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Title: Relationship between Trends in Technological Changes and Patterns in Vocational In-Service Education

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The purpose of this study was to examine the relationship between technological changes in business and industry and vocational teacher in-service training. Data were collected from 134 vocational teachers from the nursing, welding, automotive, and secretarial technologies in 12 Oregon community colleges. Questionnaires were used to collect the data. Descriptive statistics and discriminant analysis were used to compare the training patterns to the patterns of change.

Subjects were classified as "responsive to technical change" if the pattern of the number of hours of technical in-service education over the prescribed five-year period coincided with the implementation of the technological change in their

field. They were "non-responsive" if the pattern of the number of hours of technical in-service education did not coincide with the technical change.

Approximately 62 percent of the subjects participated in responsive in-service training while approximately 38 percent appeared not be responsive by not having patterns in the number of hours of training that coincided with the patter of the implementation of the change into the majority of their field. Approximately 32 percent of the respondents reported no training during any year, although only 11 percent of the subjects did not participate in technical in-service over the five year period. The most popular methods of in-service training were manufacturer´s workshops and seminars, reading technical publications, and college course-work. Factors influencing responsiveness were (1) educational attainment, (2) contact coordinator availability, (3) perception of their schools´ ability to provide salary adjustments, (4) perception of their schools´ ability to help in locating training sites, and (5) training site availability.

It was concluded that training site availability, help in locating training sites, and contact coordinator availability were related to the use of training sites. Salary adjustments were perceived to be important to the non-responsive group but were perceived as unimportant by the responsive group. Individuals in the responsive group were more likely to have lower educational attainment than the non-responsive group.

It was further concluded that Oregon community colleges need to designate and utilize a contact coordinator to coordinate in-service training. They also need to establish closer relationships with business and industry to facilitate better training site acquisition and utilization.

Relationship Between Trends in Technological Changes and Patterns in Vocational In-service Education

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I INTRODUCTION

The purpose of this study was to examine the relationship between technological changes in business and industry and vocational teacher in-service training in Oregon community colleges.

<u>Rationale</u>

American industry has experienced rapid and often dramatic changes in technology over the past thirty years (Hamilton, 1982). The most recognized changes have been due to innovations in the use of electronics or through the use of robotics, computerization, and information processing. Technological changes affect the structure of the American work force and the educational system that trains that work force (Bjorkquist, 1983; Hamilton, 1982; Sherman, 1983; Watts, 1983; Wenrich, 1956).

The rates of change among different fields have not been uniform. Some fields, such as electronics, are recognized for the magnitude of changes they are experiencing as well as for the rapidity of those changes. Such fields are described as "high technology" (Cummins, 1985). Other fields, such as secretarial occupations, display less rapid and less severe changes. These fields have been termed "advancing technology" (Cummins, 1985; Saxton, 1985).

In addition, technological changes occur at different rates and at different intensities in different fields. Some fields are entering change cycles; others are finishing them, while others are experiencing little or no change (Parsons, 1983).

The changes in American industry have had dramatic effects upon American vocational education. Workers have been displaced by automation and robotics and must be retrained into emerging technologies. Other workers require up-grading of job skills in order to keep pace with the changes in job demands (Hamilton, 1982; Wenrich, 1956). Some traditional jobs are disappearing from the market place, leaving whole classes of workers unemployable (Hamilton, 1982). An example of the loss of jobs to technical change is seen in the elimination of drafting positions. Drafts-persons no longer place designs on paper for the machine operator. Instead engineers enter the design into a computer, which transfers the design directly into the machine. The machine operator has no need for a visual copy of the plan.

Problem

A fundamental tenet of vocational education is that vocational instructors must be conversant with the environment, operations, and processes of the occupations for which they are preparing their students. This principle was postulated by Prosser, who is considered the father of vocational education. Its significance has been reaffirmed by subsequent theorists (Barlow, 1967; Roberts, 1965).

Oregon community colleges have a wide variety of vocational programs that are staffed by faculty drawn from two sources, either from colleges and universities or business and industry (Parsons, 1983; Saxton, 1985). Teachers in those studies entered teaching primarily from business and industry. Teachers entering Oregon community college vocational programs must meet minimum entry qualifications, normally three years of trade experience beyond the learner level (ORS 326.041, 244.055). Assessments of their ability to teach are made by individual community colleges based on local evaluation criteria.

Community college vocational-technical teachers, nation-wide, have low staff turnover rates, due in part, to the attractive nature of teaching as a profession (Parson, 1983; Saxton, 1985). Faculty members, who were drawn from business and industry and have been out of the mainstream of their profession for relatively long periods of time, may have outdated technical skills (Alfred and Nash, 1983; Parsons, 1983).

Community colleges may deal with this problem by an infusion of new and part-time faculty (Alfred and Nash, 1983). An infusion of new faculty directly from business or industry would help ensure that the instructional staff will have current industrial skills. However, this option is closed to most schools due to labor contracts and public relations questions (Saxton, 1985). One remaining way to keep faculty current with the changes in technology is to provide vocational faculty members with additional training in the areas where changes are occurring. Training must be given without interrupting the normal teaching schedule of the teacher (Hamilton, 1982; Parsons, 1982; Saxton, 1985).

By setting minimum job experience levels Oregon community college vocational faculty are encouraged to remain current in the technology of their fields (ORS 344.055). Oregon statutes ensure that teachers who are drawn directly from business or industry have current technical skills at the time of entry into teaching. However, the statutes provide no plan that mandates that vocational teachers must remain current in their fields.

The United States Office of Education (Pals, 1977) reported that most teacher in-service education is purely a voluntary effort on the part of the individual faculty member. Vocational administrators have little control of in-service training. The data also indicated that, annually, 30 percent of vocational teachers in the country have not experienced any in-service training during the previous year. The report further stated that there was no organized plan for identifying vocational education needs. It concluded that there was a need for more appropriate in-service training.

In spite of major technical changes in American industry, the emphasis of in-service training has been in the area of pedagogy, not in the technical areas (Lee, 1981; Storm, 1978). This trend emerged in a search of the literature using the TELNET computer data base. The data base listed 85 entries under the subject area of vocational or technical teacher in-service training. Of these, only 13 percent dealt with technical in-service training; the remaining 87 percent addressed other topics. Subject areas included computer instruction methods; teaching of disadvantaged, minorities, or handicapped students; instructional and teaching strategies; dealing with drop-out students; curriculum development; sex equality; literacy and writing skills in vocational education; time management; teaching vocational subjects to non-English-speaking students; developing testing; changing student populations trends; and teacher-exchange programs between institutions. Other studies have verified this observation (Keyser, 1977; Hamilton, 1982; Parsons, 1982; Storm, 1978).

Roehrich (1979) recognized the need for vocational in-service training for two-year community college vocational faculty and administrators. Roehrich's emphasis, however, was on the need to identify where specific update training was needed.

The problem of technical update for community college vocational faculty was also studied by Alfred and Nash in 1983. They concluded that numbers of community college faculty would eventually have to retrain or face being replaced due to their own job obsolescence or the out-dating of their technical skills. Retraining or updating was a must or teachers faced replacement.

As late as 1984, the same theme was presented by Hamilton and Wonacott. Their research showed an increased need for technical up-dating since the technology of some fields was changing even faster than in previous studies.

The same problem was discussed at a conference in 1983. Parsons (1983) delivered a paper about community college faculty training problems in New Jersey. He noted that the majority of the community college faculty had taught in vocational areas for three to seven years. Parsons observed that during their time at the community college, vocational faculty had been isolated from technological changes occurring in their fields. They were out of touch.

In 1982, a study of the training needs of high technology teachers in Ohio found major deficiencies in technical levels of many teachers. The study concluded that there was a great demand for in-service training to bring high technology teachers up to an acceptable technical level. This need for additional in-service was state wide, with no concentration of under-trained teachers in any one area (Hamilton, 1982).

A study testing the differences between the perceived needs for in-service training as viewed by vocational-technical teachers and vocational administrators was conducted by Keyser in 1977. Vocational administrators and teachers agreed that the greatest need was for technical in-service training. Similar results and conclusions were reached by Halcromb in an earlier 1975 California study and Justice in a 1979 Oregon study.

