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AUTHOR Ehman, Lee H.; Bonk, Curtis J.

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ABSTRACT

During the 1998-1999 school year faculty from Indiana University's School of Education (Bloomington) began in in-service teacher education program, Teacher Institute for Curriculum Knowledge about Integration of Technology (TICKIT). TICKIT was designed to foster the thoughtful infusion of educational technology into the K-12 curricula of teachers in rural school systems within southern Indiana. This paper describes this program, and then presents an experience-based model upon which it currently rests. TICKIT annually typically includes cohorts of four to six teachers from five school districts. Important factors include classroom-based curriculum projects, teacher choice, systematic reflection on practice, reports by teachers of their work to other professionals, and impact by teachers on others in their schools. The paper concludes with lessons learned from the program during its first four years of operation. A summary of TICKIT teacher projects is tabulated. The TICKIT Individual Project Action Plan (January 5, 2001) is appended. (Contains 35 references.) (Author/AEF)

A Model of Teacher Professional Development to Support Technology Integration

Lee H. Ehman
Indiana University
School of Education: Room 3276
Bloomington, IN 47405
ehman@indiana.edu
(812) 856-8139

Curtis J. Bonk
Indiana University
School of Education: Room 4022
Bloomington, IN 47405
cjbonk@indiana.edu
(812) 856-8353

Running Head: TICKIT Model

Abstract

During the 1998-1999 school year, faculty from Indiana University's School of Education (Bloomington) began an in-service teacher education program, Teacher Institute for Curriculum Knowledge about Integration of Technology (TICKIT). TICKIT was designed to foster the thoughtful infusion of educational technology into the K-12 curricula of teachers in rural school systems within southern Indiana. This paper describes this program, and then lays out an experience-based model upon which it currently rests. TICKIT annually typically includes cohorts of 4-6 teachers from 5 school districts. Important factors include classroom-based curriculum projects, teacher choice, systematic reflection on practice, reports by teachers of their work to other professionals, and impact by teachers on others in their schools. We conclude with lessons learned from the program during its first four years of operation.

Introduction

Professional development[1] of teachers specifically aimed at increasing infusion of technology into their classrooms has been incorporated into a number of programs, and this report describes one such activity, Teacher Institute for Curriculum Knowledge about Integration of Technology (TICKIT). The intent of this paper is to describe key aspects of TICKIT and suggest a particular model others could replicate or adapt. While we connect our TICKIT program model to general ideas from the professional development literature, the creation of this model has been principally through our own experience (trial and error might be a more apt expression) and not deductively from studying the programs of others.[2]

It would be wrong to ignore, however, the Apple Classrooms of Tomorrow (ACOT) project (Fisher, Dwyer & Yocam 1996; Sandholtz, Ringstaff & Dwyer 1997), which lasted over a decade, is well documented, and is a precursor to many teacher professional development programs of today. One aspect of the ACOT work was the set of staff development principles underlying the program's model:

- Staff-development activities should be situated in classrooms so that [staff developers] can observe and interact with teachers and students engaged in changing classroom practice;
- Participants should attend in teams of two to four members from the same school. This will help them support each other and feel less isolated;
- A constructivist learning approach should be used. Presenters should model the facilitative role and provide ample hands-on time;

- Ongoing conversation and reflection about their practice, their students, theories of learning, technology and how classroom practice might be changed should be an integral part of staff development;
- Participants should develop a lesson or unit that integrates technology and implement it upon their return to their own classroom;
- Follow-up support should be provided (Yokam 1996).

As will be seen later, each of these principles is part of the TICKIT model. While the constructivist learning approach is one we use, we do not try to "convert" teachers to use it as an essential part of their work. What ACOT leaves out, and what TICKIT holds as central, is systematic reflection on practice as a means for building practical teaching knowledge.

Description of the TICKIT Program

Purpose and Goals

TICKIT, *Teacher Institute for Curriculum Knowledge about the Integration of Technology*, is a program for rural Indiana teachers[3] of all subjects intended to increase their knowledge and proficiency in integrating technology in their classrooms. The emphasis is on thoughtful integration and use of technology that adds value to instruction and learning activities, not simply inserted for its own sake, or to "teach technology." The central idea is to promote better and deeper learning of regular subjects in the classroom. In addition to impacting the practice of individual teachers, TICKIT is designed to create school leadership cadres to support other teachers in their technology integration work.

Program Overview

The focus of the TICKIT program is on supporting each participant's integrating technology into their curriculum. Primarily school-based, it provides sustained help in classroom

application of this knowledge, through school- and university-based workshops and regular interaction among institute members, including teacher peers and Indiana University faculty.

About twenty-five teachers are recruited each year in groups of five from five rural Indiana school corporations[4]. Criteria for selection have evolved through experience with each year's programs, and include:

- Commitment of individual teachers;
- Commitment by leadership of the individual school buildings and school corporations;
- Sufficient technology infrastructure and budget, including professional development funds to support the school's portion of each teacher's participation. (Funding of the program is described below.)

Program Structure

TICKIT participants enroll 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 have typically covered most or all tuition, books, and other technology fees associated with these graduate courses. The courses do not require attendance at weekly classes, but rather incorporate a number of interrelated activities through the course of the semester. In using a mixed or blended instructional approach, some of the training takes place in live settings at Indiana University or the respective school sites as well as online using various courseware or conferencing tools.[5] The focal activity each semester is completion of a curriculum infusion project by each teacher (a few elect to create their projects in pairs). The process of specifying and working on these projects helps shape the content of the courses and interactions among participants in the institute, because they represent real curriculum needs and interests of the teachers.

An integral part of completing the curriculum infusion projects is an action research report. In these reports, teachers document the development and teaching of their project with descriptions, support materials created for teaching and learning, examples of best student work, and summaries of student evaluation data collected at the end of the instruction. The action research reports conclude with an analysis of lessons learned and revision plans for subsequent classroom use.

Teachers present action research reports in four formats and venues. First, the teachers write reports as evidence for the major portion of the grade in each graduate course. Second, each participant summarizes the research in an oral report to TICKIT colleagues at an end-of-semester workshop. Third, teachers are required to report their projects each semester to a group of colleagues, administrators, school board members, or parents. Finally, each teacher is invited to report his or her first semester project in a state (Indiana Computer Educators) conference during January. Participation at the ICE conference affords TICKIT teachers the opportunity to address colleagues from across the state. Not all choose to participate; in the 1999 and 2000 conferences, about 70% of the teachers presented reports. In 2001, however, we began to require that all TICKIT teachers present their reports.

