USING TECHNOLOGY IN MEANINGFUL WAYS WITH FIRST YEAR TEACHERS: TRIUMPHS AND TRIBULATIONS ENCOUNTERED WITH PT3 INITIATIVES

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This chapter highlights the successful strategies used to inspire and prepare beginning teachers to become effective users of technology. The triumphs and tribulations encountered during this two-year PT3 project are recounted, focusing on specific technology tools that hold promise for eliciting and encouraging meaningful reflective practice with this special population.

The PT3-funded Collaborative Advancement in Distributed Resource Education (CADRE) project is a joint initiative on behalf of the University of Arizona's teacher preparation program and three local school districts to develop technology-proficient educators who are prepared to meet the needs of 21st century learners. One of the three goals for this grant was to provide first year teachers, working in schools serving low-income or minority communities, sustained face-to-face and networked mentoring that results in continued technology integration. This chapter focuses on the innovative ways this project has transformed this aspect of teacher education, highlighting the successful strategies used to inspire and prepare beginning teachers to become effective users of technology. The chapter is presented as a journey with two different groups of first year teachers, taking a closer look at the triumphs and tribulations encountered in the efforts to present meaningful technology experiences for use with this special population.

The focus of this particular PT3 project with beginning teachers placed an emphasis on specific technology tools designed to elicit and encourage meaningful reflective practice. During the first year of teaching, novices must be surrounded with a professional culture that supports teacher learning (Feiman-Nemser, 2003). In this critical stage of development, beginning teachers are developing practical knowledge (Cochran-Smith & Lytle, 1999) dependent on the

unique context of a particular classroom (Munby, Russell & Martin, 2001). How teachers acquire such knowledge and the situations in which they learn become a fundamental part of the learning process (Putnam & Borko, 2000; Schon, 1991). It was therefore considered essential to unpack these teacher reflections through specific technology tools that compliment and in some ways are derived from the teaching practice. During the first year of work with these beginning teachers, three technology tools were utilized to elicit and encourage reflection on teaching as it naturally occurs in practice. Portfolio development, online discussion, and videotaping teaching were chosen for use with this initial group. During the second year of the PT3 project, a new group of first year teachers were introduced again to online discussions, with an additional mentor teacher support component. Paired email with mentor teachers and personal reflections using a Palm device were also promoted. Insights and understandings from the PT3 efforts and initiatives across the two academic years will now be presented, with special attention to the lessons learned in the form of trials and tribulations encountered along the way.

A Good Start: Three Promising Technology Tools

During the initial year in which beginning teachers were introduced into the PT3 grant, our plans were three-fold: 1) To give instruction and support on creation of an electronic portfolio to encourage the first year teachers' reflections on their experiences and knowledge; 2) To introduce a web-board for online discussion communication with other first year teachers across the city and provide a forum for group reflection on the work of teaching; and 3) To digitally videotape first year teachers so that they might be able to use this technology as a reflective tool and integrate results into their electronic portfolio. These three technology tools were chosen for their promise to elicit and encourage reflective practice among the beginning teachers. The electronic

portfolios were chosen so that these teachers might create a purposeful collection exhibiting their efforts, progress, and achievements (Canada, 2002; Lankes, 1998). Online learning had emerged to allow convenient asynchronous communication and reflection among learners (Harasim, 1991) overcoming obstacles of distance and time (Zhao, Englert, Chen, Jones & Ferdig, 2000). This opportunity to dialogue with colleagues or cohorts is an important aspect of teacher inquiry and reflective practice (Rust, 1999; Wilson & Berne, 1999). Videotaping teaching episodes to encourage reflection is not a new practice in preservice teacher education (Wedman, Espinosa, & Laffey, 1999; Lambdin, Duffy, & Moore, 1997). In these cases, video has been utilized to enhance self-evaluation, affording the luxury of being able to engage in reflection once a lesson has transpired (Sherin, 2000).

