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A Model of Teacher Professional Development to Support Technology Integration

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The purpose of this article is to report on the professional development model of the Teacher Institute for Curriculum Knowledge about Integration of Technology (TICKIT). This article will situate the TICKIT model with past findings from professional development research, and provide researchers and practitioners facilitating future programs advice based on our findings. TICKIT is an inservice yearlong professional development program for teachers from rural schools with the goal of fostering thoughtful infusion of educational technology into the K-12 curricula. The program was based at the School of Education at Indiana University Bloomington campus from 1999-2003. As a result of the five years experience, we have identified program characteristics that are critical to teachers successfully accomplishing their technology integration goals. These program characteristics include: (a) classroom-based curriculum projects, (b) teacher choice, (c) systematic reflection on practice, (d) reports by teachers of their work to other professionals, and (d) impact by teachers on others in their schools. Additionally, we provide several lessons learned from TICKIT that are

relevant to other technology professional development programs.

This article describes the Teacher Institute for Curriculum Knowledge about Integration of Technology (TICKIT) and identifies key characteristics of its professional development model. The goal of this report is to share the TICKIT model and findings so that future researchers and practitioners can use them to replicate or adapt to their programs. While we compare our program model to general ideas from the professional development and staff development literature, the creation of this model relied primarily on own experience taking a design experiment approach (Collins, 1999). We focused our research and development efforts to examine what professional development models work within the context of TICKIT and its participants.

We began our model development process by identifying characteristics of Apple Classrooms of Tomorrow (ACOT) (Fisher, Dwyer, & Yocam 1996; Sandholtz, Ringstaff, & Dwyer 1997). The initial TICKIT model incorporated principles from ACOT described in Yocam (1996), which include: (a) professional development activities ought to be situated in the classroom; (b) teacher participants should attend in teams of two to four members from the same school; (d) professional development activities ought to incorporate a constructivist learning approach; (e) participant teachers ought to engage in conversations and reflections regarding their teaching practices, their students, learning theories, technology, and how their teaching practices can be changed; (f) teacher participants ought to develop technology integrated lessons or units that can be implemented in their own classrooms; and (g) teacher participants need to be provided with support after they finish the program. Additionally, as a means for building practical teaching knowledge TICKIT participants were required to engage in action research and systemically reflect on their practice.

DESCRIPTION OF TICKIT

Program Overview

In the five years of TICKIT we worked with 133 teachers representing 18 school systems, supported over 250 completed classroom technology integration projects. We worked in partnership with rural southern Indiana teachers from all subject areas intended to increase their knowledge and

proficiency in integrating technology in their classrooms. During the first two years the program was open to teachers at all grade levels. However, the terms of the grant supporting the third and subsequent years restricted us from including teachers from all grade levels and we had to include at least 60% high school teachers with no more than 40% middle school teachers.

Approximately 25 teachers were recruited each year in groups of five from five school districts. Criteria for selection evolved throughout the years, and included: (a) commitment of individual teachers, (b) commitment by leadership of the individual school buildings and school districts, and (c) sufficient technology infrastructure and budget, including professional development funds.

The end goal of TICKIT was to provide year-long support to teachers who were attempting to successfully integrate technology into the curriculum. Additionally, TICKIT was designed to create school leadership cohorts to support other non-TICKIT teachers with technology integration. TICKIT staff provided support to participants by sustained assistance in classroom application of technology integration knowledge. We provided our assistance through school and university based workshops and informal interaction with participants throughout the year.

Program Structure

TICKIT participants enrolled in a three-credit graduate course in both fall and spring semesters of an academic year, thereby earning six graduate credits. Support from grants as well as the teacher's respective school districts typically covered most or all tuition, books, and other technology fees associated with these graduate courses. The courses in the program did not require attendance on a weekly basis, but incorporated a number of interrelated activities throughout the semester. We used a mixed or blended instructional approach taking advantage of both face-to-face and online instructional activities.