Examples of curriculum infusion projects include:

- Creation of one or more WebQuests[6] that fit into the teacher's curriculum;
- Development of one or more units that incorporate into the curriculum computer applications such as multimedia, e-mail, Web, word processing, databases, or spreadsheets;
- Creation of a class, department, or school Website meeting specific educational needs;
- Development of a module or course to teach computer applications.

Table 1 summarizes all categories of teacher projects. The full range of all projects since 1998 can be found at http://www.indiana.edu/~tickit/projectgallery/gallery.htm. Also found there is a technology information template that TICKIT teachers use to submit information about their technology integration project and a technology integration review form that they use to evaluate the projects of other teachers.

As part of the TICKIT program and courses, teachers attend 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 are held on campus at Indiana University in Bloomington. To support teacher project work, at least one in-school workshop is held each semester for each school cohort team; sometimes two are held in a semester, depending upon the wishes and skill needs of the teachers and availability of release time during the school day. While TICKIT staff offer information about potential workshops, the teachers determine the content of the in-school workshops for all TICKIT participants in that school. Some workshops involve all five teachers in a school team, while others are more individualized, with TICKIT staff working with individuals or groups of two or three, in "parallel workshops." Instruction is delivered within the computer network environment of the schools, rather than at the university.

On-line asynchronous Web-based conferencing is part of each TICKIT course. This conferencing is aimed at promoting teachers' thinking about general technology education issues as well as professional communication with colleagues at schools other than their own. The staff continues to experiment with the form and content of this conferencing. During the program's first three years, asynchronous conferencing included: (1) monthly progress reporting of projects within pairs (we called them "critical friends", and later, "constructive friends") of teachers; (2) commentary on required as well as teacher-selected articles on classroom technology use, as well

as reactions to commentary by their critical friend; (3) threaded discussion of articles by larger participant subgroups; and (4) 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 and three.

During the first year, the cohort of teachers from each school corporation was required to carry out some local action project whose purpose was stimulation of classroom technology integration among their non-TICKIT colleagues in the corporation's schools. Because the TICKIT staff did not communicate a clear structure of expectations about these group projects, and because of lack of time reported by the teachers, most of the five cohorts did not complete meaningful projects. In the majority of cases they abandoned more ambitious plans and simply conducted informational meetings. One group did design a series of summer technology workshops for teachers in their district, however. During the second and third years, these projects 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.

Funding of the Program

The program has been funded differently in its first three years. During the initial year, 1998-1999, funding of about $38,000 was granted by the Ackerman Foundation, which had requested a specific proposal for this purpose during the spring of 1999. Those funds, plus about $1,400 provided by school corporations for each teacher participant, supported the faculty and

staff involvement, tuition for 2 three-credit graduate courses, staff member travel, workshop fees, and other expenses.

In order to continue the program during the following year, 1999-2000, school corporations were asked to increase the amount provided for each teacher to approximately $1,700. In addition, TICKIT teachers were required to pay tuition for one of the two graduate courses in which they enrolled. In spite of these increased costs for both school corporations and individual teachers, there were sufficient applications to comprise a full complement of 28 participants, enabling us to provide the program solely through school system and teacher funding.

We were fortunate that the Arthur Vining Davis Foundation granted $150,000 to continue the TICKIT program for three more years, 2000-2003. During this period, the relative contributions of the foundation and school corporations approximated the first year's operations, with schools paying a lower cost (about $1,100) per teacher. Under this arrangement, the teachers did not have to pay for either of the graduate courses.

Some school corporations sending teachers to TICKIT during the initial four years had received technology planning grants, or in some cases, high technology implementation grants, from the State of Indiana. These grants stipulated that 30% of the funding be devoted to teacher professional development. Therefore, these schools had funds to use for TICKIT, rather than depending solely on their regular operating budgets.

Outcomes and Benefits

This project has a number of pay-offs. First, it offers technology-related learning opportunities in rural southern Indiana high schools to strengthen the teaching of regular subjects. Second, it builds leadership cadres in schools that will help support other teachers'

technology integration into their classrooms. Third, without depending on traditional campus-based courses, it provides a formal, graduate-level system of recognition for teachers adding to their competence and self-confidence to integrate technology into their classrooms. Fourth, it links public schools and university personnel. As a result, rural schools that have recently become equipped with rich technological resources are provided with community relevant training as well as opportunities for creating long-term plans for technology integration. Fifth, TICKIT serves as a model program for other institutions and teacher education programs in Indiana and the nation. Sixth, the TICKIT Web site[7] offers a rich set of Web resources, workshop materials, and teacher technology integration projects, including reflections on the projects by their teacher-authors, for other TICKIT and non-TICKIT teachers. Seventh, the pre-service teacher education program at Indiana University benefits from these rich faculty experiences in rural Indiana schools and extensive contacts with innovative teachers.

We now turn to the working model and organizing principles used to operate the TICKIT program. Following that section, we end by presenting important lessons learned from our experience with this project that others might find useful.

A Working Model For the TICKIT Teacher Professional Development Program

In the beginning of our TICKIT work, we borrowed ideas informally from various sources[8] as we invented the program. More recently, we have used our experience in conducting TICKIT, as well as more formal sources, to create a working model that describes important components and relationships incorporated to create a successful example of professional development.

There are three basic assumptions underlying the model that Wilson and Berne (1999, pp. 193-195) argued were themes in recent research on teacher acquisition of professional knowledge through professional development:

- Successful projects "...involved communities of learners that are redefining teaching practice."
- "...teacher learning ought not be bound and *delivered* but rather *activated.*" Therefore, rather than a dissemination activity, effective professional development seeks to help teachers understand their own knowledge
- Successful projects involve "...the privileging of teachers' interactions with one another...aiming for the development of something akin to...'critical colleagueship'."

Each of these three features is incorporated into the TICKIT program, and will be evident in the pictorial representation of the model, found in Figure 1.