Ten first year teachers, teaching a range of grades between kindergarten and twelfth grade and representing four school districts in the city, participated in the initial project. Participation was gained by sending an email to all graduates of the teacher preparation program, asking volunteers to respond if they were interested in participating and had obtained a beginning teacher contract within the city for the upcoming school year. The beginning teacher participants met with the research team eight times, spread evenly throughout the 2002-2003 academic year. These meetings served as instructional time for creation of the portfolio, and as a common time to discuss the project in general and touch base on other aspects of the technology experiences. The first year teachers were individually videotaped in their classroom three times during the year, in the months of September, December, and April. In the month following each videotaping, individual open-ended interviews (Seidman, 1991) were conducted to assess which technologies were beneficial to the beginning teacher and how the technologies might be improved for better use. These open-ended interviews, which took approximately 15-20 minutes

to complete at the individual teacher's school site, were taped and transcribed for later review (Bogdan & Biklen, 1992). A Likert-scale survey was administered to the first year teachers at the initial meeting in August and the final meeting in April. Finally, the beginning teachers were required to participate in an online discussion board created for the group a minimum of three times during the school year. The discussion board was introduced in October and suggested participation months were November, February, and May. Requirements for the first year teacher participation in this study were staggered so as to not overwhelm them at any particular point in the school year. Data collected from interviews, surveys, videotapes, and online discussion transcripts were analyzed to determine the effectiveness of the three technology tools for eliciting and encouraging beginning teacher reflection leading to improvement of their teaching practice. Results of this initial project are now presented in the form of triumphs and tribulations.

Triumphs from the initial project

Overall, results indicate that the first year teachers in this study found value in each of the technology tools with videotaping encouraging the most meaningful reflection on their teaching practice

    Despite slight variations among individuals, the averages for the group of beginning teachers remained constant when asked which tools encouraged the most meaningful reflection on their teaching. Results are synthesized in Table 1.

Table 1.
Group Averages For Encouraging Reflection
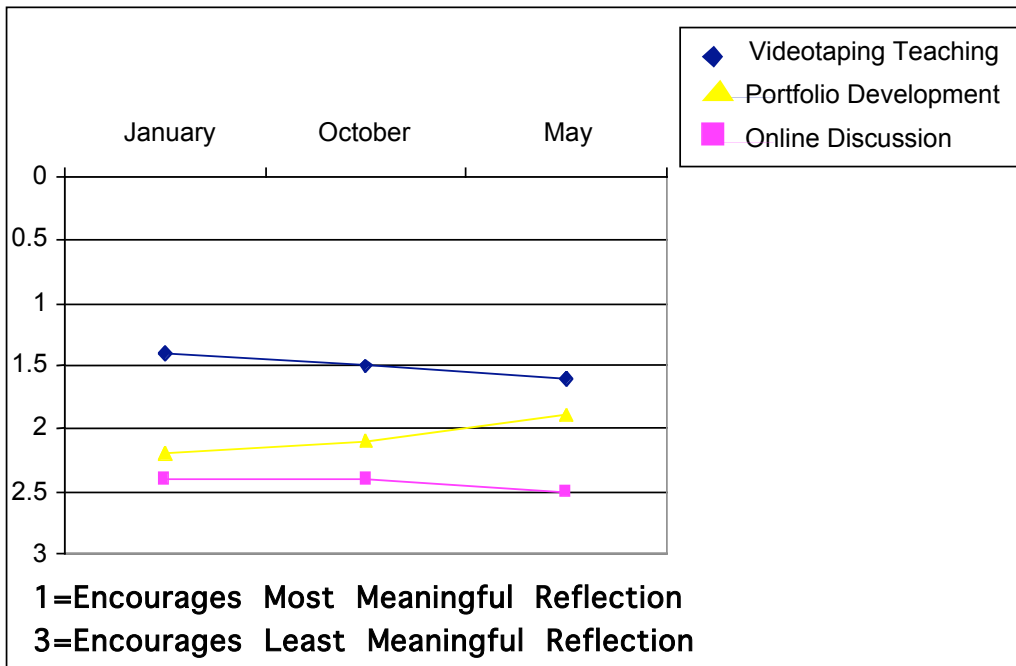
The beginning teachers in general expressed that videotaping their teaching helped them to see mannerisms and unintentional tendencies that they normally would not otherwise be aware of, such as repeatedly using certain expressions. This was the most meaningful tool to them throughout the study as it provided an opportunity for instant reflection on their teaching practice. Portfolio development began the study ranked significantly lower than videotaping teaching. However, in contrast to videotaping, these numbers increased in value over time. The increase suggests that this tool gained popularity during the study as teachers began to realize how it might encourage reflection over time. The beginning teachers reported that developing a portfolio helped them to organize their teaching materials and present the best of their teaching practices. Online discussions began with a lower average than the other two technology tools and continued to be the considered least effective at encouraging reflection throughout the study. Although this tool will be discussed further in the tribulations that follow, the beginning teachers

did appreciate the online discussion as a way to share their teaching experiences and frustrations with each other.