TICKIT teachers were responsible for completing a curriculum infusion project each semester. The process of specifying and working on these projects helped teachers shape the content of the graduate level courses. An integral part of this curriculum infusion project was an action research

report. In these reports, teachers documented the development of their project with descriptions, support materials created, examples of best student work, summaries of student evaluation data, lessons learned, and revision plans for subsequent iterations of the project.

These action research reports were shared among participants in the following formats: (a) formal written reports, (b) presentation to other TICKIT participants, (c) presentation to group of local colleagues in their schools, and (d) presentation at the Indiana Computer Educators (ICE) conference. The participation in the ICE conference provided TICKIT teachers the opportunity to address colleagues across the state. The full range of all projects since 1998 can be found at http://www.indiana.edu/~tickit/projectgallery/gallery.htm.

As part of the TICKIT program and courses, teachers attended a two-day orientation workshop at the start of the fall semester, and a one-day project-reporting workshop at the end of each semester. These three workshops were held on campus at Indiana University in Bloomington. To support teacher project work, at least one in-school workshop was held each semester for each school cohort team; sometimes two were held in a semester, depending upon the wishes and skill needs of teachers and availability of teacher release time during the school day. While TICKIT staff offered information about potential workshops, TICKIT participants determined the content of the in-school workshops. Some workshops involved all five teachers in a school team, while others were more individualized, where TICKIT staff worked with individuals or groups of two or three teachers in parallel workshops.

Online asynchronous web-based conferencing was part of each TICKIT course. This conferencing was aimed at promoting teachers' thinking about general technology education issues, and professional communication with colleagues from other schools. These asynchronous conferencing activities included: (a) monthly progress reporting of projects within pairs of teachers; (b) commentary on required as well as teacher-selected articles on classroom technology use, as well as reactions to commentary by other teachers; (c) threaded discussion of articles by larger participant subgroups; and (d) pro/con position-taking on issues. During the third year, we expanded asynchronous conferencing to include technology integration project reviews, free software reviews, thought or reflection papers, the design of classroom technology integration brochures, and web resource reviews and

suggestions. We also experimented with synchronous expert chat sessions in years two through five.

During the first year, the cohort of teachers from each school district was required to carry out some local leadership project. These projects did not meet their purpose of involving non-TICKIT teachers into technology infusion activities because TICKIT staff did not communicate the expectations clearly, and because of lack of time provided to teachers. During subsequent years of program operation, we provided clearer expectations regarding the leadership project and it became more focused and meaningful, often involving TICKIT teachers as workshop instructors in their schools, creators of instructional web sites for their departments, or organizers and designers of their entire school or school district web sites.

Outcomes and Benefits

TICKIT had a number of benefits for participants, school districts, and the university. First, the program offered technology-related learning opportunities in rural southern Indiana schools to strengthen the teaching of regular subjects. Second, it built leadership cohorts in schools that helped other teachers' technology integration into their classrooms. Third, without depending on traditional campus-based courses, TICKIT provided a formal, graduate-level system of recognition for teachers adding to their competence and self-confidence as they met professional development requirements. Fourth, it strengthened the network between public schools and university personnel. As a result, rural schools that recently became equipped with rich technological resources were provided with community relevant training as well as opportunities for creating long-term plans for technology integration. This approach avoided the problem discussed in Cuban (2001) about oversold and underused technology in schools. Finally, the university found benefits when TICKIT faculty shared their rich experiences working with innovative teachers in local schools with their colleagues, preservice teachers, other inservice teachers, and graduate students.

A WORKING MODEL FOR TICKIT

Figure 1 is a graphical representation of our professional development model. The right side of the model contains changes or outcomes that TICKIT teachers, schools, and students experienced. The left side of the model describes the TICKIT program elements, which interact with teacher prior knowledge, skills, confidence, motivations, and beliefs. The ultimate goal of TICKIT was increasing the quality of student learning through addition of various forms of technology integration in teaching and learning activities. However, before that can be achieved, we found the following teacher related changes or outcomes need to be established as prerequisites: (a) teachers' knowledge, skill, confidence, motivation, and beliefs regarding technology integration must be heightened; (b) school-level technology infrastructure and support needs to be enhanced to compliment teacher efforts on technology integration; and (c) both TICKIT and non-TICKIT teachers need to participate in the continual efforts for adding value to instruction through the thoughtful integration of technology in the classroom (Yamagata-Lynch, 2003). These teacher related changes or outcomes do not occur simply by a cohort of teachers participating in TICKIT. The schools need to provide other professional development opportunities as well.

