Articles

In-Service Activities for Technology Education: The Role of Colleges and Universities

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Many exciting technology education programs are being developed and implemented across the United States. State-wide implementation of technology education has occurred in a number of states such as New York, Illinois, Virginia, and Indiana. Additionally, well publicized regional technology education programs have emerged in locations as diverse as Delta, Colorado, and Pittsburgh, Kansas. These and many other efforts toward implementation of technology education have aroused wide interest in the study of technology and have contributed to the rapid growth of contemporary curriculum materials.

The process of implementing technology education curricula is a complex undertaking that requires an adaptation of philosophy, curriculum, and instructional practices. The dissemination of these new educational ideas and practices is largely contingent upon effective in-service professional development programs (Boser, 1991; Cordeiro, 1986; Wilkinson, 1990). In order for the technology education profession to move forward, practicing teachers of technology education require continually updated information on curriculum, methodology, and technology to allow them to make philosophical and programmatic changes that augment technology education.

Colleges and universities have traditionally facilitated this dissemination process. Further, institutions that provide contemporary pre-service technology teacher education are in a unique position to offer effective professional development programs. University personnel at these institutions are aware of state-of-the-art technology programs and instructional methods. The linkage between the university and practicing teachers is obviously mutually beneficial. Through collaboration, in-service programs may be developed that meet current needs while continually moving the local technology program toward the most contemporary examples of technology education.

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Purpose of the Research

The purpose of this research was to ascertain the extent to which colleges and universities are integrating contemporary technology education curriculum activities into in-service programs. By identifying the degree of involvement and types of technology education in-service activities currently being delivered by colleges and universities, workshop planners in teacher education, state departments, or classrooms, may have a research base from which to design more effective in-service activities.

The following research questions were investigated:

1. To what degree are colleges and universities involved in delivering contemporary technology education in-service activities?
2. What type of in-service activities are offered to teachers by colleges and universities?
3. To what extent are colleges and universities integrating contemporary technology education curriculum activities into teacher in-service programs?
4. What methods are used to deliver technology education in-service activities?

Research on Effective In-service Programs

Colleges and universities have long provided in-service activities for teachers. Richey (1957) observed that teacher educators in “normal schools” were involved in professional development activities in the early 19th century. More recently, research on in-service practices has focused increased attention on its contributions to curriculum change. Guskey (1986) reviewed research on effective schools and singled out quality professional development as an essential component of effective instruction.

Although in-service and staff development activities have begun to be mandated at many local and state levels (Duttweiler, 1988; Mulhern & Buford, 1986), contractual agreements are not usually the primary reason for teachers taking part in the staff development. Guskey (1986) pointed out that even though in-service participation may be contractually required, most teachers seek professional development to improve their classroom performance.

The development of effective in-service programs requires extensive planning, careful delivery, and follow-up of the participant's success in the teaching setting. Lambert (1988) asserted that in-service must do more than give teachers information, demonstrate innovations, and/or provide guided practice. To be effective there must be opportunities for teachers to practice and receive feedback and coaching in the field.

The lack of effective practice, feedback, and coaching in the field has been a major flaw in the in-service model that has been perpetuated by workshop presenters over generations. However, Browne and Keeley (1988) indicated that effective follow-up is a problem often overshadowed by poor presentation

planning and methodology. The authors suggested that the lecture method of instruction is an overused presentation method used primarily because of ineffective planning. Browne and Keeley recommended that instead of relying on lectures to convey information teachers need "time to design a plan for how the suggested improvement could be integrated into their classroom" (p. 98).

Guskey (1986) suggested that effective in-services must also provide teachers with knowledge and skills that they perceive as potentially useful in expanding their teaching capabilities. Further, Cordeiro (1986) avowed that effective in-service is predicated on the delivery of immediately useful teaching materials and methods. Cordeiro observed that practitioners look for things that work, and ideas that can be put into practice in the classroom the next day. The author also suggested that workshops that feature theoretical content are often poorly attended.

While Cordeiro (1986) and Guskey (1986) suggested that teachers prefer workshops that focus on the tricks-of-the-trade, there is also need for in-service to address concepts such as philosophy or curriculum development to spur initial program changes. As LaRose (1988) noted, in-service must meet the needs of both teachers and the institution. For institutional or curriculum change to take place, in-service may have to emphasize more than just instructional nuts and bolts.

Finally, some research suggested that effective in-service programs provide teachers with financial support or release time. Lodge (1989) indicated that it is important that teachers receive the monetary, time, professional and social support needed to accomplish the in-service goals. Boser (1991) found that participants in the state-wide implementation of technology education programs in New York and Illinois recommended that teachers be paid for attending in-service programs.