Hamilton and McElroy (1983) emphasized the enormity of the task of trying to keep vocational technical teachers abreast of the technology. They concluded that vocational education is behind in update training now and is falling further behind as changes occur at faster rates.

Hamilton and Wonacott (1984) found the problem to be acute in the field of secretarial and office occupations. They state that the publishers, John Wiley and Son, experienced problems in the sale of textbooks featuring the newest secretarial technology because many teachers were not sufficiently up-to-date in the latest technological changes in their fields. Therefore they would not use the newest textbooks. The solution for John Wiley and Son was to offer work-shops to secretarial and office occupations teachers in the use of the newest office equipment. Since that time John Wiley and Son have added workshops in electronics.

Dorty and Cappelle (1981) wrote that "in-service technical upgrading of post-secondary instructors. . . was found to be the most ignored area of staff development" (Page 3). They also noted the importance of teachers who are technically qualified upon entry into teaching and who remain up-to-date during their teaching careers. Hamiltons´ (1982) study of vocational-technical teachers in Ohio revealed much the same results. He concluded that few of the institutions in his study had satisfactory in-service programs. Hamilton found that greater emphasis was placed on pedagogical update than on technical up-date. Keyser (1977) agreed with this in an earlier Pennsylvania study.

A trend in some community colleges for less technical in-service and more pedagogical in-service may be related, in part, to a trend identified by Cohen (1969). Cohen noticed that some of the emerging community colleges in the 1960s hired as many faculty and administrators who had earned doctorates as possible. He saw this as a desire for prestige. This often resulted in less technically qualified individuals with advanced degrees being hired over more technically qualified individuals with less educational attainment. The result was a teaching staff that was not technically prepared to teach and not able to identify changes in its fields. Cohen was also critical of the research conducted by the community colleges during this period. He stated that this research did not result in actual program improvement and did not point out faculty development needs.

In summary, the literature indicates that community college vocational instructors have not been adequately upgrading and updating themselves in their technical specialties. This assertion is based on a one-year census, the extent to which in-service opportunities have been provided, and the alternative instructional methods that have been employed. However, technological change has varied in rate and magnitude among the fields. In addition to new and emerging technology, technical in-service offerings also address "old," well established technology. What is not known is the timeliness of the technical in-service education in which community college instructors have been participating.

Furthermore, prior research and speculation has also focused on factors which may facilitate or inhibit the instructors' participation in in-service training. However, these studies have addressed a limited number of factors at any given time. Taken individually, each of the factors which has been identified appears to be important in itself. What is not known is how these factors relate to each other.

Therefore, the problems for this study were:

1. Are vocational educators in Oregon community colleges participating in technical in-service to keep abreast of technological changes?

2. What factors aid or hinder vocational teachers in Oregon community colleges regarding participation in technical inservice training for keeping current in their fields?

The following factors may facilitate or hinder teacher participation in in-service programs: (Hamilton, 1983; Keyser,1977; Evans & Herr, 1978)

a. Time to attend;

b. Money to support inservice training;

c. Personal incentives;

d. Administrative support;

e. Adequate training site availability.

Definitions

Technical in-Service Training: Technical training taken by a teacher normally without interrupting their teaching schedule.

Technological Change: Any change in the materials, processes, equipment, or invironment affecting a technical occupation.

Responsive in-service training: Technical in-service training in a technical change which is completed within two years of the implementation of that technical change by the majority of manufacturers. Non-responsive technical in-service training is technical in-service which is completed outside the implementation period, if at all.

II RELATED LITERATURE

Recognition of Changee

Among the first authors to address the subject of change in the American work place was Wenrich (1956). He noted that, as early as 1956, America was experiencing the problem of having to retrain workers to meet technological change. Changes in technology in the 1980s have developed at an even faster rate than was envisioned by futurists of the 1950s.

Technical changes that are occurring throughout American business and industry are well documented. In order to remain current, vocational educators must recognize the magnitude and the cyclical nature of technical change. Their in-service training must closely follow the cycles of that change.

Nine out of 125 vocational program areas in Oregon community colleges were randomly selected and examined to see if patterns of change were evident. Three distinct patterns of change were apparent in the nine fields examined. These patterns are:

1. Slow continuous evolution,
2. Rapid but continuous evolution, and
3. Slow change, followed by a rapid change, then a return to slow change.

The slow but continuous evolution pattern was found in the welding, auto body and fender repair, childcare, cook, and the real estate sales vocational fields. Technological changes in the welding field over the past ten years have been slight. Improvements have been limited to modernization of equipment and introduction of new metal alloys (Giachino and Weeks, 1976; E. Rau, personal communication, May 31, 1985). A trained welder could remain current with the changes during this period through reading of material presented with the new product or through short work-shops or demonstrations presented by the sales representatives. Short periods of training were conducted at the work site.

The auto body and fender repair field has had a low but continuous rate of change throughout the five-year period of 1980 through 1984. Changes occurred in auto body design and repair procedures. Changes in repair procedures were normally taught by sales persons or industry representatives through short training sessions at the work site or through one-day seminars (C. Harrison, personal communication, October 11, 1985).

The field of childcare experienced little change during the 1980 to 1984 period. Teachers in the child care field could learn about changes in child psychology theory and law through professional literature (L. Johnson, personal communication, October 13, 1985).

Cooks also experienced little technical change over this period. Minor changes were absorbed through professional literature (K. Campnella, personal communication, October 12, 1985).

Real estate sales also had a similar pattern of technical change. There were no significant changes from 1980 to 1984. Changes in law and in real estate procedures were learned by reading professional literature or through association with other professionals in the field (K. Yu, personal communication, October 13, 1985).

A rapid but continuous evolution change pattern was identified in the nursing field. This pattern differed from the previous pattern of change by the intensity of the change. Changes were more intense and continued from year to year. Technological changes in the nursing field have been both rapid and constant during the years of 1980 to 1984 (M. Black, personal communications, October 11, 1985; N. Haltelko, personal communications, October 13, 1985). Most changes were moderate but occurred at an almost constant rate. Changes in this field have been so varied that it is difficult for the in-service training persons in any hospital to identify specific training that would be applicable to all nurses and all hospitals. Training is adjusted to fit the local conditions and requirements of physicians practicing the various specialties at a particular hospital. Nurses were expected to remain current in the field of the specialties they were supporting (N. Haltelko, RN, personal communications, October 11, 1985; M. Black, RN, personal communications, May 31, 1985). Training requirements remained constant from year to year but varied as to course content with individual nurses.

A pattern of slow change, followed by a period of rapid change, then a return to a slow rate of change was noted in the secretarial, automotive, and drafting fields. An example of this change pattern in the secretarial field was seen in the introduction of word processors (Kleinschorod, Kruk, and Turner, 1983). The IBM model MT/ST word processor was introduced in 1964. By 1975, word processors were common in many offices. An Oregon Department of Education follow-up study (1985) of recent secondary school vocational secretarial classes found that 57 percent of the respondents reported the use of word processors in their jobs. Secretaries had needed one to three weeks of additional training in word processing for each new machine and program. The frequency of change in the secretarial field was slight until the introduction of the inexpensive desk-top microprocessor. Word processing became commonplace as the technology was accepted into the modern office. This made training in the use of microprocessors a critical factor for teachers in the secretarial field.

The automotive industry has experienced the introduction of microprocessors to control both ignition and fuel systems. Chrysler first used microprocessors in 1976, Ford in 1978, and General Motors Corporation in 1979. The use of the computer for fuel controls, ignition control, and emission control occurred on production models in the early

1980s (Hearst Corporation, 1985). At that time, mechanics and teachers were suddenly required to undergo additional training lasting from one to three weeks. This training was conducted at an industrial school site or through the use of a series of video cassettes or films shown and explained by local mechanics trained at factory schools. Automotive industrial changes were slight before the introduction of microprocessors, but afterwards changes were rapid and intense for approximately three years. The rate and intensity of change are now moderate as improvements are made to the microprocessor controls.

In 1975, main frame computers were utilized by some larger engineering companies for computer-assisted drafting (CAD). The system was costly and available only to large companies. By 1982 and 1983, CAD programs were available for smaller desk-top computers. Drafts-persons had to be trained in the use of the computer-assisted drafting and computer-assisted design and drafting, CAD, and by 1984, the drafting field had moved almost wholly into the new technology (L. Richards, personal communications, October 13, 1985).