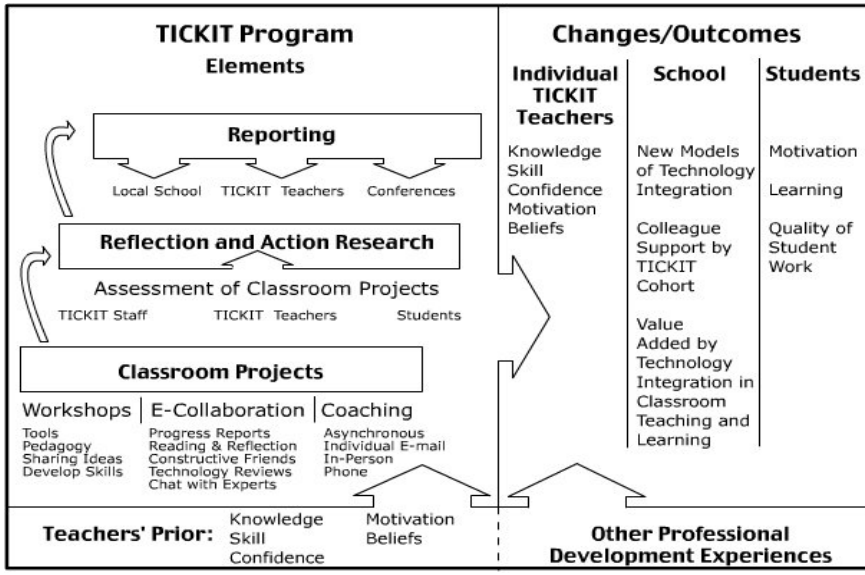

Figure 1. Model of TICKIT program elements and outcomes

Teacher practical knowledge is gained through the reflection of past experiences, and it enables teachers to quickly take action in an educational context (Richardson, 1990). The development of such knowledge, in the context of the TICKIT program, was nurtured through teacher work on their classroom projects. Additionally, teacher beliefs are a particularly important in professional development programs because teacher change is more successful when both teacher beliefs and new teaching practices are aligned (Richardson, 1994). TICKIT addressed both teacher beliefs and practices through workshop demonstration and instruction, modeling, and peer interactions. The TICKIT model was built upon the assumption that teachers have valid knowledge, skills, and beliefs, and that the program should start with those as its basis, rather than some arbitrary theory of instruction (Richardson & Anders, 1994a).

Structure for Teachers to Set Goals and Carry Out Classroom Projects

At the core of TICKIT was the process of teachers creating their classroom technology integration projects and engaging in action research surrounding these projects. Similar to problem-based learning (Savery & Duffy, 1996), these projects provided an authentic experience to participants because they were situated in the context of the everyday classroom. Technology integration situated in the teachers' classrooms emphasized contextualized learning that provided a method for meeting critical teacher professional development needs (Stein, Smith, & Silver, 1999) and avoided a decontextualized computer skills approach that is irrelevant to classroom practices.

TICKIT did not attempt to convince teachers to use a particular teaching philosophy or theory. Teachers were encouraged to work with their own philosophical beliefs and not where university faculty thought they ought to be. We were aware that systemic change models imposed on teachers that ignore the expertise and authority of practitioners may become a barrier to reflective teaching (Richardson & Anders, 1994b). Richardson (1992) referred to this struggle over who controls staff development assumptions as "the agenda-setting dilemma." TICKIT attempted to implement a collaborative model…a partnership between two individuals or groups, one of whom participates in staff development while the other facilitates it" (Richardson & Hamilton, 1994, p. 110).

