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The Journal of Vocational Education Research

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Editor's Notes

James R. Stone III
University of Minnesota

In this issue, five studies are presented. Kotrlik, Harrison and Redmann examine high school vocational teachers' perceptions of the value of information technology for instructional purposes as well as their personal assessment of their own ability to use technology and how they learn about it. Hermanussen and her colleagues developed an instrument to measure learning styles appropriate to work based learning situations. Stull and his colleagues analyze the factors that affect the breadth of a school's STW offerings. Boatwright and Slate explore demographic predictors of work ethic. Stone and Josiam examine the impact of both job quality and school supervision of work experience in the development of adolescent attitudes about work and specific job behaviors. Finally, we close this issue with another in our series of invited articles exploring the meaning and purpose of vocational education in the United States today. Morgan Lewis challenges us to reconsider a 19th century philosophy that he argues resonates in today's world. As before, you are invited to respond to these discussions with your own perspectives.

This is the final issue of 2000. I wish to thank the many reviewers listed below for their professional contributions which help to ensure that you continue to receive a quality journal.

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A Comparison of Information Technology Training Sources, Value, Knowledge, and Skills For Louisiana's Secondary Vocational Teachers

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Abstract

The population for this study consisted of secondary vocational education teachers in six vocational fields. Vocational teachers see the value and usefulness of information technology in their programs; they just don't have the necessary skills and knowledge to use it effectively for instructional purposes. Vocational programs must prepare students for the workplace and society, both now and in the future. Though teachers value the Internet and other types of information technology, their full understanding of the interrelatedness of information technology to program quality may yet to be realized. Vocational teachers have average to below average levels of both general and software specific information technology knowledge and skill. Teachers use self-directed training, personal experience, written materials and in-service provided by schools or state agencies as their primary sources of training. Teachers must continue to value information technology and seek ways to connect program and instructional management with appropriate information technology, especially the Internet.

Introduction

Computers are pervasive in the workplace, in the classroom, and in the home. Technological advances and the accel-

erated transfer of information, along with related knowledge, skills, and abilities, are of paramount importance in an information society. Many changes have occurred in this arena, and this change is especially important to vocational programs supporting workforce development. The growth and use of computers and related technology are limited only by one's imagination. Linking the technology and the explosion of information to support human resource development and the preparedness of individuals for the workforce may begin at home; however, this linking impacts the professional educator and related responsibilities in instructional design and delivery in educational settings. The teacher is the change agent between the learner and technology, and plays a critical role in the process of teaching and learning (Chin & Hortin, 1994). Therefore, it behooves the teacher to stay abreast of changing technology and current opportunities in order to assure his/her place of leadership in instructional technology. That, in turn, is supported by the cry from business and industry for better prepared individuals for the global workforce.

Before further addressing teacher competencies in the area of information technology, it is important to address whether technology enhances learning. Dede (1997) states that new technologies promise a rich education experience. This opinion is supported by studies that have reported significant gains in learning when using technology. Goldberg (1996) reported that students who were taught using both traditional methods and the Internet performed better than two other groups who were taught using either the Internet or traditional lecture, i.e., the Internet used in combination with traditional methods enhanced learning. Day, Raven, and Newman (1998) found that students who were taught using the Internet with a laboratory achieved at a higher level than those students who were taught using the traditional classroom approach. Ganguli (1992) found that the CAI (computer assisted instruction) in mathematics instruction group experienced higher enjoyment, more motivation, and bet-

ter understanding of the concepts in the course. Students taught chemistry using a computer simulation scored better than students taught using the traditional lecture method and the learning cycle method (Jackman, Moellenberg, & Brabson, 1987). It is clear that improved learning can result from using technology in instruction.

During the eighties, with the inclusion of computers in classrooms becoming more prominent, the need for teachers to become more technologically literate was realized. Nagourney (1989) considered technological literacy among the *new* basic skills. In 1990, Pomeroy found that half of the vocational teachers in Southern Nevada were not computer literate. Of those vocational teachers who were computer literate, 62% of them were self-taught, and 71% indicated they learned their computer skills after beginning to teach. In 1997, Daulton reported that family and consumer science teachers' adoption rate for computer technology had increased from 5% in 1983 to 83% in 1993. Daulton concluded that "Although the microcomputer had not reached a 100% adoption rate by 1993, the adoption of microcomputers for educational purposes by family and consumer sciences teachers had dispelled the belief that microcomputers would eventually end in the closet like so many other pieces of audio-visual equipment" (Daulton, 1997; p. 59).

A report from the Office of Technology Assessment (1988) stressed that the use of technology cannot be fully effective unless teachers receive adequate training and support. Keeping current has been especially critical because teachers need information technology competencies so they can transfer these competencies to students (Sormumen & Chalupa, 1994).

Relatively few studies in the area of information technology were conducted in the 1990's. Garton and Chung (1996) reported that in-service training on the use of computers in classroom teaching was ranked sixth out of 50 in-service needs of agriscience teachers. They queried whether teacher unfamiliarity with selected technologies and related capabilities

resulted in low acceptance/use of those technologies. Another related factor, computer anxiety, was studied by Kotrlik and Smith (1989), and Fletcher and Deeds (1994). Both studies reported that younger teachers were more likely to have higher levels of computer literacy, and that computer anxiety decreased.

A 1997 study conducted by the National Center for Education Statistics (Heaviside, Riggins, Farris, & Westat, Inc., 1997) found that more than 50% of schools technology training was left up to the teacher. This study also found that only 20% of teachers used advanced telecommunications for teaching.

With the explosion of technological advances in all areas has come the increased need for higher competencies in the area of information technology. The risk of not meeting workplace needs increases without it. Critical competencies in the area of instructional technology by the instructional leader in any setting can make or break a program whose goal is to prepare persons for the workplace.

Theoretical/Conceptual Base

Theories of adult learning are highly relevant to information technology training. Heerman (1986) and Zemke (1984) indicated that self-direction, intrinsic motivation, role of problem solving, and immediate value in learning activities have been shown to be critical in computer learning tasks. In the preparation of instructional leaders, including teachers, training should incorporate competencies in software knowledge versus system-specific skill (Lammers, 1986).

Using computers and computer-based learning systems in education is viewed as a major contributor to increased learning. Learning theories such as those by Pask, Spiro, and Salomon are considered especially relevant to the use of information technology in learning. Pask (1975) developed the Conversation Theory, and it applies to learning of any subject mat-

ter. Information technology incorporates "teachback" which is a critical method of learning according to this theory. The "teachback" method is where one person teaches another what he/she has learned, and where students learn relationships among the concepts. The Cognitive Flexibility Theory builds upon other constructivist theories and is related to the work of Salomon in terms of media and learning interaction (Spiro & Jehng, 1990). Spiro and Jehng stated, "By cognitive flexibility, we mean the ability to spontaneously restructure one's knowledge, in many ways, in adaptive response to radically changing situational demands" (p. 165). This theory is largely concerned with the transfer of knowledge and skills beyond the initial learning situation. "Cognitive Flexibility Theory is especially formulated to support the use of interactive technology" (Kearsley, 1998, p.1). Salomon (1979) developed the Symbol Systems Theory which is intended to explain the effects of media on learning. Included among the principles of the Symbol Systems Theory are the symbolic coding elements of particular media which require different mental transformations (that affects the mastery of specific skills), and the reciprocal relationship between media and learner (each can influence the other). In 1991, Salomon, Perkins, and Globerson reported the extension of the framework of Salomon's theory to computers.

A constructivist approach for vocational education programs ". . where learners may work together and support each other as they use a variety of tools and information resources in their guided pursuit of learning goals and problem solving activities" (Wilson, 1995, p. 5) seems appropriate as a foundation for a study of secondary vocational teachers' views regarding information technologies. An "environment that is good for learning can not be fully pre-packaged and designed" (Wilson, 1995, pp. 4-5). The learning environment includes computers and other technologies along with an abundance of available information. Therefore, the need for the teachers, or instruc-

tional leaders, to be competent in information technologies and to be prepared to address current and future needs of the learners is critical for the transfer of learning and for learners to transition to the workplace. Sormumen and Chalupa (1994) indicated that the use of technology can not be fully effective unless teachers receive adequate training and support.

Review of Relevant Research

Several studies have been conducted that addressed relationships between selected demographic variables and computer use. One such study was Zidon and Miller (1990) who found that weak relationships existed between demographic variables, such as age, gender, and years of teaching, with perceptions of computer use. They concluded that "such demographic variables need not be considered when planning in-service training or planning to include computers in a secondary agriculture curriculum" (p.237).

Conversely, in a study of teachers perceptions of the need for computers, Princeton Research Associates, Inc. (1993) addressed technology in the classroom for the National Education Association, and found that almost two-thirds (59%) of teachers under 35 years of age believed computers in the classroom were essential while only 29% of teachers over age 55 shared this belief. Furthermore, half of the teachers in low technology schools had home computers. The report concluded that many teachers lack access to technologies they believe to be essential resources. In a related study, Martin and Lundstrom (1988) found that having a computer in the home and having taken computer coursework contributed to home economics teachers' attitudes toward computers. In an even earlier study, Yuen (1985) concluded that trade and industrial teachers had a favorable attitude toward using computers. Trade and industrial teachers who had experience in working with microcomputers, or who had training in using microcomputers, were more in favor of using microcomputers in industrial education than those

who did not have this experience or training. In a more recent study, Ghomita (1995) found consistency between business teachers' attitudes toward microcomputers and their adoption of the microcomputer, and Marcinkiewicz (1996) found that self-competence and perceived relevance of information technology are highly correlated. Marcinkiewicz also found that for information technology to be adopted, there needs to be a perception generated by the professional environment that computer integration is expected.

Several studies have addressed factors related to the use of information technology by vocational teachers. McCaslin and Torres (1992) found three factors that accounted for 54% of the variance in vocational teachers attitude toward using microcomputers in in-service training, namely, their educational value, confidence in their use, and apprehension about their use. Two studies (Fletcher & Deeds, 1994; Kotrlik & Smith, 1989) supported apprehension of using computers thorough measures of computer anxiety. Both studies reported that younger teachers were more likely to have higher levels of computer literacy and computer anxiety decreased as computer literacy increased. Golden (1997) supported these findings when he stated that teachers do not use new technology either because they feel uncomfortable with new technology or because they lack proper training. This was supported by Miller (1997) when she stated that, "As schools spend more on technology, they're budgeting even less for training teachers to use it effectively" (p. 13).

Birkenholz, Stewart, and Craven (1989) studied the extent to which instructional technology had been adopted in secondary programs of agricultural education. The study documented the rapid increase in the use of technology in agricultural education and found that teachers supported the development of technological advances for use in their curriculum. However, in a 1996 study of Idaho teachers, Mathews, David and Hamilton found that up to one-half of all teachers never actually used technology for any instructional purpose. Over half

rated themselves as novices in all areas studied. Chin and Horton (1994) found that " . . . numerous recent studies have shown that teachers want to use the newest technology and to prepare their students for the world of technology outside of school. Apparently, what teachers really need is more time to acquire the knowledge and understanding of technology, and to absorb what instructional technology can do for them" (p. 87).

Honey and Moeller (1990) studied the relationships between teachers' beliefs and technology integration. They found that low-tech teachers tended to be more heterogeneous as a group when compared to high-tech teachers and that they could be characterized by three different characterizations:

> "First, there were teachers whose educational beliefs were student-centered, like those of the high-tech teachers, but they were reluctant to use information technologies because of personal fears and inhibitions. Second, there were teachers whose classroom practices and educational objectives were much more traditionally based . . . Finally, there were teachers whose practices tended to be student-centered and who would have liked to use computers, but either the equipment was not available or they had problems scheduling time in the computer lab" (p. 3).

Gonzenbach and Davis (1999) stated that, "Not only are new products and technologies constantly developing and changing, their impact is reshaping methods and materials used for classroom instruction" (p. 58). They cited a report entitled, "Knowledge Workers in Demand Through Year 2000," when they stated that, "By the year 2000, 20% of all jobs will require knowledge workers; workers who are charged with gathering, analyzing, and disseminating information for their employers" (p. 26). This is supported by the SCANS Report which calls for graduates to have competencies in the selection and application of technology (U.S. Department of Labor, 1992) and by Martin and Lundstrom (1988) who concluded that preparing students for the world of work means providing them

with computer experiences.

Not only is this area a concern in the United States, it is also a concern in other countries. For example, Bakar and Mohamed (1998) found that Malaysian vocational and technical teachers did not have a high level of general knowledge about computers. They were not very knowledgeable or skillful in the use of computer software. The teachers indicated they would like to attend training in using computers for instruction. Bronkhurst (1997) reported that the Netherlands is devoting 50% of student study time in teacher education programs to teach with information and communication technologies, and multimedia. The conclusions reported by Na and Barrick (1993) in their study of Korean agricultural education teachers' attitudes toward computer technology were similar to conclusions of studies in the United States. They found that several personal characteristics were related to the current study, including perceived value of computer applications, perceived need for classroom computer use, and number of information sources on computers.

Kang (1995) studied computer simulations as a framework for critical thinking instructions, and found that computer simulations were helpful in developing critical thinking skills. Computer use alone will not develop those skills but wise choice of software can enhance learning. Ingram (1996) indicated several principles to guide the thought process when considering how to apply the possibilities of information technology to educational efforts. One of those principles to keep in mind: Technologies do not teach; people do. Further, Ingram (1996) stated that the material, the audience and the instructional methods are the critical elements to consider, and once those have been effectively combined, then one can choose the technologies to deliver the message.

Kitagaki (1995) indicated that young people just beginning a career will be more concerned with learning technology at a faster pace to be proficient in their career field. For instruction

to expedite the transfer of learning, teachers must adopt and integrate new technology into their instruction by whatever means are available. For example, Downing and Rath (1997) found, ". . .that the Internet, using the Intranet model developed by the business community, can serve as a unique and solid starting point for an electronic classroom" (p. 287).

In summary, this review of research has shown that information technology is generally considered to be essential by business, industry, and education. A need for students to possess information technology competence to enter into, and succeed in, the global marketplace has been shown (Gonzenbach & Davis, 1999; Martin & Lundstrom, 1988; U.S. Department of Labor, 1992). Avenues of instructional methods and delivery have been established. Support for these methods is embedded in several key learning theories, namely, the Cognitive Flexibility Theory, Symbol Systems Theory, and Conversation Theory. The need exists for instructional leaders to possess information technology knowledge and skill so they can link learning in the classroom to the workforce. Therefore, this study focused on the information technology skills, knowledge and perceptions of vocational teachers, and their use of this technology in the transfer of learning.

Purpose and Objectives

The purpose of this study was to compare the information technology training sources, knowledge and skills for Louisiana's secondary vocational teachers. The objectives were to determine: (1) their demographic characteristics (degrees held, age, gender, ethnicity, years teaching experience, area where school is located [rural, urban or suburban], school level [high school, junior/middle school, or both], participation in professional associations); (2) the value of information technology as perceived by teachers; (3) the general information technology knowledge and skill levels possessed by teachers; (4) software specific knowledge and skills possessed by teachers; (5) teach-

ers' perceptions of the potential usefulness of information technology in program and instructional management; (6) the availability of information technology to teachers; (7) the source of information technology training received by teachers in the last three years; and (8) if differences exist in how teachers value information technology, their general information technology skill and knowledge levels, their software specific skill and knowledge levels, and their perceptions of the usefulness of information technology by vocational program area.

Research Methods and Procedures

Population and Sample

The population for this study included 2,423 secondary (grades 7-12) vocational teachers in Louisiana. Using Cochran's (1977) sample size formula, a stratified random sample of 1,126 Louisiana vocational education teachers was selected from six program areas (agriscience, business, family and consumer sciences, health, marketing, and technology). Since this study targeted vocational teachers in grades 7-12, trade and industries instructors were not included in this study because most of these instructors are employed by post-secondary institutions in Louisiana.

Instrumentation

The scales and items used in the instrument were developed by the researchers after a review of the literature guided by the theoretical base of the study. A demographics section was included to provide a description of the sample used in the study. The face and content validity of the instrument was evaluated by an expert panel of university vocational education faculty and doctoral level graduate students representing all vocational program areas in the study. The instrument was field tested with 40 vocational teachers. Changes indicated by the validation panel and field test were made. These changes occurred in the wording of items and in the instructions for completing the

instrument. Internal consistency coefficients for the scales in the instrument were as follows (Cronbach's *alpha*): Value of Information Technology in Instruction - .87, Information Technology Knowledge and Skill - .94, Software Applications Knowledge and Skill - .94, and Usefulness of Information Technology in Program Management - .94.

Data Collection

The teachers' responses were collected using two mailings and a systematic follow-up of a random sample of non-respondents. Each mailing consisted of a questionnaire, cover letter, and stamped addressed return envelope. The systematic follow-up of non-respondents included a telephone call to the random sample of non-respondents in which they were asked to complete and return the questionnaire. As a result of the telephone contact, the non-respondents either agreed to complete and return the questionnaire or were found to be frame errors. A third questionnaire with cover letter and stamped addressed return envelope was mailed to the non-respondents. A response rate of 55% (619 out of 1126) was attained. The results of the comparisons between the mail and phone responses are presented in the data analysis section.

Data Analysis

The data were analyzed using descriptive statistics for objectives 1 - 7. Analyses of variance with Tukey's post hoc mean separation test were used to analyze the data for objective 8. The alpha level was set á priori at .05. To determine if the sample was representative of the population and to control for non-response error, the scale means for the four primary scales were considered to be the primary variables in the study and the scale means were compared by response mode (mail versus phone follow-up) as recommended by Borg (1987) and Miller and Smith (1983). There were no statistically significant differences between the means for the four scales in the instrument by response mode. It was concluded that no differences existed

by response mode, and the data were representative of the population. The mail and phone follow-up responses were combined for further analyses.

Findings

Objective 1

Objective one was to describe the demographic characteristics of vocational teachers. Almost half of the respondents (47%) possessed the bachelor's degree while over half had an advanced degree (master's-27%, specialist or +30-25%, doctorate-.5%). More marketing teachers had higher advanced degrees than the other teacher groups, while the health occupations teachers had the lowest percentage of advanced degrees.

Over half (61%) of the respondents were female, the agriscience and technology teachers groups were primarily male (94% and 86%, respectively), and the business, family and consumer sciences, and health occupations teachers were primarily female (92%, 100%, and 95% respectively). Eighty percent of the respondents were white with five of the teacher groups consisting of between 72 and 78% white, and the agriscience teacher group consisting of 94% white.

The average age of the respondents was 44 years, and the average years of teaching experience was 17. The agriscience and business teachers had the lowest mean age while the health occupations teachers had the highest mean age. The business teachers had the lowest mean years of teaching experience while the technology teachers had the highest mean years.

Over half (53%) of the respondents taught in rural areas, 26% taught in urban areas, and 21% taught in suburban areas. Most agriscience teachers (82%) taught in rural schools while over half of health occupations teachers (57%) taught in urban schools. Over half (57%) of the respondents and almost all (95%) of the agriscience teachers had attended the state vocational association convention in the past three years. Only the

agriscience teachers had over half (61%) of their group attend each of the last three years. Only 19% had attended a regional or national Association for Career and Technical Education (formerly American Vocational Association) convention in the past three years. Over one-half (62%) of the teachers' schools were connected to the Internet and some variation existed by teacher group. The differences in Internet connections may be related to urban location of the schools. These data are presented in Tables 1 and 2.

Table 1
Comparison of Demographic Characteristics by Vocational Program (Continuous Variables)

	Mean (Standard Deviations)						
Demographic Characteristic	All	Ag	Bus	FACS	HO	Mkt	Tech
Age	44.01 (8.75)	41.96 (9.49)	42.52 (9.10)	45.05 (7.79)	49.53 (7.86)	43.89 (7.32)	45.93 (8.02)
Years teaching experience	17.39 (9.08)	17.72 (8.88)	15.49 (8.97)	18.06 (8.69)	16.71 (7.79)	18.02 (9.22)	19.30 (10.16)

Note: *N*=619. All=all vocational teachers in the study; Ag=agriscience education; Bus=business education; FACS=family and consumer sciences education; HO=health occupations education; Mkt=marketing education; Tech=technology education.

Objective 2

Objective 2 was to identify the value of information technology as perceived by vocational teachers. The respondents rated 33 statements on the following scale: 1=strongly disagree, to 5= strongly agree. The data revealed that vocational teachers placed a high value on information technology by strongly agreeing that teachers should know how to use computers (*M*=4.69), and that teachers (*M*=4.70) and students (*M*=4.64)

Table 2
Comparison of Demographic Characteristics

		Vocational Program						
Demographic Characteristic		All	Ag	Bus	FACS	HO	Mkt	Tech
Highest Degree Held: Bachelors	*N*=	288	54	8	62	22	16	46
	%=	47	42	53	46	65	30	51
Masters	*N*=	167	39	43	38	10	13	24
	%=	27	30	26	28	29	25	27
Masters+ 30 hrs./ Education Specialist	*N*=	151	37	35	2	23	23	19
	%=	25	29	26	6	6	43	21
Doctorate	*N*=	3	0	0	1	0	1	1
	%=	1	0	0	1	0	2	1
Gender								
Male	*N*=	237	123	14	0	2	20	78
	%=	39	94	9	0	5	39	56
Female	*N*=	377	8	151	136	37	32	13
	%=	61	6	92	100	95	62	14

Table 2 (continued)
Comparison of Demographic Characteristics

		Vocational Program						
Demographic Characteristic		All	Ag	Bus	FACS	HO	Mkt	Tech
Race								
White	*N*=	488	123	128	101	29	41	66
	%=	80	94	78	77	74	77	73
Black	*N*=	117	7	33	30	10	12	25
	%=	19	5	20	23	26	23	28
Hispanic	*N*=	1	1	0	0	0	0	0
	%=	0	1	0	0	0	0	0
Other	N=	4	0	3	1	0	0	0
	%=	1	0	2	1	0	0	0
School Location								
Rural	*N*=	308	103	85	63	71	20	30
	%=	52	82	56	49	19	37	35
Urban	*N*=	155	12	38	32	21	21	31
	%=	26	10	25	25	57	39	36
Suburban	*N*=	124	11	30	35	9	13	26
	%=	21	9	20	27	24	24	30
School connected to Internet (% responding yes)	*N*=	356	71	94	78	25	36	52
	%=	62	57	60	62	66	71	62

Table 2 (continued)
Comparison of Demographic Characteristics

Demographic Characteristic	Yrs.		Vocational Program[a] All	Ag	Bus	FACS	HO	Mkt	Tech
Number of state vocational conferences (0 to 3) attended in the past three years.	0	*N*[b]=	260	6	88	74	16	26	50
		%[c]=	43	5	55	55	42	48	56
	1	*N*=	111	14	30	29	13	10	15
		%=	18	11	19	22	34	19	17
	2	*N*=	83	16	25	15	6	7	14
		%=	14	12	16	11	16	13	16
	3	*N*=	152	93	18	17	3	11	10
		%=	25	16	12	13	8	20	11
Number of Association for Career and Technical Education (A.C.T.E.[d]) National or regional Conventions (0 to >3) attended in past three years	0	*N*=	487	92	129	114	28	46	78
		%=	80	71	80	84	72	87	87
	1	*N*=	72	16	24	11	8	4	9
		%=	12	12	15	8	21	8	10
	2	*N*=	25	12	7	4	0	1	1
		%=	4	9	4	3	0	2	1
	3	*N*=	19	8	1	6	1	2	1
		%=	3	6	1	4	3	4	1
	>3	*N*=	5	2	0	0	2	0	1
		%=	1	2	0	0	5	0	1

Note: N=619. Vocational Program[a]: All=all vocational teachers in the study; Ag=agriscience education; Bus=business education; FACS=family and consumer sciences education; HO=health occupations education; Mkt=marketing education; Tech=technology education. *N*[b]=Number of respondents. %[c]=Percentage of respondents. Percentages do not add to 100% due to rounding error. A.C.T.E.[d]=formerly American Vocational Association.

should have computers available for instruction. The respondents agreed with the other 22 positively stated value of information technology statements (e.g., teachers should know how to use the Internet, should have Internet connections for teachers). They disagreed with all eight "negative" value statements (e.g., is too expensive to be cost effective, creates problems for the teacher, makes learning too mechanical, will limit student-teacher interaction, has little value in vocational education, will isolate teachers from one another). Minimal differences existed in individual items by program area. These data are presented in Table 3.

Objective 3

Objective 3 was to determine the perceived information technology knowledge and skill levels possessed by vocational teachers. The respondents rated each statement on the following scale: 1= I don't know enough to respond, 2= My knowledge and skill in this area is below average, 3= My knowledge and skill in this area is average, 4= My knowledge and skill in this area is above average, and 5= My knowledge/skill in this area qualifies me as an expert. The data revealed that the teachers rated themselves average (between 2.50 and 3.49) on the eight areas related to the use of computers in instruction. The respondents rated themselves below average (between 1.50 and 2.49) on all of the newer technologies (Internet e-mail, multimedia computers, World Wide Web, laser disc players, video conferencing, compressed video, satellite downlinks). These data may be found in Table 4.