Methods of In-service Education

The following are examples of in-service methods that contribute to a the definition of in-service:

1. "reading periodicals and books about teaching or about the subject being taught;
2. securing part time employment during the week or during the summer in the occupation being taught;
3. attending courses and workshops conducted by business or industry;
4. visiting local business and industry; and
5. attending technical meetings or meetings of educational personnel (Evans and Herr 1978, p. 288).

A number of research efforts indicated that the most effective, least costly, and the most accessible methods of in-service update training were workshops, seminars, or conferences held at training centers of businesses or industry, at actual work sites of business and industry, or as part of college or university courses. Colleges and universities often used business sites to supplement their own resources (Bjorkquist, 1983; Garlock, 1979; Hamilton, 1982; Love, 1984; Van Ast, 1982).

Returning to colleges or universities for additional coursework was criticized by Hamilton (1982) and Love (1984) because this practice tended to emphasize pedagogical rather than technical updating. Even with this criticism, Hamilton reported that returning to the university for additional coursework was the second most popular in-service method. Hamilton however noted that coursework at colleges or universities was often used to maintain certification or for mandatory recertification.

Internships and graduate internships were popular in Mississippi (Love, 1984). Oregon State University, Portland State University, and other schools in the northwest offered credit for study through classes that combine industry and business contacts with university classes (Hunter, 1983). In these programs students worked closely with business and industry to get first-hand experience while attending support classes at the university, thus enhancing both the industrial and educational experience. Conclusive evidence on the effectiveness of this method is lacking.

The use of university sponsorship of in-service training in a technical field was most popular in vocational agriculture. Oklahoma State University offers a credit program during the summer for vocational agricultural teachers. Classes are taught by university faculty or through arrangements with industrial sources (Forsythe, 1981). Kelly (1981) wrote about a similar program offered through West Virginia State University. The popularity and use of the university as the primary source of in-service training for vocational agriculture teachers was reported in studies as early as 1952 (Cardozier,1952).

Since much of the current research and development in agriculture originates at universities (Forsythe, 1981), the advanced technology of the university agriculture programs offered an excellent delivery system for in-service training for vocational agriculture teachers. This system is relatively unique in that information is provided both by universities, through the cooperative extension service, and through industry and sales sponsorship.

The in-service delivery system of hospital training of nursing and nursing teachers had a strong similarity to the pattern for vocational agriculture. Hospitals provided training through hospital-developed courses or in cooperation with drug companies or medical equipment companies (M. Black, personal communication, October 11, 1985; N. Haltelko, personal communication, October 13, 1985).

Returning teachers to industry for experience in areas that had changed or for observation of new technical procedures was explored by a number of authors (Georgia, 1983; Hamilton, 1982; Pieratt and Wilson, 1982; Walters, 1976).

Returning to business or industry for additional experience was near the bottom of the list of every author. Only Hamilton gave a reason for placement of training in any order. After listing the methods of training, Hamilton (1982) rated this method as the least used. Hamilton's study concluded that short visits to business and industry were used as a substitute for programs where teachers actually went to a job site and worked in the area where technical change had occurred so that they could learn the new technology. These short visits were an effective way of acquainting the secondary vocational teacher with changes in technology but were not adequate as a training method for many post-secondary teachers whose curricula were more complex.

An industrial exchange program in Kentucky (Pieratt and Wilson, 1982) relied on the teachers to identify their own training needs, locate a sponsoring industry, and prepare a written proposal for funds. In 1982, the program placed 500 teachers in some type of industrial exchange program. Preference was given to teachers who could document changes in their vocational areas.

California community colleges developed a program in 1981 that offered instructors four weeks at an industrial work site followed by two weeks to develop curriculum utilizing the new material. The State Department of Education provided the money for salary and for developing curriculum materials and programs (Garlock, 1979). The program was later discontinued due to lack of state support in funding.

Another way of returning to industry to keep current with technological change is through involvement in technician classes taught directly by industry (Bjorkquist, 1983; Cardozier, 1953; Engliring, 1983; Forsythe, 1981; Pals, 1977). For example, Blackhawk Automotive Industries offered training to post-secondary auto body instructors with emphasis on the latest auto body repair technology. Blackhawk used the American Vocational Association to broker their classes to vocational teachers (Engliring, 1983). Bjorkquist (1983) listed independent study by returning to manufacturers' service schools as a growing major source of viable updating in-service training.

A similar endeavor was a partnership program between General Motors Corporation and community colleges. General Motors provided the community colleges with curriculum materials, training aids, and instructor training. The community colleges then trained auto mechanics for local General Motors dealerships (Fonte and Vernon, 1983).

The reading of materials related to the vocational field was reported as an addition in-service method. Reading, however, was unpopular in every study where methods of in-service were experimentally tested and compared (Cabb, 1974; Cardozier, 1952; Montgomery, 1952).

Bjorkquist (1983) stated that the effects of technological change on education are so well documented that vocational educators must accept this fact and need only concern themselves with how they are going to keep up to date.

Barriers to In-service

If technical in-service is needed, what prevents instructors from participating? The major barriers appear to be time, money, and links with external organizations (Hamilton, 1983; Keyser, 1977). Evans and Herr (1978) identified the problems of employing a year-round staff at the universities to handle summer in-service needs. The time and money needed for year-round university staff may place too great a burden on the finances of the university and demand too much time of individual staff members.

Bjorkquist (1983) reported that most teachers in his study indicated a need for financial support. McIntosh (1981) stated some of the costs of reading by detailing the costs of typical publications that a vocational agriculture teacher may need to read. In-service programs reported by Parson in 1983 for the New Jersey community colleges were funded by federal grants which may not be as readily available today.

Teachers who take time away from teaching to complete technical in-service training create another problem. Parson's paper (1983) gave a checklist for use by community college administrators in New Jersey to evaluate requests for an industry retraining project. The first checklist item was concerned with length of time in the field. The problem that administrators faced was how to continue the functions of absent teachers.

Establishing links with business or industry and coordinating placements of teachers in appropriate training sites were major problems. Were proper hosts available that were able and willing to offer training? If suitable host industries or businesses were found, could the training be completed in a reasonable time? A second part of this problem was identified in several studies: who was responsible for identifying and developing suitable training sites? Hamilton (1982) said that it remained the responsibility of state educational agencies. A Georgia Department of Education (1983) study found that vocational teachers felt that the administration was responsible for helping to find and also develop potential training sites. Pieratt and Wilson (1982) found the same opinions in their Kentucky study. Most of the literature, however, concluded that the primary responsibility rested with the individual vocational teachers, but that they could not succeed without help from administrators. Administrators were needed primarily to locate and develop training sites. Van Ast (1982) identified the problem of coursework that offered no college credit since credit was needed by some secondary vocational teachers for recertification or by others for salary increases. Ohanneson (1981) found that non-credit classes and also work experience could not be equated to college credits for placement on a salary scale since many colleges and universities did not recognize these. His study also found that vocational teachers often had to get prior approval for work experience and then had to document their experience with a written report in order to receive any credit. Prior approval and documentation was not required when taking college credit classes. Cardozier (1951) wrote that Louisiana recognized only a master's degree for pay increases in teacher's pay schedules. Unfortunately most of the technical classes in his study were non-credit.

Another problem or barrier identified in the literature was that reward systems did not encourage instructors to return for needed in-service training. Some teachers were not willing to volunteer their summer vacations to take in-service up-date training without some type of an overt reward (Ohanneson, 1981). The same sentiment was exhibited in Hamilton and Wonacott's (1984) study. They concluded that it was the responsibility of local administrators to ensure that teachers were able to participate profitably in update training.

Evans and Herr (1978) suggested that the problems of meeting vocational teacher in-service needs could be reduced by:

1. Development of a leadership program for state education officials,
2. Provision for universities to offer guidance to administrators for in-service programs,
3. Funding to support local proposals, and
4. Fellowships and institute programs to allow functions of in-service to be carried out on a state-wide or regional basis.