We found that many teacher projects reflected a constructivist approach to teaching and learning (Brooks, 1990; Cobb, 1994; Duffy & Cunningham, 1996; Ernest, 1995; Savery & Duffy, 1996; von Glasersfeld, 1995). We recognized that there are many versions of constructivism, but the TICKIT staff leaned toward a socially based or situated approach emphasized by Salomon (1998) and Bonk and Cunningham (1998). During workshops, online discussions, and other teaching activities, we modeled such a collaborative, team-based approach and often presented exemplars of previous projects based on socio-cultural perspectives.

As detailed in Figure 1, we valued teachers' professional experiences, insights, and beliefs, and built upon them while adding our own knowledge and skills in the particular arena of technology infusion. We advised teachers to create TICKIT projects that built on past classroom teaching that they did not integrate technology. For example, a high school biology teacher previously had his students use traditional library and textbook resources to research on bacteria. His students created hand-made brochures on bacteria. As a TICKIT project, this teacher created a WebQuest unit to guide student research for their electronic brochures.

As part of the written expectations for teacher projects, we used a one-page planning framework that each teacher outlined his or her project during the orientation workshop. This one page document evolved over the five years of TICKIT while we gained practical experience and research data from our work. The final framework shown in Table 1 contains nine items including Vision, Goal, Plan, Timeline, Resources and Problems, Strategies, Student Assessment, Evaluation of Project, and Public Presentation and Celebration. Peers and TICKIT staff reacted to each draft, giving teachers early feedback and suggestions about their projects. We found that this simple planning template assisted the communication of general project expectations. At the same time, this template activity helped teachers brainstorm a topic while thinking through various issues they might otherwise not anticipate, and make a commitment for their projects. This sense of commitment as well as peer and staff feedback was crucial motivational elements for teachers completing their projects (Reeve, 1996).

Table 1

TICKIT Individual Project Action Plan

Name(s): _____

<table>
<tr><td colspan="2">1 Vision: What is the curricular theme and focus of the project?</td></tr>
<tr><td colspan="2">2 Goal: What do I want my students to accomplish?</td></tr>
<tr><td>3. Plan: What major steps do I have to take to do it?</td><td>4 Timeline: What is my timeline for planning, implementing, evaluating, and reporting?</td></tr>
<tr><td>5 Resources & Problems: What resources do I need to get to carry out this project, and what anticipated problems might keep me from accomplishing this project?</td><td>6 Strategies: How will I get these resources and overcome these problems?</td></tr>
<tr><td>7 Student Assessment: How will I assess student accomplishment of my learning goals?</td><td>8 Evaluation of Project: What evidence do I need to evaluate the success of the project? (examples: student evaluation feedback sheets; student products; student reflections journals; colleague observation and comments</td></tr>
<tr><td colspan="2">9 Public Presentation and Celebration: To what groups of colleagues should I report this project, and in what settings?</td></tr>
</table>

Present an Array of Possible Curriculum Integration Ideas and Technology Tools

From our research and development experiences, K-12 teachers need exposure to a wide range of specific examples created by other teachers that resonate with their own classroom experience. As Brown (2001) pointed out, instructors in technology training workshops usually have little patience for theory and find those that focus solely on unique aspects of particular application packages too shallow. He found that most successful programs focus on common factors underlying teaching strategies and methods related to technology integration proven effective by other instructors (Brown, 2000). In TICKIT, we lead each cohort of teachers through a sampling of preexisting WebQuests by having the teachers evaluate them with a rubric and then share what they learned from those projects. Such an approach was selected because teachers tend to focus on individual projects rather than attempting to synthesize across a set of project-based learning cases (Krajcik et al., 1996).