Objective 4

Objective 4 was to determine vocational teachers' perceived knowledge and skill levels in the use of information technology software. The respondents rated each statement on the following scale: 1= I don't know enough to respond, 2= My knowledge and skill in this area are below average, 3= My knowledge and skill in this area are average, 4= My knowledge

Table 3
Value of Information Technology

	Mean (SD) by Vocational Program						
Information Technology Value	All	Ag	Bus	FACS	HO	Mkt	Tech
Teachers should know how to use computers	4.69 (.70)	4.58 (.67)	4.87 (.58)	4.59 (.80)	4.68 (.76)	4.79 (.64)	4.60 (.72)
Teachers should know how to use the Internet	4.39 (.84)	4.22 (.88)	4.57 (.70)	4.33 (.93)	4.35 (1.05)	4.50 (.80)	4.32 (.75)
Programs should have the following technology available for use in instruction:							
Computers for teachers	4.70 (.69)	4.60 (.68)	4.83 (.60)	4.64 (.80)	4.68 (.76)	4.79 (.64)	4.68 (.65)
Computers for students	4.64 (.74)	4.51 (.75)	4.88 (.57)	4.48 (.85)	4.53 (.96)	4.77 (.65)	4.60 (.69)
Internet connections for teachers	4.44 (.82)	4.36 (.78)	4.55 (.70)	4.34 (.92)	4.50 (1.02)	4.52 (.85)	4.40 (.77)
Multimedia computers for teachers	4.42 (.82)	4.29 (.84)	4.59 (.69)	4.35 (.90)	4.45 (.88)	4.40 (.91)	4.35 (.80)
Multimedia computers for students	4.25 (.87)	4.14 (.94)	4.46 (.74)	4.14 (.90)	4.30 (1.02)	4.19 (.93)	4.22 (.82)
Internet connections for students	4.09 (1.01)	4.01 (1.02)	4.25 (.93)	3.96 (1.03)	4.20 (1.07)	4.28 (1.07)	3.98 (1.04)

Table 3 (continued)
Value of Information Technology

Information Technology Value	Mean (SD) by Vocational Program						
	All	Ag	Bus	FACS	HO	Mkt	Tech
laser disc players for teachers	3.93 (1.00)	3.91 (.98)	4.04 (.94)	3.78 (1.09)	4.00 (1.09)	4.19 (.91)	3.78 (1.02)
video conferencing capability for teachers	3.93 (.98)	3.83 (.98)	3.97 (.90)	3.88 (1.01)	4.28 (1.03)	3.96 (1.10)	3.88 (.96)
satellite downlink capability for teachers	3.92 (.96)	3.91 (.97)	4.07 (.89)	3.74 (.97)	3.82 (1.10)	4.00 (.99)	3.90 (.95)
Programs should have the following technology available for use in instruction:							
compressed video capability for teachers	3.74 (1.00)	3.71 (.98)	3.83 (.98)	3.58 (1.00)	3.71 (1.06)	3.92 (1.10)	3.77 (.94)
laser disc players for students	3.65 (1.03)	3.67 (1.02)	3.64 (.98)	3.56 (1.05)	3.87 (1.07)	3.80 (1.13)	3.58 (1.07)
Information technology:							
helps individuals apply knowledge.	4.47 (.70)	4.31 (.60)	4.61 (.60)	4.49 (.74)	4.40 (.82)	4.63 (.69)	4.37 (.65)

Table 3 (continued)
Value of Information Technology

	Mean (SD) by Vocational Program						
Information Technology Value	All	Ag	Bus	FACS	HO	Mkt	Tech
Information technology:							
can improve the quality of programs.	4.42 (.71)	4.27 (.70)	4.53 (.66)	4.38 (.78)	4.46 (.79)	4.58 (.73)	4.41 (.62)
is a useful instructional tool.	4.42 (.76)	4.25 (.74)	4.60 (.67)	4.37 (.80)	4.30 (1.09)	4.51 (.78)	4.38 (.60)
is essential to prepare students for the workplace.	4.41 (.84)	4.14 (.83)	4.66 (.70)	4.38 (.92)	4.38 (.95)	4.55 (.83)	4.30 (.79)
adds interest in instruction.	4.41 (.71)	4.21 (.69)	4.59 (.66)	4.40 (.74)	4.35 (.89)	4.51 (.70)	4.37 (.63)
can improve teacher effectiveness.	4.37 (.75)	4.16 (.77)	4.56 (.64)	4.31 (.77)	4.25 (1.03)	4.57 (.73)	4.38 (.62)
enhances student learning.	4.29 (.78)	4.16 (.74)	4.49 (.61)	4.19 (.85)	4.28 (.91)	4.37 (.75)	4.17 (.88)
is necessary for the success of students in the workplace.	4.26 (.88)	3.95 (.91)	4.53 (.73)	4.28 (.91)	4.21 (.98)	4.41 (.88)	4.09 (.87)
is important in instruction.	4.23 (.76)	4.05 (.72)	4.47 (.57)	4.11 (.85)	4.18 (1.01)	4.41 (.75)	4.17 (.74)

Table 3 (continued)
Value of Information Technology

	Mean (SD) by Vocational Program						
Information Technology Value	All	Ag	Bus	FACS	HO	Mkt	Tech
Information technology:							
encourages teacher innovation.	4.20 (.77)	4.10 (.71)	4.33 (.69)	4.13 (.77)	4.18 (.93)	4.28 (.78)	4.16 (.89)
allows teachers flexibility in planning their instruction.	4.12 (.78)	3.95 (.78)	4.21 (.74)	4.13 (.78)	4.18 (.85)	4.24 (.76)	4.07 (.82)
promotes self-directed learning.	4.07 (.80)	3.99 (.72)	4.09 (.82)	4.02 (.80)	4.03 (.99)	4.16 (.81)	4.17 (.79)
is too expensive to be cost effective.	2.48 (1.10)	2.81 (1.10)	2.10 (.98)	2.61 (.97)	2.28 (1.05)	2.18 (1.11)	2.79 1.26)
creates problems for the teacher.	2.27 (1.06)	2.45 (1.01)	2.10 (1.07)	2.22 (.91)	2.03 (1.14)	2.26 (1.15)	2.48 (1.15)
will limit student-teacher interaction.	2.19 (1.00)	2.46 (1.02)	1.90 (.83)	2.32 (.98)	2.25 (1.17)	1.96 (.92)	2.28 (1.12)
makes learning too mechanical.	2.18 (.93)	2.40 (.91)	1.92 (.83)	2.30 (.89)	2.28 (1.10)	1.86 (.85)	2.28 (1.02)
will isolate teachers from one another.	2.06 (.97)	2.29 (1.04)	1.78 (.73)	2.22 (1.02)	2.05 (1.05)	1.94 (1.05)	2.06 (.96)
has an adverse effect on teachers.	2.05 (.99)	2.13 (.97)	1.82 (.86)	2.14 (1.05)	1.78 (.92)	2.12 (1.09)	2.28 (1.06)

Table 3 (continued)
Value of Information Technology

	Mean (SD) by Vocational Program						
Information Technology Value	All	Ag	Bus	FACS	HO	Mkt	Tech
Information technology:							
causes more problems than it solves.	1.99 (.91)	2.24 (1.00)	1.76 (.81)	2.13 (.90)	1.80 (.93)	1.84 (.84)	2.01 (.87)
has little value in vocational education.	1.69 (.95)	1.84 (.88)	1.44 (.87)	1.72 (.93)	1.82 (1.21)	1.51 (.93)	1.91 (1.05)
Scale Means	3.73 (.39)	3.68 (.41)	3.79 (.33)	3.70 (.40)	3.71 (.40)	3.77 (.37)	3.73 (.33)
N	619	131	166	136	41	54	191

Note: All=all vocational teachers in the study; Ag=agriscience education; Bus=business education; FACS=family and consumer sciences education; HO=health occupations education; Mkt=marketing education; Tech=technology education. Scale: 1=strongly disagree, 2=disagree, 3=undecided, 4=agree, 5=strongly agree.

Table 4
General Information Technology Knowledge and Skill Levels

	Mean (SD) by Vocational Program						
General Information Technology Knowledge and Skill Levels	All	Ag	Bus	FACS	HO	Mkt	Tech
Know the major components of a computer	3.33 (.98)	2.94 (.88)	3.90 (.73)	3.02 (.86)	3.00 (.99)	3.59 (.90)	3.32 (1.21)
Know how to operate a computer	3.23 (.89)	2.93 (.79)	3.75 (.67)	3.00 (.76)	2.90 (.98)	3.46 (.91)	3.08 (1.03)
Can integrate computer-based teaching materials	3.11 (1.02)	2.77 (.95)	3.62 (.83)	2.85 (.95)	2.88 (1.09)	3.33 (1.03)	3.02 (1.11)
Can evaluate software for instruction	3.10 (1.03)	2.75 (.93)	3.60 (.85)	2.86 (.99)	2.93 (.97)	3.25 (1.11)	3.05 (1.18)
Can locate computer-based teaching materials for use in instruction	3.05 (1.00)	2.70 (.91)	3.43 (.86)	2.85 (1.01)	2.95 (.96)	3.35 (1.05)	3.00 (1.007)
Know how to prepare students to use information	2.92 (1.05)	2.61 (.91)	3.53 (.82)	2.50 (.96)	2.45 (1.09)	3.13 (1.10)	2.97 (1.12)
Know how to select information technology that fits program needs (computers, modems, printers, laser disc players, etc.)	2.83 (1.05)	2.71 (.93)	3.23 (.94)	2.42 (.97)	2.43 (1.13)	3.17 (1.13)	2.87 (1.14)

Table 4 (continued)
General Information Technology Knowledge and Skill Levels

	Mean (SD) by Vocational Program						
General Information Technology Knowledge and Skill Levels	All	Ag	Bus	FACS	HO	Mkt	Tech
Can evaluate software for program management	2.80 (1.05)	2.64 (.93)	3.17 (1.01)	2.52 (.98)	2.65 (1.08)	2.91 (1.17)	2.76 (1.09)
Know how to use . . .							
Internet e-mail	2.26 (1.17)	2.09 (1.02)	2.49 (1.17)	2.09 (1.12)	2.25 (1.13)	2.59 (1.35)	2.15 (1.28)
Multimedia computers	2.24 (1.13)	2.20 (.97)	2.53 (1.15)	1.94 (1.03)	2.08 (1.05)	2.47 (1.28)	2.14 (1.25)
World Wide Web	2.17 (1.13)	2.06 (1.02)	2.35 (1.15)	2.00 (1.09)	2.20 (1.14)	2.41 (1.28)	2.07 (1.16)
Laser disc players	2.08 (1.05)	2.09 (.98)	2.18 (1.08)	1.86 (.95)	1.88 (.99)	2.37 (1.23)	2.15 (1.11)
Video conferencing	1.70 (.80)	1.72 (.71)	1.70 (.77)	1.64 (.77)	1.85 (.86)	1.76 (.99)	1.67 (.85)
Compressed video	1.63 (.76)	1.74 (.78)	1.62 (.76)	1.54 (.68)	1.68 (.80)	1.57 (.90)	1.61 (.75)
Satellite downlinks	1.63 (.76)	1.67 (.67)	1.61 (.74)	1.61 (.79)	1.70 (.76)	1.52 ( )	1.64 (.82)

Table 4 (continued)
General Information Technology Knowledge and Skill Levels

	Mean (SD) by Vocational Program						
General Information Technology Knowledge and Skill Levels	All	Ag	Bus	FACS	HO	Mkt	Tech
Scale Means	2.54 (.74)	2.39 (.68)	2.84 (.62)	2.32 (.67)	2.39 (.80)	2.72 (.85)	2.48 (.86)
N	619	131	166	136	41	54	91

Note: All=all vocational teachers in the study, Ag=agriscience education, Bus=business education, FACS=family and consumer sciences education, HO=health occupations education, Mkt=marketing education, Tech=technology education. Scale: 1 = I don't know enough about this area to respond, 2 = my knowledge/skill level in this area is below average, 3 = my knowledge/skill level in this area is average, 4 = my knowledge/skill level in this area is above average, 5 = my knowledge/skill level in this area qualifies me as an expert.

and skill in this area are above average, and 5= My knowledge/ skill in this area qualifies me as an expert. The teachers rated themselves average (between 2.50 and 3.49) or below average (between 1.50 and 2.49) in all general application software areas, with the lowest ratings typically being in the area of software that has just become commonly used in the past few years (such as Internet e-mail, World Wide Web browsers, utilities, lesson planning, file transfer, and presentation software). The software specific knowledge and skill data are presented in Table 5.

Objective 5

Objective 5 was to determine vocational teachers' perceptions of the potential usefulness of information technology. The respondents rated each statement on the following scale: 1= not useful, 2= low usefulness, 3= undecided, 4= moderately useful, and 5= highly useful. Vocational teachers perceived that information technology was moderately useful (between 3.50 and 4.49) in each of the program and instructional management areas listed (e.g., student vocational organizations, instructional management). The data representing these perceptions are presented by program area in Table 6.

Objective 6

Objective six was to determine the availability of information technology to Louisiana's vocational teachers. Over two-thirds (79%) had a computer available in their office or classroom, almost two-thirds had (63%) computers at home, and half (50%) had a computer lab available in their department. One-third had multimedia computers available in their office or classroom (34%) and at home (32%), while less than one-fourth (22%) had multimedia capacity available in a computer laboratory in their department. Less than one-fourth had the World Wide Web or Internet e-mail available at home (22%), in their office or classroom (16%), or in a computer lab in their department (10%). These data and the responses by program area are

Table 5
Software Specific Knowledge and Skill Levels

Software Specific Knowledge and Skill Levels	Mean (SD) by Vocational Program						
	All	Ag	Bus	FACS	HO	Mkt	Tech
Word Processor *(Examples: WordPerfect, Microsoft Word, Microsoft Works, Appleworks, .etc.)*	3.31 (1.11)	2.91 (1.05)	3.99 (.76)	3.10 (1.13)	2.93 (1.03)	3.64 (1.04)	2.92 (1.19)
Windows *(Examples: Macintosh, Windows 3.1, Windows95, Windows NT)*	2.75 (1.12)	2.45 (1.01)	3.21 (1.01)	2.49 (1.12)	2.61 (1.05)	3.00 (1.19)	2.63 (1.18)
Graphics *(Examples: Corel, Paintbrush, MacPaint, Harvard* Graphics, *Freehand, Print Shop, etc.)*	2.57 (1.06)	2.35 (.98)	2.93 (.93)	2.40 (1.11)	2.15 (1.01)	2.57 (1.08)	2.63 (1.12)
Spreadsheet *(Examples: Lotus 1-2-3, Excel, Microsoft Works, Quatro Pro, etc.)*	2.54 (1.14)	2.30 (.99)	3.18 (.99)	2.17 (1.14)	2.27 (.98)	2.93 (1.16)	2.18 (1.09)
Grade Book	2.54 (1.23)	2.44 (1.11)	2.70 (1.29)	2.35 (1.21)	2.44 (1.07)	2.89 (1.44)	2.51 (1.22)
Database *(Examples: Approach, dBase, Access, Microsoft Works, etc.)*	2.37 (1.11)	2.15 (.88)	2.92 (1.05)	2.02 (1.08)	2.15 (.99)	2.76 (1.25)	2.10 (1.04)
Instructional Software *(Examples: My Resume, Injured Engine, livestock feed ration formulation, personal or business finance, loan amortization, nutrition, house design, health diagnostics, etc.)*	2.35 (1.08)	2.39 (.94)	2.30 (1.14)	2.35 (1.05)	2.24 (1.14)	2.43 (1.19)	2.36 (1.14)

Table 5 (continued)
Software Specific Knowledge and Skill Levels

Software Specific Knowledge and Skill Levels	Mean (SD) by Vocational Program Area						
	All	Ag	Bus	FACS	HO	Mkt	Tech
Desktop Publishing *(Examples: Pagemaker, Ventura, desktop publishing capabilities of WordPerfect or Microsoft Word)*	2.27 (1.13)	2.01 (.94)	2.76 (1.11)	1.97 (1.08)	1.95 (.95)	2.40 (1.20)	2.24 (1.24)
Presentation Software *(Examples: PowerPoint, WordPerfect Presentations, Freelance Graphics Harvard Graphics, etc.)*	2.07 (.98)	1.97 (.84)	2.33 (1.03)	1.79 (.95)	1.98 (.76)	2.25 (1.11)	2.10 (1.01)
Internet E-mail (Examples: America On-*Line, Netscape, Prodigy, Juno, Compuserve, Eudora, etc.)*	2.04 (1.10)	1.91 (.96)	2.32 (1.14)	1.87 (1.05)	2.02 (1.06)	2.13 (1.19)	1.93 (1.16)
World Wide Web Browser *(Examples: AOL, Netscape, Prodigy, Compuserve, Internet Explorer, Mosaic, etc.)*	2.02 (1.09)	1.92 (1.01)	2.14 (1.10)	1.90 (1.08)	2.02 (1.08)	2.25 (1.27)	1.98 (1.10)
Utilities *(Examples: Norton, PC Tools, virus protection, Windows uninstaller, etc.)*	1.95 (1.01)	1.87 (.87)	2.15 (1.05)	1.70 (.93)	1.66 (.69)	2.13 (1.19)	2.09 (1.11)
Lesson Planning *(Examples: 4MATION, PET, etc.)*	1.79 (.92)	1.87 (.81)	1.69 (.94)	1.78 (.93)	1.73 (.78)	1.89 (1.07)	1.87 (1.00)

Table 5 (continued)
Software Specific Knowledge and Skill Levels

	Mean (SD) by Vocational Program						
Software Specific Knowledge and Skill Levels	All	Ag	Bus	FACS	HO	Mkt	Tech
File Transfer to and from Other Computers Using a Modem	1.78 (.93)	1.76 (.81)	1.90 (.97)	1.64 (.86)	1.68 (.85)	1.89 (1.05)	1.80 (1.04)
Scale Means	2.30 (.81)	2.16 (.73)	2.61 (.72)	2.08 (.80)	2.13 (.71)	2.51 (.91)	2.23 (.87)
N	619	131	166	136	41	54	91

Note: All=all vocational teachers in the study, Ag=agriscience education, Bus=business education, FACS= family and consumer sciences education, HO=health occupations education, Mkt=marketing education, Tech=technology education.
Scale: 1 = I don't know enough about this area to respond, 2 = my knowledge/skill level in this area is below average, 3 = my knowledge/skill level in this area is average, 4 = my knowledge/skill level in this area is above average, 5 = my knowledge/skill level in this area qualifies me as an expert

Table 6

Usefulness of Information Technology in Program and Instructional Management

	Mean (SD) by Vocational Program						
Usefulness of Information Technology	All	Ag	Bus	FACS	HO	Mkt	Tech
Instructional Management *(Grade Reports, Student Records)*	6.32 (.90)	4.09 (1.02)	4.42 (.83)	4.38 (.81)	4.55 (.85)	4.42 (.80)	4.19 (.96)
Instructional Evaluation *(Testing, Assessment)*	4.24 (.84)	4.10 (.87)	4.38 (.79)	4.27 (.78)	4.43 (.78)	4.40 (.70)	3.95 (.99)
Student Guidance and Career Development	4.18 (.88)	3.97 (.94)	4.35 (.85)	4.15 (.79)	4.18 (.90)	4.43 (.70)	4.07 (.97)
Instructional Planning *(Lesson/Unit/Curriculum Planning)*	4.16 (.91)	4.04 (.94)	4.24 (.85)	4.24 (.84)	4.25 (.95)	4.19 (.90)	3.97 (.97)
Program Planning, Development, and Evaluation *(Examples: youth organization activities, program reports, budget, equipment/maintenance, long-range planning, funding requests, fund raising, instructional material, equipment purchases, etc.)*	4.14 (.94)	4.08 (.91)	4.25 (.89)	4.24 (.83)	4.22 (1.08)	4.10 (1.00)	3.88 (1.08)
Professional Role and Professional Development	4.13 (.90)	3.98 (.93)	4.26 (.83)	4.11 (.87)	4.18 (.93)	4.25 (.90)	4.07 (.97)

Table 6 (continued)
Usefulness of Information Technology in Program and Instructional Management

	Mean (SD) by Vocational Program						
Usefulness of Information Technology	All	Ag	Bus	FACS	HO	Mkt	Tech
Instructional Execution *(Presentation of Instruction)*	4.09 (.89)	3.89 (.87)	4.34 (.80)	4.03 (.85)	4.15 (1.12)	4.27 (.80)	3.84 (.96)
Student Vocational Organizations	4.08 (.90)	4.02 (.91)	4.12 (.92)	4.05 (.86)	4.05 (.90)	4.21 (.90)	4.06 (.90)
Coordination of Cooperative Programs	4.04 (.95)	3.85 (.97)	4.19 (.97)	4.01 (.87)	4.03 (1.07)	4.23 (.90)	4.02 (.92)
School Community Relations *(Public Relations)*	3.87 (.95)	3.75 (.99)	3.88 (.94)	3.97 (.86)	3.95 (.99)	3.85 (.80)	3.82 (1.06)
Scale Means	4.13 (.72)	4.00 (.72)	4.25 (.67)	4.16 (.64)	4.21 (.80)	4.23 (.60)	3.97 (.84)
N	619	131	166	136	41	54	91

Note: All=all vocational teachers in the study, Ag=agriscience education, Bus=business education, FACS=family and consumer sciences education, HO=health occupations education, Mkt=marketing education, Tech=technology education. Scale: 1 = not useful, 2 = low usefulness, 3 = undecided, 4 = moderately useful, 5 = highly useful.

presented in Table 7.

Objective 7

Objective 7 sought to determine the source of information technology training received by vocational teachers in the last three years. The teachers were asked to place a check mark (√) beside each source of training if they had received training from this source in the last three years. These data are presented in Table 8. The sources of training that were reported most often were self-directed learning/personal experience, written materials, and in-service training sponsored by school, county or state agencies. Less than one-fourth of the teachers reported receiving training from university/college workshops and courses.

Objective 8

Objective eight was to determine if differences exist by program area in how teachers value information technology, their general information technology skill and knowledge levels, their software specific skill and knowledge levels, and their perceptions of the usefulness of information technology. The results of these analyses of variance are presented in Table 9. No significant differences existed in the values of information technology scale mean by vocational program area (F=1.33, p<.250). Significant differences existed in the teachers general knowledge and skills (F=10.36, p<.000), software skills (F=8.93, p<.000), and usefulness of information technology (F=2.91, p<.013). As indicated in Table 9, marketing teachers rated their general knowledge and skill and their software skill significantly higher than agriscience teachers, and business teachers rated these skills significantly higher than teachers from four programs, namely, family and consumer sciences, health occupations, agriscience, and technology. On the usefulness of information technology scale, business teachers rated

Table 7
Availability of Information Technology

Information Technology		Number/Percent with Computer Technology Listed by Vocational Program						
		All	Ag	Bus	FACS	HO	Mkt	Tech
Computer available in office or classroom	*N*=	441	98	124	95	22	40	62
	%=	79	79	89	78	59	82	72
With multimedia capabilities	*N*=	193	47	60	35	9	22	20
	%=	34	39	38	30	25	43	24
With World Wide Web	*N*=	90	16	39	14	1	8	12
	%=	16	13	24	12	3	16	14
With Internet e-mail	*N*=	94	19	34	15	2	9	15
	%=	17	16	22	13	6	18	18
Computer at home	*N*=	373	67	109	87	30	33	47
	%=	63	52	69	66	77	66	53
With multimedia capabilities	*N*=	175	25	58	40	20	15	17
	%=	32	21	38	36	56	33	21
With World Wide Web	*N*=	120	16	44	22	10	14	14
	%=	22	14	29	19	29	29	17
With Internet e-mail	*N*=	120	15	42	27	11	12	13
	%=	23	14	29	24	31	27	16

Table 7 (continued)
Availability of Information Technology

		Number/Percent with Computer Technology Listed by Vocational Program						
Information Technology		All	Ag	Bus	FACS	HO	Mkt	Tech
Computer laboratory in department:	*N*=	284	38	126	34	14	32	40
	%=	50	30	85	27	38	64	46
With multimedia capabilities	*N*=	123	15	52	12	9	17	18
	%=	22	13	32	11	24	33	21
With World Wide Web	*N*=	4	4	28	6	3	5	8
	%=	10	3	18	5	8	10	9
With Internet e-mail	*N*=	54	4	26	7	3	5	9
	%=	10	4	18	7	10	11	11
Multimedia computers in school	*N*=	337	82	89	72	51	28	45
	%=	57	63	56	53	54	54	53
Laser disc players in school	*N*=	209	40	58	51	12	18	30
	%=	35	31	36	41	30	35	35
Satellite downlink in school	*N*=	196	45	59	43	4	17	28
	%=	33	35	37	34	10	33	32
Video conferencing in school	*N*=	87	18	17	24	3	7	18
	%=	15	14	11	19	7	14	21

Table 7 (continued)
Availability of Information Technology

	Number/Percent with Computer Technology Listed by Vocational Program							
Information Technology		All	Ag	Bus	FACS	HO	Mkt	Tech
Compressed video in school	*N*=	63	18	8	20	3	2	12
	%=	11	14	5	16	8	4	14
N	619	131	166	136	41	54	91	

Note: All=all vocational teachers in the study, Ag=agriscience education, Bus=business education, FACS=family and consumer sciences education, HO=health occupations education, Mkt=marketing education, Tech=technology education. Scale: 1 = yes, 2 = no.

Table 8
Information Technology Training Received by Vocational Teachers in the Last Three Years

		Number/Percent Receiving Training in Last Three Years						
Training Source		All	Ag	Bus	FACS	HO	Mkt	Tech
Self-directed learning/personal experience.	*N*=	352	52	121	71	23	38	47
	%=	58	40	73	54	58	73	52
Written materials such as information booklets, training manuals, etc.	*N*=	318	53	113	61	16	34	41
	%=	52	41	69	45	40	65	46
School, county or state-sponsored in-service training	*N*=	305	41	113	60	17	31	43
	%=	50	32	69	45	43	60	48
Professional conference	*N*=	214	20	89	33	14	25	33
	%=	36	16	15	25	35	48	38
Suppliers of equipment and software	*N*=	173	25	78	26	8	18	18
	%=	29	20	48	20	21	35	21
University/college workshop	*N*=	148	15	54	29	8	19	23
	%=	25	12	34	22	22	37	26
University/college course	*N*=	120	11	48	24	5	18	14
	%=	20	9	29	18	13	35	16
Industry workshop	*N*=	89	13	31	11	8	12	14
	%=	15	10	20	9	21	24	16
N		619	131	166	136	41	54	91

Note: All=all vocational teachers in the study, Ag=agriscience education, Bus=business education, FACS=family and consumer sciences education, HO=health occupations education, Mkt=marketing education, Tech=technology education. Scale: 1 = yes, 2 = no.

Table 9
Analysis of Variance: Selected Dependent Variables by Vocational Program

Dependent Variable	SS	MS	df	*F*	*p*	Mean by Vocational Teacher Group for Those Variables Where Significant Differences Existed					
Value of I.T.[a]											
Between groups	.99	.20	5	1.33	<.250	(No significant differences existed by group for this variable.)					
Within groups	83.81	.15	567								
Total	84.80	.35	572								
General Knowledge/skill[b]						FACS[e]	HO[e]	Ag[e]	Tech[e]	Mkt[e]	Bus[e]
Between groups	26.32	5.26	5	10.36	<.000	2.32	2.39	2.39	2.48	2.72	2.84
Within groups	294.11	.51	579			Mkt	Bus	Bus	Bus	FACS	FACS
Total	320.43	5.77	584			Bus					HO
											Ag
											Tech
Software skill[c]						FACS[e]	HO[e]	Ag[e]	Tech[e]	Mkt[e]	Bus[e]
Between groups	27.18	5.44	5	8.93	<.000	2.08	2.13	2.16	2.23	2.51	2.61
Within groups	255.48	.60	584			Mkt	Bus	Bus	Bus	FACS	FACS
Total	382.66	6.04	589			Bus					HO
											Ag
											Tech

Table 9 (continued)

Analysis of Variance: Selected Dependent Variables by Vocational Program

Dependent Variable	SS	MS	df	*F*	*p*	Mean by Vocational Teacher Group for Those Variables Where Significant Differences Existed					
Usefulness[d]						Tech[e]	Ag[e]	FACS[e]	HO[e]	Mkt[e]	Bus[e]
Between groups	7.33	1.47	5	2.91	<.013	3.97	4.00	4.16	4.21	4.23	4.25
Within groups	281.67	.50	559			Bus	Bus				Tech
Total	289.00	1.97	564								Ag

Note: Ag=agriscience education, Bus=business education, FACS=family & consumer sciences education, HO=health occupations education, Mkt=marketing education, Tech=technology education. Scales: "Value" ranged from 1 = strongly disagree to 5 =strongly agree; "General Knowledge/Skill" and "Software Skill" ranged from 1 = I don't know enough about this area to respond; to 5 = my knowledge/skill level in this area qualifies me as an expert; "Usefulness" ranged from 1 = not useful to 5 = very useful.

[a]This variable is the grand mean of those items reported in Table 3. [b]This variable is the grand mean of those items reported in Table 4. [c]This variable is the grand mean of those items reported in Table 5. [d]This variable is the grand mean of those items reported in Table 6. [e]The group(s) listed below this group's mean are different from this group.

themselves significantly higher than technology and agriscience teachers.

Conclusions

For secondary vocational teachers in Louisiana, Internet connections are limited. Less than one-fourth have Internet access at home and even fewer have Internet access at school, even though most have a basic computer available. In addition, relatively small numbers have multimedia and other newer technology. Therefore, a substantial number of vocational teachers do not have access to information technology, and this is especially true with the newer technologies. This does not agree with the findings reported by Heaviside et al. (1997) in their national study of telecommunications in which they reported that 65% of schools had access to the Internet in the fall of 1996. Vocational teachers in Louisiana attend the state and national vocational education conferences and conventions on an irregular basis. Just over half of the teachers had attended the state conference one to three times during the last three years, while about one-fifth had attended national or regional vocational education conventions over the past three years.