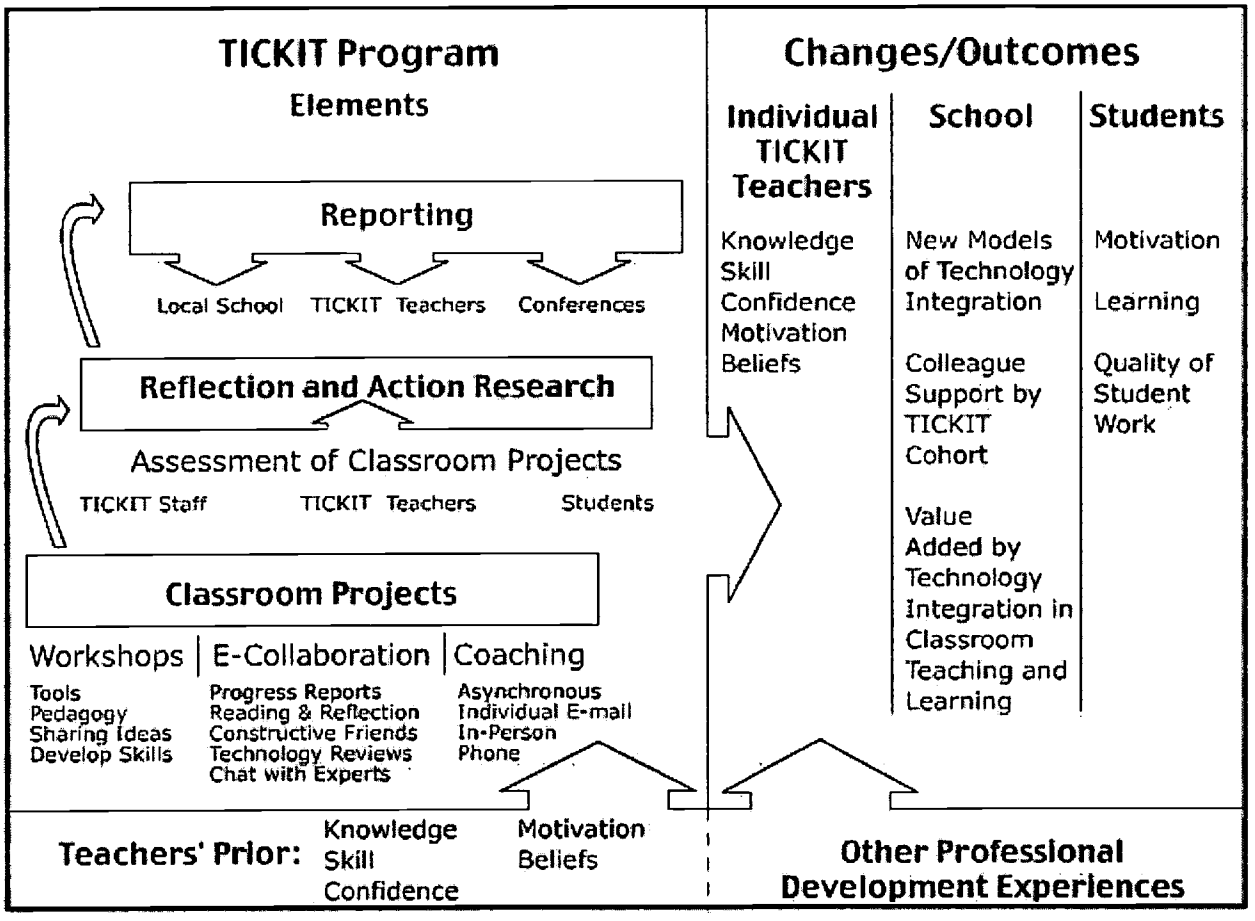

Figure 1: Model of TICKIT Program Elements and Outcomes

The right side of the model contains four goals of TICKIT. The ultimate goal is increasing the quality of student learning through addition of various forms of technology integration in teaching and learning activities. TICKIT assumes that before that can be achieved, three prior goals have to be met: (1) Teachers' knowledge, skill, confidence, motivation, and beliefs regarding technology integration must be heightened; (2) school-level capacity to carry out this integration must be enhanced, both through TICKIT teachers providing models of effective technology use for other teachers, and TICKIT teachers supporting their colleagues

directly with individual support; and (3) both TICKIT and non-TICKIT teachers adding value to instruction through the thoughtful integration of technology in the classroom.

We conceive of teacher knowledge in the same way as Richardson (1990) when she explains "practical knowledge." This form of knowledge "...allows a teacher to quickly judge a situation or context and take action on the basis of knowledge gained from similar situations in the past. Reflecting on the action and its results adds to the teacher's practical knowledge" (p. 13). The development of such knowledge, in the context of the TICKIT program, is nurtured through teacher work on their classroom projects, the most central part of our professional development model.

Teacher beliefs are a particularly important facet of TICKIT goals. As Richardson (1994), writing about the staff development process, points out:

> If beliefs are related to practices, and more particularly, if beliefs drive practices, staff development that focuses solely on teaching practices may not be successful in effecting change, unless the teachers' beliefs and the theories underlying the practices are also explored. (p. 90)

The TICKIT program attempts to deal both with beliefs and teaching practices through workshop demonstration and instruction, modeling, and peer interactions throughout the year. An example of an important belief that helps drive teacher practice regarding technology integration is that computer tools are most effective when used directly by students in their learning processes, not in the hands of the teachers who "do technology" for their students. Obviously, there is a set of other important beliefs we try to foster in our teachers.

Teacher beliefs as a goal of TICKIT are noteworthy in another way, because our model is 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. As Richardson and Anders (1994a) point out:

> New practices and procedures are adopted by teachers if they appear to work: that is, if they are consistent with teachers' beliefs concerning learning and teaching, engage the students, and allow the teachers the degree of control felt necessary. Impressions about whether a new activity works are often tacit and personal, and may be based on beliefs that are inappropriate for the given circumstances. This new form of staff development takes into account the participating teachers' existing beliefs about teaching, learning, and the curriculum. (p. 159)

At the bottom of the model there are two other components that feed into this model. First, teachers bring prior knowledge, skill, confidence, motivation, and beliefs regarding technology integration to the program. Second, other professional and staff development experiences, whether pursued individually by teachers, or in groups, may add to teachers' ability to integrate technology into the curriculum. This includes non-formal learning pursued by teachers – individuals or small groups – simply teaching themselves what they need to know, without any formal, external intervention. This last process should not be underestimated. We have found that, prior to TICKIT, many teachers taught themselves a variety of useful technology skills and acquired numerous pedagogical ideas. Many continue to learn in this same way both during and after participation in the TICKIT program.

To further identify factors influencing TICKIT teachers, we have enclosed specific program elements in the left part of the model. Most of these program features are aimed at impacting individual TICKIT teachers' knowledge, skill, confidence, motivation, and beliefs.

However, TICKIT attempts to influence the school-level outcomes as well, primarily through public reports, modeling, coaching, and other activities carried out by the cadres.

In the next section, we describe several relationships among TICKIT program elements within the model (see left side of Figure 1). In effect, these elements are intended to ensure eventual classroom success of TICKIT teachers and that of their students.