<u>Each of these technology tools was recognized by the beginning teachers in this study for professional development purposes</u>

Throughout the study, the first year teachers responded positively when asked if using computer technologies was essential to their professional development, consistent with findings from Hawkes & Rosmiszowski (2001). Since the tools were valued for gaining self-awareness and for professional development, these beginning teachers might be inclined to use these technologies in the future (Norton & Sprague, 1997). Thus, the three tools might be introduced into teacher induction practices and continuing professional development programs as an avenue for reflection on teaching and a structure for novices to think and talk about their work.

Tribulations from the initial project

<u>The online discussion tool gained inconsistent participation impeding efforts to create a sustainable and more meaningful reflective conversation</u>

Results indicated that online discussions were the least likely tool for these beginning teachers to use for reflective purposes when given the opportunity to do so in the future. These results are consistent with those of Harrington and Hathaway (1994) who suggest that not all participants recognize the value of such conferencing activities. Although the beginning teachers found value in providing and receiving nonevaluative and nonthreatening emotional support during their first year of teaching (Chubbuck, Clift, Allard, & Quinlan, 2001; Edens, 2000), their lack of consistent participation made this technology less effective. The beginning teachers also

were often frustrated that they were only talking to other first year teachers with the same amount of expertise.

The middle months of the study, November through January, gained the most participation from this group of beginning teachers. By March, it appeared that the beginning teachers were only getting on the discussion board if they wanted to initiate a topic, and very rarely were responding to others. Responses in the final interviews yielded two suggestions that were considered to be viable ways to adapt the online discussion to better meet the needs of beginning teachers. First, it was suggested that the study should have required participation more often. Although the minimum number of entries required was set as to not overburden the first year teachers, it is highly probable that this may have contributed to limited participation. However, 8 of the 10 participants made more than three entries throughout the year, and the highest number of entries for a single beginning teacher was eighteen. The second suggestion was to include mentor teachers for collaboration on the discussion board to provide for a richer discussion (Aune, 2002). Although suggested by only two of the ten beginning teachers, it seemed to be a promising addition to this technology tool in future projects.

<u>Access problems in the schools prevented equal opportunities for beginning teachers to use the technology</u>

Issues arose during the academic year regarding opportunities to use the technologies needed, specifically the online discussion board. Some of the school districts in the area employ such a high level of security screening that some web sites have been blocked or are not available to the teachers in their schools. Most of the beginning teachers in this initial group then had to rely on their personal home computer for access to the designated site. In most cases this was sufficient, yet one particular beginning teacher had problems with her own system as well.

Although the percentage of those affected was not significant in this particular study, it is worthy to mention as it cannot be presumed that all beginning teachers will have access to all of the technology tools they might need or be asked to use.

<u>A uniform lack of integration when using the three technology tools</u>

The three tools emerged as separate in that two of them were considered more personal, and the third more of a group reflective tool. The beginning teachers in this study indicated a preference for videotaping and portfolio development, both of which are concrete displays of teaching practice providing an opportunity for personal reflection. These teachers chose to keep the videotapes of their teaching to themselves, and not a single participant chose to include these displays of practice in their teaching portfolio despite being given examples of how to do so. Similarly, videotaping teaching was never discussed during the online discussions. There was only one instance in which the beginning teachers demonstrated integration of the three technology tools. At one time during the online discussion, the conversation turned to writing a philosophy of education, which many teachers were including in their portfolio. Despite this small overlap, the beginning teachers tended to consider the technology tools to be separate tools and rarely explored options to integrate the three.

