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ABSTRACT

Teacher education institutions need to accept responsibility for helping to keep vocational and technical teachers technically current. The University of Minnesota is helping inservice teachers keep up-to-date in three ways. The largest number of teachers have been served through short technical workshops. The workshops have covered a wide variety of topics and have been taught by instructors from industry who received help in developing instructional plans and materials. The State Department of Education has provided money for the workshop coordinator's position and has subsidized the cost of the workshops. Teachers also enroll in internships that refer to industrial employment in the teacher's field of specialization. The state of Minnesota pays the essential costs, including hiring of a substitute teacher and extra travel. Inservice teachers can also utilize a variety of other learning experiences through independent studies. Independent studies can center on participation in manufacturers' service schools, attendance at a trade show, travel, research and writing, and consulting. Some principles can ensure the quality of a learning experience. These include careful planning, analysis of need, statement of objectives, use of the community as a resource, integration of the technical updating into teaching, and evaluation of outcomes. (YLB)

KEEPING TEACHERS' TECHNICAL SKILLS UP-TO-DATE

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Changes in technology and the effect of these changes on education are well documented. Teachers in academic subjects, as well as those who prepare students for work are challenged to keep the content of their courses up-to-date. Vocational and technical teachers are expected to produce graduates who can step into jobs and return a financial gain to their employers within a short period of time. These expectations require that teachers understand the advanced concepts in their fields.

Traditionally, the responsibility for remaining current has fallen to the teacher alone. Today, the size of the problem of keeping technical skills up-to-date requires that the teacher be supported by others. As a result, state departments of education, equipment vendors, teacher education institutions and others are taking a more active part in technical updating. The teacher's technical competency is not just a matter of the teacher's credibility, it is also a matter of the school's and vocational and technical education's authenticity. The public wants to know that we can deliver what we claim that we can.

In many instances, teacher education institutions have not accepted responsibility for helping to keep inservice teachers technically current. Their thrust has been to provide instruction in pedagogy and to develop individuals for educational leadership positions. Teachers were expected to survive, technologically, on the basis of the skills they had developed through the occupational experience they brought with them to the teaching position. Teacher education institutions need to become partners in helping vocational and technical teachers to develop new technical abilities.

Vocational and technical teachers are curious about developments in their fields of work and they want to know about evolving ideas. It is often frustrating to these teachers because they do not have access to learning about the developments that they want to know.

During this presentation, I will describe three ways in which we are participating to help vocational and technical teachers keep up-to-date. These are: technical workshops, internships, and independent study. In examining these, I will describe some principles that can help to assure that these are productive experiences.

Technical Workshops

The largest number of teachers have been served by us through technical workshops. These workshops have been focused on specific topics and have been short in duration. The most frequently offered workshop has been on computer assisted drafting. They have been taught at two levels--for beginners and for those with more advanced skills. Each of these workshops has been conducted in one, eight-hour day. Most of the computer assisted drafting workshops have been taught by a University faculty member in mechanical engineering. One University credit (quarter credit) has been given for each workshop. In addition to attending the workshop session, the inservice teachers are responsible for completing a project in which they integrate the content into their own teaching.

Workshops have been offered on a wide variety of topics. These have included computer numerical control milling, automotive emissions control, chain saw maintenance, machine wood carving, IEEE, and diesel engine tune-up. There is no prescribed limitation to the topics that we will consider using for a workshop, if teachers that we serve have a need for it.

The planning that occurs before a workshop is held is a major determinant

of the success of the workshop. Gaining a measure of the need for a particular workshop is critical but imprecise. We try to use more than one estimation of need, The supervisors in the State Department of Education are consulted, requests by individuals are considered, need surveys are conducted, and direct contacts are made with the vocational and technical teacher's association. It is desirable, too, for those who are being served to feel some ownership of the workshops. This will improve the response to the workshops. If teachers have a significant influence in determining what workshops will be scheduled, they will be more possessive of them.

For each workshop there must be stated learning objectives, a plan for instruction, hands-on learning activities, and an evaluation of learning. The instructors are usually from industry and many are not experienced in teaching. For this reason we provide them with help in developing the necessary instructional plans and materials.

Most of the industrial representatives have been good instructors, some are outstanding. The help they have needed has been in developing appropriate hands-on learning activities and in soft pedalling their selling instincts. Many companies provide instructors free of charge and they realize the benefits of not trying to sell their product during a workshop. A sales pitch by an instructor seems to have a negative effect on individuals who have paid tuition to receive instruction.

The location of workshops has varied according to the subject matter and instructor. Industrial sites are often used because of the availability of equipment needed for learning activities. The Industrial Education laboratories and other University facilities have been used too.

A one-half time workshop coordinator is employed by the University to conduct workshops in Industrial Education. The coordinator's responsibilities

include identifying needed workshops, recommending instructors, assisting in organizing content, developing announcements and mailing lists, evaluating integrating projects, arranging physical facilities, evaluating workshops, and other assorted but related functions. The workshop coordinator needs to be dedicated to delivering instruction that will fill the needs of the individuals who attend. The coordinator must also relate to the constituency group so that they feel a responsiveness to their needs.

The State Department of Education has accepted responsibility for the technical updating of vocational and technical teachers. This commitment is expressed in money provided for the workshop coordinator's position and in subsidizing the cost of the workshop. Tuition paid by students does not cover the expense of all of the workshop. The State Department has agreed to support workshops for as few as ten individuals. This helps assure that there are workshops available in fields that have relatively small numbers of teachers.