Vocational teachers place a high value on information technology. No differences exist in how vocational teachers value information technology by vocational program area. Teachers consistently agree with positive statements about information technology and consistently disagree with negative statements about information technology. This is consistent with the high value they placed on the use and availability of all types of information technology. These conclusions are supported by the findings of Birkenholz et al. (1989), Mathews et al. (1996), and Chin and Horton (1994).

Vocational teachers have average to below average levels of *general* information technology knowledge and skill. When one considers that vocational instructors should be using technology both to support education methodology and to prepare

students for the workforce, their information technology competency levels are clearly inadequate. Their skills are average on the use of computers in instruction, and they are weakest in the newer technologies. Differences exist in teachers' perceptions of their *general* skill levels by vocational program area. Business and marketing teachers' *general* skill levels are higher than the skill levels of family and consumer science teachers. In addition, business teachers *general* skill levels are higher than the skill levels of health occupations, agriscience, and technology teachers. These conclusions indicate that the lack of computer literacy reported by Pomeroy (1990) continues to be a concern in vocational education.

Vocational teachers have average to below average levels of information technology *software* knowledge and skill. Their level of competency is again clearly inadequate. Their skills are average on the use of software that has been on the market for many years, such as word processors and databases, but are weakest on software that has just become commonly available in the past few years, such as Internet and multimedia software. Differences exist in teacher's perceptions of their *software* skill levels by vocational program area. Business and marketing teachers' perceptions of their *software* skill levels are higher than the skill levels perceived by family and consumer science teachers. In addition, business teachers' perceptions of their *software* skill levels are higher than the skill levels perceived by health occupations, agriscience and technology teachers.

Given the emphasis on some types of information technology and software in business and marketing education, these conclusions appear to be logical. Even though the general information technology and software skills reported by business and marketing teachers were significantly higher than the other groups, neither the business nor the marketing teachers have an expert or above average level of general or software knowledge and skill in any of the general information technology knowledge and skills, or in information technology software.

Information technology is of moderate usefulness in all areas of instructional management. Business teachers perceptions of the usefulness of information technology is significantly higher than the perceptions of technology and agriscience teachers. Again, this is understandable given the emphasis on information technology in business education, even though their perceptions were not higher than the other vocational teacher groups.

Teachers no longer rely on any one source of information technology training. Teachers use self-directed training, personal experience, written materials and in-service provided by schools or state agencies as their primary sources of training. This conclusion supports Pomeroy's (1990) finding that a majority of teachers were self-taught in the area of computer skills. A low percentage of teachers use university/college workshops and courses for their information technology training.

Implications

Vocational teachers see the value and usefulness of information technology in their programs; they report they just don't have the necessary skills and knowledge to use it effectively for instructional purposes. Though teachers value the Internet and other types of information technology, their full understanding of the interrelatedness of information technology to program quality may yet to be realized. Vocational programs must prepare students for the workplace and society**,** both now and in the future. In order for teachers to do that, they must continue to value information technology and seek ways to connect program and instructional management with appropriate information technology, especially the Internet. Teachers' competency in information technology is essential if they are to be successful as instructional leaders as they use and transfer this competency to their students. Certainly, this information technology foundation is a necessity for all teachers and students.

Pre-service programs should strengthen their emphasis on the information technology knowledge and skills of pre-service vocational teachers. This is supported by Handler (1993) who stated that university faculty should serve as role models in incorporating information technology as an instructional tool. Chin and Horton (1994) also indicated that ". . . teachers' attitudes could change toward technology through proper staff development" (p. 93). The Louisiana Department of Education and professional associations should place a high priority on increasing the information technology knowledge and skills of in-service teachers. However, given that no significant differences existed by program area in how teachers valued information technology, and given that significant differences did exist by program area in their general and software knowledge and skill, this suggests that teachers in the different program areas may not be receiving the same amount and quality of pre and/or in-service training on information technology. Perhaps the varying availability of information technology by program area may help to explain these differences. This could result in variances in the quality of the instruction delivered to students. Therefore, additional information technology training and equipment is warranted. Teachers should seek out mentoring opportunities and business/industrial assistance in upgrading their knowledge and skills. Perhaps, the establishment of school-business partnerships for improved learning opportunities for both teachers and students needs to be nurtured. Additional research should be conducted to determine the most efficient and effective use of information technology in vocational programs.

Fiske (1998) argued that the reason information technology has failed to become central to education is that they offer no added value to the traditional "factory model" school of today. "Teaching in such schools usually takes the form of teacher talk, while computers are by nature student centered" (p. 12). Additional research should be conducted to determine why in-

formation technology has not been adopted more widely and if Fiske's claim is valid.

Many public and private sources of information technology and training exist today. The low proportion of teachers who use college/university courses and workshops as a source for their training may be reflective of changes in the public service philosophy of some universities. Historically, universities and colleges have had a substantial role in the in-service professional development of teachers. However, teachers are not as dependent on courses and workshops provided by teacher education institutions as in the past. Training source issues imply the need for answering several important questions. Is low usage of college and universities as a source of training a result of teachers not valuing those courses and workshops? Is it because colleges and universities do not place a high priority on information technology training for vocational teachers? Or, could it be a result of the limited financial support for these types of activities from Carl Perkins Technology funds for 4-year institutions? Should teacher education programs change or expand opportunities by utilizing different methods for instructional delivery, including training of teachers to be self-directed learners and increasing the use of technology as one delivery vehicle? Should teacher education recommend other avenues to improve competency levels of teachers? Further research is needed to answer these questions.

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Learning Styles in Vocational Work Experience

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Abstract

A critical discussion of existing instruments for measuring learning styles in work-based learning situations resulted in a new instrument: the Questionnaire Practice oriented Learning (QPL). It consists of bipolar items, intended to measure five bipolar constructs: immersion, reflection, conceptualization, experimentation, and regulation. In a pilot study testing the usefulness of the instrument, data were gathered about the work-based learning of 407 students of a Dutch vocational school. A cluster analysis, followed by a discriminant analysis, resulted in three well interpretable work-based learning styles: 1. Focused on doing with incidental learning, 2. Learning on the basis of external regulation, and 3. Self-regulated learning on the basis of theory and reflection. Some suggestions for further research on the instrument and the learning style model behind the instrument are offered in conclusion.

Introduction

An important component of vocational education programs is the work experience component. In many countries vocational education contains both a school component and a field

component. In senior secondary vocational education in The Netherlands, the field component covers at least 20% of the curriculum. Students can choose for either a school-based program (with a maximum of 60% field experience) or a work-based program (with over 60% field experience). Little is known about the way students learn from their field experiences. For an empirical investigation into these learning processes and in order to develop procedures to support these learning processes, a descriptive model of learning-from-work-experiences is needed, plus an instrument to measure individual differences in learning-from-work-experiences. In particular, we are interested in identifying work-based learning styles.

Generally speaking a learning style is defined as a *coherently used combination* of learning activities that a student *usually* employs in a *particular type* of teaching-learning situation, a combination that is *characteristic* of him/her in a certain period (compare Slaats, Lodewijks & Van der Sanden, 1999; Vermunt & Verloop, 1999; Wierstra, Kanselaar, Van der Linden, Lodewijks, & Vermunt, 2000). For the purpose of our research we confine the teaching-learning situation to work-based learning.

Mainstream educational theory with regard to learning is biased towards formal theoretical learning in classrooms and individual study. A large category of learning style research (e. g. Biggs, 1987; Marton, Hounsel, & Entwistle, 1988; Schmeck, 1988; Vermunt, 1998) is, implicitly or explicitly, focused at this type of learning. Slaats (1999) concludes that the dominant learning models and the learning inventories departing from these models are more closely related to theoretical learning settings than to practical settings. In a sense this is understandable, because many studies of learning styles have been conducted in the fields of general and higher education, types of education that are typically theoretical and highly abstract in nature. Slaats argues that further research is needed in order to gain insight in the learning processes that occur in practical set-

tings.

Researchers and educators interested in on-the-job learning often resort to the experiential learning style model of David Kolb (e.g. Kolb, 1984) and his followers, since this model is more geared to learning in practical settings, although claimed to be generally applicable. It is a comprehensive model of learning-from-experience, integrating a variety of literature on learning, cognitive development, and cognitive styles. This model depicts experiential learning as a process alternately involving four basic modes of learning. According to Kolb, students usually have preference for some modes above others. Such a combination of preferred learning modes constitutes the person's learning style. Kolb (1976, 1985) developed two versions of an instrument to measure experiential learning style. From a test theoretical point of view, both instruments contain major flaws, which will be discussed below. Although some investigators have developed alternative instruments based upon Kolb's experiential learning model, trying to correct some of these flaws, the results are still not satisfactory.

Not only are the instruments based upon Kolb's model problematic, but also the model itself has some weak spots. Its dimensionality can be criticized, for both theoretical and empirical reasons, as will be demonstrated. Nevertheless, several elements in the model have considerable face value, and are well rooted in the literature on experiential learning and cognitive development. In our study, we developed an instrument inspired by the experiential learning theoreticians as for the identification of four learning modes, but without incorporating Kolb's assumptions with respect to the dimensionality of these learning modes and with correction of some of the test-theoretical weaknesses found in the existing instruments.

Kolb's Experiential Learning Theory

The following four propositions summarize Kolb's experiential learning theory (see also De Ciantis & Kirton, 1996):

1. Experiential learning involves four distinct *learning modes*: concrete experience CE ('feeling'), reflective observation RO ('watching'), abstract conceptualization AC ('thinking'), active experimentation AE ('doing').
2. The four learning modes represent four stages in experiential learning. Experiential learning is a *cyclical process* in the sequence: CE, RO, AC, AE and so on in a new cycle.
3. The four learning modes represent two dimensions: CE and AC are supposed to be poles on a dimension *'prehension'*, and RO and AE are poles on a dimension *'transformation'*.
4. Although normal adults possess and use all the four learning modes, there are differences between individuals in preference patterns or 'strengths and weaknesses'. These preferences can be assessed on the basis of the two dimensions. That means that patterns of preferences can be characterized in terms of the following *learning styles*: diverger (CE preferred to AC, and RO preferred to AE), assimilator (AC preferred to CE, and RO preferred to AE), converger (AC preferred to CE, and AE preferred to RO), accommodator (CE preferred to AC, and AE preferred to RO).

The Kolb model may be considered as a learning stage model (focusing on element 2) or as a learning style model (focusing on elements 3 and 4). Within the framework of this article we are interested in the learning style model and not in the learning stage model. However, the question may be raised whether the learning style model is not conflicting in several aspects with the learning stage model. As indicated by De Ciantis and Kirton (1996), Kolb, in this interpretation of learning style, "has inadvertently conflated three theoretically unrelated cognitive elements — style, level (abilities or capacity), and process" (p. 809-810). We agree with this criticism, and in ad-

dition we find insufficient empirical evidence of the existence of the two dimensions mentioned in proposition 3, as will be elaborated upon in the next section. Thus the foundations for Kolb's learning style assessment as described in proposition 4 are lacking. Therefore, we ignore this supposed dimensionality, and restrict ourselves to the first proposition as point of departure for the development of our instrument.

There are several other obstacles one comes across when trying to apply Kolb's model to work-based learning in (particularly) vocational education**.** One of these problems is that experiential learning is a less isolated phenomenon than suggested by the model. Sensory experience is not the only input the student receives. Since the student acts in an educational context, other inputs will consist of concepts, theories, models and strategies explicitly or implicitly taught by others. And also, other people (like teachers and practicum supervisors) may prescribe (internal and external) activities to be performed. A descriptive model of experiential learning should not just describe the way students go through an 'autistic' learning cycle, but should also provide categories to describe the way students respond to external instructions and prescriptions.

Measuring Work-Based Learning

Based upon the experiential learning model, described above, Kolb developed an instrument to measure learning style: the Learning Style Inventory or LSI (Kolb, 1976), which he later revised (Kolb, 1985). As explained, we needed an instrument to measure the experiential learning constructs concrete experience, reflective observation, abstract conceptualization, and active experimentation. In deviation from Kolb, we wanted to measure these learning modes as they are manifested in vocational field experiences in particular. In addition, we wished to avoid some test theoretical pitfalls identified in evaluation studies on the LSI.

Evaluation of the LSI

We limit our discussion to the 1985 version of the LSI (the LSI-1985). The instrument consists of twelve short statements concerning learning situations, and the respondents are asked to rank-order four sentence endings that are supposed to represent the four learning modes (CE, RO, AC, AE). One of the items for example is "I learn by feeling /watching /thinking /doing". In each item the respondent is asked to rank the four sentence endings from 4 to 1, to the extent each mode applies to him. The individual learning style is determined in two steps. First, the four scale scores CE, RO, AC and AE are computed through adding for each learning mode the corresponding rank numbers across the 12 items. In the second step the difference scores (AC - CE) and (AE - RO) are computed. The two difference scores determine the learning style, which can be either 'diverger' (dominance of CE and RO), 'assimilator' (dominance of AC and RO), 'converger' (dominance of AC and AE), or 'accomodator' (dominance of CE and AE). Both the test format (forcing the respondent to choose between four learning modes, and repeating this twelve times) and the graphic representation of the results (in quadrants) are appealing features of the test, which may explain its popularity in the field. The instrument is considered to possess strong face validity and intuitive appeal (Cornwell, Manfredo, & Dunlap, 1991; Veres, Sims, & Locklear, 1991). The internal-consistency (coefficient alpha) of the scales is reported to be acceptable (Sims, Veres, Watson, & Buckner, 1986; Veres, Sims, & Shake, 1987; Willcoxson & Prosser, 1996). Yet the LSI has been heavily criticized, for a series of reasons, some of a test-theoretical nature, and others of an empirical nature, for example:

- *Ambiguity of the test content.* As Willcoxson and Prosser (1996) observe, "the accompanying instructions do not specify that the person completing the inventory should think of a given learning context when filling it out. Thus the response of someone focussing upon learning preferences in the context of acquiring driving skills might be quite different from the re-

sponses recorded by that same person when focussing upon the study of English Literature in an academic context…"(p. 248). For the aims of our research the context should be specified as vocational work experience.

- *Forced ranking of the four learning modes***,** causing a built-in interdependence of the four learning mode scores. The variables are 'ipsative'. As a consequence of the method of ranking the alternatives, the sum of the CE-, RO-, AC- and AE-scores is constant for each item and each person, namely 1+2+3+4=10. Accordingly, the four scale scores are (linearly) dependent on each other. This built-in dependency of the learning modes obscures the real relation between them. It will cause the correlations between the variables to shift in a negative direction and the artificial and the real relations between the variables cannot be separated (Cornwell & Manfredo, 1994; Geiger, Boyle, & Pinto, 1992; Loo, 1999, 1996).
- *Inconclusive evidence of the existence of the two dimensions 'prehension' and 'transformation'***.** Although Yahya (1998) does report these dimensions, not all factorial studies find them. Some studies report a different factorial structure, involving the dimensions (AC-AE) and (CE-RO) (Cornwell, Manfredo, & Dunlap, 1991; Geiger, Boyle & Pinto, 1992). Factor solutions that *did* support the proposed dimensions accounted only for a small percentage of the variance (32. 1 %, reported by Loo, 1996).

Adaptations to the LSI

There have been several attempts to improve the LSI, in particular its disputed use of multiple ranking. Marshall and Merritt tried out different formats to present the answering alternatives: a (four point) Likert-type normative format (Merritt & Marshall, 1984), and a semantic differential format (Marshall & Merritt, 1985). Their conclusion is that "these results suggest that valid normative forms for the LSI can be developed and that the structure provided through the use of semantic differential format can improve scale internal consistency as compared

to that of a Likert-type of normative format" (Marshall & Merritt, 1985, p. 936). Honey and Mumford (1982) developed a scale with a normative answering format as well, although with only two alternatives per item (agree/not agree). They also extended the number of items. In our opinion, the normative format has the disadvantage of being very susceptible to acquiescence set and social desirability. We agree with Marshall and Merritt (1985) as far as their preference for a semantic differential format is concerned, but we think that presenting the choice between the two modes it is incompatible with the unsupportive empirical results regarding the existence of these two dimensions.

A New Instrument

On the basis of the preceding arguments, a new instrument should be developed to measure the way students learn from work experiences. This is also the opinion of others, who are conducting research into learning strategies in vocational education. Slaats (1999) asserts: "further research might produce a more suitable questionnaire than Kolb's LSI for measuring learning styles in practical settings" (p. 177). In our opinion, this instrument should focus explicitly upon work-based learning, it should measure clearly identifiable components of this learning**,** which can manifest themselves in inter-individually different patterns, and it should use a semantic differential format. Theoretically, either of four procedures can be used to develop such an instrument:

1. Start with exploratory phenomenological research, interviewing students about their learning activities in the work experience program, and categorizing their answers. Formulate items, based upon the resulting categories. Determine dimensions by way of factor analysis.
2. Start with a review of empirical literature on work-based learning and experiential learning. Identify variables describing aspects of this type of learning, plus directions for the measurement of these variables. Con-

struct a test battery containing measurements for each ofs the variables identified. Determine dimensions by way of factor analysis.

3. Start with a general theory of learning (styles). Develop a more specified theory of work-based learning styles, based upon that general theory. Operationalize the concepts con-stituting the theory.

4. Start with the four learning modes assumed by current experiential learning models. Develop alternative items for each of the four modes, tailored to learning from work experience, and using a semantic differential for mat.

Although each of these procedures has its merits, we employed procedure number 4, supplemented with procedure number 2. The most creative part of it was the determination of the opposites of each of the learning modes as formulated by Kolb, without involving one of the other modes. When doing this, we were inspired by concepts and dimensions reported in other literature about work-based and experiential learning. Our efforts resulted in the following bipolar constructs (Table 1):

The first construct (Immersion: immersed versus detached)

Table 1
Bipolar Constructs Related to Experiential Learning Modes

Experiential learning mode	Construct	First pole	Second pole (opposite)
Concrete experience (CE)	Immersion	Immersed (emotionally/ intellectually)	Detached (emotionally/ intellectually)
Reflective observation (RO)	Reflection	Insight-oriented (or learning-oriented)	Results-oriented (or performance-oriented)
Abstract Conceptualization (AC)	Conceptualization	Generic (or strategic)	Idiosyncratic (or pragmatic)
Active experimentation (AE)	Experimentation	Inquiring (or experimenting)	Prescription-oriented

resembles the active-reflective dimension found by De Ciantis

& Kirton (1996), in their psychometric reexamination of the four experiential learning modes (using the instrument of Honey & Mumford), with concrete experience at one pole, and reflective observation at the other pole. It is about the amount of distance the student tends to take from the ongoing events. As the literature about on-the-job learning shows, learning by immersion is common practice (see for example, McCall, Lombardo, & Morrison, 1988), although often criticized (see for example, Jacobs & Jones, 1995).

The second construct (Reflection: insight-oriented versus results-oriented) resembles the goal orientation dimension reported in psychological literature (Dweck, 1986; Porter & Tansky, 1996), ranging from performance orientation to mastery or learning orientation. Students with a learning orientation attempt to understand their tasks, and learn from them; students with a performance orientation strive to succeed with little effort, and are satisfied with success, even if they do not understand how it was acquired. Many authors recommend the fostering of a more reflective attitude than often encountered in on-the-job learning (for example, Hart-Landesberg, Braunger, & Reder, 1992).

The third construct (Conceptualization: generic versus idiosyncratic) resembles the theorist-pragmatist dimension found by De Ciantis & Kirton (1996), which "seems to describe the mode of evaluation in decision making, ranging between "considering many sources, angles and data before making a decision' to 'earlier closure to make a decision more expediently and efficiently". . ." (p. 817). It is about theory-inspired action versus pragmatic action. According to Garrick (1998), students tend to be less interested in truth than in usefulness.

The fourth construct (Experimentation: inquiring versus prescription-oriented) resembles psychological constructs like curiosity (Reio & Wiswell, 2000; Spielberger & Starr, 1994) and openness to experience (Digman, 1990). On-the-job training programs differ widely in the extent to which they appeal to

either prescription or inquiry (De Jong & Versloot, 1999). In summary, the first and fourth constructs are concerned with depth and width of involvement respectively, and the second and third with post-active reflection and pre-active reflection respectively.

As we observed earlier, the Kolb model does not recognize external social influences; it treats the student as an isolated individual processing individual experiences. Since in vocational education teachers and tutors are considered to exercise at least some influence upon the learning process, we introduced a fifth construct, which we called 'Regulation': the student's preference for either internal regulation or external regulation. This construct resembles constructs like meta-cognitive activity (Ford, Smith, Weissbein, & Gully, 1998) and self-directed learning (Confessore & Kops, 1998), and more in particular the regulation strategies 'internal regulation' and external regulation, as described by Vermunt (1998) and Slaats, Lodewijks and Van der Sanden (1999), referring to self-initiated strategies versus dependency upon external resources for regulation of the learning process. As observed by Poell (1998), "Work-related learning is usually referred to in terms of the activities of trainers, consultants , or HRD staff" (p. 5), and "Employees are not regarded as crucial learning actors, who have their own theories and interests as to what they should learn, for what purpose, and in what way". Yet, modern work conditions seem to demand 'free agent learners' (Marsick et al., 2000).

Research Problem

Our aim was to construct a first version of an instrument (the Questionnaire Practice oriented Learning or QPL) for measuring learning strategies in vocational work experience. The instrument should be based upon theories and instruments of the experiential learning theoreticians, but overcome the drawbacks mentioned in the previous sections. It had to be an easy-to-administer questionnaire, and scale scores should be

calculated by averaging the item scores per scale.

Research question 1, then, is: *How well can the learning modes immersion, reflection, conceptualization, experimentation and regulation be measured with the QPL, and how are these modes interrelated?*

But these learning modes alone yield no learning styles. Research question 1 is about clustering of items and clustering of variables (scales). Learning styles, on the other hand refer to the clustering of students. In order to determine the usefulness of the questionnaire for the determination of learning styles, we wanted to examine whether the QPL can reveal well interpretable clusters of students with common patterns of learning mode scores. Thus, research question 2 can be formulated as: *What work-based learning styles can be found, using the QPL, among students in a modal school for senior secondary education in The Netherlands?*

Method

Instrument

For measuring the five constructs representing aspects of work-based learning, a new measuring instrument, the Questionnaire Practice oriented Learning (QPL) was developed. Each QPL-item contains two opposite statements (comparable with a semantic differential), out of which the respondent should make a choice on a scale from 1 to 5. An example of an item in the *Conceptualization* scale is: "When I get stuck in a task I consider the possibility to find a solution with help of the theory / When I get stuck in a task the theory is not very helpful for me, because practice is often very different". After testing a trial version, the first version of the QPL was developed. This first version consisted of sixty-eight items (13 or 14 items per scale).

Procedure

The investigation was carried out in the health care and engineering departments of a school for senior secondary vocational education in The Netherlands. With help of school managers and teachers, students who had finished a work experience program were asked to fill in (anonymously) the QPL while they were back in school for a seminar. They were asked to respond to the items with reference to their most recent work experience program.

Sample

Of the 450 QPL questionnaires, 407 were filled in. The average age of the students was 21.6 years; 105 of them were male and 302 female. The number of students from the health care department was 313, and from the engineering department 94. Students were almost equally divided over the school-based program (217) and the work-based program (190).

Data Analyses

Related to research question 1 we performed classical analyses on items (factor analysis and Cronbach alpha) and on scales (correlations and factor analysis). Related to research question 2 we performed a cluster analysis and a discriminant analysis. Cluster analysis is the appropriate method for identifying subgroups containing individuals with similar attributes (Vermetten, 1999; Wierstra & Beerends, 1996). Discriminant analysis is used to describe and interpret the resulting clusters.

Results

Reliability of QPL Scales

On the sixty-eight QPL items factor analyses (principal factors) and reliability analyses were conducted. These analyses were directed on identification of the five scales. Thus, in the factor analyses five factors were looked for, after a varimax rotation of the first five principal factors. The factor analysis served as a selection procedure for determining which items should be included in a particular scale, after which the Cron-

bach alpha reliability of the scale was computed (scale score = average of item scores). We used the following strategy for item selection and item validation (convergent and discriminant validation). If an item turned out to be hardly related to the construct at which it was aimed (low loading on the relevant factor and low item-scale correlation), or if an item seems to measure more than one construct, the item was removed. After removal of thirteen items the five scales of Table 2 were generated. The reliability of the scales is not high, but yet suitable for research purposes (Nunnally, 1978).

Table 2
Cronbach Alpha Reliability & Exemplary Items of the QPL Scales (N=407)

Scale	Cronbach *a*	Sample items	
		Positive pole	Negative pole
Immersion (13 items)	.63	When I have to take a decision, I play it by ear.	I consult the theory when I have to make a decision.
		I don't mind if I am expected to act differently from what theory tells.	It disturbs me when I am expected to act differently from what theory teaches me to do.
Reflection (12 items)	.62	When I have finished a task I ask myself: what have I learned from it?	When I have finished a task I go on with the next assignment.
		In post hoc discussions I try to phrase what went right and what went wrong.	In post hoc discussions I seldom try to phrase what went right and what went wrong.

Table 2 (continued)
Cronbach Alpha Reliability & Exemplary Items of QPL Scales (N=407)

Scale	Cronbach α	Sample items: Positive pole	Sample items: Negative Pole
Conceptualization (12 items)	.70	I try to find out how field assignments relate to theory.	I don't bother because practice is too remote from theory.
		Before starting with an assignment, I consider what problems I can expect.	I just start with an assignment; in the process of working at it I find out what may go wrong.
Experimentation (8 items)	.69	I like to get the freedom to try out how I can best handle things.	I prefer well delineated assignments, so I know what is expected of me.
		I like to make decisions about my way of doing things.	I appreciate getting guidance as to what I might better do or leave off.
Regulation (10 items)	.64	If I don't understand Something, I try to find an explanation by myself.	I often ask my supervisor explanations about things that I do not understand.
		After I finish an assignment, I can judge by myself whether I did it right.	I really know whether I did it right only after my supervisor says so.

Correlations between the QPL Scales

The correlations between the QPL scales are given in Table 3. This table shows that the divergent validity of the scales is satisfactory. The significant negative correlation between *Conceptualization* and *Immersion* (-.30) and the relatively high positive correlation between *Conceptualization* and *Reflection*

Table 3
Correlations between the QPL Scales (N=407)

	Immersion	Reflection	Conceptual-ization	Experimen-tation	Regulation
Immersion		-.06	-.30***	.00	-.15*
Reflection			.51***	.07	.23***
Conceptualization				.07	.23***
Experimentation					.50***

*p<.05; **p<.01; ***p<.001 (two-sided)

(.51) are quite understandable. The same is true for the relatively high correlation between *Experimentation* and *Regulation* (.50). The relations between the five scales may be summarized by the results in Table 4 of a principal factor analysis on the scales, followed by a varimax rotation. On the first factor, high loadings are found for Reflection and Conceptualization. Experimentation and Self Regulation have high loadings on the second factor. On the third factor only Immersion shows a high loading.

Table 4
Factor Loadings of five QPL Scales on three Varimax Rotated Factors

	Factor 1	Factor 2	Factor 3
Immersion	-.08	.01	**.97**
Reflection	**.90**	.09	.11
Conceptualization	**.81**	.07	-.32
Experimentation	-.03	**.89**	.07
Regulation	.21	**.83**	-.14
eigenvalue	1.90	1.26	.95
% explained variance	38.00	25.20	10.02

Cluster Analysis

Whereas factor analysis results in clustering of variables, cluster analysis groups cases (i.e. persons). In order to find learning styles in the practical phase a cluster analysis (K-means cluster program of SPSS 7.5 for Windows) on the sample of 407 students was conducted, on the basis of the five QPL scale scores. We tried several numbers of clusters, with a maximum of four. The best solution (in terms of discrimination and interpretation) was found for three clusters consisting of 117, 176 and 114 students, respectively. For interpreting the clusters we used discriminant analysis.