The determination of the level of training that was needed to match the amount of change that had actually taken place in business and industry was identified as a problem. According to Parson (1983), a New Jersey program matched the need for training to the amount of change. Hamilton's (1982) study recommended similar criteria for training in Ohio. Hamilton suggested that an assessment of the technical level of each teacher be made along with an assessment of technological changes in each field.

Ohanneson's (1981) paper addressed the question of how to identify where changes were actually occurring and how to classify change magnitude. He suggested periodic industrial visitations, use of professional associations, attendance at staff and departmental meetings, viewing other school catalogues for changes, reading education publications, and contacting part-time faculty who come directly from industry.

A Georgia State University Department of Vocational and Career Education study in 1983 showed that returning to industry could be highly effective for high technology teachers and that these programs were most effective when the needs of the teacher were matched to the job assignment. This required a great deal of preparation by the teacher, the administrator, and the industry. The Georgia study was similar to an earlier Ohio study (Walters, 1976).

Summary

Based on a review of the literature it is reasonable to ask these questions:

1. To what extent does Oregon community college instructors´ participation in technical in-service education coincide with the rate and magnitude of change in their technologies?
2. What is the relationship between the timeliness of the instructors´ participation in technical in-service education and the following factors which may aid or hinder that participation:

a. Time to attend;

b. Money to support in-service training;

c. Personal incentives;

d. administrative support;

e. adequate training site availability?

III DESIGN OF THE STUDY

Sample

The population for this study was all full-time vocational teachers in Oregon community colleges. The sample for the study consisted of full-time faculty members in four vocational fields located in 12 Oregon community colleges. The four vocational fields were nursing, automotive, secretarial, and welding. One community college president declined the request to survey his faculty. The college that declined the request to survey faculty comprised approximately 11 percent of vocational faculty of Oregon community colleges (Oregon Department of Education, 1982-1983). The actual number of faculty members involved were 21 in the nursing (29 percent of the subjects), four in the welding (14 percent), seven in the automotive (20 percent), 14 in the secretarial fields (24 percent).

The four technical fields in the sample were chosen because they represented the three patterns of technical change identified in Chapter Two. The automotive and secretarial fields were characterized by an abrupt change followed by no change. Welding experienced a slow evolutional change. Nursing had a high but continuous evolutional change.

The 1984-85 catalogues of the 12 community colleges each stated that programs in nursing, automotive and secretarial fields were available. Welding programs were offered by all but one. Letters (Appendix 1) were sent to all college presidents in late July 1985 seeking permission to survey vocational faculty and a current list of all full-time faculty in the four fields chosen for the study, as well as in a fifth--heavy equipment diesel mechanics. Follow-up phone calls were made to three colleges in early September. The numbers of faculty members identified by the colleges for the 1985-86 school year were:

Heavy Equipment Diesel	10
Secretarial	58
Welding	28
Nursing	72
Automotive	35
Total	203

Heavy equipment diesel subjects were not included in the remainder of the study because of their small number.

Responses were received from 150 subjects. However, one nursing respondent, two welding respondents, and four secretarial respondents reported that they were not teaching in the fields for which they had received questions. In these cases, names had been submitted by mistake so the responses were not used. The numbers and percentages of responses were therefore as follows:

Group	Corrected Sample Size	Number of Respondents	Response Rate
Nursing	71	51	71.8%
Welding	26	17	65.3%
Auto	35	30	85.7%
Secretarial	54	45	83.3%
Total	186	143	76.8%

Procedures

Four forms of a survey instrument (Appendices 5 through 8) were developed to gather the information needed to address the research question. Because the nature and timing of technological change differed among the four fields, the instrument was customized for each technology. The instruments consisted of three parts. The first part was concerned with the timeliness of the technical in-service in which the subjects participated. The questions on the instructors´ participation in technical in-service education asked for the amount of technical training taken during each of the five years from 1980 to 1984. The instrument for instructors in the secretarial and automotive fields asked for the amount of technical training specifically concerned with the implementation of microprocessors in their technologies. Their instruments also requested information on other technical in-service in which they participated.

Questions in the second part concerned factors that may facilitate or hinder technical in-service training. The points identified in the literature that may help or hinder in-service training were time (Hamilton, 1983; Keyser, 1977; Parsons, 1983); money (Bjorkquist, 1983; Hamilton, 1983; Keyser, 1983), a perceived need for additional training (Ohanneson, 1981); personal incentives (Hamilton and Wanacott, 1984; Ohanneson, 1981) and the availability of training (Georgia, 1983; Hamilton, 1982; Pieratt and Wilson, 1982). The third part of the instrument requested demographic information.

The survey instruments were then tested by two faculty members from each of the four fields at Linn-Benton Community College. They were asked to complete the questionnaire using only the written instructions. They were then asked to comment on the clarity of the written instructions and questions. Any portion that appeared to be a problem was altered. Revised instruments were then returned to that same group. The process was repeated until all problems in format and clarity were resolved. The final draft of each survey instrument was given to one additional person in each of the four technical areas for further comments. These individuals had no further comments or corrections. Approximately 50 percent of this test group did not respond in the final survey.

The final questionnaire and the cover letter (Appendix 2) were printed on off-white rag bond paper using a professional printing service. They were sent on November 14, 1985, to all respondents at their college addresses along with a postage-paid return envelope. Each subject was assigned a identification number to facilitate individual follow-up of non-respondents.

Postcards (Appendix 3) were sent to all participants two weeks after the initial mailing thanking them for their participation if they had responded and encouraging them to return questionnaires if they had not.

Three weeks after the postcards were mailed, another cover letter (Appendix 4), survey questionnaire, and stamped envelope were sent to each non-respondent. This cover letter explained the importance of the survey and asked for a reply by January 6, 1986.

The data from the completed questionnaires were encoded on optical scanning forms. A data file was created in the CYBER computer at Oregon State University. The data were examined using the descriptive statistics and discriminant analysis procedures of the Statistical Package for Social Scientists (Nie, Hull, Jenkins, Steinbrenner, and Dale, 1975).

IV FINDINGS

Responsiveness

The first question posed in this study was: to what extent do community college instructors' participate in technical in-service training that coincides with changes in their technologies. Subjects were asked to provide the numbers of hours of technical in-service training in which they had participated each year during 1980 through 1984. For the secretarial and automotive technologies, technological changes were associated with the introduction of microprocessors. Because there were no single significant technological changes in nursing and welding, those instructors were asked about technical in-service in general.

The technical in-service training completed by subjects was classified as "responsive" or "non-responsive" to technological change(s) in their fields based on subjective interpretation. A subject was classified as "responsive" if the pattern of the number of hours of technical in-service education over the prescribed five-year period coincided with the implementation of the technological change. For the secretarial field, the target technological change was the widespread implementation of word processing on microcomputers. The peak of this implementation occurred during 1980 and 1981. The implementation was relatively slow prior to this period, and subsequent changes involved refinements to the technology. To be classified as responsive, a subject would have had to indicate relatively higher levels of technical in-service training on the target technological change during 1980, 1981, and 1982. The amount of technical in-service training that they completed during 1983 and 1984 should have been less than the three implementation years. The absolute magnitude of technical in-service education was not material; only the pattern of participation was considered relevant. Subjects in the automotive field were classified in the same manner based on the major implementation of microprocessors in fuel, ignition, and emission-control systems during the same time period.

Both the nursing and welding fields had not experienced any single major technological change during the 1980 to 1984 period. However, technological changes in the nursing field were frequent and relatively large in magnitude. They were, however, focused on the specializations and subspecializations in nursing. On the other hand, the welding field experienced very minor change during the five year window for this study. Nursing respondents were classified as responsive if the number of hours of technical in-service training was relatively high during each of the five target years for this study. If the amount of in-service education was relatively low for one or more of the five years, the subjects were classified as non-responsive. The distinction between "high" and "low" was somewhat subjective. The welding subjects were classified in the same manner, except the number of hours of technical in-service education should have been consistently low over the five year period.

Approximately 62 percent of the subjects had participated in responsive technical in-service education (Table 1). On the other hand, 38.5 percent of the subjects appeared not to have had responsive technical in-service education. It should be noted, however, that the responsiveness of technical in-service varied significantly (Chi-

Table 1

Number and percentage of subjects participating in in-service education that was and was not responsive to technological change by technology.