Provide a Structure for Teachers to Set Goals and Carry Out Their Specific Classroom Projects

At the core of TICKIT is the process of teachers creating their classroom technology integration projects. An example of problem-based learning (Savery & Duffy, 1996), these projects provide an authentic experience for TICKIT participants. The projects cement together all other parts of the program; without completing them the teachers would not have the success regarding quality of student work, learning and motivation they report consistently in their project reports, final program evaluations and through other communications with the staff. Technology integration based in the teachers' own classrooms emphasizes contextualized learning important to their needs, and avoids a decontextualized "computer skills" approach in the TICKIT program. Stein, Smith and Silver (1999) emphasize the importance of this feature in professional development programs generally:

> Teachers need assistance that focuses on their day-to-day efforts to teach...Such assistance is best provided by support directly focused on an individual teacher's practice, such as co teaching, coaching, assistance with planning, and reflecting on actual lessons. (p. 239)

While requiring these classroom projects, TICKIT does not attempt to convince teachers to use a particular teaching philosophy or theory. We believe that they should work from where they are as teachers, not where we think they should be. We, like Richardson and Anders

(1994b), fear that a barrier to reflective teaching might be externally imposed systemic change models that:

> hold the individual practitioner and student at arm's length. They fail to acknowledge the expertise and authority of the practitioner...In other words, these policies still suggest that someone other that the teacher in the local setting knows best how to work with the students in his or her class, and they attempt to exert control, from afar, over teachers' intentions, educative goals, and practices. (p. 212)

Elsewhere, Richardson (1992) refers to the struggle over who controls staff development assumptions and beliefs, teachers or staff developers, as "the agenda-setting dilemma." The TICKIT program attempts to implement a collaborative model of ownership, "...a partnership between two individuals or groups, one of whom participates in staff development while the other facilitates it" (Richardson & Hamilton 1994, p. 110). They contrast this model with two others, the externally driven, and the teacher-initiated.

While we consciously avoid dictating a theoretical perspective on teacher projects, we find that many projects reflect a constructivist approach to teaching and learning (Brooks, 1990; Cobb, 1994; Duffy & Cunningham, 1996; Ernest, 1995; Savery & Duffy, 1996; von Glasersfeld, 1995). While we recognize that there are many versions of constructivism, we lean, where possible, 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 sometimes model such a collaborative, team-based approach and often present exemplars of previous projects based on a socio-cultural perspective. We attempt to accomplish this by allowing TICKIT participants choice, setting goals, embedding tasks in their actual teaching environments, emphasizing collaboration and sharing, and fostering reflection. At the same

time, we often eclectically mesh learner-centered principles from the American Psychological Association (1993) with cognitive and social constructivist principles.

Huba and Freed (2000) point out that a learner-centered approach is shifting the focus on college campuses from teaching to learning. According to these scholars, principles of this new learner-centered paradigm in college include instructors and students learning together, the use of interdisciplinary investigations, active involvement in one's own learning, emphasis on asking questions and learning from mistakes, and a culture that is cooperative, collaborative, and supportive. In effect, knowledge is no longer transmitted, but is constructed by students through inquiry, synthesis, critical thinking, problem solving, and communication. Stated another way, the goal is to use and communicate knowledge not simply acquire it. At the same time, instructors no longer are providers or evaluators of all knowledge, but are coaches and facilitators within the learning environment. When desired learning is assessed, it is mainly though projects, performances, and portfolios, instead of more indirect measures such as objective tests. While not explicitly planned, the activities within the TICKIT program correspond to most, if not all, of these emerging learner-centered principles.

It is important to note that most of these same learner-centered principles were documented as vital to the ACOT project mentioned earlier (Sandholtz et al., 1997). For instance, core principles of technology integration included viewing technology as a tool for reengaging students and teachers in the learning process by helping making it relevant. In addition, technology is deemed most powerful when utilized to support student inquiry, collaboration, composition, and communication. Sandholtz et al. point out that since technology is just one ingredient within school reform efforts, it must be integrated into larger instructional and curricular frameworks. For instance, adequate access to these technologies must be

provided. As with other theoretical paradigms briefly reviewed above, they view learning as an active and social process that is student-centered. Here, instructors take on facilitative roles to guide student inquiry. Student knowledge building is balanced with guided practice and direct instruction. From this learning perspective, new competencies include the ability to recognize problems, collaborate, acquire and use large amounts of information, and apply technology to solve real-world problems. To support such learning, these scholars argue that:

> "Professional development is accelerated in contexts where teachers work as teams and engage in reflective, collegial patterns of work focused on the development of new learning tasks, situations, interactions, tools, and assessments for their own classrooms" (p. 184).

Finally, they note that adequate modeling, coaching, reflection, and support are needed for success of professional development efforts related to technology integration. Once again, while not necessarily intentional, TICKIT embeds many of these exact principles.

As detailed earlier in Figure 1, we attempt to value teachers' professional experience, insights, and beliefs, and build upon them while adding our own knowledge and skills in the particular arena of technology infusion. So, for instance, if the goal is to improve student achievement test scores in mathematics, a TICKIT teacher may decide to build a Web site for their students to receive additional practice or drill exercises at night or on weekends. Of course, we will also try to foster teacher reflection on how to expand such an activity to some type of personally reflective, peer reviewed, or collaborative activity.

We advise teachers to create projects that build on classroom teaching they have done previously in some form but without integrating technology. This permits them to avoid creating brand new approaches to content while helping them implement thoughtful and effective ways to

use technology in learning activities. For example, a high school biology teacher previously had his students use traditional library and textbook resources to research different bacteria and create hand-made brochures to describe them. As part of one of his technology integration unit in TICKIT, he created a WebQuest unit to guide student research, while adding Web information sources as well as word-processed tri-fold brochure production. This is an example of how we urge teachers to choose projects that will challenge them, but not move them too far out of their "comfort zone." Course evaluations typically indicate that we are highly successful in accomplishing this goal. Sometimes we have to give strong advice to scale down their plans, either for the scope of their work, or the number of classes or students they are attempting to reach with their projects. And, at other times, we nudge or gently prod teachers to reflect on how their projects might be enhanced, extended, or, in some cases, transformed by additional components, goals, plans, strategies, or assessment options.

It is also critical to provide teachers a clear structure of expectations for these projects. Part of the challenge is to leave the requirements at a general enough level to incorporate the needs, classroom settings, and initial experience and skill level of a wide range of teachers, while at the same time presenting enough structure and clarity so that teachers will understand and be able to meet the project expectations.