Discriminant Analysis

On the three clusters a discriminant analysis with two discriminant functions was conducted. The discriminant analysis is used for descriptive purposes; our only purpose is to be able to interpret the differences found between the clusters. A discriminant function is (like a factor in factor analysis) a latent variable, this is a particular weighed addition of the manifest variables, in this case the five scale scores. The weights of the scale scores are determined by the computer program in such a way that the new overarching variable - the latent variable - differentiates maximally between the clusters, while within a cluster the differences between the students on the discriminant function are minimal. The two discriminant functions turned out significant (however, significance of these functions is not our main concern, but the descriptive power of the functions). Table 5 summarizes the results of the discriminant analysis. The structure coefficients depicted in Table 5 are the correlations (pooled within groups) between the scale scores and the discriminant functions.

On the basis of the two discriminant functions 97.1% of the students could be classified correctly in one of the three clusters. The first discriminant function can be interpreted as *Analysis*: taking distance, conceptualize, reflect. The second discriminant function can be interpreted as *Initiative*: immersion, ex-

Table 5
Structure Coefficients, Eigenvalues, and % Explained Variance for Two Discriminant Functions

	Function 1	Function 2
Immersion	**-.39**	**.55**
Reflection	**.47**	.13
Conceptualization	**.67**	-.10
Experimentation	.18	**.71**
Regulation	.31	**.58**
eigenvalue	2.07	.55
% explained variance	80%	20%

perimentation, regulation. The cluster means of the discriminant functions are depicted in Table 6.

It appears from Table 6 that the first discriminant function (Analysis) describes a contrast between all three clusters, but especially between the clusters 1 and 3. On the second discriminant function (Initiative) especially type 3 distinguishes itself from type 1 and 2.

Scores of the Three Clusters on the QPL Scales

In Figure 1 the profiles of the three clusters on the five scales are shown. On the x-axis, the scales are represented and on the y-axis, the mean item score for each scale is indicated.

Table 6
Cluster Means ('Centroids') of two Discriminant Functions

Clusters	Discriminant function 1 (Analysis)	Discriminant function 2 (Initiative)
1	-1.83	-.68
2	-.05	- .85
3	1.97	.61

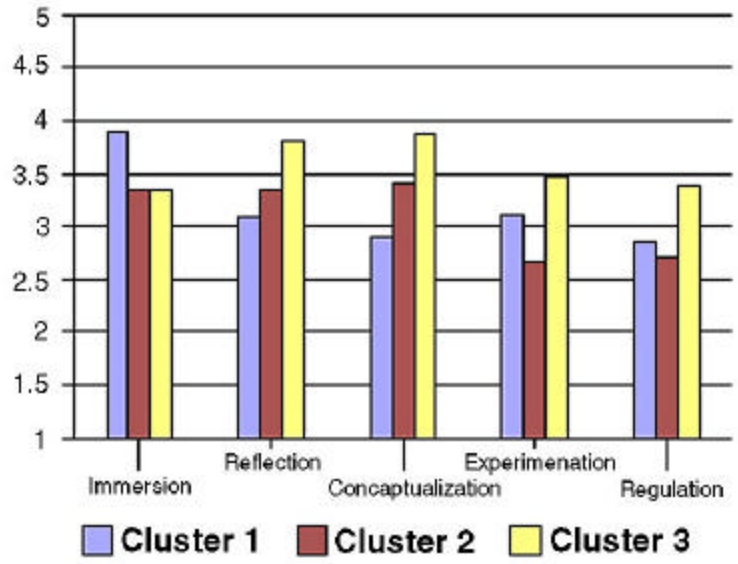

Figure 1: Profiles of QPL-learning style clusters

For each of the five scale scores we tested by means of an ANOVA whether the three cluster means differed significantly.

Table 7
Means and Standard Deviations of QPL Scales for three Clusters; ANOVA, F, and p-Values

	cluster 1	cluster 2	cluster 3	*F*
Immersion	3.90 (.33)	3.34 (.37)	3.34 (.38)	98.31***
Reflection	3.09 (.40)	3.34 (.43)	3.80 (.35)	93.15***
Conceptualization	2.90 (.35)	3.40 (.36)	3.88 (.42)	138.88***
Experimentation	3.10 (.59)	2.66 (.53)	3.47 (.59)	72.30***
Regulation	2.85 (.45)	2.70 (.46)	3.38 (.47)	78.18***
N	117	176	114	

*p<.05;**p<.01;***p<.001 (two-sided)

As Table 7 shows, all F-ratios are significant.

Next we investigated by means of Tukey's HSD-test whether pairs of clusters differ significantly. The following results were found:

- *Immersion*: Cluster 1 scores significantly higher than the clusters 2 and 3.
- *Reflection*: Cluster 1 scores significantly lower than the clusters 2 and 3. Cluster 3 scores significantly higher than the clusters 1 and 2.
- *Conceptualization*: Cluster 1 scores significantly lower than the clusters 2 and 3. Cluster 3 scores significantly higher than the clusters 1 and 2.
- *Experimentation*: Cluster 2 scores significantly lower than the clusters 1 and 3. Cluster 3 scores significantly higher than the clusters 1 and 2.
- *Regulation*: Cluster 3 scores significantly higher than the clusters 1 and 2. Cluster 2 scores significantly lower than the clusters 1 and 3.

Work-Based Learning Styles

On the basis of the preceding information (results of cluster analysis, discriminant analysis, ANOVA and Figure 1) the three learning style clusters for practical learning could be described as follows:

Cluster 1: Focused on Doing with Incidental Learning (*117 students*). Students with this learning style do not learn very intentionally. The student aims largely at being busy during the practical work and at immersing in experiences. They approach the practical tasks on the basis of intuition and feeling and they hardly relate these to the school theory. Because they don't conceptualize nor reflect much, their experiences are not integrated with theoretical knowledge.

Cluster 2: Learning on the basis of External Regulation (*176 students*). The learning activities of students with this

learning style are in the practical phase mainly externally regulated. Reflecting and relating practical activities to school theory occurs on a moderate level.

Cluster 3: Self-regulated Learning on the basis of Theory and Reflection (*114 students*). Students with this learning style incorporate the practical work experiences into a theoretical framework. During the practical work they regulate their learning activities themselves, using theoretical concepts learned at school and concepts formed by themselves. They reflect much and they prefer learning by 'trying out', not in the sense of 'trial and error', but by a thoughtful way of experimenting.

Conclusion

We tested a first version of a new instrument, the Questionnaire Practice oriented Learning (QPL), using a sample of 407 students in senior secondary vocational education. The QPL measures five learning modes derived from literature on work based and experiential learning: immersion, reflection, conceptualization, experimentation, and regulation. Its reliability turns out to be modest but sufficient for research purposes (scales Cronbach *alpha* between .62 and .70). The scales Reflection and Conceptualization are positively correlated, as is also the case for the scales Experimentation and Regulation. Accordingly, two or three factors ('Analysis', 'Initiative', and 'Immersion') cover most of the variance in the data. Cluster analysis results in three well interpretable clusters, representing three distinct learning styles. Two of these learning styles seem to be opposites, namely '*Self-regulated Learning on the basis of Theory and Reflection'* and '*Focused on Doing with Incidental Learning'* (for this last learning style the *work activities* are largely intentional, but the *learning* is largely 'incidental'*)*. The third learning style (denoting the largest group of students), is characterized by dependence of *External Regulation*, and takes an intermediate position with regard to the other learning style elements. These are clearly interpretable learning styles, which

corroborates the validity of the constructs we developed to describe work-based learning.

These results may be integrated in a theory-of-work-based-learning, which should be further developed on the basis of both theoretical and empirical future studies. A first next step is an investigation of the relations between aspects of work-based learning as measured by the QPL and learning strategies for school learning. Another next step is the investigation of the relations of QPL scores with study discipline and type of work experience program. Also, the QPL may be improved by developing new items related to the constructs measured (thus attempting to raise the scale Cronbach alpha reliabilities), and maybe also by adding new constructs based upon a further study of the literature on work-based learning. A thus improved test can be of good use as a diagnostic tool in schools for vocational education. It may also serve as a measurement instrument in research studies which should uncover how the learning effects of field experiences depend upon the interaction of student learning styles and characteristics of the work place as a learning environment.

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The Effects of School Size and Leadership On Participation in the School-to-Work Movement

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Abstract

What determines the extent to which a high school offers its students support in making the transition from school to work? This study uses multiple regression analysis and data on 1,144 public comprehensive high schools from the NELS:88 administrator survey to identify the crucial factors that determine the breadth of a school's STW programming. Using school leadership indices, school and district size, student body characteristics, and various geographic indicators as independent variables, the estimated model accounts for over 50% of the variation in the number of STW activities offered. The study finds that schools with stronger leadership as measured by indices of innovation, school climate, and external cooperative relationships have significantly broader STW programs. It also finds that the scope of STW programming only increases slightly with increases in school or district enrollment, suggesting that small schools are not necessarily at a disadvantage in providing a range of STW activities.

The school-to-work (STW) movement can trace its origin, like many other recent education reform efforts, to the 1983 publication of *A Nation at Risk* (National Commission on Educational Excellence, 1983). The central premise of this report was that the nation's preeminence in science, technology, in-

dustry, commerce, and military preparedness was threatened by its mediocre schools. In the decade that followed, several other widely-circulated national reports took its general concerns as points of departure and used them to focus on the specific educational and career problems of young people who do not attain a bachelor's degree. These included *The Forgotten Half: Pathways to Success for America's Youth and Young Families* (William T. Grant Foundation Commission, 1988), as well as *America's Choice: High Skills or Low Wages* (Commission on the Skills of the American Workforce, 1990) and *What Work Requires: A SCANS Report for America 2000* (Secretary's Commission on Achieving Necessary Skills, 1991). All of these publications stressed the need to raise the job skills of noncollege youth so they can make a successful entry into and progress within what has come to be known as the subbaccalaureate labor force (Grubb, 1996).

The cumulative effects of these reports, and of the problems to which they were responding, have been felt at every level of the American education system. Individual states and localities began developing their own STW programs in the late 1980s, and these were reinforced by a series of federal legislative efforts in the 1990s. The first of these were the 1990 Amendments to the Carl A. Perkins Vocational and Applied Technology Act of 1984. The Perkins amendments were a response to research showing that the majority of vocational education students do not benefit from the occupationally specific training they receive in high school (Boesel, Hudson, & Masten, 1994; McCormick, Tuma, & Houser, 1995). The amendments required federally-supported vocational education programs to "integrate academic and vocational education" as a way of providing vocational education students with more general skills.

The second important piece of federal legislation was the 1994 Goals 2000: Educate America Act. Goals 2000 enacted the National Education Goals announced at the 1989 National

Education Summit attended by the nation's governors and President George P. Bush. Two of the goals directly addressed the concerns of the STW movement. One (Student Achievement and Citizenship) specified that all American students will leave school prepared for "productive employment." Another (Adult Literacy and Lifelong Learning) specified that every adult American will be prepared to compete effectively in the global economy.

The culmination of the STW movement, however, was the passage of the School-to-Work Opportunities Act (STWOA) of 1994 (Jennings, 1995). States received grants under this legislation once they established a statewide STW partnership that included representatives from the governor's office, state agencies, business firms, organized labor, nonprofit human service organizations, and the education sector. The statewide partnerships distributed funds to local partnerships that then worked to establish STW systems in individual schools and districts. The STWOA did not specify in detail what such local systems should look like except that: (1) they must consist of school-based learning, work-based learning, and connecting activities, and (2) they must be sufficiently comprehensive and structured so that students can choose among one or more sets of linked school- and work-based learning paths each leading to defined postsecondary education or employment opportunities. By 1999, all 50 states plus Puerto Rico and the District of Columbia had received STWOA development and implementation grants.

Purpose and Scope of the Study

The purpose of this study is to determine what factors explain high school involvement in the STW movement as measured by the number of such activities available to students. As discussed in more detail below, we hypothesize that school (and, by extension, district) size and several dimensions of school leadership are important determinants of the number of

STW activities that a school offers. We also hypothesize that certain student body, community, state, and regional variables exert an influence on STW programming. These hypotheses are tested using a multiple regression analysis, the results of which are presented and evaluated in the final sections of the paper.

Secondary education in the U.S. is dominated by large comprehensive public high schools that draw students from relatively wide feeder areas and provide a variety of academic and nonacademic programs and services. In their classic study, Powell, Farrar, and Cohen (1985) describe these schools as "shopping malls" which attempt to serve the diverse educational needs of their student "customers, " subject to a set of budgetary and political constraints imposed by local school boards, state boards of education, and, to a much smaller extent, the federal government. Operating within these constraints, high schools allocate their resources – primarily staff time and energy -- among a broad range of curricular and extracurricular activities.

Over the past fifteen years, STW programming has become a legitimate contender for these resources. Anecdotal evidence (Olson, 1997) as well as the data used in this study suggest, however, that schools vary greatly in the extent to which they have chosen to participate in the STW movement. Some high schools became deeply involved in STW programming, others (the majority) made a partial commitment, and still others ignored the movement entirely. The general purpose of the research being reported here is to explain this variation.

The study is based primarily on data from a national sample of 1,144 comprehensive public high schools collected as part of the U.S. Department of Education's National Education Longitudinal Survey of 1988 (NELS:88). Included in the NELS:88 database are a set of school-level indicators of STW programming. Using these indicators in conjunction with various school, community, and state characteristics from NELS:88 and

other sources, we seek to explain why some high schools became more involved in STW activities than others. The data are for 1992 -- after the appearance of the national reports on youth cited above but prior to the passage of the STWOA. The research thus analyzes the behavior of schools before the U.S. government intervened to provide broad-based financial incentives to establish STW programming. The STW activities shown in our data are therefore primarily the result of local or state initiatives rather than federal funding.

The shopping mall is a useful metaphor for public high schools in America. It does not, however, provide much insight into the process whereby resources are allocated to the different "stores" in the mall. Indeed, what it does imply is misleading. The metaphor suggests that resource allocation is determined by "market forces," which in a school setting are presumably best represented by student demand. In reality, under the "one best system" (Tyack, 1974) public schools everywhere in the country are governed by democratically controlled bureaucratic structures whose actions are affected by a broad range of internal and external influences that only partially reflect the desires of students and their parents (Chichura, 1989; Chubb & Moe,1988; Ferris, 1992; Hartman, 1988; Jones, 1985; Monk, 1981).

To capture this reality, we develop a conceptual model of STW programming at the high school level that is designed to capture as many of these influences as possible. In recent years, education researchers have focused considerable attention on two specific determinants of school resource allocation and student outcomes: school size and school leadership (see, for example, Hallinger & Heck, 1996; Lee & Smith, 1997). Special effort is therefore devoted in the study to determine the importance of these particular factors. In addition, we test for the influence of a wide variety of student body, community, state and regional variables on STW programming.

Previous Research

Despite an extensive review of the literature, we were unable to find any research similar to what is being reported on here. This turned out to be true both substantively and methodologically. Substantively, there is now a large literature on STW, but much of it is made up of case studies reporting on individual schools, districts, consortia, or partnerships that have created "successful" STW programs (for example, Olson, 1997). Two very useful reviews of the STW research literature have been prepared by the National Center for Research in Vocational Education (Stern, Finkelstein, Stone, Latting, & Dornsife, 1995; Urquiola, et al., 1997). Together, these reports provide a comprehensive overview of published research through 1997 on both STW implementation and on the effect of STW programming on student outcomes. Except for the Mathematica research discussed below, however, none of the studies cited by the NCRVE reports are based on quantitative data showing the extent of STW activity across a national sample of education entities.

The only research we found that quantifies the establishment of STW practices nationwide is the work carried out by Mathematica Policy Research, Inc. In the early 1990s, Mathematica completed several national studies of specific STW programs such as Tech Prep. More recently, it received a multiyear grant from the U.S. Department of Education to analyze the implementation of the STWOA. Thus far it has issued three STWOA reports (Hershey, Silverberg, & Haimson, 1999; Hershey, Hudis, Silverberg, & Haimson, 1997; Silverberg, Haimson, & Hershey, 1998) based on interview and survey data from STW partnerships and students across the country. This work is quite comprehensive, but it differs from the research being reported here in three fundamental ways. First, its central focus is on the implementation of the STWOA. Therefore, it is looking at a later stage of the STW movement when local programming was substantially driven by this legislation. Second,

its primary units of analysis are the local STW partnership (typically made up of several school districts) and the individual student. Unlike the present study, it focuses little attention on decision making at the school level. Third, its analysis thus far is primarily descriptive. It does not use multivariate techniques to try to explain why schools, districts, or partnerships vary in their STW involvement.

More surprisingly, we did not find many methodological precedents for our work either. Looked at in the broadest context, the study seeks to explain one dimension of school resource allocation in terms of the internal and external influences on school decision makers. We expected to find empirical studies in the school change or implementation literature in which the dependent variables are school decisions and the independent variables are school characteristics. Such research appears to be nonexistent except for the work of David Monk. Using large data sets, Monk and his collaborators have sought to explain why high schools vary in the diversity of their curricula, with particular emphasis on the influence of school size (Haller, Monk, Spotted-Bear, Griffith, & Moss, 1990; Monk, 1987; Monk & Haller, 1993). The research being reported here builds substantially on Monk's econometric approach and replicates some of his general findings concerning the effect of school size on the breadth of school offerings. To the best of our knowledge, however, his methodology has never been applied to STW programming.

Data

The data used in this research are derived from multiple sources. The most important of these, as noted above, is the NELS:88 longitudinal study. The NELS:88 project began with a national sample of over 25,000 eighth grade students drawn from approximately 4,000 public and private schools in 1988 (base year). A subsample of these students (along with some additional students) were resurveyed in 1990, 1992, and 1994

(first, second, and third follow-ups). In the base year, first follow-up, and second follow-up, administrators (usually principals) of the schools attended by the students were surveyed as well. They were asked to provide information in seven areas: school characteristics, student characteristics, teaching staff characteristics, school admission policies and practices, grading and/or testing structure, school programs, and school climate. Questions pertaining to STW programs and services were included in several sections of the questionnaire.

The research draws most heavily on data from the second follow-up school administrator survey. We chose the second follow-up results because they provided the most comprehensive information about STW programming at the school level. Approximately 1,400 high schools were included in the second follow-up. After eliminating private schools (both sectarian and nonsectarian) and specialty public schools (such as vocational and technical institutes), we were left with a sample of 1,144 comprehensive public high schools. Given the NELS:88 student and school selection process, this sample is reasonably representative of the national population of such schools in the early 1990s.

The dependent variable and most of the independent variables are drawn from the NELS:88 dataset. Additional independent variables come from the Common Core of Data (CCD). The CCD is the principal U.S. database for primary and secondary public schools and public school districts. It is published annually (since 1987), covers all public schools and districts in the nation, and provides data that are comparable across states (Davis & Sonnenberg, 1993). We linked the CCD file for 1992 to the NELS:88 second follow-up administrator file so that variables from the former can be used in regressions across the NELS:88 schools. The most important of the CCD variables for our purposes are those that describe school revenues and expenditures broken down along a variety of dimensions. These represent significant additions to the data because

NELS:88 contains no fiscal information. A third set of independent variables are derived from data on the timing of state participation in the STWOA. These variables are intended to provide a rough measure of overall state commitment to the STW movement in the period before the STWOA.

Conceptual Model

Our model takes the school as the decision-making unit whose behavior is to be analyzed. Therefore, its dependent variable and all the independent variables are measures of school characteristics. The specific variables used in the model are described in this section. More details are provided in a technical appendix available on request from the authors.

Dependent Variable

The term "school-to-work" as used both in the professional literature and the popular press has come to denote a wide and somewhat vaguely defined set of school services and programs that have workforce preparation and/or placement as their objectives. At the deepest level any school activity that enhances the intellectual or emotional maturity of a student or adds to her skills or competencies could be labeled as STW because such gains can, and in many cases do, contribute to future success in the workplace. From this perspective, sports teams, history classes, foreign language clubs, and student government are all STW activities. Such a broad human capital definition may be useful for some purposes, but this study is based on a narrower conception that is closer to the general understanding of the term. Specifically, we define a STW activity as a school program or service that has as its overriding purpose the preparation of students for career choice, job placement, and/or labor market success.

To make this general definition operational, we divide STW activities into four general groups: job skill provision, work readiness training, job placement, and business involvement. This is only a rough classification because many activi-

ties can easily be placed in more than one group. Job skill activities directly provide general and specific skills to students that will be useful in the labor market. Traditional vocational and cooperative education programs, as well as more modern initiatives such as Tech Prep, are included here. Work readiness activities prepare students psychologically for entry into the full-time labor force. They include work readiness seminars, STW counseling, and ability/interest assessment. Placement activities focus on obtaining full-time employment for students after they graduate from high school. Examples include job fairs, practice interviews, resume workshops, and placement courses. Finally, business involvement activities connect the school to specific local businesses. They include provision of student information to prospective employers, listing of jobs available in the local area, and business sponsorship of the entire school or specific programs.

In the NELS:88 data there is information on 24 school activities that could be reasonably classified into at least one of the four groups. These are shown in the top portion of Table 1.

Table 1

STW Activities Index: Components and Characteristics

Job skill activities:	Job placement activities:
Cooperative education	Employment search help
Other work experience programs	Job fairs
Tech-prep or other 2+2 program	Provision of letters of recommendation
Vocational education program	Practice interviews
Basic computer skills training	Arrangement of interviews
Computer programming training	Job placement courses
Credit for off-campus work experience	Job placement counseling
	Job placement services in school/district

Table 1 (continued)
STW Activities Index: Components and Characteristics

Business involvement activities:	Work readiness activities:
School adoption by business	Transition to employment counseling
Incentive program sponsored by business	Vocational interest and/or ability assessment
Anti-drug program sponsored by business	Provision of interest inventories
Job lists provided by businesses	Career readiness seminars
Recommendations requested by businesses	

Range: 0-24. *Median:* 14.00. *Mean:* 12.42. *Standard deviation:* 5.56.
Cronbach's alpha: 0.89.

Note: All variables coded 1 for "yes" and 0 for "no."

The dependent variable in the study -- the STW activities index -- is a simple count of the number of these activities present in a school. It is important to note that this index is a breadth measurement of STW programming and therefore does not take into account program depth (that is, the extent of student participation) or program quality. Descriptive statistics for this composite variable are presented at the bottom of the table. As these statistics indicate, there were substantial differences in the breadth of STW programming across the sample schools in 1992.

Independent Variables

As discussed in earlier sections, schools are subject to a variety of internal and external forces that influence their resource allocation decisions. We classify these influences into five groups: school and district size, school leadership, student body, community, and state/region. A general description of each group is provided below with some discussion of specific variables. More details are provided in the next section where

the results are presented.

School and District Size

In recent years a strong case has been made for smaller high schools on the basis that they provide more personal education for students. This is believed to be of particular importance for students who are educationally at risk. One of the principal arguments against smaller schools, however, is that they lack the economies of scale necessary to offer a broad range of alternative programs and activities. Following this line of reasoning, we hypothesize that school involvement in the STW movement depends positively on both school and district size measured in terms of the number of students. We include school district size because many STW programs are organized at the district level. However, as Monk and Haller (1993) found, size relationships are likely to be nonlinear in that they increase at a decreasing rate. This functional form is expected because adding (say) 100 students to large school will probably have a smaller impact on STW programming than adding 100 students to a small school who are educationally at risk.

School Leadership

Evidence is accumulating (though much of it is anecdotal) that a necessary condition for school change is effective leadership. We hypothesize that an important factor in the establishment of STW programming is leadership at the level of the individual school, primarily by the principal. Using NELS:88 data from the school administrator survey, we created indices for three different dimensions of school leadership that seem important for the establishment of STW programming: the ability to innovate, the ability to maintain a school climate conducive to learning, and the ability to establish cooperative relationships with external constituencies. Tables 2-4 present the components of each index and reports their descriptive statistics -- including Cronbach's *alpha*, a measure of internal reliability (Bohrnstedt & Knoke, 1994; Helmstadter, 1964). In

each case, Cronbach's *alpha* is greater than 0.75 indicating that the components of the index are substantially correlated with each other and thus likely to be measuring the same underlying construct. Each index is discussed in more detail below.

School innovation index. A crucial task for any leader is to bring new ideas into the organization. Since a broad-based STW program agenda represents a fairly radical break with traditional thinking about how high school education should be organized, we hypothesize that innovative school leaders are more likely to embrace the STW philosophy than those content with the status quo. To measure "innovativeness" we created an innovation index as one of the independent variables (Table 2). This variable is a simple count of the number of non-STW innovative practices (from a list of seven) that were established in the school in the three years prior to the NELS:88 second follow-up administrator survey. These practices include curriculum reform, interdisciplinary teaching, broad changes in instructional methods, and new procedures for student assessment. Approximately 20 % of the sample schools established no innovative practices (possibly overstated because of missing

Table 2
Leadership: School Innovation Index

Innovative practices established in past 3 years
New procedures for making school policy
Major new curriculum programs
Changes in student ability grouping policy & practice
School-wide changes in instructional methods
New roles for teaching and supervisory staff
Interdisciplinary teacher teams
New school-wide procedures for student assessment

Range: 0-7. *Median*: 3.00. *Mean*: 2.94.
Standard deviation: 2.20 *Cronbach's alpha*: 0.78.

Note: All variables coded 1 for "yes" and 0 for "no".

data) and almost 7% established all seven.

School climate index. Perhaps the single most important responsibility of an academic leader is establishing a school climate that is conducive to learning. Studies of successful schools repeatedly emphasize the importance of high academic expectations; orderly classrooms; student effort; and mutual respect among teachers, students, and administrators. Our hypothesis is that school leaders who have established strong learning climates are more likely to embrace STW than those who have not because a commitment to the complexities of work-based learning requires that the fundamentals of high school education already be in place. To test this hypothesis, a climate index was created for each school in the sample based on a list of thirteen characteristics drawn from the NELS:88 data that are indicators of strong learning climates (Table 3). The value of the index for each school is the number of reported characteristics. Slightly less than 15% of the sample

Table 3
Leadership: School Climate Index

Characteristics of schools with strong learning climates
Teachers encourage academic achievement.
Teachers encourage students to enroll in academic classes.
All students are expected to do homework.
Students are encouraged to compete for grades.
Seniors must pass a test to receive a diploma.
Students place a high priority on learning.
Teachers do not find motivating students difficult.
Discipline is emphasized.
Classroom activities are highly structured.
Teacher morale is high.
Student morale is high.
Teachers have positive attitudes toward students.
There is no conflict between teachers and administrators.
Range: 0-13. *Median*: 7.00. *Mean*: 7.28. *Standard deviation*: 2.83. *Cronbach's alpha*: 0.76.

Note: All variables coded 1 for 'yes' and 0 for 'no'.

schools had eleven or more of the characteristics and an almost equal number of schools had three or fewer.