Internships

As used here, internships refer to industrial employment in the teacher's field of specialization. These internships are most popular during the summer months, but with more schools operating year around, that is changing. Those who enroll in the internships are responsible for finding their own employment. The purposes to be achieved through the internship are written by the intern and are agreed to by the employer and University coordinator. This is a crucial step since it sets the direction for the internship. It helps to communicate to intern and employer that priority in the internship is to be given to learning.

During the period of the internship the intern completes weekly report forms, signed by the on-the-job supervisor, and submits them to the coordinator.

These reports ask the intern to describe new skills that have been used, interpersonal relationships as between employer and employees and employee to employee, and number of hours worked. Inservice teachers sometimes return to former employers for an internship. They often report how they observe things about the job that they never noticed before because of the weekly report forms they must complete.

University credits for internships are granted on the basis of hours on the job. The ratio that we have used is 1 to 100. The internship coordinator makes periodic visits to the job site. This is a good opportunity to interact with the employer.

Preplanning and supervision in an internship distinguish it from other occupational experience. There are occasional requests to grant internship credit for previously completed occupational experience. We have not done this because we cannot have the assurances of quality that are permitted by a preplanned, supervised experience. In recognition of this, Minnesota recognizes each internship hour completed as equivalent to two hours on the job for purposes of vocational licensure.

Since Fall 1983, the State of Minnesota has sponsored industrial internships for vocational and technical teachers. In doing this they are paying the essential costs of participating in an internship. This includes hiring a substitute teacher and extra travel. The State sponsorship of internships is off to a modest start and it is being evaluated carefully. It is expensive and it is difficult to reach large numbers of teachers. It does, however, provide for an indepth learning experience that is not always available.

Independent Study

There are many other learning experiences that are available to inservice

teachers that can help them to update their technical skills. These can be arranged for through independent studies wherein one teacher works with one teacher educator. The objectives and learning activities of the independent study are agreed to in advance. After this, the teacher engages in the activities necessary to complete the independent study and reports back to the teacher educator at the conclusion.

There are many technical updating experiences that are appropriate for independent study for vocational and technical teachers. The manufacturers of many products operate their own service schools for the purpose of keeping their field service representatives current with the product line. These same service schools can meet the needs of vocational and technical teachers. Another valuable learning experience can be attendance at a trade show. In that setting it is possible to see the product line of many vendors in a field and to learn about the latest advances in equipment, materials, and techniques. Trade shows often include other presentations such as the one we are participating in now.

Independent studies can also be centered on travel, research and writing, consulting, and other selected activities. Those activities that become good independent studies are distinguished from the others, in part, by the planning. There is no reason that a person couldn't engage in the activities described here without interacting with a teacher educator. What the teacher educator can add is help in focusing the experience through the planning. Instead of a casual trip to the store, a planned independent study is like going to the store to make a specific purchase. When there are stated purposes for the independent study, they help the inservice teacher to direct effort toward the achievement of those purposes. This will change the nature of the learning experience and it should, if done well, make it more valuable.

An independent study should attend to the use of any newly acquired technical skill and knowledge in the classroom. Part of an independent study may be revisions of lesson plans, alterations in facilities, purchase orders for new equipment, new learning activities for students, or the identification of community resources to supplement instruction.

Independent study offers diversity of learning experience and it accomodates the needs of the individual inservice teacher. It also requires that the teacher search out good learning experiences and make the necessary arrangements to participate. The amount of effort required of the inservice teacher will vary according to the activity planned. For example, it will probably take more effort to develop a good travel plan than it will to attend a trade show.

Independent study provides a means of serving individualized needs. It is not always possible to form class size groups for technical updating. There are some vocational and technical fields with small numbers of teachers and the needs of teachers in any field are not necessarily homogenious.

Quality Assurance

The technical updating opportunities described here are not exhaustive but they provide some examples. They also give us a chance to look for some principles that help to assure the quality of the learning experience. These principles can be applied when conducting workshops, internships, and independent studies. They can also be tested for their applicability to other learning experiences.

1. It is difficult, if not impossible, for inservice teachers to carry the responsibility of technical updating by themselves. State departments of education, school districts, teacher

associations, teacher education institutions, and industry are organizations that can share the responsibility.

2. Any technical updating experience should be carefully planned. The planning accomplished will have an impact on the outcomes of the experience.
3. A careful analysis of need should precede a technical updating experience. Those who plan workshops should interact with those they intend to serve. Inservice teachers who are planning internships or independent studies should analyze their own needs.
4. Based on the analysis of need, objectives for the technical updating should be carefully stated. These objectives can direct the learning outcome.
5. The learning mode should fit the circumstances of the technical updating needed. Workshops cannot be conducted efficiently for single teachers. But, some industry resources are available for workshops but not individuals.
6. Be selective in the learning experience used. This means selecting instructors who know the subject matter for workshops or picking internship sites that will accommodate personal learning objectives.
7. Use the community as a resource for technical updating. There is no single best source for the knowledge and skill needed by vocational and technical teachers.
8. For the benefits to vocational and technical students to be optimized, teachers need to give attention to integrating the technical updating they receive into their teaching.

9. The outcomes of technical updating experiences should be evaluated against the learning objectives specified. The learning accomplished by the inservice teacher should be assessed and the quality of the learning experience evaluated.

As time goes on, we can expect to see an increase in the variety of technical updating experiences available. Teachers are taking more control over their own inservice education and the location of the education is often shifting from teacher education institutions. Other resource bases have opened in industry, school districts, and state departments of education. All of these can be used to develop more productive technical updating experiences.