To assist reflective activities, TICKIT teachers from prior years showcased their technology integrations to new participants. For specific computer application skills, we encouraged each cohort to inform us of the specific software or tools they need to learn to meet their technology integration project goals. Once the skills were determined, we scheduled half- or full-day workshops in each cohort's school. Rather than trying to teach all 25 teachers a particular application, and then hope it was useful, we took a form of "just in time" training that was most valued by busy teachers. It also provided a degree of teacher choice within their professional development activities, which has been found to be an important part of successful professional development programs (McKenzie , 2001; Richardson & Hamilton, 1994).

Teach a Systematic Approach to Evaluation, Self-reflection, and Revision of Practice

The key tenant of TICKIT was teacher involvement in action research brings about systematic reflection on practice for teacher change. We value reflection-in-action on practice as an educative tool for teachers (Richardson, 1990; Schön, 1987). For each action research activity, teachers collected evaluation data from his/her students regarding their learning and

personal reactions to the curriculum integration project. These data were analyzed and summarized as part of the formal report to TICKIT staff at the end of each semester. Through this reflective process, teachers evaluated their classroom practices. Additionally, the action research projects allowed TICKIT staff to identify what teachers learned from professional development activities, which are often times difficult to capture (Wilson & Berne, 1999).

Provide Audiences and Venues for Teacher Reports and Reflections

TICKIT required teachers to conduct a formal report of their reflections in professional settings. First, each teacher reported his/her project reflections to local colleagues in order to provide models of thoughtful and successful technology integration into the regular classroom. These reports provided a venue for celebrating individual accomplishments, and provided an opportunity for TICKIT participants to be acknowledged by professional peers. Additionally, the reports served as a catalyst to break down the sense of isolation in schools, which according to Little (1990) many teachers face at their work place.

As a second form of reporting, TICKIT teachers presented their projects and reflections formally to one another in workshops on campus at the end of each semester. Such presentations afforded all teachers the opportunity to observe a wide range of methods technology can be integrated into their classrooms. The workshops also served as a form of celebration and acknowledgement of teacher efforts, which were particularly important with an audience of TICKIT peers who fully understood the enormous amount of time and effort involved. These reports invariably lead to brainstorming and discussion of common problems, components of success, and effective ways to overcome or replicate them. TICKIT staff encouraged such brainstorming because it was extremely valuable to our participants' future technology integration efforts and collegial collaborations.

TICKIT teachers reported their first-semester projects to colleagues in formal sessions at the statewide Indiana Computer Educators (ICE) conference held annually in January. When TICKIT teachers first learned of this requirement, many reacted negatively or became anxious. Some of them feared making a presentation to a roomful of strangers, whereas others

worried that they would not have anything interesting or important to share in the sessions. However, at the end of the program, this experience was often remarked upon as a highlight, of TICKIT because it fostered teacher professional growth and self-confidence. Such success in moving teachers to the edge of their professional comfort zones was also rewarding to TICKIT staff members and sponsoring school administrators.

Electronic and Face-to-Face Collaboration with Colleagues and Coaching by TICKIT Staff

Jamie McKenzie (2001) argued that professional development of teachers related to the effective use of technologies too often amounts to a wasteful spending of money. According to McKenzie, there is a growing need for cohorts of teachers in schools to generate and share professional development plans in study groups while working in curriculum development or invention teams that build innovative curricula based on district accepted standards and guidelines. He mentioned that teacher support for their technology integration ideas may come from technology coaches, mentors, and school leadership cadres, as well as informal support groups, help lines, conferences, visits or excursions to other teachers' classrooms, and online courses and resources.

We additionally promoted teacher cooperation through a structured set of required posts and replies in an asynchronous web conference in the form of a "constructive friends" activity based on the "critical friends" idea for supporting teacher professional development by the North Central Regional Educational Laboratory ([NCREL], 1997). Through these web conferencing activities, we attempted to nurture peer interaction and support from teachers with similar experiences and interests. Our research has shown that a primary and somewhat unexpected underlying purpose of the exchanges of project report posts between constructive friends was social and emotional support rather than substantive suggestions and help with classroom projects (Ehman, 1999). Teachers found it important to praise, commiserate, and empathize their experiences. In contrast, we found that for conferencing activities such as online debates and reading reactions, the focus was more on generating and evaluating content ideas. Not surprisingly, TICKIT teachers strongly favored constructive friend activities over the debates and article reactions (Bonk, Ehman, Hixon, & Yamagata-Lynch, 2002).