School external cooperation index. Though less emphasized in the leadership literature than the previous two elements (see, however, Fullan, 1993, 1997), a school leader's ability to establish cooperative relationships with external constituencies is of central importance to the establishment of a comprehensive STW program. The model STW system (Stull & Sanders, 1999) requires a coherent program of school-based and work-based learning activities for a broad range of students. Establishing such a program necessarily entails an enormous amount of collaborative participation with outside groups -- particularly parents, employers, and district administrators. It seems reasonable, therefore, to conjecture that school leaders having good external relationships will be more successful in establishing STW programming than those that lack them. To measure the strength of such relationships we developed a cooperation index based on seven questions in the NELS:88 data set (Table 4). The value of the index for a particular school is the number of affirmative responses to the questions. Approximately 50% of the sample schools had cooperative relationships with all

Table 4
Leadership: School External Cooperation Index

Cooperative relationships with external groups and individuals
Superintendent
School board
Central office administrators
Teachers association or union
Community
Local businesses
Parents

Range: 0-7. *Median*: 6.00. *Mean*: 5.37. *Standard deviation*: 2.39. *Cronbach's alpha*: 0.91.

Note: All variables coded 1 for "yes" and 0 for "no".

seven external constituencies and 14% had them with none (again, a possible overstatement due to missing data).

Student Body

The shopping mall model suggests that programs and activities are established in high schools at least in part to satisfy the demands of students (and their parents). This suggests that otherwise similar schools with different student bodies might have different responses to the STW movement. To capture such effects, we include independent variables measuring the composition of the student body along the following dimensions: course of study, family income, educational aspirations, and race. We hypothesize that, other things equal, schools with higher proportions of low income students, higher proportions of vocational students, and higher proportions of non-college students have broader STW programs. We make these conjectures because the STW movement is strongly oriented toward improving the high school experience for students not destined to graduate from a four year college or university (more so in its earlier years than later). We make no a priori judgments concerning the influence of racial composition since there appears to be no basis for doing so once other variables are controlled for.

Community

Public schools are substantially creatures of the community in which they are located. Local taxpayers provide significant financial support, and local residents typically elect representatives to serve on the board that governs the school system. Given these important connections, it is natural to suppose that the community has an influence on school decision making that is separate and distinct from that of students or school leaders. In principle, there are many community characteristics that might affect a school's involvement in STW programming, including the socioeconomic characteristics of its citizens (income, age, racial composition, etc.) and their willingness to

spend tax dollars on public education. Because of data limitations, the focus in this study is on economic variables.

State and Region

Finally, it is reasonable to suppose that a school's involvement is STW activities might be shaped in part by political and economic forces that are external to its local community. Regional economic and political conditions might exert a significant influence. In addition, as noted above, there have been many STW initiatives at the state level, most of which have been implemented through the actions of individual districts and schools. Our expectation is that schools in states that made a substantial commitment to the STW movement are more likely to have significant STW programming than otherwise identical schools in states with lesser involvement.

Results

Various versions of the foregoing model were estimated using different combinations of independent variables. The final results are shown in Table 5. The dependent variable, as noted above, is the number of STW activities offered by the school, and the independent variables are various internal and external factors that might reasonably be expected to influence STW programming. In the table, the latter are divided into the five groups identified in the previous section. To facilitate interpretation of results, both regular and standardized regression coefficients are presented. However, unless otherwise indicated, discussion in the text will always refer to the former.

Overall, the model fits the data reasonably well. The R^2 is .55, which is excellent for a cross-section study with a large number of observations. In addition, most of the eighteen independent variables are statistically significant with the anticipated sign. The specific results shown in the table are discussed below. In each case of statistical significance, we attempt to provide some measure of substantive significance by comput-

Table 5
Effects of Student Body, School, Community, State, and Regional Characteristics on the Number of STW Activities Provided by the School

Variable	Regression coefficient	Standardized regression coefficient	*t*-test	*p*-value
School and district size				
Log of district size	0.2226	0.0698	2.383	0.017
Log of school size	0.553	0.0698	2.600	0.009
Grade levels in school	-0.241	-0.05444	-2.533	0.011
School leadership				
Innovation index	0.451	0.1784	7.556	0.000
Climate index	0.236	0.1248	4.912	0.000
Cooperation index	1.214	0.5219	19.409	0.000
Student Body				
%students non-Hispanic White	-0.011	-0.0611	-2.028	0.043
%students eligible for free/reduced cost lunch	0.002	0.0059	0.225	0.432
%graduates enroll in 4-yr. College	-0.009	-0.0339	-1.449	0.148
%students in academic program	-0.006	-0.0270	-1.119	0.263
%students in vocational program	0.017	0.0551	2.502	0.012
Community				
Median household income (in $1000)	-0.030	-0.0512	-1.847	0.065
District expenditure per pupil (in $1000)	0.073	0.0224	0.786	0.432
%district revenues non-local	-0.017	-0.0582	2.104	0.036

ing the effect on the dependent variable of a "large" change in the independent variable. For some independent variables, a

Table 5 (continued)
The Effects of Student Body, School, Community, State, and Regional Characteristics on the Number of STW Activities Provided by the School

Variable	Regression coefficient	Standardized regression coefficient	*t*-test	*p*-value
State and region				
State received early STWOA grant[a]	0.651	0.0585	2.453	0.014
Intercept	-0.517		-0.266	0.790
South region[a]	0.593	0.0511	1.368	0.172
Midwest region[a]	0.521	0.0402	1.302	0.192
West region[a]	1.086	0.0821	2.354	0.019
Intercept	-0.517		-0.266	0.790

R^2= .55 [a]Variable coded as a dummy with 1 = 'yes' and 0 = 'no'.
n = 1144 comprehensive public high schools in 1992.

one standard deviation change is used. When this is not appropriate, different measures are employed. For example, the school and district size variables have very large standard deviations because their distributions are highly skewed toward the high end. A percentile-based measure of change is used for these two variables. Research and policy implications of the findings are presented in the last section.

School and District Size

Three size variables are used in the estimation shown in Table 5; all have coefficients that are statistically significant and have the expected signs. However, the magnitudes of the estimated coefficients are not large, so the variables are not of great substantive significance in explaining why the schools in the sample differ in STW involvement. As one would expect, there is a positive correlation between school size and district size (0.42), but it is not enough to affect the results (as evidenced by the fact that the coefficients of both school and district size are statistically significant.)

School size. Larger schools, not surprisingly, have more STW activities than smaller schools. The estimated relationship is logarithmic rather than linear, however, so the size effect tapers off as the number of students increases. This finding parallels Monk and Haller's (1993) results for curriculum diversity mentioned above. In addition, the strength of the effect, statistical significance notwithstanding, is not large within the range of typical high school sizes. Based on the value of the regular regression coefficient, an increase in school size from the 25th percentile of the sample (720 students) to the 50th percentile (1125 students) only brings about a 0.25 increase in the STW index--less than 2 percent of the index value for the median school.

District size. Holding school size constant, schools in larger districts have more STW activities than those in smaller ones with the estimated relationship again being logarithmic. As might be expected, the regression coefficient for district size (0.226) is smaller than the one for school size (0.553). School districts have a much broader range of sizes than individual schools, however, so percentile changes have similar effects in the two cases. Increasing district size from the 25th percentile (3500 students) to the 50th percentile (10,500) also increases the STW index by 0.25.

Number of grade levels. Not all schools in the sample have four grade levels (i.e., freshman, sophomore, junior, senior); some have three and some have more than four. Holding the size of the student body constant, the number of grade levels in a school is inversely related to the number of its STW activities. This is expected because such activities are mainly provided for juniors and seniors. Again, however, the effect, though statistically significant, is small. Having three grade levels instead of four (school and district size constant) only increases the STW index by 0.21.

School Leadership

All three indices of school leadership are both statistically and substantively significant in the regression analysis. All are significant at the .001 level and their standardized regression coefficients are appreciably larger than those of the other variables. These results provide strong support for the position that leadership is an important determinant of STW programming.

Innovation index. The innovation index is a count, from 0 to 7, of the number of innovative practices reported by the school. Our a priori expectation is that schools that are more innovative in general would be more active participants in the STW movement as measured by this index. The results in Table 5 provide strong support for this hypothesis. A one standard deviation increase in the innovation variable (2.20) increases the STW index by 0.99 -- approximately 7 percent of the index value for the median school. Using the standardized regression coefficient, this translates into a 0.18 standard deviation increase in the STW index, the second largest in the study.

Climate index. Schools also differ in the extent to which they have a climate conducive to learning. Our hypothesis that schools with strong learning climates are more likely to be active providers of STW programming is supported by the results in Table 5. The estimated coefficient of the climate index is statistically significant, though smaller in size than those of the other leadership indices. The climate index takes on integer values between 0 and 13. A one standard deviation increase (2.82) raises the STW index by 0.66 -- more than 0.12 standard deviation (as shown by the standardized regression coefficient). This latter effect is the third largest in the study.

Cooperation index. Among the three leadership variables, the index measuring the strength of cooperative relationships with external constituencies is the most important in explaining STW programming. The index takes on integer values from 0 to 7. A one standard deviation increase (2.39) raises the STW

index by 2.9 -- almost 21% of that index's value for the median school. Using the standardized regression coefficient, this translates into a 0.52 standard deviation increase in the STW index, by far the largest in the study. These results strongly support the hypothesis that having cooperative relationships with external groups greatly contributes to the establishment of a broad-based STW program.

Student Body

Table 5 shows the estimated coefficients for five student body variables. Contrary to the spirit of the shopping mall model, the variables as a group are not important determinants of STW programming. Only two are statistically significant, and in both cases the estimated coefficients are relatively small. We tentatively conclude that the characteristics of a school's students, particularly their socioeconomic status (SES), do not have much influence on the extent of its STW programming.

Percentage non-Hispanic white. The coefficient of this variable has a negative sign and is statistically significant – indicating that schools with higher percentages of minority students, other things equal, tend to have more STW programming. This result was neither anticipated nor unanticipated since there is no prior maintained hypothesis concerning minority involvement with STW after holding constant SES. As noted above, however, the strength of the effect is small. Decreasing the percentage of non-Hispanic Whites by one standard deviation (32.35), and hence increasing the percentage minority by the same amount, only leads to a 0.36 increase in the STW index.

Percentage eligible for free or reduced cost lunch. The percentage of students eligible for free or reduced cost lunch is widely recognized as a flawed measure of SES for high school students because many students from low-income families do not enroll due to the stigma attached to the program. The variable was used only because it is the only direct indicator of stu-

dent income available for the sample schools. (In addition, it is perhaps reasonable to assume that under enrollment is proportionally the same in all schools and therefore that its presence will not affect the results.) We expected that the free lunch coefficient would be positive and significant because students from poor families have traditionally been the main participants in high school work readiness programs. However, in all estimations -- including those excluding the non-Hispanic White and four-year college variables -- the coefficient is statistically insignificant.

Percentage attending four-year college. Administrators in the sample schools were asked to report the percentage of recent graduates who attend a four-year college or university soon after graduation. We anticipated that this variable would have a negative influence on STW programming for the same reason that we expected the percentage of students eligible for a free lunch to have a positive influence: high school curriculum programs that are not primarily academic have usually focused on noncollege students. However, like the free lunch variable, it is consistently insignificant regardless of model specification.

Curriculum. All students in the sample schools were enrolled in an academic, vocational, or general curriculum. In the equation reported in Table 5, the percentages of students in academic and vocational tracks are included as independent variables. (The percentage in the general curriculum track was excluded to avoid perfect multicollinearity.) The academic track variable is not statistically significant, indicating that increasing the proportion of academic track students at the expense of general track students has no effect on STW programming. The percentage vocational variable, however, is statistically significant and positive in sign. Schools with relatively high proportions of vocational students have more STW programming than those with relatively high proportions of students in either of the other two curricula. This is the anticipated result but, some-

what surprisingly, the effect is not particularly large. A one standard deviation increase in the percentage of vocational students (17.86) increases the STW index only by 0.30.

Community

Table 5 presents estimated coefficients for three community variables, all of which represent economic characteristics of the school district in which the school was located. Experiments with other community socioeconomic variables were always unsuccessful. For example, some earlier versions of the estimated model included dummy variables for urban and suburban location (with rural location as the benchmark category) but these never proved to be statistically significant. Two of the three included variables have estimated coefficients that are statistically significant but their values are not large. Overall, the results suggest that community SES is not a major determinant of STW programming, a conclusion that parallels a similar finding for student body SES.

Median income. Median family income in the school district has a negative effect on STW programming that is small and of marginal statistical significance ($.05 < p\text{-value} < .10$). We interpret the result to indicate that more affluent communities are only slightly less likely to have STW activities than less affluent ones, other things equal.

Expenditure per pupil. We anticipated that district expenditure per pupil would have a positive effect because high expenditure districts would have more resources for implementing STW activities than low expenditure districts. Contrary to this expectation, however, the results in Table 5 show that the variable is statistically insignificant.

Percentage district revenues non-local. All school districts receive some revenue from state and federal sources. Since federal funds for broad-based STW programs were limited in 1992, we hypothesized that schools with high percentages of

non-local funding would have less STW programming than schools with low percentages (holding constant overall expenditure per pupil). This conjecture is supported by the results in the table, though again the effect is not a strong one. Increasing a school's non-local percentage by one standard deviation (18.82) only decreases its STW index by 0.32.

State and Region

As noted earlier, it seems reasonable to suppose that schools might differ in STW involvement because of differing economic or political conditions in their states or regions. At the state level, some states were much more involved in the STW movement than others in 1992. At the regional level, some areas in the country were harder hit by the recession of the early 1990s than others. We attempted to control for these influences primarily by using dummy variables of various kinds (including, at one point, separate dummies for each state). In general, we found state and region effects to be of marginal statistical and substantive significance. The results reported in Table 5 are representative.

State received early STWOA grant. This is a dummy variable taking on the value one if the state in which the school was located received its first STWOA grant in the first two years of the program (1994 or 1995) and zero otherwise. We hypothesized that schools in such states would be more likely to have had extensive STW programs in 1992, other things equal, than schools in other states because the state climate was likely to have been more supportive. Our results support this hypothesis, but the effect, though statistically significant, is not large. Being in an early recipient state only increased the STW index by 0.65, other things equal.

Regions. These are dummy variables for three of the four census regions. The estimated coefficients show that schools in the South, Midwest, and West regions had slightly more STW

programming than schools in the Northeast region, but the differences are small and only one is statistically significant.

Summary and Conclusions

Stepping back from the detail in the preceding section, the principal findings of the study are as follows:

1. Differences in STW programming across schools are not random events. A substantial portion of the observed variation can be explained by school characteristics.
2. The scope of STW programming does not increase very much with school or district size, even after controlling for the number of grade levels.
3. Schools with strong leadership in the areas of innovation, school climate, and cooperation with external constituencies have broader STW programs than schools weak in these leadership dimensions.
4. A variety of student body, community, state, and regional variables have statistically significant influences on STW programming but the effect sizes tend to be fairly small.
5. Student body and community income variables do not seem to have much influence on STW programming.

These results have important implications for both future research and policy. We conclude the paper with a discussion of some of them.

This appears to be the first multivariate study of the determinants of STW programming at the school level using a reasonably representative national sample of public schools. It should not be the last. The work reported here is based on data from 1992, prior to the passage of the STWOA. Research on STW implementation using more recent data is obviously called for. Such research will be particularly crucial for deter-

mining the long-run impact of the STW movement whose future at this moment is quite uncertain. Also, there is a great need for the development and estimation of depth models – i.e., models that seek to explain the intensity of student involvement in STW at the school level rather than just the presence or absence of program elements in the school. The breadth model presented in this paper does not distinguish between programs that are "a mile wide and an inch deep" and those that both offer a broad range of activities and serve large numbers of students. Finally, in the estimation of both breadth and depth models there is a need for further experimentation with independent variables, particularly student body and community characteristics. The limitations of our database in these areas provide obvious opportunities for future research.

The policy implications of our work are twofold. First, the results on school size provide indirect support for the movement to make the public high schools more intimate learning environments by making them smaller. The coefficients in Table 5 indicate that size reduction at either the school or district level will not reduce the scope of STW offerings very much. Second, the statistical and substantive significance of the leadership coefficients in the table suggest strongly that developing strong academic leaders, either through pre-service or in-service training, is vital to the successful implementation of STW. The results are particularly suggestive with respect to the ability to establish cooperative relationships with external constituencies. This ability has not always been emphasized in the research on or the teaching of educational leadership. Perhaps this under emphasis is a mistake, not only from the perspective of STW programming but other large-scale education reforms as well.

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Work Ethic Measurement of Vocational Students in Georgia

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Abstract

In this study, we used a two-phase mixed methods research design in which qualitative methods were followed by a quantitative method to investigate work ethics as defined by the Georgia Department of Technical and Adult Education. Though work ethic instruments exist in the literature, none were suitable to serve as an evaluation instrument for the work ethic component of the curriculum taught in the technical institutes in the state of Georgia. Following an extensive content analysis of pertinent documents, two focus groups and a needs assessment, a Likert survey was developed and administered to 307 persons. Participants clearly recognized and supported commonly accepted work ethic values, with females reporting stronger work ethics than males. Age and maturity of respondents were related to work ethics. Implications of our findings are discussed.

A common theme arising among Business Advisory Committees of technical institutes, the business community as a whole, and technical institute administrations is that prospective employees lack a suitable work ethic (James Bridges, President of Valdosta Technical Institute, personal communication, April 26, 1996). Further, a lack of an intrinsic value set governing

appropriate workplace behavior renders an applicant unemployable, even though the applicant may possess excellent ability and job skills. This incongruity between possession of adequate skill levels and appropriate work ethic values has increasingly become an area of concern for the business community and for technical institutes (James Bridges, personal communication, November 13, 1996).

In response to this disparity between skill levels and appropriate work ethic values, each of the 33 technical institutes in the Georgia Department of Technical and Adult Education has incorporated the concept of work ethic into their curriculum. The core component of work ethic values, as outlined in the department's policy, includes: (a) attendance and punctuality, (b) integrity and honesty, (c) productivity, (d) cooperativeness and teamwork, (e) responsiveness to supervision, (f) adherence to policies, (g) proper use of tools and resources, and (h) observance of safety provisions (Georgia Department of Technical and Adult Education—GDTAE, 1991). As an integral facet of the work ethic curriculum, students receive work ethic grades reported in the same manner as other course grades and these grades are recorded on the student's transcript. Additionally, each institute may augment these core values by expanding the value set to reflect the unique economies of their region and/or the specific focus of the institute's programs.

Not operationalized in the *Work Ethics Program* is a means to determine the relative value set possessed by students entering technical programs, prior to their exposure to the work ethic curriculum component. Similarly, no post-test of program graduates takes place (GDTAE, 1991). Because no pre-/post-assessment of student values occurs, Georgia technical educators have been unable to measure the effectiveness of their work ethic training efforts.

Definition of Work Ethics

Formal inspection of the topic of work ethics has stemmed

largely from the field of psychology. Numerous researchers such as Blood (1969), Mirels and Garrett (1971), Wollack, Goodale, Wijting, and Smith (1971), Furnham et al. (1993), and Knoop (1994) have focused on the value of work, job satisfaction, and global constructs related to work ethics. From the myriad of available research studies, a substantial number of concepts defined as work values have been identified. Such concepts include general satisfaction, job involvement, peer satisfaction, skill variety, initiating structure, higher order need strength, security, work conditions, advancement opportunities, conservatism, commitment, and recognition.

Researchers have investigated work ethic not in a comprehensive manner but rather in a piecemeal manner. That is, the different components of work ethic have been examined separately and not in an overall fashion. Thus, although each researcher has contributed to the existing body of knowledge about work ethic, the study of different work ethic components has led to disparate study results. For example, contradictory results were produced by Ganster (1981) when he attempted to replicate the work of Merrens and Garrett (1975). Merrens and Garrett (1975) found that subjects possessing a strong Protestant work ethic tended to spend more time on task and produce greater output whereas Ganster (1981) found the opposite when the tasks were changed by the researcher.

A second example is illustrated by the comparison of Buchholz's (1978) study and Gooding's (1972) study. Gooding found that workers under the age of 30 reported lower levels of job satisfaction than did workers 30 years of age and older. In addition, Buchholz found that commitment to the work ethic was strongest for subjects under the age of 30 and steadily declined as subjects moved into older age groupings.

Accordingly, work ethics, for purposes of this study, must be defined. We based our definition on the following works. Cherrington (1980) stated that in its simplest terms, work ethic referred to a positive attitude toward work. That is, persons

who enjoy their work would be regarded as having a better work ethic than persons who did not enjoy their work. Hitt (1990) proposed that the principles of the work ethic were synonymous to values and explained that "any description of a person's ethics would have to revolve around his or her values" (p. 5) because a person's value set is what guides his or her life.

Miller and Coady (1986) connected the benefits of work with an individual's values and principles [individual value set] and described an enabling work ethic as "an integrated and interactive system of attitudes, values, and beliefs that empowers an individual to adapt to and initiate change in order to sustain long term harmony with his or her work environment" (p. 6). The practical implication of Miller and Coady's interpretation is that when individuals are faced with ethical conflicts, they must make decisions regarding potential reactions. Such decisions are normally based upon environmental choices or previous experience, but may result from the individual's understanding of appropriate ethical conduct in the workplace.

Accordingly, we defined work ethics in two ways. First, work ethics were defined by the extent to which participants responded to work ethic items in terms of their importance in the participants' views. Second, work ethics were defined by the work ethic values responded to by participants. Thus, Cherrington's (1980) positive attitudes, Hitt's (1990) work ethic values, and Miller and Coady's (1986) values and principles were incorporated into our operational definition of work ethics.

Ongoing discussions between institute officials of the Georgia Department of Technical and Adult Educational System (GDTAE) and employers in the state have revealed discrepancies between the value sets possessed by program graduates and those value sets desired by business and industry. For example, program graduates seem to lack an understanding that punctuality and attendance, work productivity, and the frugal use of raw production materials impacted company profitability and in turn, their continued employment with that organization. Fur-

ther discussions between technical institute personnel and business and industry personnel have focused on the basic characteristics desired by employers. Commonalities emerged through these discussions and formed the basis and definition of the GDTAE work ethic value set. These commonalities included: (a) attendance and punctuality, (b) integrity and honesty, (c) productivity, (d) cooperativeness and teamwork, (e) responsiveness to supervision, (f) adherence to policies, (g) proper use of tools and resources, and (h) observance of safety procedures. In 1991, after a one-year pilot test in 20 institutes, a program employing these eight factors as the core value set and referred to as the *Work Ethics Program* was formally adopted by GDTAE (James Bridges, personal communication, April 26, 1996).

Measurement Instruments

A plethora of instruments are available in which the measurement of work value, job satisfaction, loyalty, self concept, organizational commitment, beliefs, work performance, attitudes, and role conflict are examined. Two commonalities have emerged from an inspection of these studies and the instruments employed by the researchers. Researchers have focused either on minute processes (e.g., within the whole of work ethics) or upon global constructs (e.g., the Protestant Work Ethic, the Catholic work ethic, or the Islamic work ethic).

Though a myriad of instruments exist by which work ethics can be assessed, no one instrument is suitable for purposes of this study. That is, the GDTAE Work Ethic Program incorporated into the technical education curricula in the state of Georgia can only be adequately evaluated by an instrument in which each work ethic component in the curricula is assessed. To design an instrument by which the components of the GDTAE Work Ethic Program could be assessed, the researcher selected four instruments employed in previous research which most closely paralleled the focus of this work.

The first of these instruments was The Survey of Work Values (SWV). Wollack, Goodale, Wijting, and Smith (1971) developed the SWV to reflect an index of a person's general attitude toward work. Wollack et al. explained that previous research in this area had resulted in scale development focused on the measurement of work values and occupational values. Further, even though those measures had been meticulously developed, they seemed to be extremely global. The SWV differed from previous scales in that it was limited to the secularized Protestant Work Ethic and was focused toward areas of values with which the construct of the Protestant Work Ethic seemed to be closely linked. Additionally, the researchers specifically identified the concept of socially desirable responses as prone to bias and explained, "If one is concerned about the extent to which a group of individuals shares a common value pattern, then in a very real sense it is social desirability that is being measured" (Wollack et al., 1971, p. 336). The implication of this discussion was that regardless of whether people's behavior was controlled by their intrinsic value set or by socially desirable behavior patterns the result was the same. That is, the individual's behavior would approximate socially desirable behavior.

The second of these instruments was The Protestant Ethic Scale developed by Milton Blood (1969). Blood attempted to measure individual differences in work values and predicted that persons ascribing to Protestant Ethic ideals would exhibit greater job satisfaction than those persons who did not ascribe to Protestant Ethic ideals. He found that agreement with the Protestant Ethic was directly correlated to job satisfaction. Similarly, agreement with non-Protestant Work Ethic items was inversely related to job satisfaction. Reliability and validity coefficients of the instrument used by Blood were not discernible from the article; however, Furnham et al. (1993) reported Spearman-Brown reliability as .70 for this instrument and noted that both concurrent and predictive validity evidence was avail-

vailable. Blood explained that work values preceded and influenced job satisfaction as opposed to job satisfaction, or the lack thereof, generating positive or negative work values. Practical applications of Blood's conclusion were evident when attempts were made to assimilate hard-core unemployed into the work force and to resocialize this workforce segment by instilling Protestant Ethic ideals during the 1970s. The results of these resocialization efforts were largely unsuccessful.

The third of these instruments was The Protestant Ethic Scale developed by Mirels and Garrett (1971). These researchers produced a popular measurement instrument utilized in 39 psychological studies focusing on the Protestant Work Ethic (Furnham et al., 1993). The principal reason given for such wide usage was the investigation of the Protestant Work Ethic- one of the few topics that has bridged nearly all of the social sciences.

Mirels and Garrett (1971) examined the Protestant Ethic as a dispositional variable. Moreover, they sought to depict its psychological meaning in terms of occupational interests and relationships with other personality variables. The researchers' initial attempts were directed toward the development of an internally consistent measure of the endorsement of Protestant Ethic ideology. Mirels' and Garrett's instrument employed 19 questions which were scaled on a six point Likert format with no neutral position. Questions employed an easily read format centered on value items familiar to white, middle-class Americans. Furnham et al. listed reliability figures for the Mirels and Garrett instrument as follows: (a) Spearman-Brown reliability, .67, (b) Kuder-Richardson reliability, .79, (c) Cronbach's *alpha*, .67, and noted that concurrent and predictive validity evidence were available. The practical application of these findings was that success in such occupations could be quantified in terms of earned profits or in terms of how efficiently and how well specified duties were fulfilled. Further, no significant differences in their work ethic measurement were present between

males and females.

The fourth instrument was developed by Petty (1991) who developed a concise scale employing 50 one-word descriptors relating to work ethic, value of work, and work competencies to provide a succinct, accurate measure of the vocational aspect of the work ethic. Descriptors grouped into four subscales: dependable, ambitious, considerate, and cooperative. Pilot test results generated correlation alphas ranging from .90 (Hatcher, 1995) to .95 (Hill, 1992) for this instrument. Subsequent research employing Petty's instrument has focused toward the identification of key themes that characterized the modern occupational or vocational work ethic. The conclusions of one research study employing this instrument were of particular relevance to this research study. The authors stated, "the elements of work ethic that are of greatest significance in the preparation of people for work are the attitudes and behaviors ascribed to work ethic rather than a sectarian belief system that inculcates these characteristics" (Hill & Petty, 1995, p. 60).

Research Questions

1. What factors and values comprise work ethic as defined by:
   (a) Technical Institute Advisory Committee members? (b) Technical institute faculty members? (c) the Georgia Department of Technical and Adult Education?
2. How do the factors and values of the three populations noted in question one interrelate?
3. Is there a statistically significant difference in work ethics as a function of respondent demographic variables?