As part of the written expectations for the projects, we use a one-page planning framework with which each teacher outlines his or her project during the orientation workshop. The framework contains nine items including Vision, Goal, Plan, Timeline, Resources and Problems, Strategies, Student Assessment, Evaluation of Project, and Public Presentation and Celebration. (See Appendix A for the framework). Peers and TICKIT staff react to each draft plan, giving teachers early feedback and suggestions about their projects. We have found that

this simple planning template assists us in communicating our general expectations. At the same time, this template activity helps teachers brainstorm a topic while thinking through various issues they might otherwise not anticipate. We believe that part of the key here is getting some type of commitment or goal, before they leave our August and January workshops, toward which teachers then work toward during the semester or year. In effect, having a stated target or goal as well as instructor feedback on those goals and ideas are crucial motivational elements (Reeve, 1996) that we have embedded in the TICKIT program. Without such preplanning and commitment, many teachers would waste valuable time early in the semester. Of course, there are moments when some teachers become anxious about either the lack of ideas during these workshops or not knowing if their ideas are doable within the technological infrastructure of their school system. To deal with these concerns and potential performance-impairing stress (Reeve, 1996), TICKIT teachers are encouraged to modify projects or change directions if their initial plans prove unworkable.

Present an Array of Possible Curriculum Integration Ideas and Technology Tools

The TICKIT program attempts to increase teachers' knowledge of ways technology can add value to their students' learning. From our experience, K-12 teachers need exposure to a wide range of specific examples created by other teachers, ones that resonate with their own classroom experience. As Brown (2001) points out, instructors in technology training workshops usually have little patience for theory and find those than focus solely on unique aspects of particular application packages too shallow. Instead, he has found most success when focusing on common factors underlying teaching strategies and methods related to technology integration proven effective by other instructors (Brown, 2000).

Similarly, we provide a variety of examples through our workshop activities and Web site. For instance, we lead each cohort through a sampling of a number of preexisting WebQuests by having the teachers evaluate them with a rubric and then share those projects with that were intriguing or potentially useful with their TICKIT colleagues. This approach was deemed important since other research on teacher professional shows that teachers tend to focus on an individual projects rather than attempting to synthesize across a set of project-based learning cases (Krajcik, Soloway, Blumenfeld, Marx, Ladewski, Bos, & Hayes, 1996). To assist their reflective activities, in some workshops, TICKIT teachers from prior years showcase their technology integrations projects and inform new participants on the success of that idea or unit as well as changes they have made or intend to make. They might direct the new cohort toward free Web tools that they found particularly useful in their classroom or applications packages such as PowerPoint that their students readily utilize. In addition to such expert advice, there are opportunities for TICKIT teachers to brainstorm in small groups how ideas from the examples might be adapted for use in their own classrooms.

In all cases, the focus is on what these teachers and their school cohorts can accomplish by utilizing technology as a tool in their instruction. As McKenzie (2001) recommends, in contrast to traditional professional development of teachers, the focus of adult learning is on allowing the learner to choose from a rich and varied set of choices or possibilities. McKenzie also points out that such choices must match teacher interests, needs, and developmental readiness. The adult learner must take responsibility for planning, nurturing, and directing his or her own learning experiences.

Most technology integration approaches and ideas require some knowledge related to using computer applications or software, ranging from Web editors to image manipulation tools

to concept-mapping software like *Inspiration*. In TICKIT, we have each cohort inform us of the specific software or tools they need to learn to meet their technology integration project goals. Once this is determined, we schedule and later deliver this training in half- or full-day workshops in each cohort's school. As indicated earlier, such workshops are held once or twice a semester, depending on local circumstances. Rather than trying to teach all 25 teachers a particular application, and then hope it is useful, the typical TICKIT workshop delivers what they need when they need it – a form of "just in time" training most valuable to busy teachers. It also provides a degree of teacher choice within their professional development activities, which is proven to be an important part of successful programs (Richardson & Hamilton 1994, p. 110).

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

A key tenant of the TICKIT project is that teachers need to reflect systematically on their practice in order to improve it. As Richardson (1990) points out, classroom experience might not be the best teacher because "...experience is educative only with reflection" (p. 12). We have built reflection into the TICKIT experience, in part, by requiring action research as part of their classroom projects. Each teacher collects evaluation data from her students regarding their learning and personal reactions to the project. These data are analyzed and summarized as part of the formal report to TICKIT staff at the end of each semester. This final report also includes description of the curriculum, materials used, successes and problems of the teacher in developing and teaching the unit, plans for revising it, and a presentation of lessons learned through the process. Through this mechanism, we try to instill a framework for teachers to think about and evaluate what they do in the classroom. They report this to be a valuable part of the TICKIT experience. We hope that they internalize this thinking process, including collecting and analyzing student data as part of evaluation and revision.

In addition to providing teachers a reflective process within which to test systematically their practice and beliefs, the action research projects have a second function. As Wilson and Berne (1999) point out, "As a field, we know very little about what teachers learn [from professional development activities]...Action research, in which teachers document and analyze their own experiences, can be seen as one important attempt to redress this problem" (p. 174). Because the TICKIT staff lacks the resources to assess teacher learning resulting from our program, the action research reports give us some data upon which to base conclusions of effectiveness.

Reflection is also fostered through paired evaluation tasks such as the constructive friend reports of progress on classroom projects as well as colleague reactions to these reports. It is also a key feature of peer evaluations of technology integration projects used during the semester-end reporting workshops. There are some indications that TICKIT teachers incorporate such reflective acts in their own classrooms once they have completed the program (Yamagata-Lynch, 2001).

Provide Audiences and Venues for Teacher Reports and Reflections on Their Classroom Projects

Connected to the goal of promoting a reflective process is TICKIT's provision for formal teacher reports of this reflection in professional settings. This linkage is represented by two separate elements within the TICKIT model. First of all, each teacher reports her project reflections to local colleagues in order to provide models of thoughtful and successful technology integration into the regular classroom. These reports also provide a venue for celebrating the successes, and for being acknowledged by professional peers. Local reporting also generally helps to break down the walls of isolation too often existing between teachers in their schools.

In a second form of reporting, TICKIT teachers present their project activities and reflections formally to one another in the two semester-end workshops on campus. Such presentations afford all teachers the opportunity to observe a wide range of ways technology can be integrated into their classrooms. The workshops also serve the celebration and acknowledgement functions, which are particularly important with an audience of TICKIT peers who understand fully 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 members encourage such brainstorming since it is extremely valuable to their future technology integration efforts and collegial collaborations.

TICKIT teachers also report their first-semester projects to colleagues in formal sessions of a statewide professional conference, the Indiana Computer Educators (ICE), held in January. It is notable that when TICKIT teachers first learn of this requirement, many react very negatively. Some of them fear making a presentation to a roomful of strangers, whereas others worry that they will not have anything interesting or important to share in the sessions. However, at the end to the TICKIT program, this experience is often remarked upon as a highlight, because it fosters teacher professional growth and self-confidence. This is a way in which the TICKIT program finds success in moving teachers to the edge of their professional comfort zones.