Responsiveness to techno-logical change	Technologies									
	Nursing		Welding		Automotive		Secretarial		Total	
	N	%	N	%	N	%	N	%	N	%
Responsiveness	44	83.6	11	64.7	14	46.7	19	42.2	88	61.5
Non-responsive	7	13.3	6	35.3	16	53.3	26	57.8	55	38.5
Total	51	100%	17	100%	30	100%	45	100%	143	100%

Chi Square 23.15, df = 3, p = .00

Association of selected technologies (welding, automotive and secretarial, and responsiveness to technological changes: Chi square = 2.52, df = 2, p = .281

Association of selected technologies (nursing verses the combined welding, automotive, and secretarial) and responsiveness to technical change: Chi square = 18.90, df = 1, p = .00.

square = 23.15, df = 3, p = .00) among the four technologies. Relatively more nursing instructors (Chi-square = 18.90, df = 1, p = .00) participated in responsive technical in-service education than instructors in the other three technologies.

The data were examined to ascertain what types of training were the most popular for the four groups. The data (Table 2) indicated that the most popular type of in-service education for all the technologies was workshops and seminars conducted by manufacturers. The nursing technology appears somewhat different than the other technologies in the availability of technical in-service training. All the community college nursing programs have access to in-service education programs that are conducted by local hospitals. The delivery systems for the other technologies appeared to be very fragmented and normally available only in metropolitan areas. Local access to manufacturer sponsored workshops and seminars was very limited and varied.

The second most popular method of in-service training was self-study. This form of in-service training was available to all technologies.

Table 2.

Percentage of respondents reporting using each type of Technical in-service training method.

Type of technical in-service	Technological Field				
	Nursing	Welding	Automotive	Secretarial	Total
Manufacturers/hospital workshop	30.5%	100%	40.2%	20.3%	37.6%
College course-work	20.8%	7.6%	22.8%	5.5%	14.0%
Self study	29.1%	23.0%	48.5%	7.4%	25.6%
On Job Training	5.6%	3.8%	2.0%	1.8%	3.3%
Total N	51	17	30	45	143

However, comments on surveys indicated that subjects felt that self-study was a good method of learning about changes but a poor method of training due to a lack of hands-on experience and a lack of equipment.

A distant third in importance was college coursework. This method was significant for only two technologies: nursing and automotive. Nursing respondents reported college coursework through medical and nursing schools, while the automotive respondents reported participating in manufacturers´ workshops that gave college credit through coordination with the Oregon Department of Education and the state university system. However, these workshops would be more appropriately classified as manufactures´ workshops. Again, the nursing respondents had training available to them through the medical training facilities while comparable educational support was unavailable for other technologies.

Approximately 11 percent of the subjects reported that they had not participated in any technical training during the five years addressed by the study (Table 3). Individuals who had participated

Table 3.

Average hours of total technical in-service training over five years excluding individuals who did not participate in technical education.

	Total
N	128
Median	26.1 hours
Mean	37.0 hours
Standard Deviation	38.9
Minimum	0.4 hours
Maximum	211.2 hours
Number not participating in technical in-service training	16
Percent not participating in technical in-service training	10.5 percent
Annual average not particapating in technical in-service training over five year period	31.92 percent

in training during the five-year period reported 26.1 hours of instruction. The distribution was highly skewed. However, when the data of those reporting no training were examined on a year to year basis, the average annual percentage of individuals reporting no technical training was 31.92 (Table 3).

There was no significant difference ($F = 2.08$, $df = 3$, $p = .11$) in the mean hours of instruction among the four fields (Table 4).

The data were examined according to geographical areas within the state to determine if institutional location may have affected the responsiveness of increased education. No significant association (Chi-square = 0.66, $df = 2$, $p = .72$) was found between geographical location of the subject colleges and the responsiveness of the technical in-service (Table 5).

<u>Factors Affecting In-service Training</u>

The second question of this study was: <u>what is the relationship between the responsiveness of instructors' participation in technical in-service education and the factors which may aid or hinder that participation</u>. Discriminant analysis was used to ascertain which variables were associated with

Table 4.

Analysis of variance of the hours of technical in-service training over five year by technology.

Technology	N	$\bar{X}$	S
Nursing	51	42.5	43.8
Welding	17	24.0	35.6
Automotive	30	34.8	29.2
Secretarial	45	24.9	37.0
Total	128	37.0	38.87

Source	SS	df	MS	F	p
Between	9023.1	3	3007.7	2.08	.11
Within	201270.8	122	1448.0		
Total	210293.9	125			

Table 5

Association of college location and responsiveness to technological change.

Responsiveness to Technological Change	College location: Portland Metro		50-100 miles		Over 100 miles		Total	
	N	%	N	%	N	%	N	%
Responsive	29	60.4%	36	65.5%	23	57.5	88	61.5%
Non-responsive	19	39.6	19	34.5	17	42.5	55	38.5
Total	48	100%	55	100%	40	100%	143	100%

Chi square = 0.66, df = 2, p = .72

responsive in-service education. A step-wise method with Wilk's Lambda Criterion ($p < .10$) was used to identify the variables best suited to describe the responsive groups. Descriptive statistics are provided in Appendix 9.

Five of the 12 independent variables entered as useful in the discriminant analysis before their addition accounted for total variance became non-significant (Table 6). In the order of their ability to account for variance these were: educational attainment, contact coordinator availability, perception of their schools' ability to providing salary increases for additional education, perception of their schools' ability to locate training sites, and perception of training sites not available. The variables that appeared to be unrelated were hours of college credit earned outside of technical area, perception of their schools' reimbursement for travel expenses, perception of their schools' reimbursement for course tuition, perception of their schools' reimbursement for housing and meals, time to attend, age of the respondent, and respondents' years as a full time teacher.

Table 6

Summary of step-wise discriminant analysis.

Step	Variables Entered	F to enter or remove	Wilk´s Lambda	P
1.	Educational attainment	3.29	.943	.04
2.	Perception of contact coordinator availability	2.87	.902	.02
3.	Perception of schools´ ability to provide Salary increases	3.03	.871	.02
4.	Perception of schools´ ability to help to locate training sites	2.20	.853	.02
5.	Training site availability	1.71	.832	.02

Variables not entered

1. College Credit earned during test period.
2. Perception of schools´ reimbursment for travel.
3. Perception of schools´ reimbursment for course tuition.
4. Perception of schools´ reimbursment for housing and meals.

Table 6 (continued)

5. Time to attend.

6. Years as a full time teacher

7. Teachers age.

Standardized canonical discriminate function coefficients.

Variables	Function 1
Educational attainment	-.534
Contact coordinator availability	.496
Perception of schools´ provide salary increases	-.516
Perception of schools´ help in locating training sites	.453
Training site availability	.402

Elgenvalue = .201 Percent of variance 100
Canonical correlation coefficient = .409
Wilk´s lambda = .832

Chi square 12.74, df = 5, p = .02

Canonical discriminant function evaluation at group means (centroids)

Group	Function 1
Responsive	-.297
non responsive	.659

Table 6 (continued)

Classification of subjects based on the discriminant functions.

	percentage of group membership	
Actual Group Membership	Responsive	Non-Responsive
Predicted on	62.7%	52.2%
Predicted not on	37.3	47.8
Total	100%	100%
N	83	46

57.4 percent of grouped cases correctly classified.

N = 143

When the five factors that were selected as useful in predicting members of the "responsive" group were examined, it appeared that the lower the educational attainment of the subjects the greater the chance they would be responsive to technical change. If colleges where a teacher is employed had a designated person who coordinated in-service training needs, subjects were more likely to be "responsive" to technical changes. Also, "responsive" subjects tended to work at a college that they felt did not give adequate salary increases for additional technical training. "Responsive" subjects were more likely to come from colleges where they felt help was available from administrators and fellow faculty in locating training sites. Responsive subjects also felt they had training needs that were not being met due to a lack of an adequate training site (Table 6).

Discussion

It is evident from the findings that a majority of the subjects in this study were responsive to technical changes. However, a significant proportion were non-responsive to technological changes in their fields. This is somewhat consistent with previous research (Pals, 1977).