Methods and Procedures

Qualitative Procedures

Copies of the Work Ethic Program Manual and The Work Ethic Program pilot-test summative report were obtained from a

state Technical Institute, a copy of the Work Ethic Program assessment completed in May, 1996 was obtained from a different state Technical Institute, and institute catalogs were obtained from three Technical Institutes. These documents were reviewed to determine specific work ethic value descriptors and general reference to the work ethic topic. Each work ethic value descriptor was identified by a specific descriptor term and source and recorded in a Lotus 123 electronic spreadsheet file to facilitate manipulation of the data. Five hundred sixty-nine specific descriptors were identified through this methodology (Ryan & Bernard, 2000) with data sorted alphabetically, maintaining the integrity of the descriptor source.

The initial organization of the data was followed by the employment of a logical content analysis to identify value clusters. Commonalities among descriptor definitions contributed to data reduction (Miles & Huberman, 1994). A series of nine subsequent data reductions allowed the value descriptors to be collapsed into the eight principal work ethic value themes identified in the GDTAE *Work Ethic Program Manual.*

Focus groups. A listing of Business Advisory Committee Members was obtained from a state Technical Institute. Committees were segregated into the categories of business (e.g., hotel and restaurant management) and health (e.g., nursing) programs, and into the categories of technical (e.g., computer technology) and instructional programs (e.g., early childhood care) based upon their program focus. Business and health program committees consisted of 123 members and technical and instructional program committees consisted of 121 members. Of these groups, focus group participants were randomly selected via a table of random numbers obtained from Keller and Warrick's (1994) Essentials of Business Statistics. Eight participants were determined to provide optimal group interaction based upon the research of Krueger (1988) and Morgan (1997). Assuming a 50% replacement rate, 12 participants were initially selected from each of the two advisory committee catego-

ries.

Members of each group were assigned unique consecutive numbers to facilitate selection. Selection of business and health advisory committee members was initiated through the use of the serial number F57991162F obtained from a one dollar bill. Business and health candidates 62, 45, 112, 67, 16, 73, 12, 83, 71, 9, 38, and 17 were selected for participation. A similar process was employed to select technical and instructional advisory committee members. The serial number F32767331F obtained from a one dollar bill was employed to begin selecting Technical and Instructional candidates 48, 69, 85, 63, 45, 27, 90, 10, 60, 51, 62, and 112 were selected for participation. Readers should note that although participants were selected randomly within each category, they were purposefully selected for being either in the business and health category or for being in the technical and instructional advisory committee.

Two one-hour focus groups were then scheduled. Letters of invitation, signed by the president of one of the state's Technical Institutes (i.e., the president primarily involved in the work ethic component of the GDTAE curriculum), were mailed to the 12 potential candidates in each of the two categories. Telephone calls were completed to non-respondents a week later to discern their intentions regarding participation. Two candidates from the business and health category and three candidates from the technical and instructional category participated in each of the focus groups. Thus, a total of 10 participants was involved in the two focus groups.

Nine focus group questions were developed from the content analysis previously performed (See Table 1). Participant responses were recorded on a flip chart during the interactive meeting process. The senior researcher then recorded these responses in a Lotus 123 electronic spreadsheet file to facilitate manipulation of the data the following day. Data were merged and analyzed to determine emergent work ethic themes (Miles & Huberman, 1994; Silverman, 2000).

Table 1
Questions Used in the Focus Groups

1. Describe what the term "work ethic" means to you.
2. Describe to me a person who has excellent work ethic.
3. What *key* elements need to be included in a statement defining work ethic?
4. Describe the characteristics of your best [better] employees.
5. Describe the characteristics of employees that possess poor work ethic.
6. What do you think the relationship of work ethic is to success in the workplace?
7. Describe why employees with a high level of work ethic are more successful in the workplace.
8. How do employers measure the success of employees in the workplace?
9. What is the role of work ethic in job performance?

Needs assessment. Following the two focus groups, three technical institutes were randomly selected, using a random numbers table (Ary, Jacobs, & Razavieh, 1996), to be sent a needs assessment questionnaire. Needs assessment questionnaires were completed by 15 faculty members at one Technical Institute, 20 faculty members at a second Technical Institute, and 9 faculty members at a third Technical Institute (n = 44). With 25 surveys sent to each technical institute, a return rate of 58% was obtained. Data were collected utilizing a researcher-developed needs assessment questionnaire. Three open-ended questions, designed to elicit qualitative responses, constituted the instrument. The questions were: (a) What do you like best about the GDTAE work ethic curriculum?, (b) What do you like least about the GDTAE work ethic curriculum?, and (c) How would you improve the GDTAE work ethic curriculum?. Questionnaires included an introductory paragraph to explain the purpose of the study; a statement that there were no right or wrong answers; and that participation was voluntary. Identical instruments were utilized in all institutions.

Data were merged and analyzed to determine emergent work ethic themes (Miles & Huberman, 1994; Silverman, 2000). Commonalities among participant responses contributed to data reduction (Miles & Huberman, 1994). Then the themes from the needs assessment data were merged with the themes from the focus groups and with the themes from the document analysis.

Quantitative Procedures

Quantitative participants. Participants in the quantitative portion of this study consisted of 202 vocational students, 18 small business owners, 19 managerial and technical personnel employed in a manufacturing environment, 32 adult and technical education educators, and 36 high school and elementary school educators employed in a county public educational system (N = 307). The sample was comprised of 36% male and 64% female subjects. Detailed demographic information about the sample is provided in Table 2.

Table 2
Characteristics of Participants who Responded to the Importance and Values Survey Items

Demographic Criteria	*N*	Percent of sample
Gender		
Males	112	36.5
Females	195	63.5
Age		
Less than 19 years	90	29.3
Age 20-24 years	52	16.9
Age 25-29 years	37	12.1
Age 30-34 years	32	10.4
Greater than 35	96	31.3

Table 2 (continued)
Characteristics of Participants who Responded to the Importance and Values Survey Items

Demographic Criteria	*N*	Percent of sample
Ethnicity		
Caucasian	227	73.9
African-American	73	23.8
Hispanic-American	1	.3
Asian-American	31	1.0
Other		.3
Highest Educational Level Attained		
Some high school	65	21.2
H.S. diploma or GED	120	39.1
Vocational certificate or degree	17	5.5
Some college	34	11.1
College degree	69	22.5
Work Experience		
Part-time only	96	31.3
Less than 1 year full-time	15	4.9
1-2 years full-time	28	9.1
3-5 years full-time	45	14.7
More than 5 years full-time	120	39.1
Participant Type		
Students	202	65.8
Institute faculty	32	10.4
Independent business owners	18	5.9
Manufacturing	19	6.2
Elementary and high school educators	36	11.7

Quantitative instrumentation. Results of the content analysis, focus groups, and needs assessments were employed by the researcher to develop a 55-item questionnaire. Questionnaire items one through five were designed to elicit participant demographic data as delineated through the quantitative research question. Questionnaire items 6 through 30 consisted of one-word and short phrase work ethic descriptors. Questionnaire items 31 through 55 employed a series of questions designed to elicit a participant's value perceptions of various facets of the

Work ethic (see tables 3 through 5).

Participant responses from questionnaire items 6 through 30 were collapsed under a heading of Importance and summed. Similarly, participant responses for questionnaire items 31 through 55 were collapsed under a heading of Values and summed. This procedure yielded an index of work ethic perceptions and values in which higher scores were indicative of a stronger work ethic.

Cronbach's coefficient alpha (i.e., internal consistency) was employed to ascertain the reliability of the instrument. Because the instrument format employed a series of 25 short phrases and one-word descriptors and a series of 25 value-related questions, coefficient alphas were computed separately for each section. The instrument component consisting of short phrases and one-word descriptors yielded a Cronbach's *alpha* of .94 in the initial analysis. Therefore, all items were retained in the first part of the survey.

Initial analysis of the 25 value-related questions led to the elimination of questions 50, 51, and 55 due to low or negative item-total correlations. With the remaining 22 items, a coefficient alpha of .77 was yielded for this component. Per Nunnally (1978), these coefficient alphas of .94 and .77 are sufficiently high for research purposes. Table 3 contains all survey items, their means, and standard deviations.

Table 3

Quantitative Survey Instrument: Means & Standard Deviations

Number	Survey Question	*M*	*SD*
6	Ability to organize your work	4.27	.78
7	Accepts constructive criticism positively	3.84	.90
8	Accepts work supervision positively	4.31	.85
9	Adherence to company policies	4.49	.73
10	Appropriate professional and social behavior	4.52	.66
11	Attendance	4.64	.64

Table 3 (continued)
Quantitative Survey Instrument: Means & Standard Deviations

Number	Survey Questions	*M*	*SD*
12	Capability to adjust to different work situations	4.27	.78
13	Character	4.33	.72
14	Cooperativeness	4.50	.70
15	Diligence	4.18	.83
16	Flexibility	4.23	.82
17	Honesty	4.73	.59
18	Industriousness	4.11	.86
19	Integrity	4.42	.77
20	Maturity	4.43	.78
21	Observance of safety procedures	4.49	.77
22	Positive attitude	4.44	.69
23	Productivity	4.38	.73
24	Proper use of tools and resources	4.39	.80
25	Punctuality	4.43	.72
26	Responsibility	4.64	.65
27	Responsiveness to supervision	4.39	.74
28	Tactfulness	4.25	.82
29	Teamwork	4.51	.73
30	Trustworthiness	4.74	.59
31	The ability and willingness to follow directions is important to my work.	4.69	.54
32	Attention to detail is very important in any line of work.	4.49	.68

Table 3 (continued)
Quantitative Survey Instrument: Means & Standard Deviations

Number	Survey Questions	*M*	*SD*
33	Dependability is a subjective term and can not be judged by others.	2.71	1.34
34	Enthusiasm is not important if the job gets done.	2.43	1.25
35	A good work ethic is just as important as a good skill level.	4.38	.78
36	Good work ethics include being willing to do what I am asked to do even if I don't want to.	4.30	.87
37	Good work ethics include the willingness to do the right thing.	4.40	.73
38	I do not always follow directions if I know a better or an easier way.	3.13	1.14
39	I respect my supervisors and the company that I work for.	4.36	.78
40	I should follow company policies and procedures even if I don't agree with them.	4.13	.94
41	I take a lot of pride in the quality of work that I complete.	4.59	.64
42	I would be more loyal to my employer if he/she cared more about me.	3.66	1.16
43	I would be more productive if the company treated me better.	3.58	1.21
44	I would not tell the truth if one of my friends would be fired because of my answer.	2.46	1.14
45	I would overlook shady business practices if they were not illegal and it would put money in my pocket	2.03	1.13
46	If all employees had good work ethics, then the company would do better and then all employees would do better.	4.32	.84

Table 3 (continued)
Quantitative Survey Instrument: Means & Standard Deviations

Number	Survey Question	*M*	*SD*
39	I respect my supervisors and the company that I work for.	4.36	.78
40	I should follow company policies and procedures even if I don't agree with them.	4.13	.94
41	I take a lot of pride in the quality of work that I complete.	4.59	.64
42	I would be more loyal to my employer if he/she cared more about me.	3.66	1.16
43	I would be more productive if the company treated me better.	3.58	1.21
44	I would not tell the truth if one of my friends would be fired because of my answer.	2.46	1.14
45	I would overlook shady business practices if they were not illegal and it would put money in my pocket.	2.03	1.13
46	If all employees had good work ethics, then the company would do better and then all employees would do better.	4.32	.84
47	If the company wants me to be innovative and resourceful, they should pay me more.	3.01	1.07
48	I'm not really all that concerned about what other people think about the way that I dress.	2.87	1.33
49	My personal appearance does not affect my ability to do my job.	3.00	1.38
50	Results justify the means.	3.36	1.24
51	Smiling makes a person a better employee.	3.76	1.14
52	An employee should always give 8 hours work for 8 hours pay regardless of their pay rate.	4.09	.99
53	"White lies" are acceptable if the truth would cause damage to the business.	2.41	1.20

Table 3 (continued)
Quantitative Survey Instrument: Means and Standard Deviations

Number	Survey Question	*M*	*SD*
54	Everybody makes mistakes; the important thing is that you learn from your mistakes and try not to repeat them.	4.60	.72
55	Choosing to be honest is not always the easiest thing to do.	3.98	1.22

Due to the distinct natures of the item descriptor and work ethic value related questions, separate principal component factor analyses, followed by Varimax rotations were performed. The item descriptor questions, labeled Importance, were clustered into three internally consistent factors. Factor 1, with an *eigenvalue* of 10.04 and 40.2% of variance explained, consisted of questions 1, 7, 9, 11, 15, 16, 18, 19, 23, and 29. The coefficient alpha for factor 1 was .88. Factor 2, consisting of questions 4, 5, 12, 14, 21, 22, and 30, generated an *eigenvalue* of 1.36 and accounted for 5.5% of the variance. The internal consistency factor for factor 2 was .82. The third factor, consisting of questions 8, 10, 13, 14, and 20, had an *eigenvalue* of 1.29 and accounted for 5.2% of the variance. Factor 3 generated an internal consistency factor of .80. These three factors, each possessing adequate internal consistency, explained 50.9% of the variance in participants' responses to the item descriptor questions.

The next set of items subjected to the factor analysis were the Values items. Three factors with sufficiently high internal validity were yielded. Factor 1, with an *eigenvalue* of 4.19 and 16.8% of variance explained, consisted of questions 35, 36, 40, 41, and 46. The internal consistency factor for factor 1 was .66. Factor 2, consisting of questions 31, 32, 37, and 39, generated an *eigenvalue* of 2.98 and accounted for 11.9% of the variance. Factor 2 generated an internal consistency factor of .72. The third factor, consisting of questions 34, 44, 45, and 53, had an

eigenvalue 1.64 and accounted for 6.6% of the variance. The internal consistency of factor 3 initially computed as .63. Subsequent elimination of question 34 yielded an improved internal consistency of .66. These three factors explained 35.3% of the variance in participants' responses to the value item questions.

Results

To examine the extent to which differences were present in respondents' answers on the Importance and Value factors, two multivariate analysis of variance (MANOVA) procedures were conducted. Initially, a MANOVA was conducted to ascertain differences on the Importance and Value factors for the variables of gender, age, and ethnicity. A statistically significant difference was present for the overall effect for gender, Roy's Largest Root (2, 248) = 4.14, $p < .05$, for age, Roy's Largest Root (4, 249) = 8.04, $p < .001$, but not for ethnicity, $p > .05$. No statistically significant interaction effects were present for the overall effect, $p > .05$. Follow-up univariate *F*s revealed that statistically significant differences were present between males and females for the Importance factor, F (1, 249) = 6.85, $p < .01$, and for the Values factor, F (1, 249) = 3.84, $p < .05$. Mean scores indicated that females (M = 112.26) scored higher than males (M = 105.98) on the Importance variable. Females (M = 84.32) also scored higher on Values than males (M = 81.43). Thus, in these results, females reported stronger work ethic values than did males.

In addition, follow-up univariate *F*s revealed that statistically significant differences were present among the age groups for the Importance factor, F (4, 249) = 6.06, $p < .001$, and for the Values factor, F (4, 249) = 4.76, $p < .001$. Scheffe's post hoc analysis yielded statistically significant differences for the variable Importance between participants age 19 or under (M = 105.35), and participants age 20-24 (M = 113.67), and between participants age 19 or under (M = 105.35), and participants age 35 or over (M = 111.40). Post-hoc analysis yielded similar re-

sults for the Importance variable between participants age 19 or under (M = 105.35), and participants age 20-24 (M = 113.67), and between participants age 19 or under (M = 105.35), and participants age 35 or over (M = 111.40). Respondents in age group 20-24 and age group 35 and older possessed significantly higher scores on the Importance variable than did subjects age 19 or under, with age group 20-24 exhibiting the highest mean scores.

In regard to the Value factor, Scheffe's post hoc analysis revealed statistically significant differences among participants age 19 or under (M = 78.63), and the remaining four groups, participants age 20-24 (M = 83.81), participants age 25-29 (M = 84.75), participants age 30-34 (M = 86.21), and participants age 35 and over (M = 85.76). Participants age 30-34 exhibited the highest mean score.

Next, a MANOVA was conducted to ascertain whether differences were present in the Importance and Value variables as a function of educational level and work experience. A statistically significant difference was present for the overall effect for educational level, Roy's Largest Root (3, 257) = 4.44, $p < .01$, and for work experience, Roy's Largest Root (2, 257) = 8.85, $p < .001$. Follow-up univariate Fs revealed that statistically significant differences were present among the educational levels for the Importance factor, F (3, 257) = 3.09, $p < .05$, and for the Values factor, F (3, 257) = 3.21, $p < .05$. Regarding the Importance variable, Scheffe post hoc analysis yielded statistically significant differences between participants with some High School (M = 105.90), and participants with a High School Diploma or GED (M = 111.92). Participants with a High School Diploma or GED appeared to place more importance on the work ethic than those participants who did not possess such certification.

For the Values variable, Scheffe post hoc analysis yielded statistically significant differences among participants with some High School (M = 76.85), and participants with a High

School Diploma or GED (M = 84.68), participants with a Vocational Certification/Degree and some college (M = 85.19), and participants with a College Degree (M = 85.35). The implication of the analysis was that participants with a College Degree, exhibited the strongest work ethic values followed by participants with a Vocational certificate or degree and some college and participants with a High school diploma or GED respectively.

In addition, follow-up univariate Fs revealed that statistically significant differences were present among the levels of work experience for the Importance factor, F (2, 257) = 6.28, p < .01, and for the Values factor, F (2, 257) = 5.65, p < .01. For the Importance factor, Scheffe post hoc analyses yielded that statistically significant differences were present between both participants with part-time experience only (M = 106.63), and participants with less than one year full-time experience (M = 112.20), and between participants with part-time experience only (M = 106.63), and participants with 1 to 2 years full-time experience (M = 110.94). Participants with full-time work experience from one to five years tended to exhibit higher scores on the Importance variable followed respectively by participants employed more than six years full-time and participants employed in a part-time capacity.

For the Values factor, Scheffe post hoc analyses revealed that participants with less than one year full-time work experience (M = 84.85), and participants with 1 to 2 years full-time work experience (M = 85.74) generated statistically significant results when compared to participants with only part-time work experience (M = 78.67). In this comparison, participants with one to two years full-time work experience exhibited the strongest work ethic values followed by participants with less than one year full-time experience, then participants with part-time experience only. All effect sizes for this statistically significant differences were small (Cohen, 1988).

To permit the analysis of gender differences in depth, two

discriminant analyses were conducted. First, a stepwise discriminant analysis was conducted with the Importance items as the discriminating variables and statistical significance at the .05 level as the inclusion criteria. The resulting function was statistically significant, X^2 (5) = 59.68, $p < .001$ and accounted for 19% of the variance between groups (i.e., canonical correlation = .4323). Following the recommendations of Tabachnick and Fidell (1983), items with standardized discriminant function coefficients that had absolute values of .3 or higher were used to interpret the discriminant function. These items are displayed in Table 4. Because the group centroids were +.35 for females and -.63 for males, positive coefficients indicated that females reported more appropriate work ethic values than males.

Table 4
Standardized Discriminant Coefficients Differentiating Males and Females Based on the Variable of Importance

Question	Work Ethic Importance Item	Standardized Coefficient
5	Appropriate professional and social behavior	+.68
10	Diligence	+.60
16	Observance of safety procedures	+.59
23	Tactfulness	+.41
13	Industrious	+.39
22	Responsiveness to supervision	+.39
15	Maturity	+.38
4	Adherence to company policies	+.37
21	Responsibility	+.37
29	Teamwork	+.36
18	Productivity	+.36
19	Proper use of tools and resources	+.34
14	Integrity	+.34
9	Cooperativeness	+.34
8	Character	+.31
17	Positive attitude	+.31

Next, a stepwise discriminant analysis was conducted with the Value items as the discriminating variables. Again, statistical significance at the .05 level was employed as the inclusion criteria. The resulting function was statistically significant, X^2 (4) = 27.37, $p < .001$ and accounted for 9.47% of the variance between groups (i.e., canonical correlation = .3078). Items with standardized discriminant function coefficients of .3 or higher are displayed in Table 5. Group centroids of +.24 for females and -.43 for males indicated that females placed higher importance on work ethic than did males.

Table 5
Standardized Discriminant Coefficients Differentiating Males and Females Based on the Variable of Values

Question	Work Ethic Value Item	Standardized Coefficient
35	A good work ethic is just as important as a good skill level.	+.63
40	I should follow company policies and procedures even if I don't agree with them.	+.59
51	Smiling makes a person a better employee.	+.47
46	If all employees had good work ethics, then the company would do better and then all employees would do better.	+.39

Discussion

Instrument composition consisted of readily identifiable work ethic descriptors and a series of statements incorporating work ethic values to which participants reflected upon the conditions delineated by the questions and made a judgment choice regarding their personal response (Miller & Coady, 1986) in the stated scenario. Responses regarding the importance of work ethics tended to cluster tightly around the means and exhibited narrow standard deviations. Thus, these findings were interpreted as evidence that respondents clearly recognized and supported commonly accepted work ethic values (Hitt, 1990) or

that respondents offered the socially acceptable response choice. In either case, responses were evidence that respondents were familiar with commonly accepted workplace values. Conversely, when responses regarding work ethic values were required, response patterns exhibited significantly wider dispersions indicating that whereas respondents tended to view these situations from similar perspectives, respondents did not view the ethical conditions in the same manner as they viewed the importance of work ethics.

Specific findings of this study will now be delineated. First, a gender effect was present, a finding that contrasts with Mirels and Garrett (1971)'s study in which males and females did not report different work ethic values. In this study, females reported stronger work ethic values than males. Second, an age effect was yielded, with respondents aged 20 - 24 reporting higher work ethic values than other age categories when the importance of work ethics items was present. This finding is congruent with Buchholz's 1978 study in which he reported the strongest work ethic commitment (i.e., importance in our study) among younger workers than with older workers. However, when questions requiring respondents to respond regarding work ethic values were compared, respondents aged 30 - 34 exhibited the highest scores followed closely by respondents aged 35 or over. This finding is congruent with Gooding (1972). These differences may be attributable in part to exposure to work ethic value terminology throughout the participants' educational process in comparison to participants' maturity and experience as they assimilate the realities of the workplace.

Third, prior educational level provided yet another statistically significant effect. Participants with a High School Diploma or a GED scored slightly higher than participants with a Vocational Certificate/Degree or some college and participants with a college degree on the work ethic values items. When the importance of work ethics items were interjected into the comparison, participants with college degrees yielded higher mean

scores than participants with Vocational Certificates/Degrees, participants with High School Diplomas/GEDs, or participants with some high school. Again, work ethic perceptions tended to be a function of exposure in the first comparison and a function of maturity and experience in the second comparison.

Finally, when work experience was compared against Values and Importance, statistically significant results were yielded. Participants with one to five years work experience possessed stronger work ethic values than the remaining two groups. This finding is congruent with Buchholz (1978). As with previous comparisons, when the importance of work ethics was interjected into the comparison, participants with more than five years work experience displayed higher scores than the remaining two groups. These findings were again interpreted to mean that age and maturity were directly related to participant perceptions (e.g., Buchholz, 1978; Gooding, 1972).

Limitations

Several limitations of the study were present. First, this study was a two-phase mixed methods study in which initially qualitative methods were used, followed by a quantitative method (Patten, 1997; Rossman & Wilson, 1991). Such a mixture of methods connotes a pragmatist philosophy on our part and may not be satisfactory to either the positivist or the post-positivist philosophies. Second, a convenience sample was employed for the quantitative portion of this study. This convenience sample was skewed as a result of disproportionate representation in the sample demographics on the basis of gender, age, ethnicity, and work experience (see Table 2). However, the sample demographics do match the demographics of students who attend the technical institutes in the state of Georgia. Third, data were gathered from a geographically restricted location. Fourth, the qualitative and quantitative components of this study were directed toward the work ethic component present in the GDTAE curriculum. Fifth, this two-phase mixed methods study was intended to explore work ethics as they are defined

through the Georgia Department of Technical and Adult Education, rather than through a theoretical framework. This approach, though providing an applied focus and action-oriented information, does not lend itself well to a theoretical context. Therefore, readers should be cautious in the extent to which they generalize these findings. Until these findings are replicated, readers are urged to be tentative in any generalizations they make from this study.

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The Impact of School Supervision of Work and Job Quality on Adolescent Work Attitudes and Job Behaviors

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Abstract

In this study, the effect of school intervention in adolescent work experience and job quality on adolescent work attitudes and negative job behaviors was examined. These analyses are based on a longitudinal survey of youth conducted as part of a National Center for Research in Vocational Education study that included nearly 1800 high school age participants. While youth who worked in school supervised work experience reported higher job quality on most dimensions, there was no independent effect of school intervention on job attitudes and behaviors. The results of this study support the contention that job quality matters in adolescent work. Of the nine elements of job quality, jobs where SCANS skills were learned were the most consistent predictor of positive work attitudes in the baseline and follow up surveys. The young workers' relationship with a supervisor and absence of learning SCANS skills were the most consistent predictor of negative work attitudes and negative work behaviors. The authors argue that policy focus should shift more to the nature of the workplace in which young people labor, rather than exclusively on how many hours young people work.

Working adolescents are seen in restaurants, supermarkets, retail stores, and other work places in contemporary America. Many adolescents also work in less visible jobs like baby-sitting or lawn care. Estimates of the extent of adolescent employment range from 64% for juniors and 73% for seniors (Pergamit, 1995) to more than 80% by Greenberger and Cauffman (1995). Pergamit's analysis showed that juniors worked 41.5% of the weeks during the school year and seniors 51.5%. Juniors worked 18.7 hours and seniors 23.5 hours on average, in the weeks they were employed. He concluded that when they work, teenagers work the hours associated with normal part-time employment.

Working appears to be an increasingly middle-class phenomenon. Mortimer, Finch, Owens, and Shanahan (1990) found that more advantaged youth began working at an earlier age. Similarly, Carr, Wright, and Brody (1996) concluded that students who work while they are in high school are disproportionately junior and senior white males, from intact, relatively well-educated middle class families, enrolled in college preparatory tracks, and better-than-average students.

One reason for high levels of adolescent employment may be favorable attitudes towards youth work by both parents and adolescents. Mortimer and her colleagues report that parents of the students in the Youth Development Study, who grew up in the 1950s and 1960s, evaluated their own adolescent work experience highly. Although holding different types of jobs, these parents and their children held remarkably similar views about the valuable lessons learned: how their work promoted their own independence, interpersonal skills, career development, and other beneficial outcomes (Mortimer, Harley, & Aronson, 1997).

Yet critics of youth employment, beginning with the oft-quoted Greenberger and Steinberg study, When Teenagers Work (1986) to the more current National Research Council report, argue that work ought to be restricted in hours and in

duration. A consistent criticism is that youth work creates poor work attitudes and contributes to deviant behavior (National Academy Press, 1998). What these critics have failed to consider is that not all youth jobs are the same. Workplaces for adolescents likely vary in terms of job quality like the workplaces of their elders.

Adolescent Work and Job Quality

If we now understand that job characteristics affect a variety of outcomes amongst adult workers, it is reasonable to assume the same would hold true for younger workers as well. However, since youth employment is relatively understudied, the quality of their work is even less understood. Instead, most research has relied upon gross measures of hours or weeks worked. Given that jobs, even with the same job titles, may vary greatly from one location to the next, it is important to enlarge the question of whether work is good or bad for adolescent workers. Carr, Wright and Brody (1996) suggest that more details about the workplace need to be included in studies of youth development.