Provide a Framework for Electronic and Face-to-face Collaboration With Colleagues and Coaching by TICKIT Staff:

Jamie McKenzie (2001) argues that the 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 mentions 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. TICKIT embeds nearly every component advocated by McKenzie. Across program components, there is a focus on teacher collaboration in school-based cohort groups that receive informal as well as formal advice and counseling.

In TICKIT, two program elements combine to provide collaboration and coaching during the classroom project development. As mentioned previously, we use a structured set of required posts and replies in an asynchronous Web conference set up specifically for TICKIT participants. Computer conferencing activities include communications between two teachers who teach similar content at similar grade levels, but not in the same school; we call these pairs "constructive friends" based on the "critical friends" idea for professional development support by NCREL (North Central Regional Educational Laboratory 1997, pp. 59-60). Using the constructive friend technique, we have them exchange progress reports on their projects, as well as reactions to readings they select from a book of classroom technology articles (Bonk, Ehman, Hixon, & Yamagata-Lynch, 2001). They also participate in discussions of broader issues, and sometimes engage in role-play as proponents of different sides of a debate issue. Through these Web conferencing activities, we attempt 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 is social and emotional

support rather than substantive suggestions and help with classroom projects (Ehman 1999). Teachers find it important to praise, commiserate, and empathize. In contrast, we also found that for activities such as online debates and reading reactions, the focus was more on generating and evaluating content ideas. Not surprisingly teachers favor critical friend activities over the debates and article reactions (Bonk et al., 2001).

In addition to asynchronous computer conferencing, there are occasions when TICKIT staff brings in guest experts for a real-time chat with TICKIT teachers. Guests are based on TICKIT teacher interests, readings, and current events. About one-third to one-half of the TICKIT teachers typically participant in these optional real-time chat events. These chats have proved modestly successful, though they depend on timing of the event, access and functionality of the chat tool, and expertise of the guest speaker. Overall, the quality of the chat sessions has increased with experience.

The other key online support component involves coaching by TICKIT staff via e-mail and phone. (We also occasionally provide face-to-face support of classroom project work in the schools or at the university, usually individual tutoring in specifics of an application not dealt with in the regular in school or university workshops.) While e-mail and telephones are available to most if not all TICKIT teachers, only about half of them in any year use e-mail or phone contact; e-mail is typically preferred. However, when those that rely on e-mail support specify the problems blocking progress toward developing or teaching their classroom project. TICKIT staff can respond very quickly to these queries and requests for help. This just-in-time assistance is often identified as a key strength of TICKIT in the end of year evaluations.

Provide a Structure for Developing Leadership Cadres to Assist Other Teachers in Technology Integration Across the Curriculum

One of the principal reasons for having administrators recruit cadres of five teachers from a school system is the hope that the teachers will provide leadership for their colleagues after completing the TICKIT year. This approach has succeeded in several, but not all, of the fourteen schools in which we have worked. One of the factors leading to success is multi-year involvement of a school – where two or three cadres participate in TICKIT over successive years, rather than involvement of just one team for one year. Four of our fourteen schools have participated in multiple years, three of them for three years.

Yamagata-Lynch (2001) studied what happened in two of these three schools after their first year of participation in TICKIT. She found examples of mutual support between cadres in the same school from different years, as well as activities in which TICKIT teachers helped other colleagues with technology integration. In one of the two schools, Yamagata-Lynch reports that:

> Teachers in TICKIT shared ideas with other teachers from the same school district, different school districts, different grade levels, and different subject areas. From this experience TICKIT teachers not only made new colleagues outside their schools, but also built closer bonds with teachers in their own school system. In some cases, this opened new communication channels that developed into an ongoing relationship between teachers from the same school district that did not work collaboratively prior to TICKIT. (p. 98)

She documented a similar pattern in the other school she investigated as well.

We have also found considerable evidence, in the year-end evaluations, of local support of colleagues by TICKIT teachers. Finally, we have independent evidence from school administrators that, after completing classroom projects, TICKIT teachers continue to teach in-

school technology workshops and participate in other activities to promote technology integration into the curriculum.

Summary

A variety of TICKIT elements combine to foster teacher knowledge, skill, confidence, motivation, and beliefs. These, in turn, impact others in their schools, as well as their own classroom practices, where thoughtful integration of technology into teaching and learning promotes increased student learning. The key program element is completion of the two classroom technology integration projects. TICKIT staff support these projects through workshops, primarily conducted in TICKIT teacher schools. In addition, peer support is encouraged through on-line collaboration, while individual coaching is available via site visits, e-mail, and phone. Reflection and action research on each project, plus formal reporting in local schools as well as other professional venues, helps teachers gain insights into the professional development process, thereby improving effectiveness of practice in the classroom.

All of these factors appear to be vital in impacting on teachers' professional lives. We now turn to our own reflections about important lessons learned from conducting the program over the past four years.

Lessons Learned During Four Years of TICKIT

Working with teachers to add skill and competence to infuse their curricula with appropriate technology use has been an extremely educational and sometimes humbling experience. At this point, we are finishing our fourth year of the program, worked with 115 teachers in 14 school systems, and have seen over 150 classroom technology integration projects planned and completed. We wish to point out and give instances of what we have learned during

this process, hoping this information will help others plan or implement programs similar to TICKIT.

Avoid Including Shanghaied Teachers

The recruitment process for TICKIT involves having local administrators identify and select a group of teachers to participate, with the assumption that it is they who can best match the opportunities of TICKIT to their local talent and needs. Therefore, we select or reject 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 screen the individual teacher applications, we have yet to turn one down because on paper, at least, they invariably meet our minimum requirements.

In the four years of the program, however, 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 TICKIT. In a few cases, such reluctant teachers dropped out of the program. We believe that of the four teachers who dropped out in the first year of the program, three were in this category of being unwilling participants (the fourth became very ill early in the school year). Two of these three were from one school district, and in their local cohort there were two other teachers who were obviously unwilling as well, even though they did not drop from the program. A very persuasive administrator apparently convinced this group that they could work on another project, part of a grant they hoped to receive, as the main part of their TICKIT work. This turned out not to be possible, and the teachers from that school reacted very

negatively when they discovered this. They felt aggrieved both by the TICKIT staff, who they believed were not flexible enough to let them do whatever they wished, and the administrator, who had promised them something that proved unworkable.

There have been a handful of other, more isolated incidents of TICKIT teachers participating against their real wishes, but none stood out like the four difficult or unresponsive teachers from the one school referred to above. Because they were a group, they made life miserable for themselves as well as the TICKIT staff and, in a few cases, for TICKIT teachers in others schools (a few of the asynchronous conferencing assignments had tasks that partially depended on the contributions of another teacher.) The staff was relieved when two of the group quit the program in mid-year.