Structure for Developing Leadership Cohorts

One of the primary reasons for having administrators recruit cohorts of five teachers from a school system was the hope that our participants would provide leadership for their colleagues upon completing TICKIT. This approach succeeded in several, but not all, of the 18 schools in which we partnered. One of the factors leading to success was multi-year involvement of a school where two or three cohorts participated in TICKIT over successive years, rather than involvement of just one team for one year. Four of our 18 schools have participated in multiple years, three of them for three years. Yamagata-Lynch (2003) studied what happened in two of these schools after their first year of participation. In both schools, she found examples of mutual support between cohorts in the same school from different years, as well as activities in which TICKIT teachers helped other colleagues with technology integration.

We have also found considerable evidence, in the year-end program evaluations that TICKIT teachers provided considerable support to their local colleagues. Finally, we found independent evidence from school administrators that, after completing classroom projects, TICKIT teachers continued to teach in-school technology workshops and participated in other activities to promote technology integration into the curriculum.

Summary

A variety of TICKIT elements fostered teacher knowledge, skill, confidence, motivation, and beliefs. These, in turn, impacted others in their schools, as well as their own classroom practices, where thoughtful integration of technology into teaching and learning promoted increased student learning. The key program element was completion of the two classroom technology integration projects. TICKIT staff supported these projects through workshops, primarily conducted in TICKIT schools. In addition, peer support was encouraged through online collaboration, while individual coaching was available through site visits, e-mail, and phone. Reflection and action research on each project, formal reporting in local schools as well as other professional venues, helped teachers gain insights into the professional development process, thereby improving effectiveness of practice in the classroom. All of these factors were vital in impacting on teachers' professional lives.

LESSONS LEARNED DURING FIVE YEARS OF TICKIT

Avoid Including Shanghaied Teachers

The recruitment process for TICKIT involved local administrators to identify and select a group of teachers to participate. We assumed that they could best match the opportunities of TICKIT to their local talent and needs. Therefore, we selected or rejected school applications with a set of teacher applications from each school, including a statement of school-level intentions, not based on individual teacher applications alone. Although we screened the individual teacher applications, we never turned one down because on paper they invariably met our minimum requirements.

However, in the five years of the program we encountered several instances in which it became obvious that the local administrators who put together their TICKIT cohort must have either misrepresented the program to teachers, or coerced them into participating. The results were predicable. Teachers who were least devoted to developing, teaching, and reporting their classroom technology integration projects were the ones who did not volunteer, but rather were coerced, to participate. In a few cases, such reluctant teachers dropped out of the program mid-year.

We responded to this problem by directly communicating about this with the administrators in school systems when they recruit their cohorts, before they submit applications. We believe this helped ward off the problem, but was not a foolproof solution. We learned that we cannot assume complete willingness to participate on the part of teacher applicants, in spite of information given in their applications indicating keen interest in TICKIT.

Teachers Need a Reasonable Technology Environment in Which to Work

Part of the application process to the program involved teachers providing information about their computing environment at school as well as at home. We had administrators from each school certify that minimum levels of technology equipment, software, and personnel support were available. Unfortunately, there were few instances in which promised computer support at school was below an acceptable level. In three cases, TICKIT staff had to intercede with school computer coordinators or other administrators to get the required equipment or Internet connections for individual teachers.

Computer access at home was an extremely important factor that determined participants' program success. The proportion of teachers having home computers increased steadily since TICKIT began in 1998. In fact, in the 2001-02 academic year, only one of the 25 teachers did not have a computer at home, although two teachers did not have Internet connections. Given the many obligations and time pressures teachers have, home computer simplified TICKIT-related work, whether it was project development or web interaction assignments.