There is some evidence that youth are limited in their employment opportunities to those occupations usually associated with poor job quality when worked by adults. According to a recent study by Steinberg and Cauffman (1995), restaurant work and retail work accounted for nearly 60% of jobs held by youth. These jobs, they suggest, are menial and have little developmental benefit. However, Ruscoe, Morgan, and Peebles (1996) reported that only 43% of their survey sample worked in these jobs. This suggests regional differences in employment opportunities, or more likely, differences in sampling techniques.

Some benefits of early employment in terms of attitudinal and behavioral outcomes have been empirically documented. As the subject of youth employment emerged as an issue in the

early 1980s, researchers found that youth employment was linked to punctuality, personal responsibility, and dependability (Greenberger, 1984; Steinberg, Greenberger, Garduque, Ruggiero, & Vaux, 1982). Snedeker (1982) suggests that even marginal jobs require self-discipline, mobilization of effort, and application to a task.

Job quality in the adolescent workplace has several dimensions. Jobs of higher quality use the young person's skills, provide training and a chance to learn new things, provide task variety, an opportunity to work with people, and the opportunity to help others. High quality jobs pay higher wages, and supervisors provide feedback and encourage good work habits. Some argue that the most obvious indicator of job quality is wages (Pergamit, 1995). He notes that it is an established fact that higher paid jobs are associated with higher levels of education and training.

Learning, as a function of job quality, has been identified in several studies. Stern and Nakata (1991) found that skill utilization in adolescent work predicts success in the job market for the first three years following graduation. Mortimer and Shanahan (1994) found that job quality, as measured by skill learning, enhances older boys' relationships with their fathers. Learning skills on the job which will be useful in adulthood connotes progress in vocational development, that may be viewed quite favorably by boys and their fathers.

Among adults, prior occupational values have been found to influence the selection of work, including the extent of autonomy, income, and social content (Lindsay & Knox, 1984; Mortimer & Lorence, 1979;). However, there is reason to expect divergence in such person-job dynamics on this younger group, for whom occupational values may have less salience and motivational force. Moreover, because adolescents have limited work opportunities concentrated in the retail, service sectors, and in informal work, they may not be able to select jobs that are congruent with their values (Mortimer, Finch,

Shanahan, & Ryu, 1992).

Hamilton and Hamilton (1990) argue that the value of adolescent working may be in the attitudes and work behaviors acquired rather than knowledge and skills. Stern, Finkelstein, Urquiola, and Cagampang (1997) analyzed the relationship between job characteristics and work attitudes. In a regression analysis that included student's background characteristics (parent's education and occupation classification, grade level, gender, race, and site location), they found that three job characteristics significantly predicted work motivation and two significantly predicted work cynicism. The opportunity to learn new things and a job that is physically challenging were positively associated with work motivation, while a job perceived as conflicting with school was negatively associated. School-job conflict was positively associated with work cynicism as was the lack of opportunity to use existing skills.

Given that work values are important determinants of vocational choice and actual occupational destinations, it is important to understand their origins. It is reasonable to suppose that work experience would have a significant formative influence on adolescents' thinking about the potential rewards to be obtained from work (Mortimer, Finch, Ryu, Shanahan, & Call, 1996). Using data from the St. Paul Youth Development Study, they found that the opportunity to use and develop skills on the job enhances both intrinsic and extrinsic occupational reward values. In contrast, the intensity, or hours of work, mattered little for occupational value development during the high school years.

Mortimer and Lorence's (1979) research on a panel of male college graduates found that high levels of economic reward enhanced the valuation of extrinsic rewards. In their study, and in Lindsay and Knox's (1984) replication with a national sample of high school seniors, high monetary remuneration fostered declines in intrinsic values, while autonomous and challenging work strengthened intrinsic values over time.

Stressors in the workplace could also foster an extrinsic orientation toward work (House, 1980; Kahn, 1981; Kohn & Schooler, 1983). That is, if a young person's work experience is punishing, work may come to be seen not as providing intrinsic gratifications in itself, but only as a source of income and instrumental benefits. Schulenberg and Bachman (1993) found that students suffer when they work in poor quality jobs for long periods of time -- in jobs that do not make use of their talents, are unconnected to anticipated future jobs, and are only being done for the money.

Brooks, Greenfield, and Joseph (1995) found that the qualities of work experience had a direct influence on the career development of students. Students who perceived more variety in their work tasks obtained more occupational information. Higher perceived levels of feedback were associated with a greater degree of self-concept crystallization. Perceptions of more feedback and opportunities to deal with people were related to an increase in vocational self-efficacy. However, Mortimer, Dennehy, and Lee (1991) found that self-direction at work has no significant relation to adolescent occupational values.

What other qualities of youth jobs might make a difference? In anticipating their adult possible selves, adolescents may respond to occupational experiences that forecast successful role adaptation, such as acquisition of general proficiencies or skills (Markus, Cross, & Wurf, 1990). Being able to help others may also foster a satisfying sense of movement toward adult status, increasing the adolescent's sense of usefulness and competence.

Marsh (1991) examined job quality using data from the national survey, High School and Beyond. There were six job quality indicators -- four of which were negative job attitudes (job is a place to goof off, job is just for money, enjoy job more than school, job is more important than school). The amount of job training and the job's encouragement of good work habits were the other two items. Of 132 correlations examined, only

26 were significant ($p \leq .05$) or about 20% of the contrasts. These data do not present a consistent pattern of relationships. Jobs that encouraged good work habits were positively associated with desirable outcomes. Not surprisingly, negative attitudes were negatively associated with desirable outcomes. The amount of job training was negatively associated with the amount of academic credit received and college attendance. Although interesting, the nature of the items used and the lack of a consistent pattern in the findings does not provide much evidence to help clarify the role of job quality.

These existing studies suggest that the quality of jobs held by students is likely to have important consequences. It is possible that the quality of work is even more consequential for adolescents than for adults, since attitudes and abilities may be more malleable when people are younger.

In summary, the literature shows that a number of dimensions of job quality can affect the development of attitudes. These are: (1) job autonomy, (2) reading on the job, (3) writing on the job, (4) use of math on the job, (5) job training, (6) task variety, (7) job stress, (8) school-job conflict, (9) school-job congruence, (10) job challenge, (11) opportunity to learn new skills, (12) opportunity to use and develop existing skills, (13) learning "soft" skills (how to work with others, take orders, punctuality, persistence etc.), (14) working with people, (15) physical challenge on the job, and (16) guidance and feedback from job supervisor.

Adolescent Work and School Supervision

Numerous governmental panels promoted adolescent work during the 1980s and 1990s. These panels concluded that schools were not adequately preparing adolescents for adulthood and that work could supplement the schools in this role (Mihalic & Elliott, 1997). The relationship between school and youth work has been defined by the term "school-to-work transition" and is part of numerous federal, state and non-

government reform efforts. One underlying assumption is that both school-based learning and work-based learning have roles to play in facilitating the transition of young people through school to work. Thus we find that an essential element of the school-to-work movement is the inclusion of work experience for all students (Stone, 1995; Stone & Mortimer, 1998). This movement is predicated on the assumption that schooling will provide a more effective preparation for work if work is part of the curriculum.

Schools that purposively connect youth to employed adults through job-shadowing, internships, or other career-related projects demonstrate positive results (Steinberg, 1997). In such schools, surveys conducted by Jobs for the Future reported that 90% of students planned to enroll in postsecondary education and that, in a limited subset of these schools, 77% actually go on to enroll. The cause of such behavior may lie in the academic focus embedded in the school to work initiatives in the schools. Crain, and his colleagues found that career-magnet high school graduates were more likely to have declared a college major when they went to college, earned more college credits, and were employed more months after graduation (Crain, et al., 1998).

Schools connect young people directly to the workplace through internships, cooperative vocational education programs, general work experience programs, and school-based enterprises. Of these, the most common are internships and cooperative education programs (Stern et al., 1995). However, most students' after school jobs are not related to what they are studying in school (Stone et al., 1990). There is evidence that such unrelated work experience sometimes actually interferes with students' educational attainment. In short, students are getting more work experience, but less of it is explicitly designed to promote learning.

Stone, Stern, Hopkins and McMillion (1990) compared coop students, whose work was supervised by schools, and a

comparison group of students who worked in similar jobs unconnected to school. The students in school-supervised work experiences more frequently reported that they used basic academic skills, had jobs that were challenging, and described their workplaces as more supportive than did students who worked but in jobs unrelated to their school work. He found that these students also differed on work motivations. Coop students were 33% more likely than non-coop students to report that they were working to learn. Non-coop students were more likely than coop students to report that they were working to earn money and because their friends worked for the same employer. In these analyses, Stone did not control earlier attitudes; thus we do not know if students differed in work attitudes before they began working.

School Supervised Work and Educational Outcomes

Augenblic, Van de Water and Associates (1987) found that students in jobs related to their academic majors or career area of interest had higher grades than those whose jobs were unrelated to their majors or career interest. Like other studies before, Stern et al. (1997) found a negative and significant partial correlation between the number of hours worked and GPA for both coop and non-coop students. That is, for both groups longer hours worked during their senior year is associated with lower grades but the effect is less pronounced for coop students, although coop students had lower grades to begin with. However, in this cross-sectional design, the coefficient for the coop sample is only half as large as for the non-coop comparison group.

There are also differences between coop and non-coop when the number of hours worked is divided into quartiles. Coop students show a small increase in grade point average up to 20 hours per week after which it declines in a way similar to the non-coop. Although their findings show coop students work longer and have lower average grades at every level of analysis, the difference in grade point average between coop

and non-coop students is smallest among those who work the most.

Light (1995) found a strong association between working more than 21 hours a week and committing more than 30% of classroom time to vocational subject credits. Although students were not asked if they were enrolled in coop programs, students earning this many vocational credits likely included credit for related work experience. Light also found this group of intensive student workers scored lower on the Air Force Qualifying Test (AFQT). The intensive student workers' AFQT scores mirror those of students who did not work at all.

Stern et al. (1997) speculate as to the causes of such findings noting that unmeasured, pre-existing differences may exist between students. Some students may simply be more interested in working and enroll in coop. This is clearly supported by Light's (1995) finding noted earlier. Others may be more interested in school, and work without enrolling in a coop program. A second explanation they offer is that the program itself may produce these results. The authors of this study created a unique strategy for addressing this alternative explanation. They examined the congruence between the students' and their work supervisors' descriptions of 32 elements in the work environments. These elements included measures of the use of academic skills, the skills the job develops, and other aspects of the work environment. Aside from the finding that employers were more positive about the work environment than were the students, the difference was much less between coop students and their supervisors than between non-school supervised work experience (NSWE) students and theirs, especially on dimensions of mental challenge, effort, and responsibility. They concluded that the greater congruence was a result of the better communication between student employee and supervisor caused by the structures of the coop program. They conclude that school intervention in the adolescent work experience does have a positive, meliorating effect on the negative relationship between

grade point average and working more than 20 hours a week.

Another explanation for this finding is that students may compensate for working by taking fewer or easier classes. Stone's (1995) analysis of student responses reported that 42 percent of coop students and 11 percent of non-coop ($p < .001$). However, we do not know if this behavior is correlated with hours worked.

School Supervised Work and Economic Outcomes

Bishop (1994) provides evidence that concentrated vocational training in high school, and finding employment related to their training, led to substantially higher earnings for students immediately after graduation. Bishop compared high-school students in their final three years taking four related vocational courses and eight full-year academic courses to students taking 12 academic courses.

Stern et al. (1997) found that black and Hispanic students were less likely to be employed, a finding consistent with earlier studies (see Steinberg & Cauffman, 1995). Among those students who did work, students in cooperative education programs were more likely from families where the parents were high school graduates but not four-year college graduates. As well, the coop students scored lower on a written essay than their non-coop counterparts. The authors acknowledge, however, that the predictive power of their logit regression for coop participation was not great.

Stern et al. (1997) reported that coop participation had a positive effect on early adult earnings. However, further analysis using simultaneous equations showed that former coop students were less likely to be enrolled in college. This, and the likelihood that non-coop students' wages were depressed by college attendance explain a simple explanation for their finding of higher wages. Students enrolled in higher education tend to earn lower wages while in school.

To the extent that coop participation curtails further education in favor of employment, the long-term impact on vocational development is an open question. Although some research shows early earnings linked to later earnings (Pergamit, 1995), if the acquisition of more education continues to yield significant earnings payoffs, then these students may be shortchanged in the long term as Mihalic and Elliott (1997) argue. However, the Stern et al. (1997) finding that coop students do not consider themselves part of the academic track in high school, may suggest that coop and non-coop students are different in a very important way, given that educational expectations are associated with educational attainment.

The Present Study

This study was designed to address two important questions regarding the impact of working on adolescents. First, what is the impact of school intervention on the job quality of employed youth? Second, what is the impact of job quality, school supervision of work and other job factors on occupational attitudes and behaviors?

Methodology

Data used in this analysis are from the National Center for Research in Vocational Education (NCRVE) sponsored, longitudinal study entitled, Learning Through School Supervised Work Experience Programs (LSWEP). In the following analyses, only data gathered from 1800 high school student questionnaires in the LSWEP study were used. A detailed description of the LSWEP is provided by Cagampang (1995). What follows is a brief summary of their methodology.

LSWEP data were gathered from students, their teachers, and employers from several programs located around the country. The baseline sample at each school included students who were involved in school-based work experience programs, stu-

dents in non-supervised jobs, and non-working students. Follow-up data were collected approximately one year later. The choice of sites was based on prior knowledge of programs with reputations for being successful, suggestions from an advisory committee and other individuals, a canvass of state departments of education, vice-presidents of the Association for Career and Technical Education, and logistical considerations.

One acknowledged limitation of this data set is that the sample schools were not a probability sample of American high schools. The designers of the LSWEP study compared their sample to other national samples and concluded that the LSWEP sample closely resembled students in other national surveys. No major differences were found between this sample and the national probability sample in the 1982 Monitoring the Future (MTF) study (Bachman, Johnston, & O'Malley, 1984).

The LSWEP was designed to be a longitudinal study. Individual students were tracked over time, and data were gathered and classified by student. However, this analysis is limited to two cross-sectional analyses of the *same **group** of students*, rather than a longitudinal study of the *same students*. This happened for three reasons.

First, large numbers of students failed to answer many of the same questions either in the Baseline or the Follow-Up. Second, many students who were participants in SSWE in the Baseline shifted to NSWE in the Follow-Up and vice-versa. Third, students were asked to describe the job quality in their *current* jobs, first in the Baseline and then in the Follow-Up. However, there were no controls or measures for the jobs they were performing in the interim, or for periods of unemployment. Furthermore, students may have been in different jobs in the Baseline and Follow-Up, or performing different tasks in the same job. It is likely that the job attitudes of many students were influenced by the *unmeasured* characteristics of jobs they held in the interim.

For these three reasons, it was not possible to measure the

impact of a job held continually by a large subset of the sample for the duration of the study. It is clear that what could be measured, and what was actually measured was: (1) the job quality of the *current job* of a group of students in the Baseline, and (2) the job attitudes of this group of students at this point in time; (3) the job quality of the *current* job of this same group of students in the Follow-Up, and (4) the job attitudes of this same group of students at the point of the Follow-Up.

The Sample

The sample extracted for use in these analyses was 51.8% male and 68% white. Eighty-two percent were juniors or seniors and 37% were enrolled in a school-supervised work experience program. The useful sample size for analysis varied depending on the particular set of variables used (see Tables 1 - 13). They worked an average of 21.5 hours per week.

Variables Used in the Analysis

Three dimensions of work attitudes are included in this study: Positive Attitudes to Work, Work Motivations, and Negative Attitudes to Work. Respondents were asked a number of questions about their attitudes towards work. Using Factor Analysis, these questions were then reduced to seven measurable constructs of work attitudes: Positive Job Attitudes, Work Ethic, Job Satisfaction, Social Motivations for Work, Economic Motivations for Work, Work Cynicism, and Promotion Cynicism.

Many questions were asked of respondents about their negative behaviors on the job. This was reduced to one measurable score of Negative Job Behaviors. One additional variable was included the analysis that indicated if the job was part of a school-supervised work experience program (SSWE/NSWE). What follows is a brief description of each dependent variable.

Positive Attitudes to Work

Positive job attitude. This composite variable was con-

structed by taking the mean of ten variables. A sample statement was: A worker should feel some responsibility to do a decent job whether or not his/her supervisor is around.

Work ethic. This composite variable was constructed by taking the mean score of three variables. A sample question was: How important is it in your life to be successful in your line of work?

Job satisfaction. This was the score on a single question. The actual question was: How satisfied are you with your job *as a whole*?

Work Motivation

Social motivations for work. This composite variable was constructed to reflect the role of peer pressure and social desirability in the lives of adolescents as they select whether to work or not, or choose from employment options. This composite variable was constructed by taking the mean of three variables. A sample statement was: My friends would not think much of me if I did not have a good job.

Economic motivations for work. This composite variable was constructed by taking the mean score of three variables. A sample statement was: A person should choose a job which pays the most.

Negative Work Attitudes and Behaviors

Work cynicism. This composite variable was constructed by taking the mean of ten variables. A sample statement was: People who take their work home with them probably don't have a very interesting home life.

Promotion cynicism. This composite variable was constructed to reflect a lack of interest in advancement on the job by taking the mean of three variables. A sample statement was: A promotion to a higher-level job usually means more worries

and should be avoided for that reason.

Negative job behaviors. Respondents were asked nine separate questions about their negative behavior in the context of their jobs. A composite variable was created by taking the mean score. A sample question was: Since you have had a job, how often have you called in sick with a phony excuse?

Analysis

Eighteen items measuring job quality were identified in this study (See Table 1) and were included in the baseline and follow-up questionnaires. All variables in this study were meas-

Table 1
Analysis of Variance for Relationship between Job Quality and School Supervision of Work in the Baseline

Job Quality Variables in the Baseline	*N* in Analysis	*F* value	*Mean* (*SD*) SSWE	*Mean* (*SD*) NSWE	Range of Scores	Cohen's *d*
Job autonomy	1000	8.182**	2.66 (0.59)	2.80 (0.81)	1-5	-.197
Job challenge	992	39.098**	2.78 (0.84)	2.41 (0.92)	1-4	.420
Physical challenge on job	1008	0.239	4.76 (1.58)	4.81 (1.68)	0-7	
Job training in hours	658	16.208**	15.38 (16.19)	10.75 (12.94)	1-70	.316
Task variety	1000	3.946*	7.03 (1.82)	6.79 (1.86)	1-12	.130
Job uses existing skills	92	53.060**	2.93 (0.74)	2.54 (0.85)	1-4	.489
Job teaches new skills	995	145.158**	3.05 (0.81)	2.38 (0.87)	1-4	.797
Job teaches SCANS skills	1002	35.863**	3.23 (0.52)	3.0 (0.59)	1-4	.396
Use of school learning on job	991	168.490**	2.60 (0.94)	1.85 (0.83)	1-6	.845

Table 1 (continued)
Analysis of Variance for Relationship between Job Quality and School Supervision of Work in the Baseline

Job Quality Variables in the Baseline	*N* in Analysis	*F* value	*Mean* (*SD*) SSWE	*Mean* (*SD*) NSWE	Range of scores	Cohen's *d*
School-job ignorance	983	175.107**	2.68 (0.57)	2.15 (0.61)	1-4	.898
Relationship with supervisor	855	3.528	3.71 (0.83)	3.60 (0.84)	1-5	
Uses math on the job	616	1.572	2.80 (1.10)	2.69 (0.97)	1-6	
Uses reading on the job	454	22.833**	2.77 (1.28)	2.26 (1.01)	1-6	.442
Uses writing on the job	574	17.657**	2.63 (1.00)	2.31 (0.83)	1-6	.348
Dealing with people	998	8.800**	4.02 (1.23)	4.26 (1.21)	1-5	-.196
Interaction with older people	992	79.491**	4.40 (0.70)	3.84 (1.06)	1-6	.623
Job stress	1005	9.545**	2.58 (0.64)	2.44 (0.69)	1-5	.210
School-job conflict	989	0.760	7.08 (3.14)	7.27 (3.27	1-19	

*p<.05 (two tailed), **p<.01 (two tailed).

ured in the same way in the Baseline and Follow-Up to permit direct comparison over time. All variables were recoded for consistency in scale direction. For example, for a positive dimension of job quality such as job autonomy, higher scores reflect greater levels of autonomy. Similarly for negative dimensions of job quality such as job stress, higher scores reflect greater stress. Only those job quality dimensions that entered the regression equations are shown in Tables 3-13 (Beta

weights).

Table 2
Analysis of Variance for Relationship between Job Quality and SSWE/NSWE in the Follow-Up Survey

Job Quality Variables in the Follow-Up	*N*	*F* value	*Mean* (*SD*) NSWE	*Mean* (*SD*) NSWE	Range of Scores	Cohen's *d*
Job autonomy -FU	777	5.396*	2.71 (0.59)	2.83 (0.77)	1-5	-.174
Job challenge -FU	759	30.208**	2.72 (0.87)	2.35 (0.88)	1-4	.423
Physical challenge on job -FU	780	0.36	.82 (1.48)	4.89 (1.65)	0-7	
Job training in hours-FU	485	8.650**	16.59 (17.51)	11.99 (16.02)	1-70	.306
Task variety -FU	777	11.083**	7.24 (1.98)	6.77 (1.85)	1-12	245
Job uses existing skills-FU	770	85.339**	3.01 (0.74)	2.44 (0.86)	1-4	.711
Job teaches new skills-FU	770	113.397**	2.94 (0.80)	2.29 (0.81)	1-4	.807
Job teaches SCANS skills -FU	776	34.741**	.21 (0.52)	2.95 (0.60	1-4	.463
Use of school learning on job -FU	768	140.986**	2.62 (0.93)	1.85 (0.83)	1-6	.874
School-job congruence-FU	765	161.777*	2.73 (0.53)	2.16 (0.62)	1-4	.988
Relationship with supervisor-FU	690	1.312	3.73 (0.79)	3.66 (0.74)	1-5	

Table 2 (continued)
Analysis of Variance for Relationship between Job Quality and SSWE/NSWE in the Follow-Up Survey

Job Quality Variables in the Follow-Up	*N*	*F*	*Mean* (*SD*) NSWE	*Mean* (*SD*) NSWE	Range of Scores	Cohen's *d*
Math on the job -FU	518	5.254*	2.91 (1.17)	2.69 (0.99)	1-6	.203
Reading on the job-FU	421	5.552*	2.67 (1.26)	2.40 (1.09)	1-6	.229
Writing on the job-FU	472	16.199**	2.76 (1.12)	2.41 (0.77)	2.41	.365
Dealing with people-FU	771	6.111*	4.01 (1.29)	4.25 (1.25)	1-5	- .188
Interaction with older people-FU	772	44.833**	4.37 (0.74)	3.91 (1.00)	1-6	.978
Job Stress -FU	776	26.74**	2.60 (0.63)	2.35 (0.66)	1-5	.387
School-Job conflict-FU	765	0.000	7.38 (3.84)	7.38 (3.71)	1-19	

*p<.05 (two tailed), **p<.01 (two tailed)

School Supervision of Adolescent Work

We begin our analysis by asking if the quality of jobs held by students whose work is supervised by the school is different from those who work, but whose work is not connected to school in any structured way. Two parallel sets of ANOVA analyses were conducted; one for the baseline and one for the follow-up surveys. Mean scores on all measures of job quality were compared between the two groups. The findings are presented in Tables 1 and 2.

In both the baseline and follow-up survey, school-supervised adolescent workers (SSWE) report higher quality on

most job dimensions included in this study. The exceptions in the baseline are Job Autonomy and Dealing with People, where SSWE respondents report significantly lower levels of job quality than non-school supervised (NSWE) respondents. Furthermore, SSWE respondents also report higher levels of Job Stress. In the follow-up survey, the pattern continues for Job Autonomy and Dealing with People as exceptions.

With samples of this size, it is useful to distinguish between statistical significance and practical significance. Cohen (1988) described one technique for ascertaining this as effect size. Effect size is an index of the magnitude of a treatment effect when comparing two groups. Cohen's *d* is the statistic used to describe effect size and coefficients of .2 are defined as small effects, .5 as medium effects and .8 as large effects. Most of the school supervised work experience effects are in the small to medium range, but there are large effects in students' perceptions that their job teaches them new skills, that they use school learning on the job and there is congruence between their jobs and school. These effects increase in the follow-up with the use of existing skills and interaction with older people showing greater effect. The latter is particularly intriguing as it may signal the movement of SSWE participants into more mature workplaces and out of workplaces dominated by adolescents.

In this sample, the SSWE students worked significantly more hours per week and earned significantly more income as a result. SSWE students averaged 24.6 hours per week in the baseline and 23.5 hours per week in the follow-up. By contrast, the NSWE students averaged 19.7 hours and 20.6 hours respectively.

We conducted a series of ANOVAs comparing SSWE and NSWE students on measures of occupational attitudes and behaviors. We found weak or inconsistent relationships with no patterns emerging from the data (tables omitted). Thus, the perceived job quality differences between SSWE and NSWE students shown in Tables 1 and 2 do not appear to carry over into

attitudes or behaviors on the job.

Positive Job Attitudes

We now turn our attention to examining the impact of job quality on students' attitudes and behaviors. We conducted a series of regression analyses to examine the multivariate relationship among the eighteen job quality factors, school supervision of work experience, personal characteristics and two instrumental job components: pay and hours worked. All predictor variables were entered simultaneously. Only variables statistically significant in the baseline or follow-up surveys are included in these tables. All regression models were significant ($p \leq .05$). Standardized regression coefficients are reported in the tables.

As shown in Table 3, where SCANS skills are taught and where the relationship with the supervisor is positive, adolescents express more positive job attitudes both in the baseline and the follow-up. Unique to the baseline model, students who report greater use of existing skills on the job and those who received more hours of job training express more positive job attitudes. In the follow-up only, it is seen that writing on the job has a positive impact on positive job attitudes. School-job conflict and job challenge have a negative impact on positive

Table 3
Job and Individual Characteristics and Positive Job Attitudes: Baseline and the Follow-Up

	Base Line	Follow-Up
SSWE/NSWE	NS	NS
Job Quality		
Job teaches SCANS skills	.215**	.156**
Use of existing skills	.138**	
Job training in hours	.090**	
Relationship with supervisor	.082*	.096*
School-Job conflict	- .115*	
Job challenge	- .092*	
Writing on the job		.127**

Table 3 (continued)
Job and Individual Characteristics and Positive Job Attitudes: Baseline and the Follow-Up

	Base Line	Follow-Up
Job Factors		
Weekly job hours	NS	NS
Weekly job income	NS	NS
Individual Characteristics		
Gender	.085**	.132
Positive self concept	.148**	.250**
Locus of control	-.164	-.094
N	598	439
Adjusted R^2	.224	.172

Note: NS=Not significant. *p<.05 (two tailed), **p<.01 (two tailed)

job attitudes in the baseline only.

This suggests that adolescents' perceptions of skill acquisition and development through their jobs foster a more positive view of work, as does a good relationship with the supervisor. Consistent with these findings, where adolescents perceive that the demands of their jobs are competing with the demands placed upon them by school, they tend to be less positive about working.

While the finding of negative impact of school-job conflict might be expected, that related to challenging jobs is not. Furthermore, that more job training and use of skills fail to influence positive job attitudes in older working adolescents is also puzzling.

Work Ethic

Respondents who perceive that their job teaches them SCANS skills report higher levels of Work Ethic both in the Baseline and the Follow-Up (Table 4). This is the only significant job quality variable to enter the equations. This is consistent with the earlier finding that perceptions of skills acquisition foster positive attitudes toward work. However, again it is puzzling that other important dimensions of job quality such as skill utilization, training, and school-job conflict fail to influence this attitudinal measure.