The research reviewed suggests that much is known on how change occurs in education and the role that in-service can play in supporting change. If the implementation of technology education is to increase nationally, one would expect to find the components of effective in-service present in college, university, state, and regional program offerings.

Methodology

A questionnaire was developed, pilot tested, and mailed to selected colleges and universities that graduated five or more technology education teachers in 1991. One of the difficulties of assessing the degree of in-service activity specifically occurring in technology teacher education is the identification of institutions that are actually preparing teachers of "technology education." However, it is not always easy to distinguish between programs that prepare teachers of technology education as opposed to those programs preparing traditional industrial arts teachers. Householder (1992) addressed this problem in a

recent survey designed to ascertain the number of graduates of technology education programs available for teaching positions in 1992. As part of the study, Householder identified a population of institutions that specifically prepare teachers of technology education. In order to survey institutions actively involved in technology teacher education and thereby develop a portrait of contemporary in-service activity, institutions selected for inclusion in this study were among those colleges and universities identified by Householder as graduating five or more Technology Education teachers in 1991.

Due to the relatively large size of the sample and the national scope of the study, a mailed questionnaire was selected as the most reliable, valid, economical method of obtaining information (Fink & Kosecoff, 1985). The questionnaire was pilot tested at 15 regional technology teacher preparation institutions. Twelve of the 15 pilot questionnaires were returned and appropriate adjustments and corrections were made to the questionnaire. The revised questionnaire was then mailed to the 50 selected institutions.

Results and Discussion

Of the 50 institutions surveyed, 35 questionnaires were returned. Of these 35 questionnaires returned (70%), three institutions reported no in-service activity in the past year and three questionnaires were returned but not completed. In total, 29 useable questionnaires were returned for a response rate of 58%. Each of these 29 institutions reported sponsorship of at least one in-service activity in the past year.

Responding institutions were located in at least 22 states (one questionnaire could not be identified by state). Due to the fact that few states have more than one institution which met the sample selection requirement of five or more graduates per year in technology education, no attempt was made to sort the data by state. Table 1 lists the number of in-service activities reported by the institutions.

Table 1

Number of In-service Sessions Offered by Responding Institutions (n=29).

In-services Offered	Number of Institutions	Percent of Institutions
1-3	9	31%
4-6	9	31%
7-9	2	7%
≥10	9	31%

Coordination of In-service

Two survey items attempted to determine the degree of involvement colleges and universities have in organizing in-service activities. Specifically,

survey items asked, “Who coordinates the in-service program in your state?” and “Who typically leads those workshops?”

Fifty five percent (*n*=16) of responding institutions reported a coordinated program of Technology Education in-service in their state. Program coordination used a variety of formats which often involved a cooperative effort between a State Department of Education and a university or college, and/or the state or professional association (*n*=9). Five institutions reported that a government department was the sole coordinating agency in their state, and in two instances a university was identified as the state coordinating agency. These findings indicate that universities and colleges appeared to be active partners in delivering in-service activities in their states.

University personnel were very active in the leadership of in-service and professional development. As indicated in Table 2, 27 of 29 institutions offered in-service sessions lead by university personnel (93%). Not listed on Table 2 bbut specifically mentioned in the “Other” category were: (a) State Department of Education personnel, (b) university personnel and/or graduate student support, and (c) representatives from various areas of education such as the district superintendent.

Table 2

Leadership of In-service Events (Respondents checked all that applied. Maximum n=29 in any category).

In-service Leader	Number of Institutions	Percent of Institutions
University personnel	27	93%
Classroom teacher	16	55%
Business or industry personnel	9	31%
Consultant	9	31%
Other	3	10%

Type of In-service Activities

To understand the goals of current in-service activity and to determine the degree of change toward new technology education content, respondents were asked to indicate which of the listed elements of change were the focus of their in-service programs. The major focus of in-service activities is reported in Table 3. Technology update sessions (*n*=25) and curriculum development (*n*=24) were the most common focus of in-service programs. Only 14 institutions reported conducting sessions focusing on the philosophy of Technology Education. This may indicate that, in many areas, teachers have an understanding of the philosophy of technology education (usually a first step in

the implementation process) and that in-service events can now devote increasing amounts of time to issues such as curriculum implementation.

Table 3
Major Focus of In-service Events. (Respondents checked all that applied. Maximum n=29 in any category.)