We Must Teach Technology Use in the Teacher's Computing Environment

A critical part of TICKIT operations was to provide instruction and support for teacher projects at the K-12 school setting and not at the university. This practice resulted in several benefits. First, teachers appreciated university staff visiting their schools and paying attention to them. There were teacher participants that reported that the visibility of the university made their non-TICKIT participating colleagues realize that technology integration was a valid form of curriculum development rather than a hobby-like activity (Yamagata-Lynch, 2003).

Second, university personnel learned about the realities of teachers work conditions, students learning environment, curriculum needs, and computing support available in each school. Therefore, we learned firsthand some of the technology opportunities and constraints experienced by teachers. Third, and perhaps most important, onsite contact provided an outside, but respected source of information and recommendations, resulting in needed support for TICKIT teachers from the computer coordinators and administrators. If TICKIT staff did not journey to the schools, we would not know what support our participants needed, let alone be able to lobby to obtain it. Finally, the fact that we worked in the schools provided practical classroom examples for TICKIT staff to discuss with their preservice teachers and graduate students back at the university.

Local Leadership

Local leadership varied widely from no leader at all to very strong leaders, including some from outside the formal ranks of TICKIT teacher participants. Sometimes the cohort leader simply informally emerged from the

group of five teachers, but we learned not to take this for granted. The best possible situation was when there were two leaders: (a) a within-cohort leader who facilitated communication among the group and between them and other important school figures, including the computer coordinator, media specialist, and principal; and (b) an administrator who gave both curriculum and resource support to the cohort during the TICKIT year.

The TICKIT staff permitted whatever within-group leadership arrangements, but we actively identified and worked with an external leader so that the teacher cohort "was not isolated and forgotten. To make sure they felt welcomed and needed, we invited these nonTICKIT administrators to Indiana University and school workshops, as well as the state computer educator's conference. When a school had this external leader, the TICKIT cohorts invariably performed better.

Requiring Projects in a Graduate Course Framework

TICKIT was structured within two graduate courses, one each semester. Therefore, there were a set of required "assignments" and corresponding grades for the participants. For many of the teachers, this added considerable stress. Not only did we coerce teachers to create and teach instructionally significant classroom technology integration units, but we also required one written and three formal oral reports, as well as several asynchronous conferencing assignments, all of which were graded. Among the most common complaints during the year was that the course requirements were extremely demanding, there was not enough time to complete projects, and that stress levels were unmanageable.

There was another common reaction on the final evaluations at the end of the year as the following quotes indicates:

> I thought that I'd never be able to do all this, and I felt pressured and forced to do things I ordinarily wouldn't have done, but now I'm really glad I did them, because I learned a great deal, improved my teaching, and am a better professional as a result. (Comment from end of year TICKIT participant evaluation)

Yamagata-Lynch (2003) found similar results in her interviews from the case studies at two TICKIT schools.

Asynchronous Conferencing Requires Structure and Meaning for Teachers

Based on our five years of involving teachers in asynchronous web conferencing activities, we learned that careful and clear structuring of expectations was important to its success. To make the online interactions work well, it was necessary to be very clear about expectations and sometimes present models or examples of what was expected. In addition, program coordinators needed to plan reasonable time frames for each activity and stick to them. In our five years of TICKIT, we brought in more structure to teacher online activities as we built more experience in the usage of online discussion tools.

CONCLUSION

TICKIT combined a number of features that heightened its effectiveness. One of which was the fact that it was a yearlong program. Research indicates that the duration of professional development programs often distinguishes effective from ineffective programs (Garet et al., 1999). TICKIT also incorporated a collaborative approach in which teacher participants helped determine aspects of the program. At the heart of the program were teachers working in their own classrooms to invent, teach, and reflect upon their technology integration and daily teaching practices to build practical knowledge. As pointed out throughout this article, many of these same elements have been found to be vital in previous professional development research. What we have learned in our experience is how to operationalize many of the effective professional development practices found in past research. It is our hope that our report will make further contributions for insights for future efforts made by researchers and practitioners facilitating professional development programs.

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