The methods of technical in-service training preferred by Oregon community college teachers were consistent with methods reported in previous research (Bjorkquist, 1983; Garlock, 1979; Hamilton, 1982; Love, 1984; Van Ast, 1982). Manufacturer's workshops and seminars were the most popular method of training, followed by self study and college coursework.

Factors that would identify individuals within the responsive group were identified in the study. These factors were consistent with previous research. Getting and maintaining contacts with business and industry for the purpose of establishing and maintaining adequate training sites had been found to be a problem. Three of the five items identified with the responsive group were related to the issue of training sites. These were the availability of a training coordinator, the lack of adequate training sites, and the need for help in locating training sites. This last factor is closely related to the coordinator issue but has the added dimension of peer involvement and support and administrative support and encouragement.

The findings on a lack of money being a hindrance to technical in-service training was not consistent with previous research. Teachers in the non-responsive group perceived their colleges as offering salary adjustment for increased training. Responsive individuals perceived their colleges as having no salary adjustments for additional training. Other money issues such as payments of tuition, housing, meals, and travel also did not seem to influence responsiveness. Although prior research (Evans and Herr, 1978; Hamilton, 1983; Keyser, 1977) identified all money issues as important, this study found that this factor was secondary to other issues.

The assumption that personal incentives were unrelated to the teachers' responsiveness to technical in-service training was supported by this study. Educational attainment could be a personal incentive. Previous research (Hamilton and Wonacott, 1984; Ohanneson, 1981) showed that many vocational teachers enter community college teaching directly from business and industry. Teachers in vocational fields could enter community college teaching with lower levels of educational attainment than teachers in other fields (Hamilton and Wonacott, 1984; Ohanneson, 1981). A desire on the part of the individual teacher to maintain the technical proficiency they had before entering teaching could be a personal incentive. Therefore, one might assume that those individuals having lower educational attainment would be more likely to select technical updating education over pedagogical education.

The factors identified in the study indicated that responsive subjects acknowledged the need for additional in-service training and were attempting to use the system to help themselves. Money and personal incentives were secondary.

V SUMMARY AND CONCLUSIONS

This study had two purposes. The first was to ascertain if vocational teachers in Oregon community colleges were participating in technical in-service to keep abreast of changes in their fields. The second purpose was to ascertain the factors that aided or hindered participation in responsive technical in-service education.

Using mailed questionnaires, data for the study were gathered from 143 nursing, welding, automotive, and secretarial teachers in 12 Oregon community colleges. The response rate was 77 percent. Data were analyzed using descriptive statistics and discriminant analysis.

Individuals were classified as being responsive if the pattern of their number of hours of technical in-service training over a prescribed five year period coincided with the implementation of the technological change(s) in their field. They were classified as non-responsive if the number of hours of technical in-service training did not coincide with the implementation of change. The judgment on the matching of patterns was subjective. Absolute magnitude of the technical training was not material; differing magnitudes of training were allowed to account for the differing demands upon individual teachers. It was recognized that all teachers would be affected by change within their field but the affect would not be equal among teachers.

There was a large percentage of subjects (62 percent) who were judged "responsive" to technical change by having patterns of training that matched the patterns of change. However, a significant percentage (38 percent) were judged non-responsive because their patterns of training did not match the patterns of change for their fields. About one third of the subjects reported no training during each of the five years; this was similar to the percentage reported in previous research (Pals, 1977). However, only 11 percent did not participate in technical in-service over the five year period.

Teachers who were able to maintain contact with their technologies were more responsive to change. This is consistent with previous research which showed that technologies that maintained contact with the work place developed a better defined educational delivery system and were consistently more responsive to change (Georgia, 1983; Hamilton, 1982).

The geographical location of colleges within the state of Oregon had no significant bearing on responsiveness to technological change.

Three factors were useful in predicting members in either the "responsive" or "non-responsive" group. One factor was associated with training sites. A related issue was the availability of a coordinator. Members of the responsive group were more likely to work at a community college that was perceived by them to have a designated coordinator who could assist with coordinating in-service training and training site needs. A second related issue was help from peers or administrators in locating training sites. Responsive individuals had help from peers, administrators, and designated coordinators in locating training sites. The data supported previous research which said that a well developed and coordinated training site system was vital to successful technical in-service training (Hamilton, 1982; Keyser, 1977).

Another factor selected as useful in predicting group membership was educational attainment. Subjects with lower educational attainment were more likely to be in the responsive group. Teachers in many technical areas enter community college teaching directly from business and industry. Those individuals may have had less educational attainment than teachers in other academic areas. Their previous contact with their technologies makes them more likely to be responsive to technical change.

Salary adjustment was the only money issue predicting membership in the responsive or non-responsive group. The non-responsive group tended to be employed at colleges that they felt did offer adequate salary adjustments. Responsive individuals tended to be employed at colleges they perceived as not offering adequate salary adjustments. The impact of salary incentives on teachers who may be at the top of the salary schedule and therefore would not benefit from further salary adjustments for increased technical education was not explored in this study. Other money issues were secondary to the salary issue. This finding disagrees with the literature.

Previous research found that a lack of money was a hindrance to technical in-service training.

Limitations

The conclusions of this study may be limited by the questions in the instrument that asked the subjects to rate their institution's ability to support different aspects of technical in-service education. Questions on individual attitudes, needs, and preferences and the support individuals received were needed rather than their institution's ability to provide motivators. These kinds of questions would have provided data that would be more suited to analysis and interpretation.

Conclusions

Vocational teachers in Oregon community colleges were partially responsive to changes in their fields. The majority were, in fact, participating in in-service training. However, a significant proportion (approximately 38 percent) of vocational teachers were not being responsive to technical change.

Two related factors were identified as influential to individual responsiveness to technical change.

First, adequate training sites needed to be identified, developed, and made accessible to vocational teachers. Second, assistance or coordination of activities that led to timely and responsive in-service training was required. A coordinator should be available to assist teachers in identification of training needs, identification of training sites, and identification and coordination of necessary school resources.

Money support from the school was perceived as an issue for responsive teachers but not perceived as an issue for non-responsive teachers. Other money concerns, such as payments of tuition, housing, and meals, were incidental to salary concerns.

Recommendations

Community colleges within the state of Oregon need a designated in-service coordinator who will coordinate teacher inservice training needs with the resources of the schools to ensure that timely and appropriate training is available to all faculty. Faculty need to know about the training coordinator and need to be encouraged to use that resource to further training needs. The scope of the use of a coordinator was not examined but deserves further study.

Community colleges need to improve their contacts with business and industry for all relevant vocational fields. Frequent contact would assist teachers in identification of changes while providing a way to gain training. Improved communication with business and industry would also make development and coordination of training sites easier for the teachers and the training coordinator. Such contacts also would allow teachers to use local industry to provide students with first-hand knowledge of a vocational field. Contact with industry or business would provide a continuing form of in-service training because the teachers would, pressured by students and the demands of frequent industrial or business contact, have to remain current with the field.

Further study is needed to explore the issues of money incentives, the affect of perception of technical change upon individual teachers, and the scope of the use of training coordinators. Replication of this study should be attempted using a newly designed instrument that asks respondents their opinions and experiences on the availability of time, money issues, personal incentives, administrative support, and training site experiences and problems. Such an instrument could provide more useful data and data that are more easily examined.

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APPENDICES

Appendix 1

Presidents´ Request Letter.

Appendix 1

School of Education

OSUWOSC

A merged School serving Oregon State University and Western Oregon State College with graduate and undergraduate programs in Education

July 8,1985

President ----------------
---------COMMUNITY COLLEGE
------ ------ ------
------, OR --------

Dear President -----------;

We request your permission to send a survey questionnaire to your faculty in selected fields. The purposes of the study are to assess the status of in-service training in which vocational technical instructors of Oregon community colleges are participating. We have enclosed a draft of questions which may be asked of selected faculty.

May we have a roster of full time faculty members for the 1985-86 academic year in the areas listed below. They should have taught for over one year at your institution.

1. secretarial
2. welding
3. nursing
4. auto mechanics
5. heavy equipment diesel mechanics

Survey instruments will be mailed directly to each person. All replies will be confidential; neither individuals nor colleges will be identified in any reports. We will provide you a summary of the findings when they become available.