Focus of In-service	Number of institutions	Percent of Institutions
Technology update	25	86%
Curriculum development	24	83%
Student learning activities	19	66%
Teaching methods	18	62%
Curriculum integration (Math, Science, & Tech.)	16	55%
Philosophy	14	48%
Other (Classroom research)	4	14%

In-service Topics

The 29 responding institutions collectively reported 74 specific in-service topics that spanned a wide range of contemporary issues in technology education from "action labs" to "using Lego educational products." Consistent with the emphasis noted on technology update in-service activities, the majority of topics were designed to expand teachers knowledge and skills in technological areas. Many of these technology update topics specifically addressed computer applications and operation. In-service topics most often mentioned by the respondents included: robotics (7), Principles of Technology (6), CAD (4), integrated academics or mathematics, science, and technology integration (4), CNC (3), desktop publishing (3).

Selection of In-service Content

Respondents reported that in-service topics were typically selected and planned with teacher involvement. Institutions reported various forms of teacher participation. Specifically mentioned were (a) direct teacher input (n=23), (b) workshop committees (n=6), (c) a district teacher meeting (n=1), and (d) collaboration between university faculty members, school district administrators, and teachers. The second most common approach was to have the content determined by university personnel (n=22). Other sources for the selection of in-service content were state plans (n=9), conceptual framework for technology education (n=3), and grant programs (n=1). The majority of in-service topics are determined by teachers or university personnel and not specifically selected through the guidance of a state plan or conceptual framework.

Instructional Methods

Modeling is a meaningful educational practice, therefore it is important to understand the types of instructional methods used to deliver in-service activities. In keeping with the traditions of technology education, both hands-on activities and demonstrations were frequently mentioned instructional delivery methods. Perhaps reflecting the philosophy of technology education, small group activities were also widely used. The venerable lecture obviously still has a place for delivering information quickly to large groups. Methods that were mentioned under the "Other" category included independent study, practicum, and technical occupational experience. Instructional methods used for the delivery of in-service events are reported in Table 4.

Table 4

Instructional Methods Used at In-service Events. (Respondents checked all that applied. Maximum n=29 in any category.)

Methods	Number of Institutions	Percent of Institutions
Hands-on activities	27	93%
Small groups	25	86%
Demonstration	22	76%
Lecture	18	62%
Seminar	13	45%
Other	6	21%

Scheduling Format

Nineteen institutions (65.5%) reported that in-service credits were required by teachers for continuous certification in their State. In attempting to meet this demand, institutions reported using a number of scheduling formats to deliver in-service programs. By far the most common vehicle used for in-service was summer workshops, which were offered by 93% (n=27) of the responding institutions. College credit was reported to be available for summer workshop participants in 66% of institutions. College credit was also available for all continuing education programs (n=7), and 87% of in-service events scheduled on weekends. Additional formats reported were: (a) spring conferences, (b) local association meetings, (c) consultation sessions, (d) occupational experiences, and (e) individual independent studies. A listing of the in-service formats is presented in Table 5.

Table 5

Type of In-service Delivery Format Used by Colleges and Universities. (Respondents checked all that applied. Maximum n=29 in any category.)

Type of In-service Delivery Format	Number of Institutions	Offered for Credit
Summer workshop or course	27	18
Teacher in-service/institute day	14	2
Weekend	8	7
After school workshop	9	3
Continuing education	7	7
Other	4	0

Attendance

Nineteen of the 29 institutions estimated average attendance at workshops to be in the range of 11-20 participants. Another seven institutions estimated attendance between 21-30 participants. Of the remaining three institutions, one reported less than 10 participants, while the two counted more than 30 teachers in attendance at workshops. Average attendance was 18.7 participants.

The objective of the questionnaire was not to find out the total number of teachers served by in-service events, however some insight can be gained from the responses of these institutions. By using the most conservative estimate of the total number of in-service events offered (n=149, see Table 1), times the average number of participants (n=18.7), one can estimate that approximately 2790 teachers were served by this group of institutions.

Financial Responsibility

The data suggested that 66% of colleges and universities are financially responsible for at least some of the in-service events they offer. State departments of education played a role in funding in-service at 41% of the institutions. One institution, which reported delivering more than 10 in-service activities, stated that grant or project monies paid for most activities. Given ever shrinking college budgets and the reported high level of institutional funding of in-service activity, one begins to wonder if budget reductions are also reducing the number of in-services offered. Or, perhaps the financial sponsorship reported by institutions more accurately reflects graduate courses in technology education. Declining funding of higher education in many states could be a significant problem in the future. A listing of the agencies responsible for funding in-service events is presented in Table 6.

Table 6
Agency Financially Responsible for In-service Activities. (Respondents checked all categories that applied. Maximum n=29 in any category.)