Table 4
Job and Individual Characteristics and Work Ethic: Baseline and Follow-Up

	Base Line	Follow-Up
SSWE/NSWE	NS	NS
Job Quality		
Job teaches SCANS skills	.204*	.231*
Job Factors		
Weekly job hours	.227**	
Weekly job income	- .185**	
Individual Characteristics		
Race	.163*	
Father's education	- .089**	- .095
Positive self concept	.190*	.254*
Locus of control	- .094**	-.075**
N	726	664
Adjusted R^2	.155	.152

Note: NS=Not significant. *p<.05 (two tailed), **p<.01 (two tailed)

Job Satisfaction

Skill acquisition and utilization appears to play a major role in job satisfaction (Table 5). Students who perceive that their job teaches them new skills, or teaches them SCANS skills, ex-

perience greater levels of job satisfaction in both the baseline and the follow-up surveys. Respondents with stronger relationships with their job supervisor also report higher levels of job satisfaction over time, as do those who find their jobs to be challenging.

Table 5
Job and Individual Characteristics and Job Satisfaction: Baseline and the Follow-Up

	Base Line	Follow-Up
Job SSWE or NSWE	.064*	NS
Job Quality		
Job teaches new skills	.247**	.217**
Relationship with supervisor	.192**	.189**
Job teaches SCANS skills	.170**	.139**
Job challenge	.144**	.264**
Use of existing skills	.128**	NS
Job stress	-.224**	-.203**
School-Job conflict	-.104**	NS
Writing on the job	NS	.096**
Job Factors		
Weekly income	.096**	NS
Individual Characteristics		
Gender	NS	-.105**
Race	-.062*	-.088
Mother's education	NS	.118
N	698	407
Adjusted R^2	.453	.359

Note: NS=Not significant. *$p<.05$ (two tailed), **$p<.01$ (two tailed)

Use of existing skills is a predictor of increased job satisfaction in the baseline only. Similarly, using higher levels of writing on the job is a predictor in the follow-up only.

As respondents experience higher levels of conflicts between the demands of school and work, they report lower levels of job satisfaction in the baseline survey. Consistent with this, as respondents experience higher levels of job stress,

they are less satisfied with their jobs in both the baseline and the follow-up surveys.

Work Cynicism

When adolescents feel a high level of conflict between the demands of school and work, they report higher levels of cynicism about the value of work over time (Table 6). Jobs that teach SCANS skills have a strong negative correlation with work cynicism over time. Respondents reporting higher levels

Table 6
Job and Individual Characteristics and Work Cynicism: Baseline and Follow-Up

SSWE/NSWE	Base Line NS	Follow-Up NS
Job Quality		
School-Job conflict	.241**	.292**
Job teaches SCANS skills	- .102**	- .104*
Use of school learning on job	NS	.135*
Relationship with supervisor	NS	- .085*
Math on the job	NS	- .076*
Job Factors		
Weekly job hours	- .058*	
Individual Characteristics		
Gender	- .150**	- .192**
Race	.167**	.185**
Locus of Control	.251**	.190**
Negative self concept	.153**	.167**
N	946	489
Adjusted R^2	.275	.390

Note: NS=Not significant. *p<.05 (two tailed), **p<.01 (two tailed)

of positive relationships with their supervisor report lower levels of Work Cynicism in the Follow-Up. Respondents reporting greater use of math on the job and use of school learning on the job, report lower levels of Work Cynicism in the Follow-Up.

It appears that when younger and older adolescents feel they are learning useful skills such as SCANS at the job, they

are less cynical about the value of work.

However, it is seen in the Follow-Up only, that Use of School Learning on Job increases Work Cynicism. Perhaps, this is perceived by older adolescents to be a conflict between the role of school and work.

Promotion Cynicism

In the Baseline, respondents reporting higher level of SCANS skills acquisition on the job report higher levels of Promotion Cynicism (Table 7). However, it is also seen that respondents reporting more hours of training report lower levels of Promotion Cynicism. Since training contributes to skill acquisition and development, the latter finding is puzzling.

Two different job quality variables enter the equation in the

Table 7
Job and Individual Characteristics and Promotion Cynicism: Baseline and the Follow-Up

	Base Line	Follow Up
SSWE/NSWE	NS	NS
Job Quality		
Job Teaches SCANS skills	.109**	NS
Job training in hours	- .082*	NS
Job uses existing skills	NS	.115*
School-Job conflict	NS	.123*
Job Factors		
Weekly job hours	NS	NS
Weekly job income	NS	NS
Individual Characteristics		
Gender	- .088*	- .107**
High school class year	- .112**	
Locus of control	.285**	.212**
Negative self concept	NS	.085*
N	645	728
Adjusted R^2	.108	.115

Note: NS=Not significant. *p<.05 (two tailed), **p<.01 (two tailed)

Follow-Up. Respondents who make greater use of their existing skills on the job are more cynical about promotion. Respondents reporting higher levels of School-Job conflict are also more cynical about promotion. Again, it appears that job quality measures that influence work attitudes vary between younger and older working adolescents.

Social Motivation to Work

Respondents who report acquisition of SCANS skills on the job and those who believe they are using their school based learning at work are more likely to report that their social standing is affected by their job status (Table 8). This is seen in both Baseline and Follow-Up. However, it is seen that respondents reporting higher levels of school-job conflict also report higher scores on social motivation to work over time.

Table 8
Job and Individual Characteristics and Social Motivations For Work: Baseline and the Follow-Up

	Base Line	Follow-Up
SSWE/NSWE	NS	NS
Job Quality		
Job teaches SCANS skills	.166**	.100*
Use of school learning on job	- .086*	.156**
School-Job conflict	.104**	.214**
Job stress	.074*	NS
Job challenge	- .082*	NS
Job training in hours	NS	- .139**
Job Factors		
Weekly job hours		
Weekly job income		
Individual Characteristics		
Gender		
Race		
High school class year		
Negative self concept		
N	973	458
Adjusted R^2	.124	.166

Note: NS=Not significant. *p<.05 (two tailed), **p<.01 (two tailed)

Respondents reporting higher levels of challenge and stress in their job report lower scores on this variable in the Baseline only. While respondents reporting higher numbers of hours in training for their jobs report lower scores on this variable in the Follow-Up only.

Economic Motivations for Work

Respondents experiencing higher levels of school-job conflict report higher scores on this outcome variable in both the Baseline and the Follow-Up (Table 9). It is seen that in the baseline only, adolescents experiencing higher levels of positive relationships with their supervisor are likely to feel more strongly that work is all about making money. Respondents

Table 9
Job and Individual Characteristics and Economic Motivations for Work: Baseline and the Follow-Up

	Base Line	Follow-Up
SSWE/NSWE	NS	NS
Job Quality		
School-Job conflict	.102**	.222**
Job teaches new skills	.091*	NS
Task variety	-.099**	NS
Relationship with supervisor	.077*	NS
Reading on the job	NS	-.093*
Use if school learning on job	NS	.138**
Job Factors		
Weekly job hours	NS	NS
Weekly job income	NS	NS
Individual Characteristics		
Gender	-.158**	-.164**
Race	.154**	.181**
High school class year	-.099**	NS
Locus of control	.098**	.123**
Positive self concept	.084*	NS
Negative self concept	.098**	NS
N	844	402
Adjusted R^2	.118	.189

Note: NS=Not significant. *p<.05 (two tailed), **p<.01 (two tailed)

who perceive that their job teaches them new skills also report higher scores on this outcome.

In the Baseline only, respondents who experience greater task variety report lower scores on this outcome. In the Follow-Up, different variables enter the equation. Respondents reporting higher levels of application of school learning on the job score higher on this outcome. On the other hand, respondents reporting higher levels of reading on the job are less likely to perceive that jobs are all about making money.

Negative Job Behaviors

Higher levels of school-job conflict are predictive of higher levels of negative behavior (Table 10). Greater use of school learning on the job also appears to increase the propensity to indulge in negative behaviors. Both these findings persist over time.

In the Baseline only, it is seen that dealing with people on the job and job stress are predictive of higher levels of negative behaviors. On the other hand, Job Uses Existing Skills, and Job Teaches SCANS Skills have a negative relationship with the outcome variable in the Baseline. This suggests that as respondents perceive higher levels of skills utilization and acquisition on the job, they are less likely to indulge in Negative Job Behaviors.

In the Follow-Up, different variables enter the equation. Respondents with higher levels of job autonomy report a higher propensity to indulge in negative behaviors. Respondents reporting higher levels of Math on the Job and those reporting higher levels of Writing on the Job, indulge in lower levels of Negative Job Behaviors. Respondents experiencing higher levels of Physical Challenge on the Job are also less likely to indulge in negative behaviors, as are those with closer relationships with their supervisors. These findings (beta weights) are summarized in Tables 11-13.

Table 10
Job and Individual Characteristics and Negative Job Behaviors: Baseline and the Follow-Up

	Base Line	Follow-Up
SSWE/NSWE	NS	NS
Job Quality		
Use of school learning on job	.166**	.132**
School-Job conflict	.129**	.233*
Dealing with people	.110**	NS
Job stress	.069*	NS
Job teaches SCANS skills	- .164**	NS
Job uses existing skills	- .090*	NS
Job autonomy	NS	.104*
Relationship with supervisor	NS	- .130**
Math on the job	NS	- .117**
Writing on the job	NS	- .155*
Physical challenges on job	NS	- .093*
Job Factors		
Weekly job hours	NS	.238*
Weekly job income	NS	- .267**
Individual Characteristics		
Gender	- .181**	- .237**
Race	.109**	.264**
High school class year	- .114**	.093*
Locus of control	.094**	NS
Negative self concept	NS	.159*
N	947	380
Adjusted R^2	.135	.353

Note: NS=Not significant. *p<.05 (two tailed), **p<.01 (two tailed)

Discussion

The results of this study support the contention that job quality matters in adolescent work. Job quality had the greatest positive impact on student expressions of a positive work attitude and job satisfaction. Job quality was also associated with adolescent negative job behaviors. These findings are consistent with Mortimer and Shanahan (1994).

Despite some criticism since their publication, SCANS

skills are an important part of the youth work environment. Work sites where students use technology, manage resources, employ a deep set of interpersonal skills, use information and learn about systems are consistently linked to positive work attitudes and behaviors.

The importance of the student-supervisor relationship in developing job attitudes was shown in this study. Job satisfaction for adolescents was higher in work sites where they found their work challenging, learned new skills, experienced less stress, and had a good relationship with their supervisor. All of these are factors affecting the job quality of youth work sites.

Importantly, we found that when students perceived a conflict between their work and school, negative work attitudes developed. In addition, we found an increase in work cynicism when the job did not teach SCANS skills. Negative job behaviors were more likely when students worked in jobs where they did not perceive that they used what they learned in school. For older adolescents, there was some impact of the number of hours worked on reporting higher levels of negative job behaviors.

Curiously, there was a consistent relationship between both social and economic motivations for working and a perception of school-job conflict. In a somewhat contradictory finding, these same motivations were positively linked to use of school learning.

Conclusions

That school supervision of adolescent work did not appear to directly influence any of the outcomes of interest in this study is puzzling. Students who worked in jobs directly connected to school through cooperative education and other means scored these jobs higher on most job quality dimensions than did their employed peers. But when school supervision was included in more complex analyses of attitudinal and behavioral outcomes, its independent effect disappeared.

It is clear, however, that job quality matters in adolescent employment. That the single most important job quality component is the opportunity to learn SCANS skills deserves special consideration. The relationship between job quality and outcomes of interest in this study is an important finding for those who work in the policy and practice arenas trying to connect young people to the workplace. These findings suggest specific strategies that should be supported if we are interested in enhancing the value of work experience in the lives of young people. As the debate over youth work continues, the policy focus should shift more to the nature of the workplace in which young people labor, rather than exclusively on how many hours young people work.

Table 11
Summary of Findings: Job Quality and Positive Work Attitude Outcome Variables

Variables	Positive JAs -BL	Positive JAs -FU	Work Ethic -BL	Work Ethic -FU	Job Satis-faction -BL	Job Satis-faction -FU	Summary of Impact "HITS"
Job SSWE or NSWE	NS	NS	NS	NS	0.064	NS	1
Job Quality							
Job Teaches SCANS Skills	0.215	0.156	0.204	0.231	0.170	0.139	6
Relationship with supervisor	0.082	0.096			0.192	0.189	4
Job Challenge	- 0.092	NS			0.144	0.264	3
School-Job Conflict	- 0.115	NS			- 0.104	NS	2
Job Stress					- 0.224	- 0.203	2
Job Uses Existing Skills	0.138	NS			0.128	NS	2
Job Teaches New Skills					.0247	0.217	2
Writing on the Job	NS	0.127			NS	0.096	2
Job Training in Hours	0.090	NS					1
Job Factors							
Weekly Hours Worked			0.227	NS			1
Weekly Job Income			-0.185	NS	0.096	NS	2

Table 11 (continued)
Summary of Findings: Job Quality and Positive Work Attitude Outcome Variables

Variables	Positive JAs -BL	Positive JAs -FU	Work Ethic -BL	Work Ethic -FU	Job Satisfaction -BL	Job Satisfaction -FU	Summary of Impact "HITS"
Individual Characteristics							
Gender	0.085	0.132			NS	- 0.105	3
Race			0.163	NS	- 0.062	- 0.088	3
Father's Education			- 0.089	- 0.095			2
Mother's Education					NS	0.118	1
Locus of Control	- 0.164	- 0.094	- 0.094	- 0.075			4
Positive Self-Concept	0.148	0.250	0.190	0.253			4

Table 12
Summary of Findings: Job Quality and Negative Work Outcome Variables

	Work Cynicism-BL	Work Cynicism-FU	Promotion Cynicism-BL	Promotion Cynicism-FU	Negative Job Behaviors-BL	Negative Job Behaviors-FU	Summary of Impact "HITS"
Job SSWE or NSWE	NS	NS	NS	NS	NS	NS	0
Job Quality School-Job Conflict	0.241	0.292	NS	0.123	0.129	0.233	5
Job Teaches SCANS Skills	-0.102	-0.104	0.109	NS	-0.164	NS	4
Job Uses School Learning	NS	0.135			0.166	0.132	3
Relationship with Supervisor	NS	-0.085			NS	-.013	2
Job Uses Existing Skills			NS	0.115	-0.09	NS	2
Math on the Job	NS	-0.076			NS	-0.117	2
Writing on the Job					NS	-0.115	1
Job Training in Hours			-0.082	NS			1
Job Stress					0.069	NS	1
Physical Challenge on Job					NS	-0.093	1

Table 12 (continued)
Summary of Findings: Job Quality and Negative Work Outcome Variables

Variables	Work Cynicism -BL	Work Cynicism -FU	Promotion Cynicism -BL	Promotion Cynicism -FU	Negative Job Behaviors-BL	Negative Job Behaviors-FU	Summary of Impact "HITS"
Dealing with People					0.11	NS	1
Job Autonomy					NS	0.104	1
Job Factors							
Weekly Hours Worked	- 0.058	NS				0.238	2
Weekly Job Income						- 0.267	1
Individual Characteristics							
Gender	- 0.15	- 0.192	- 0.088	- 0.107	- 0.181	- 0.237	6
Race	0.167	0.185			0.109	0.264	4
High School Class Year			- 0.112	NS	- 0.114	0.093	3
Locus of Control	0.251	0.19	0.285	0.212	0.094	NS	5
Negative Self Concept	0.153	0.167	NS	0.085	NS	0.159	4

Table 13
Summary of Findings: Job Quality and Work Motivation Outcomes

Variables	Social Motivations -BL	Social Motivations -FU	Economic Motivations -BL	Economic Motivations -FU	Summary of Impact "HITS"
Job SSWE or NSWE	NS	NS	NS	NS	0
Job Quality					
School-Job Conflict	0.104	0.214	0.102	0.222	4
Job Uses School Learning	0.086	0.156	NS	0.138	3
Job Teaches SCANS Skills	0.166	0.100			2
Job Challenge	- 0.082	NS			1
Relationship with Supervisor	NS	NS	0.077	NS	1
Job Stress	0.074	NS			1
Job Variety			- 0.099	NS	1
Job Teaches New Skills			0.091	NS	1
Job Training in Hours	NS	- 0.139			1
Reading on the Job			NS	- 0.093	1
Job Factors					
Weekly Hours Worked	NS	NS	NS	NS	0
Weekly Job Income	NS	NS	NS	NS	0
Individual Characteristics					
Gender	- 0.196	- 0.155	- 0.158	- 0.164	4
Race	0.091	0.108	0.154	0.181	4
High School Class Year	- 0.129	NS	- 0.099	NS	2

Table 13 (continued)

Summary of Findings: Job Quality and Work Motivation Outcomes

Variables	Social Motivations -BL	Social Motivations -FU	Economic Motivations BL	Economic Motivations -FU	Summary of Impact "HITS"
Locus of Control			0.098	0.123	2
Negative Self-Concept	0.089	0.15	0.098	NS	3
Positive-Self-Concept			0.084	NS	1

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Vocational Education and the Dilemma of Education

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Abstract

The thesis of this paper is that secondary vocational education at the beginning of the 20th century and the community college in the middle of the century were our society's attempts to deal with education's basic dilemma: its conflicting functions of assisting each student to realize his or her maximum potential while selecting and socializing all students for their future occupational roles. In a modern industrialized society, adolescents are not developmentally ready to make informed career decisions. Secondary vocational education should return to the principles of manual training and use occupational contexts to improve academic skills and teach SCANS competencies.

The week I began to put down these thoughts two journals crossed my desk with discussions of issues that go to the heart of the continuing debate about secondary vocational education. I shall use the old terminology, because it is the "old" vocational education, namely occupationally specific preparation for jobs requiring specialized skills and knowledge, that the continuing debate over role and purpose is about. One journal contained an article, "Emerging Adulthood: A Theory of Development from the Late Teens through the Twenties" (Arnett, 2000). The other journal had reviews of two books on tracking and its effect on students (Welner & Mickelson, 2000). The implications of both would cause anyone seriously concerned about education to wonder why vocational education continues as a viable curriculum alternative at the secondary level.

In this article I present my assessment of the broad societal function that vocational education plays that has resulted in its continuation. I shall return to the two journals, but first I would like to be as explicit as possible about the perspective I bring to this discussion. Let me set forth five axioms that I believe to be true about our society:

1. The most basic of our values is that every child should have the opportunity to become all that he or she is capable of becoming. This value is held despite the huge differences in opportunities that children face because of the circumstances of their birth.
2. Every society must select and prepare young people for the occupations that are essential to the economy of that society.
3. There are fewer desirable occupations (as defined by socioeconomic status and earnings) than there are young people who would like to enter those occupations.
4. It is essential to the stability of a society that those who do not obtain the more desirable occupations feel that they had a reasonable chance to prepare for and enter them. Individuals must internalize a sense that the reasons they did not obtain preferred occupations lie in their own lack of ability or commitment and not because of an unfair opportunity structure.
5. Students differ in their performance in academic classes, and it is these differences that are used to select young people for the more desirable occupations. Young people who do well are encouraged to continue their education and prepare for college, the primary entry point for access to the more desirable occupations.

If the reader does not accept these axioms, there is no point in proceeding further. All of the following builds upon them. I state them as self-evident truths, but if the reader wishes to review a good summary of what evidence there is that underlies

them, see Inoue (1999).

The basic thesis of this paper is that secondary vocational education at the beginning of the 20th century and the community college in the middle of the century were our society's attempts to deal with the dilemma raised by the conflict between the first and the remaining four axioms.

Everyone agrees that the purpose of education is to facilitate the development of the individual. While attempting to encourage individual potential, however, education plays a critical role in selecting and socializing young people for the future positions they will assume in the workforce. Students who perform well in traditional school activities--reading, writing, and computing--are encouraged to continue their education beyond high school. Those who do so obtain degrees that provide access to jobs unavailable to those without degrees.

Because of the critical role education plays in providing access to desirable jobs, there is concern that if an occupational choice is made at too early an age, future options will be foreclosed. In response to these concerns, advocates of occupational education at the secondary level have always stressed its potential to help achieve general educational goals by providing learning experiences that have more relevance and utility than the typical academic subject.

Woodward (1883) was one of the primary spokespersons for a more relevant curriculum. To test his approaches, he founded the Manual Training School at Washington University in 1880 where traditional language, mathematics, science, and history were combined with shop instruction in wood and metal work. He was convinced by the response of his students that his approach was correct. He continually stressed, however, that his intent was not to prepare students for work, but to achieve general educational goals.

The Commission on National Aid to Vocational Education (1914) desired stronger ties to the labor market than manual

training provided. Nevertheless, the Commission stressed the broadening effect of vocational education:

> Vocational education will indirectly but positively affect the aims and methods of general education: (1) By developing ing a better teaching process through which the children who do not respond to book instruction alone may be reached and educated through learning by doing; (2) by introducing into our educational system the aim of utility, to take its place in dignity by the side of culture and to connect education with life by making it purposeful and useful. (p. 177)

The report of this Commission laid the foundation for the Smith-Hughes Act of 1917 that established the structure for vocational education that persists to this day. Vocational education is part of public education, conducted primarily in schools under the direction of governing bodies responsible for all of education. This in the judgment of some has resulted in vocational education always being the "second-choice" education for those who cannot meet the requirements of the college preparatory curriculum. But it has allowed educators to blur the dilemma caused by the dual functions that they perform: maximizing individual potential while selecting for future occupational roles.

The introduction of vocational education into public education was in large part a response to the increasing numbers of young people who were continuing from elementary to high school. In a similar manner, the growth of the community college in the years after World War II was a response to the increased demand for access to higher education. Society needed another institution to deal with the dilemma of education and the outcome was the community college.

Grubb (1989) has examined the participation patterns of graduates from the high school classes of 1972 and 1980 in postsecondary institutions. About 60 percent of the graduates from both cohorts began programs, but only about half contin-

ued to obtain degrees. Dropout rates from community colleges were higher than from four-year institutions, and most of the dropouts had relatively short-periods of attendance. The results that Grubb obtained describe occupational exploration much more than occupational preparation. Grubb used the term "milling around" to describe the course taking patterns of the dropouts.

Many of the students whose experiences Grubb described–representative sample of high school graduates--seemed to be trying to find some career direction for their lives, and postsecondary institutions are socially approved settings for such exploration. These students were told throughout their prior schooling that if they wanted to obtain good jobs they had to continue their education. Many were testing whether they could satisfy the requirements of postsecondary study. Community colleges admit students with poor academic records. Enrollment is for many of them one final trial to see if they can succeed in an educational setting. If they have difficulty, they are required to take remedial courses, counseled to set "realistic" goals, notified of inadequate performance, and finally, placed on probation. This process has been labeled the "cooling out" of marginal students who enroll with the intention to transfer to four-year colleges (Clark, 1960).

Krabel (1972) extended Clark's analysis explicitly to address the dilemma that is the focus of this paper:

> Community colleges, which are located at the very point in the structure of education and social stratification where cultural aspirations clash head on with the realities of the class system, developed cooling out as a means not only of allocating people to slots in the occupational structure, but also of legitimating the process by which people are sorted. One of the main features is that it caused people to blame themselves rather than the system for their 'failure.' This process was an organic rather than a conscious one; cooling out was not designed by anyone but rather grew out of the conflict between cultural as-

pirations and economic reality (p. 539).

A more recent examination of the cooling-out process (Hellmich, 1994) found it still in operation in a Florida community college, but unrelated to socioeconomic status, race, or gender of students.

In describing what I see as the broad societal functions of secondary vocational education and community colleges, I am not being pejorative. I believe both institutions perform functions that are vital to our society and economy. Education, inherently, sorts and socializes for future occupational roles and vocational education and the community college play key roles in this process. The key question, it seems to me, is not whether education should perform this function, but how can it be carried out as fairly and independent of circumstances of birth as possible. One could argue that most of federal education legislation, including vocational education legislation, since the 1960s has attempted to increase the equity of the sorting process.

If one accepts my thesis, what are the implications for the structure and conduct of secondary vocational education? To consider this question, I turn to two key questions raised by the journals I cited in my introduction.

> *Are adolescents (defined as from puberty to 18 years of age) developmentally ready to make informed decisions concerning their future careers?*

Arnett's (2000) answer would be an emphatic "No." Arnett proposes that in modern, postindustrial countries there is a new stage in the developmental sequence: emerging adulthood. He thinks this typically starts around 18 when children complete high school and begin living away from their parents, and continues until individuals have made career commitments and taken on responsibilities for others. He cites evidence that emerging adulthood is a time of exploration and identity formation at least as critical as the adolescent stage.

From my 35 years of studying vocational education, I find Arnett's argument convincing. As much as educators would like to believe that counseling and guidance can lay a foundation for informed, realistic career decisions in the high school years, I see little evidence that it does so. My experience persuades me that most young people choose vocational courses because of broad, self-perceptions about themselves and their futures rather than to achieve specific career objectives.

In my judgment, Gottfredson (1981) has the most accurate theory of how career choices are made: circumscription and compromise. Circumscription refers to the increasing differentiation of self-perceptions that eliminates unacceptable occupational alternatives. She posits that this takes place during a developmental sequence that first rejects jobs viewed as inappropriate for one's sex and then eliminates those of unacceptable low status or high difficulty. Within the limits set by these self-perceptions, individuals seek the best match for their interest and abilities among the possibilities open to them in their circumstances. Final decisions are compromises between what is desired and what is available.

High school students who choose vocational education have developed self-perceptions that exclude occupations requiring college degrees because they do not like academic subjects, have done poorly in them, or see very little likelihood that they can afford to go to college. Very few have made firm commitment to prepare for and enter specific occupations.

Does vocational education inherently track students from lower socioeconomic backgrounds and depress their educational and occupational aspirations?

I am afraid it does. The evidence that I am familiar with indicates that students from lower SES families are disproportionately enrolled in vocational classes (Campbell & Laughlin, 1988; Oakes, 1985; Rojewski & Yang, 1997). Selection of vocational education at the high school level is the result of nine to ten years of prior educational experiences that persuade some

young people that they should not aspire to college. Participation in vocational education tends to reinforce these prior experiences.

To sum up, secondary vocational education plays a key societal function by muting the dilemma of all of education: facilitating maximum individual development while sorting young people for future occupations. Vocational classes provide learning environments that for many students are more comfortable that the typical academic classroom. And vocational courses teach skills that some students use to obtain their first regular jobs after high school. Because of its utility to society, I believe it would be a major mistake to eliminate secondary vocational education.

If secondary vocational education is to continue, what changes are needed to make it more aligned with the reality of adolescent development, and to the extent possible, independent of the backgrounds of the students it serves? My recommendation: return to the principles of Woodward's manual training. The focus of vocational courses should be on reinforcing basic skills and teaching the SCANS (Secretary's Commission on Achieving Necessary Skills, 1991) skills that are needed in all occupations. Improvement of basic skills, to which vocational instruction may contribute, will enhance postsecondary options. Attainment of SCANS skills will contribute to success in any option that is pursued.

Teaching such skills requires an occupational context, and students will need to select a career cluster to provide that context. Instructors should not delude themselves, however, that they are preparing most of their students for occupations in the chosen cluster. Instructors should use the context as a medium to achieve broad education goals while providing opportunities for career exploration.

If what I am recommending looks like technology rather than vocational education, so be it. Technology education is the successor to industrial arts, which is the direct descendent

of manual training. It provides a model that is consistent with the developmental stage of high school students and stresses general principles more than specific skills. Sorting and socializing for future occupations in some form, overt or covert, will remain whether or not there is something called vocational education. They are essential functions of all of education.

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