We would appreciate receiving the roster of these full time faculty by September 1, 1985, to facilitate our mailings.

We appreciate your support. If you have any questions, please call us at 754-2961.

questions, please call us at 754-2961.

Respectfully,

Warren N. Suzuki
Professor in Charge
Vocational Education
Studies Program

Michael C. Henich
Faculty, Auto/Diesel
Linn Benton
Community College

Send reply to Dr. Warren N. Suzuki
Department of Vocational
Technical Education
Oregon State University
Corvallis, OR 97331-2404

Appendix 2

Instrument Instruction Letter.

Appendix 2

School of Education

OSUWOSC

A merged School serving Oregon State University and Western Oregon State College with graduate and undergraduate programs in Education

November 14,1985

Dear Vocational Instructor:

Vocational educators are concerned with the quality of the programs provided to the students in Oregon community colleges. One of the concerns expressed by many vocational educators is the need to remain technically current as changes occur in their professional areas. The purpose of the survey is to determine the amount and the types of in-service training that instructors in selected programs are experiencing.

Your technical field has been selected along with others as a sample of vocational fields. We would appreciate your assistance in filling out the enclosed questionnaire. Your answers are needed for the survey results to be valid. There is no way we can substitute for the answers you provide.

Your response will be confidential. Your questionnaire is numbered only so that we can avoid sending reminders to you if you have already returned one. The results will be summarized by programs for all schools, not for individuals or for schools.

You need not answer any or all questions, however we believe that this survey is important in finding out more about how the in-service technical training needs of vocational instructors in Oregon community colleges are being met. Please fill out the your questionnaire and return it promptly in the enclosed postage paid envelope. Thank you for helping us.

Respectfully,

Warren N. Suzuki
Professor in Charge
Vocational Education
Studies Program

Michael C. Henich
Faculty, Auto/Diesel
Linn Benton
Community College

Appendix 3

Follow-up Postcard.

Appendix 3

School of education
Oregon State University
Corvallis, Oregon

November 20, 1985

Dear Vocational Teacher,

Last week a questionnaire was mailed to you seeking information about your in-service training and your institution's support of vocational education in-service.

If you have already returned the completed survey, please accept our sincere thanks. If you haven't, please do so right away. It is very important that your reply be included in the summary of the results so that it accurately represents the experiences of all vocational instructors in your field. Thank you.

Respectfully,

Michael C. Henich
Faculty, LBCC

Appendix 4

Instrument Follow-up Letter.

Appendix 4

School of Education

OSUWOSC

A merged School serving Oregon State University and Western Oregon State College with graduate and undergraduate programs in Education

November 27, 1985

Dear Vocational Instructor,

About three weeks ago we sent you a survey form that addressed in-service education for vocational instructors. We are attempting to determine the amount and patterns of vocational in-service education in Oregon community colleges. As of today we have not heard from you.

We need your help! For this study to truly reflect the vocational faculty of Oregon community colleges, it is essential that every person return their questionnaire. In the event that your questionnaire has been misplaced, a replacement is enclosed.

May we please have your questionnaire by December 13, 1985? Your cooperation is greatly appreciated.

Respectfully,

Warren N. Suzuki
Professor in Charge
Vocational Education
Graduate Studies

Michael Henich
Faculty Auto/Diesel
Linn Benton
Community College

Appendix 5

Nursing Study Instrument.

Appendix 5

The following questions will be used to determine the amount of technical in-service education you have received over the past five years. Technical in-service is defined as training you have completed that relates directly to the technical area in which you teach. In-service training is normally done without interrupting your normal teaching duties. Estimate the number of HOURS of in-service you have completed for each year. The questions also ask you to rate your institution's support of technical in-service training.

1. How many hours of technical or hospital in-service training have you received over the past five years?

   1980 1981 1982 1983 1984

   ____ ____ ____ ____ ____

2. How did you receive this training? (manufactures work shops, schools, reading, etc)

   ____

   ____

3. How did you find out about available training programs.

   ____

   ____

4. How many hours of other technical training have you received over the past five years? (Not including nursing training)

   1980 1981 1982 1983 1984

   ____ ____ ____ ____ ____

5. How many DAYS have you worked in your technical field in the past five years?

   1980 1981 1982 1983 1984

____ ____ ____ ____ _____

6. How many hours of college credit have you earned that are out side of your technical area over the past five years?

____

7. How many hours of college credit have you earned in how to teach or to improve your teaching?

____

8. Place an X above the year(s) showing the amount of technical change that has occurred in your field.

AMOUNT						
	Large					
	Medium					
	Small					
		1980	1981	1982	1983	1984

9. Place an X on the scale to rate your institution's system of providing salary increase for additional technical training.

None	Poor	Average	Above Average

10. Place an X on the scale to rate your institutions system of providing travel payments for expenses incurred as a result of technical in-service training.

None	Poor	Average	Above Average

11. Place an X on the scale to rate your institution's system for reimbursements for course tuition for technical in-service training.

None	Poor	Average	Above Average	

12. Place an X on the scale to rate your institution's system for reimbursements for housing and meals incurred during technical in-service training.

None	Poor	Average	Above Average	

13. Place an X on the scale to indicate your institution's system of providing you with time (exclusive of vacation time) to attend technical in-service training.

None	Poor	Average	Above Average	

14. Place an X on the scale to rate your institution's ability to help you to locate appropriate technical training to fill your needs.

None	Poor	Average	Above Average	

15. Have you needed technical training but felt the training being offered did not meet your needs?

Yes ______ No _____

16. Have you ever needed some technical training and were not able to find a training site?

Yes______ No______

17. Does your institution have a single contact person to coordinate your in-service training needs.

Yes________ No___________

18. Do you receive help in identifying training sights from anyone on the staff of your institution. (administrators, other faculty, etc.)

Yes -------- No----------

19. Your Age ________________

20. Your education level in years.

____

21. When did you last work full time in the technical field in which you now teach.

____

22. How many years have you been a full time teacher?

____

Appendix 6

Automotive Study Instrument.

Appendix 6

The following questions will be used to determine the amount of technical in-service education you have received over the past five years. Technical in-service is defined as training you have completed that relates directly to the technical area in which you teach. In-service training is normally done without interrupting your normal teaching duties. Estimate the number of HOURS of in-service you have completed for each year. The questions also ask you to rate your institution's support of technical in-service training.

1. How many hours of in-service training have you received in the repair of microprocessors controlled fuel and ignition systems in the following years?

1980	1981	1982	1983	1984
____	____	____	____	____

2. How did you receive this training? (manufactures work shops, schools, reading, etc)

____

____

3. How did you find out about available training programs.

____

__________ ____________________

4. How many hours of other technical training have you received over the past five years? (Not including the repair of microprocessors for fuel and ignition control)

1980 ____ 1981 ____ 1982 ____ 1983 ____ 1984 ____

5. How many DAYS have you worked in your technical field in the past five years when you were a full time teacher?

1980 ____ 1981 ____ 1982 ____ 1983 ____ 1984 ____

6. How many hours of college credit have you earned that are out side of your technical area over the past five years?

____

7. How many hours of college credit have you earned in how to teach or to improve your teaching?

____

8. Place an X above the year(s) showing the amount of technical change that has occurred in your field.

A Large |
M
O Medium |
U
N
T Small |___1980___1981___1982___1983___1984

9. Place an X on the your

14. Place an X on the acale to rate your institution's ability to help you locate appropriate technical training to fill your needs.

:	:	:	:	:
None	Poor	Average	Above Average	

15. Have you ever needed training but felt the training being offered did not meet your needs?

Yes ______ No ______

16. Have you ever needed some technical training and were not able to find a training site?

Yes ______ No ______

17. Does your institution have a single contact person to coordinate your in-service training needs?

Yes ______ No ______

18. Do you receive help in identifying training sites from anyone on the staff of your institution? (administrators, faculty, etc.)

Yes ______ No ______

19. Your age ____________

20. Your education level in years ____________

21. When did you last work full time in the technical field in which you teach?

____

22. How many years have you been a full-time teacher?

____

Appendix 7

Welding Study Instrument.

