller and smaller values for the calculated p indicate that the results are more and more likely to be replicated in future research.
Disagree 1 2 3 4 5 Agree
9. A Type II error is impossible if the results are statistically significant.
Disagree 1 2 3 4 5 Agree
10. Statistically significant results are more noteworthy when sample sizes are small.
Disagree 1 2 3 4 5 Agree
11. Smaller p values provide direct evidence that study effects were larger.
Disagree 1 2 3 4 5 Agree
12. All statistical analyses (e.g., t -tests, ANOVA, r , R) are correlational.
Disagree 1 2 3 4 5 Agree
13. In regression and other analyses, stepwise analyses can reasonably be used to identify the best subset of predictors of a given subset size.
Disagree 1 2 3 4 5 Agree
14. If a dozen different researchers investigated the same phenomenon using the same null hypothesis, and none of the studies yielded statistically significant results, this means that the effects being investigated were not noteworthy or important.
Disagree 1 2 3 4 5 Agree
15. The p values that are calculated in a given study test the probability of the results occurring in the sample, and *not* the probability of results occurring in the population.
Disagree 1 2 3 4 5 Agree
16. Every null hypothesis will eventually be rejected at some sample size.
Disagree 1 2 3 4 5 Agree
17. Type I errors may be a concern when the null hypothesis is *not* rejected.
Disagree 1 2 3 4 5 Agree
18. Studies with non-significant results can still be very important.
Disagree 1 2 3 4 5 Agree
19. Testing the significance of a reliability or a validity coefficient with a null hypothesis that $r^2 = 0$ is not useful or productive.
Disagree 1 2 3 4 5 Agree

AVERA Members' Perceptions of Statistical Significance Tests

20. When researchers do stepwise analyses, the order of the entry of the variables (1st, 2nd, etc.) provides one useful indication of the importance of the variables.	Disagree 1	2	3	4	5	Agree
21. Significance tests evaluate the probability that the results for the sample are the same in the population.	Disagree 1	2	3	4	5	Agree
22. It is possible to make both a Type I and Type II error in a given study.	Disagree 1	2	3	4	5	Agree
23. Poor reliability of data in a given study will tend to lower or attenuate the effect sizes that are detected.	Disagree 1	2	3	4	5	Agree
24. The p values reported in different studies cannot be readily compared, because these values are confounded with the different samples sizes across studies.	Disagree 1	2	3	4	5	Agree
25. Significance tests are partly a test of whether the researcher had a large sample.	Disagree 1	2	3	4	5	Agree
26. It is <i>not</i> possible to use regression to statistically test the null that means of different groups are equal.	Disagree 1	2	3	4	5	Agree
27. Unlikely results are generally more important or noteworthy.	Disagree 1	2	3	4	5	Agree
28. Reliability does <i>not</i> directly affect the likelihood of obtaining significance in a given study.	Disagree 1	2	3	4	5	Agree
29. Type II errors are probably fairly common within published research.	Disagree 1	2	3	4	5	Agree

Author

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The Journal of Vocational Education Research

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