We have responded to this problem by attempting to communicate about it directly with the persons in school systems as they are recruiting their cohorts, before they submit applications. We believe this has helped ward off the problem (TICKIT had no dropouts during the third year), but is certainly not a foolproof solution. We have definitely 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 involves teachers giving us information about their computing environment at school as well as at home. We also have administrators of each school certify that minimum levels of technology equipment, software, and personnel support are available. At the present time, we require that each teacher has a modern (Pentium II or higher), Internet-connected workstation at their desk or otherwise available for their dedicated use at

school, and that there be sufficient student access to modern, Internet-connected computers either in their classrooms or labs, or both.

Fortunately, there have been few instances in which promised computer support at school has been 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.

Computers in the homes of TICKIT teachers have proved a very important component of the general support picture, although during the program's early years we did not realize this. The proportion having home computers has increased steadily since TICKIT began in 1998, and in the current 2001-02 academic year, only one of the 25 teachers does not have a computer at home, although two more lack Internet connections. Given the many obligations and time pressures of these teachers, having a home computer simplifies TICKIT-related work, whether it is project development or Web interaction assignments. During the 2000-01 year, two teachers had their home computers crash, and they both reported that this made their TICKIT work more difficult and less effective. We have concluded that in screening school applications for the program, teachers' home computers is a good indicator that the group is "ready" for TICKIT, and helps us avoid relatively naïve and uncommitted teachers.

We Must Teach Technology Use in the Teacher's Computing Environment, Not Ours

Part of the model for TICKIT operations is to position most instruction and support for teachers' projects in their own school setting, not at the university. This practice has resulted in several benefits. First, teachers appreciate university staff visiting their schools and paying attention to them there, making it a more valid school-university partnership. Second, university staff learn much they would not know without the school contact – about the teachers, students,

curriculum, and computing support in each school. Therefore, we learn firsthand some of the technology opportunities and constraints experienced by teachers. Third, and perhaps most important, on-site contact provides 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 is needed, let alone be able to lobby to obtain it. Finally, it provides practical classroom examples for TICKIT staff to discuss with their preservice teachers and graduate students back at the university.

An important example of this third point is teachers' access to and ability to publish on the school's Web server. Because so many TICKIT projects involve Web publishing, this is a critical and sometimes difficult "detail" that varies from school to school. We have learned to scout the Web publishing process for each school in advance of school workshops, which includes establishing a guest Web account and then practicing as well as documenting the process before ever visiting the school. Even with these precautions, we often have been surprised by unusual problems once we arrive at schools. Without conducting the workshops in schools, we would not be aware of technical or other problems encountered by our teachers.

A Local Leader is Important For a Cohort of Teachers In a School

Local leadership of the 21 teacher cohorts in the first four years of TICKIT has varied widely, from no leader at all to very strong leader leaders, including some from outside the formal ranks of TICKIT teacher participants. Sometimes the cohort leader simply emerges from the group of five teachers, but we have learned not to take this for granted. Experience has shown that the best possible situation is when there are actually two leaders: (1) a within-cohort leader who facilitates communication among the group and between them and other important

school figures, notably the computer coordinator, media specialist, and principal; and (2) an administrator who gives both curriculum and resource support to the cohort during the TICKIT year. The TICKIT staff permits whatever within-group leadership arrangements are made, but we actively try to identify and work with an external leader so that the teacher cohort is not isolated and forgotten. To make sure they feel welcome and needed, we invite these non-TICKIT administrators to Indiana University and school workshops, as well as the state computer educator's conference. When a school has this external leader, the TICKIT cohorts invariably perform better than when no such person works with them.

Teachers Respond to Challenge and High Expectations

Throughout our program, we have seen many teachers work hard in stressful situations to accomplish TICKIT program goals that initially appeared quite daunting. We believe that as long as the requirements are not excessive or unreasonable, and are viewed by teachers as professionally valuable, the teachers will do everything they can to meet them (Reeve, 1996). As we have modified the requirements over four years, we have done some simplifying, but at the same time have increased the level of expectations. Each year, teachers have risen to these new levels.

Requiring Projects in a Graduate Course Framework Creates Teacher Stress But Pays Off For Most Teachers

The TICKIT program is structured within two graduate courses, one each semester. This means that there are a set of required "assignments" and corresponding grades for the participants. For many of the teachers, this adds considerable stress. Not only do we coerce them to create and teach instructionally significant classroom technology integration units, but also we require one written and three formal oral reports, as well as several asynchronous

conferencing assignments, all of which are graded. There are deadlines as well. Among the most common complaints during the year are that the course requirements are very demanding, there is not enough time to do them, and that stress levels become unmanageable. However, there is another common, and parallel reaction on the final evaluations at the end of the year: "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."

An alternative to requiring enrollment in graduate courses would be to take teachers on a volunteer basis, perhaps paying them a stipend each semester for their participation. However, our knowledge of programs that use this approach has shown that the primary problem is lack of application of knowledge in the classroom by the teachers, and lack of follow-through on other program obligations, such as on-line conferencing or helping other non-program teachers to integrate technology in their classrooms. We believe that the course structure, with its requirements, deadlines, and grades, does much to insure the success of the TICKIT program. Many teachers would rather not be forced to do the work, but when they actually do complete it, they are thankful and even enthusiastic about the requirements and coinciding results.

Asynchronous Conferencing Requires A Lot of Structure and Meaning For Teachers

Based on our four years of involving teachers in asynchronous Web conferencing activities, we have learned that careful and clear structuring of expectations is critically important to its success. As described above, we have four typical Web participation tasks during each year: (1) monthly progress reporting of projects within pairs (we called them "constructive friends") of teachers; (2) commentary on required as well as teacher-selected articles on classroom technology use, as well as reactions to commentary by their critical friend;

(3) threaded discussion of articles by larger participant subgroups; and (4) pro-con position-taking on issues posed by TICKIT staff or participants. In order to make these formats work well, it is necessary be extremely very clear about expectations and sometimes present models or examples of what is expected. In addition, program coordinators can plan out reasonable time frames for each activity and stick to them. Finally, they can make any required readings specific to teaching tasks meaningful to the teachers. Our experience in TICKIT indicates that most practicing teachers tend to resist strongly readings that are general and not linked to classroom practice. These guidelines have emerged from evaluations and research we have conducted within TICKIT (Bonk, Ehman, Hixon & Yamagata-Lynch 2001; Ehman 1999).

Conclusion

The TICKIT program combines a number of features that heighten its effectiveness. Research indicates that the duration of professional development programs often distinguishes effective from ineffective programs (Garet, Birman, Porter, Desimone, Herman, & Suk, 1999). Therefore, TICKIT lasts a year in length for each teacher, and for schools sending cohorts over two or more years, the impact upon a school is longer. TICKIT also incorporates a collaborative approach in which teacher participants help determine aspects of the program. Participating teachers and TICKIT staff alike value this choice factor. At the heart of the program are 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 manuscript, many of these same elements have been found to be vital in previous professional development research.