Agency Financially Responsible	Number of Institutions	Percent of Institutions
College or University	19	66%
State department	12	41%
Grant funding	7	24%
Local school district	2	7%
Technology Education Association	1	3%

Outcomes of In-service Activities

Respondents were asked to evaluate the outcomes of the in-service activities based on actual classroom observation or follow-up studies of participants. For example, did the in-service result in a change of classroom practice? Twenty-four of the respondents completed this section. Fourteen institutions (48%) reported that the materials or instructional practices presented at the workshop had been implemented by participating teachers. Nine (31%) institutions noted that changes in practice had been observed and one institution reported that the outcome of their in-service was unknown.

On a yes-no question, 11 institutions reported that data had been gathered on the effectiveness of any in-service activities offered during the past year and 18 (65%) reported no follow-up activity. Types of follow-up included after session evaluation forms and follow-up questionnaires to teachers. Of those institutions that reported no follow-up workshop evaluation, one respondent noted that the office of continuing education fulfilled this function.

Although respondents indicated that changes had occurred as a result of in-service programs, it is unclear how respondents arrived at this conclusion or how many teachers actually implemented the content. Further, the majority of institutions did not collect data on the effectiveness of their in-service offerings. Therefore, reports that instructional changes had occurred as a result of attending workshops are not necessarily supported by documentation.

Participant Support

The last area explored in this study was the way in which classroom teachers were supported or reimbursed for attending in-service activities. Typical types of support included release time, travel reimbursement, and paid substitute teachers. Other forms of teacher support noted by respondents included "recertification points," and software manuals, such as AUTOCAD, provided by vendors. Almost half of the institutions reported "no support" for participat-

ing teachers. Table 7 presents a tabulation of the ways in which teachers were supported and the source of that support.

Table 7

Types of Financial Support Provided to Teachers For Attending In-service Activities (Respondents checked all categories that applied. Maximum n=29 in any category.)

Type of Support	School District	State	Grant	Other	Totals
Release time	9	2	1	1	13
Travel expenses	8	4	2	0	14
Paid substitutes	9	2	1	0	12
No support					14

Conclusions

Colleges and universities that are active in pre-service technology teacher preparation are actively involved in in-service and professional development for classroom teachers. The in-service activities provided by this group of institutions typically emphasized new technologies and teaching methods consistent with contemporary directions in technology education.

While university personnel assumed the leadership role in a large majority of in-service events, topics were usually selected and planned with some form of classroom teacher input. Teacher input is obviously critical to the development of effective in-service. As Guskey (1986) noted, teachers who participate in in-service look for knowledge and skills that can potentially expand their teaching capabilities. Thus, the solicitation of teacher input keeps in-service content on-track with teacher needs.

Summer workshops and teacher institute days were the most common formats for the delivery of in-service professional development. Although these types of sessions are commonly used to initiate program improvements, researchers such as Browne and Keeley (1988) and Lambert (1988) suggested that continued on-site follow-up is required if teachers are to adopt changes in classroom practice. It appears there is a need for colleges and universities to develop long term relationships with in-service participants.

Related to the idea of long-term relationships with participants, it was found that little follow-up and evaluation of the effectiveness of in-service activities is occurring. Follow-up is important for at least two reasons: (a) to ascertain whether the desired educational outcomes are being achieved, and (b) to indicate if money spent on in-service actually made a difference in teaching practices. Two-thirds of the institutions reported assuming some of the finan-

cial responsibility for in-service activities. Effective follow-up may assure that this money is spent wisely.

Another possible cause for concern is that approximately one-half of the institutions offered in-service sessions with no monetary or release time support of teachers who attend in-service professional development activities. This is not consistent with recommendations by authors such as Lodge (1989) who indicated that it is important that teachers receive the monetary, time, professional and social support needed to accomplish the in-service goals.

Recommendations for Practice

Based on the conclusions of this study the following recommendations were derived:

1. In order for the technology education profession to receive the best value for scarce in-service resources, colleges and universities that offer activities must begin to implement a more effective means of evaluation and follow-up.
2. Providers of in-service programs may consider varying the location and timing of programs and offering workshops at nominal (or no) cost to attract greater numbers of teachers or a different segment of teachers other than those served by current arrangements.
3. Given continual pressure on institutional budgets, colleges and universities need to find ways of funding in-service on a consistent basis, independent of institutional funding.

Two additional items deserve some consideration. In conducting this study the researchers found limited information on in-service practices in technology education. Therefore, it would be helpful if results from successful in-service programs were disseminated in widely read publications such as *The Technology Teacher*. This could serve to promote and share effective in-service methods.

Further, several of the written comments by respondents suggested an emphasis on in-service activities that promote teachers-teaching-teachers. It seems logical then, that college and university personnel need to collaborate with other stakeholders in technology education to develop strategies to increase the involvement of technology education teachers in the planning, presentation, and evaluation of in-service activities.

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