Appendix 7

#____

THE FOLLOWING QUESTIONS WILL BE USED TO DETERMINE THE AMOUNT OF TECHNICAL IN-SERVICE EDUCATION YOU HAVE RECEIVED OVER THE PAST FIVE YEARS. TECHNICAL IN-SERVICE IS DEFINED AS TRAINING YOU HAVE COMPLETED THAT RELATES DIRECTLY TO THE TECHNICAL AREA IN WHICH YOU TEACH. IN-SERVICE TRAINING IS NORMALLY DONE WITHOUT INTERRUPTING YOUR NORMAL TEACHING DUTIES. ESTIMATE THE NUMBER OF HOURS OF IN-SERVICE YOU HAVE COMPLETED FOR EACH YEAR. THE QUESTIONS ALSO ASK YOU TO RATE YOUR INSTITUTION'S SUPPORT OF TECHNICAL IN-SERVICE TRAINING

1. How many hours of in-service training have you received in welding over the past five years?

1980	1981	1982	1983	1984
___	___	___	___	___

2. How did you receive this training? (manufacturers' workshops, schools, reading, etc.)

____

3. How did you find out about available training programs?

____

4. How many hours of other technical training have you receiced over the past five years? (not including welding)

1980	1981	1982	1983	1984
___	___	___	___	___

5. How many DAYS have you worked in your technical field in the past five years? (including summer vacations)

1980	1981	1982	1983	1984
___	___	___	___	___

6. How many hours of college credit have you earned that are outside of your technical area over the past five years?

____

7. How many hours of college credit have you earned in classes about teaching methods or how to improve your teaching?

____

8. Place an X above the year(s) showing the amount of technical change that has occurred in your field.

A	Large	:					
M							
O	Medium	:					
U							
N	Small	:					
T							
			1980	1981	198	198	1984

9. Place an X on the scale to rate your institution's system of providing salary increases for additional technical training.

: : : : :

None Poor Average Above Average

10. Place an X on the scale to rate your institution's system of providing travel payments for expenses incurred as a result of technical in-service training.

: : : : :

None Poor Average Above Average

11. Place an X on the scale to rate your institution's system for reimbursements for course tuition for technical in-servie training.

12. Place an X on the scale to rate your institution's system for rembursements for housing and meals incurred during technical in-service training.

: : : : :

None Poor Average Above Average

13. Place an X on the scale to indicate your institution's system of providing you with time (exclusive of vacation time) to attend technical in-service training.

: : : : :

None Poor Average Above Average

14. Place an X on the acale to rate your institution's ability to help you locate appropriate technical training to fill your needs.

: : : : :

None Poor Average Above Average

15. Have you ever needed training but felt the training being offered did not meet your needs?

Yes ______ No ______

16. Have you ever needed some technical training and were not able to find a training site?

Yes ______ No ______

17. Does your institution have a single contact person to coordinate your in-service training needs?

Yes ______ No ______

18. Do you receive help in identifying training sites from anyone on the staff of your institution? (administrators, faculty, etc.)

Yes ______ No ______

19. Your age ______________

20. Your education level in years ______________

21. When did you last work full time in the technical field in which you teach?

____

22. How many years have you been a full-time teacher?

____

Appendix 8

Secretarial Study Instrument.

Appendix 8

The following questions will be used to determine the amount of technical in-service education you have received over the past five years. Technical in service is defined as training you have completed that relates directly to the technical area in which you teach. In-service training is normally done without interrupting your normal teaching duties. Estimate the number of HOURS of in-service you have completed for each year. The questions also ask you to rate your institution's support of technical in-service training.

1. How many hours of in-service training have you received in using microprocessors for word processing over the past five years?

1980	1981	1982	1983	1984
___	___	___	___	___

2. How did you receive this training? (manufactures work shops, schools, reading, etc)

____

3. How did you find out about available training programs.

____

____

4. How many hours of other technical training have you received over the past five years? (Not including the use of microprocessing for word processing) control)

1980	1981	1982	1983	1984
___	___	___	___	___

5. How many DAYS have you worked in your technical field in the past five years?

1980	1981	1982	1983	1984
___	___	___	___	___

6. How many hours of college credit have you earned that are out side of your technical area over the past five years?

____

7. How many hours of college credit have you earned in how to teach or to improve your teaching?

____

8. Place an X above the year(s) showing the amount of technical change that has occurred in your field.

A Large |
M
O Medium |
U
N |
T Small |
1980 — 1981 — 1982 — 1983 — 1984

9. Place an X on the scale to rate your institutions system of providing salary increase for additional technical training.

| | | | |
None Poor Average Above Average

10. Place an X on the scale to rate your institutions system of providing travel payments for expenses incurred as a result of technical in-service training.

| | | | |
None Poor Average Above Average

11. Place an X on the scale to rate your institution's system for reimbursements for course tuition for technical in-service training.

None	Poor	Average	Above Average	

12. Place an X on the scale to rate your institution's system for reimbursements for housing and meals incurred during technical in-service training.

None	Poor	Average	Above Average	

13. Place an X on the scale to indicate your institution's system of providing you with time (exclusive of vacation time) to attend technical in-service training.

None	Poor	Average	Above Average	

14. Place an X on the scale to rate your institution's ability to help you to locate appropriate technical training to fill your needs.

None	Poor	Average	Above Average	

15. Have you ever needed technical training but felt the training being offered did not meet your needs?

Yes ____ No ____

16. Have you ever needed some technical training and were not able to find a training site?

Yes____ No ____

17. Does your institution have a single contact person to coordinate your in-service training needs.

Yes________ No______

18. Do you receive help in identifying training sights from anyone on the staff of your institution. (administrators, other faculty, etc.)

Yes ______ No______

19. Your Age __________

20. Your education level in years.

____

21. When did you last work full time in the technical field in which you now teach.

____

22. How many years have you been a full time teacher?

____

Appendix 9

Discriptive statistices on factors considered in discriminant analysis

Appendix 9. Descriptive statistics on factors considered in discriminant analysis.

Factors	N	$\bar{X}$	S
College credit earned	143	10.75	19.10
Provide salary increases	140	1.92	1.10
Provide travel pay	143	2.72	.96
Provide course tuition	143	3.67	2.58
Provide housing and meals	143	2.62	1.14
Time	142	2.72	1..07
Ability to locate training sites	141	2.24	1.24
Contact coordinator	137	1.97	.49
Training site availability	140	.45	.50
Educational attainment	136	16.97	2.21
Years as full time teacher	137	12.74	5.61

Appendix 9 continued.

Pearson correlation coefficient for factors
in discriminant analysis.

r
N
P

Factors	1	2	3	4	5	6	7	8	9	10	11	12
1. College credit												
2. Salary	-.01 140 .42											
3. Travel	.01 143 .44	.23 140 .00										
4. Tuition	.10 143 .11	.00 140 .49	.32 143 .00									
5. Housing/ meals	.01 143 .44	.22 140 .00	.69 143 .00	.43 143 .00								
6. Time	.01 142 .41	.20 139 .00	.38 142 .00	.23 142 .00	.62 142 .00							

Appendix 9 continued

	1	2	3	4	5	6	7	8	9	10	1
7. Locate training sites	-.03 141 .34	.20 138 .00	.19 141 .01	.20 141 .00	.38 141 .00	.46 141 .00					
8. Contact coord/inator	.00 127 .48	-.04 134 .29	.21 137 .00	.02 137 .38	.10 137 .10	.05 136 .27	.00 135 .50				
9. Training site available	-.17 140 .01	.01 137 .41	-.05 140 .25	.05 140 .26	-.08 140 .17	-.13 139 .05	-.12 138 .07	-.03 136 .32			
10. Age	.06 133 .21	.01 130 .43	.09 133 .12	.11 133 .09	.06 133 .24	.09 132 .12	.02 131 .36	.16 133 .02	-.06 132 .24		
11. Education level	.09 136 .14	.05 133 .26	.00 136 .48	-.20 136 .00	.01 136 .42	.12 135 .02	.03 134 .35	.06 135 .21	-.11 135 .09	.12 132 .07	
12. Years full time teacher	.03 136 .39	-.01 134 .12	.00 137 .48	.06 137 .23	-.05 137 .24	.02 136 .37	-.07 135 .19	.20 136 .00	.08 136 .16	.33 133 .00	