While we are beginning to recognize the principles and components necessary for program success, we do not know if TICKIT teachers have progressed through specific

professional development stages in the process of incorporating technology in their classrooms. That remains an interesting question for further research. In the ACOT research (Budin 1999), however, teachers appeared to move through five distinct stages:

- Entry Stage: teachers are not yet comfortable with technology and do not use it;
- Adoption Stage: teachers have mastered initial management issues but have not typically incorporated technology past occasional student drill-and-practice use;
- Adaptation Stage: teachers use technology to speed up curriculum coverage, leaving more time for higher-order thinking;
- Appropriation Stage: teachers understand technology well enough to use it as a tool to develop new methods of instruction incorporating technology, and students are more actively engaged in their own learning with technology tools;
- Invention Stage: teachers use technology to develop new learning environments.

The TICKIT screening and selection process tries to avoid teachers in the Entry stage. We have observed growth through the Adoption, Adaptation, and Appropriation Stages, although it is uneven and we cannot claim that all teachers reach a certain stage during or after TICKIT. We are skeptical whether our TICKIT teachers have reached the fifth stage, "Invention," and without detailed classroom observation and research it is impossible to make any claims one way or the other about its achievement.

The five-stage model omits a critical component of professional development, that of systematic reflection on practice. Without teachers engaging in this activity to promote their practical knowledge of teaching and learning, moving through any set of growth stages is incomplete. We have created the TICKIT program, in part, to foster this important professional outcome. As the program continues to be developed and refined, we will search for similar

programs and models, factors crucial to program success, and opportunities to share what we have learned.

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Table 1. Summary of TICKIT Teacher Projects

Type of Project	Description
Classroom Web site	Teachers created classroom Web sites for students to publish their work. Additionally, many teachers used their Web site as a space to communicate to parents about homework assignments and classroom activities.
Database Development	Teachers involved students in creating a electronic database surrounding various topics (such as endangered species and chemical characteristics of elements) within their subject area.
HyperStudio Multimedia	Teachers assigned students to create a hypertext based HyperStudio Multimedia autobiography, book reviews, and various presentations.
Internet Research	Teachers assigned students to conduct research on the Internet regarding an issue related to the subject area, and assisted students in determining how to find reliable information on the Internet.
Keypals	Teachers assigned students to exchange e-mail with students from other schools within the US and overseas, and tied these interactions to their curriculum unit.
PowerPoint Multimedia	Teachers assigned students to create a PowerPoint Multimedia autobiography, book reviews, and presentations.
Video Conferencing	Teachers used the video conferencing distance education equipment to interact with other students from different schools, different grade levels, and experts in a particular subject area.
Web Classroom Newsletter	Teachers and students collaboratively created Web-based classroom newsletters.
Web Conferencing	Teachers hosted Web conferencing between their students and students from Indiana University, or students from a different grade level in their schools.
WebQuest	Teachers created a curriculum unit based on Bernie Dodge's WebQuest (for more information visit: http://edweb.sdsu.edu/webquest/webquest.html).

(Used by permission from Yamagata-Lynch, 2001)

Appendix A

TICKIT Individual Project Action Plan
January 5, 2001

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>
</table>

9 Public Presentation and Celebration: To what groups of colleagues should I report this project, and in what settings?	

[1] Richardson and Hamilton (1994; 109) distinguish between "professional development" and "staff development", explaining that the former is "the continuing development of the individual teacher, usually undertaken voluntarily"; the latter term indicates a systematic group-based program for developing or advancing the goals of the institution, where it is required by a school district or individual school, and the individual teacher has no option to participation. In this paper we use the terms interchangeably, as the TICKIT program represents aspects of both terms.

[2] We have, however, recently created a Web site that summarizes a number of programs similar to TICKIT while also providing Internet links to these respective programs (see http://www.indiana.edu/~tickit/infocenter/programs.htm). Additionally, we intend to add a matrix to this site that compares the key components or features of these programs.

[3] During the first two years the program was open to teachers at all grade levels. Terms of the grant supporting the third and subsequent years restrict us to including at least 60% high school teachers with no more than 40% middle school teachers. Elementary teachers are excluded from the present program. Indiana school systems involved with TICKIT during its first four years included:

Bloomfield Community School Corporation (years three and four)
Brownstown Central Community School Corporation
Eastern School District of Greene County
Eastern Hancock County Community School Corporation
Flat Rock-Hawcreek School Corporation
Lanesville Community School Corporation
Mt. Vernon Community School Corporation
Nineveh-Hensley-Jackson United School Corporation (first two years and year four)
North Spencer County School Corporation
Salem Community School Corporation (first three years)
MSD Shakamak
South Harrison Community School Corporation
Spencer-Owen Community Schools (first three years)
Turkey Run Community School Corporation

[4] The actual numbers are: 1998-1999: 26 total teachers, with 3 dropping out and 1 added during the second half; 1999-2000: 29 total teachers, with 3 dropping out and 1 added during the second half; 2000-2001: 30 teachers admitted from six rather than five school corporations; none dropped out; and 2001-2002: 26 teachers from five school corporations, with 2 dropping out.

[5] Such courseware or conferencing tools have included the Conferencing on the Web (COW), the Virtual University, WebCT, and Blackboard. The use of these tools has been either free or at a nominal cost.

[6] A WebQuest is a teaching strategy that utilizes the Web for student inquiry, information gathering, question asking, information analysis, small group activities, and general problem solving (Donlevy & Donlevy, 2000). It typically is a teacher-generated Web resource with active, preselected Web links for a particular purpose or unit goal (Kelly, 2000). A WebQuest may be incorporated to prepare students for a particular lesson or event, to extend ideas addressed within a unit, or to culminate a unit. A WebQuest typically includes six key components, Introduction, Task, Process, Resources, Evaluation, and Conclusion. In TICKIT, we also ask that teachers post reflective notes for other teachers about the purpose and intent of their particular WebQuest. Note that the WebQuest strategy was conceived by Bernie Dodge at San Diego State University (http://edweb.sdsu.edu/webquest/webquest.html).

[7] The TICKIT Web site is http://www.indiana.edu/~tickit/.

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Printed Name/Position/Title: Lee H. Ehman, Professor

Organization/Address: Education 3276, Indiana Univ.
Bloomington, IN 47405-1006

Telephone: 812.856.8139

FAX: 812.856.8116

E-Mail Address: EHMAN@INDIANA.EDU

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