A New Start: Breathing Life into Online Discussion and the Introduction of Other Technologies

Using lessons learned from the tribulations encountered with the initial group, new technology experiences were created for use with a second group of beginning teachers in the subsequent year. First, the disappointing reception received from the earlier initiative for online discussion created a motivation to improve the tool so that it might be more effective. Utilizing

the suggestions from the beginning teachers in the initial group, mentor teachers were added to the electronic discussion to provide additional insights and perspectives about the practice of teaching. Adding mentor teachers was hoped to enhance the potential for reflective discourse in the context of a community (Nicholson & Bond, 2003; Harrington & Quinn-Leering, 1996). The other suggestion from the initial group was to increase the amount of participation required in the online discussion throughout the academic year. It seemed reasonable that doing so would indeed increase participation, and would also place a larger emphasis on the tool's importance. Thus, the new online discussion component required the beginning teachers to participate a minimum of 20 times during the year, or approximately every other week between August and May. Mentor teachers were employed to be regular contributors to the board and respond to anyone who may have made a posting during that time. The mentors were asked to participate 40 times during the school year, approximately once a week during the academic year. Consistent with the beginning teacher assessment at the end of the initial study, the online discussion would be considered to be a group reflective technology tool.

Two new technology tools were introduced in the second year project to offer technology experiences between pairs and on an individual basis. The decision to change tools from the initial year was made primarily to assess the use of two new tools, considering that videotaping and portfolio development had already established themselves as viable tools for use with beginning teachers. The first new tool was paired mentoring through email correspondence. Mentor teachers have often been employed to work with beginning teachers as a way of establishing relationships based on dialogue and reflection (Stanulis, 1995), giving beginning teachers access to the mentor's teaching knowledge and critical examination of issues (Fairbanks, Freedman & Kahn, 2000). Research indicates that correspondence via email offers one way to

gain these additional perspectives and support for solving problems (Davis & Resta, 2002). Each of the beginning teachers was paired with a mentor teacher outside of the school in which they taught. Paired conversations between the beginning teachers and their assigned mentors were to be completed a minimum of 20 times throughout the school year. The mentor teachers were asked to serve as a guide and advisor as they assisted the beginning teacher to reflect in this setting, and the mentors were responsible for keeping records of all email correspondence. The other new technology introduced was an alternate way for the beginning teachers to engage in individual reflection. A Palm Pilot device was provided for each of the beginning teachers to use for recording their individual reflections, with a minimum of 20 required throughout the school year. The beginning teachers were asked to compile these reflections and provide this data after the first and second semesters of school.

Twenty beginning teachers participated in the second year PT3 project. They taught in all grades ranging from kindergarten to seventh grade. Participation for this second group was gained through email as in the first initiative, but only graduates who had participated in earlier PT3 activities as an undergraduate received the call to volunteer. Thirteen of the twenty beginning teachers were employed for their first year of teaching in the city where they completed their initial teaching certification, representing six different districts across the city. The seven remaining beginning teachers accepted jobs outside of the city, but were able to participate as they remained in the same state and all requirements for this study were electronic. The beginning teachers were paired with mentors according to grade level at an introductory meeting in August before the study began. Mentor teacher participation was gained primarily from a pool of practicing teachers who were also graduate students seeking their advanced degree in teacher education. Additional volunteers from the mentor teachers' schools were then

included to meet the number of beginning teachers in the project. Ten of the twenty pairs of beginning and mentor teachers taught at the same grade level. In eight pairings, there was a difference of one grade between their assignments. In only two cases was the gap larger between grade levels, yet in both cases there was only a difference of two years. The mentor teachers' collective experiences included teaching in all grades from kindergarten to twelfth grade and special education, with a range of 3-25 years of classroom teaching experience.

In addition to data collected from the online discussion transcripts, paired emails, and individual reflections from the beginning teachers, survey and interviews were conducted via email with the beginning teachers (Bogdan & Biklen, 1992). A six-point Likert scale survey was conducted in August, December, and April. An open-ended response interview (Seidman, 1991) was also distributed electronically three times during the school year, in the months of September, January and May. As in the previous initiative, requirements for the beginning teacher were staggered so as to not overwhelm them during any particular week. On one week, they were asked to email their mentor. The following week, they were asked to visit the discussion board and make an individual reflection. This cycle continued from the first week in August to the final week in May, for a total of 40 weeks during the entire academic school year. The data was analyzed to determine the impact of each of these technology tools for improvement of the beginning teachers' practice, along with which tools encouraged the most meaningful reflection. Suggestions made by this second group were also compiled for consideration when working with future groups of beginning teachers. Results of the second project are now presented in the form of triumphs and tribulations.

Triumphs from the second project

The combination of the three separate technology tools provided something for everyone

When asked which of the three technology tools encouraged the most meaningful reflection on their teaching practice by the end of the study, the twenty beginning teachers responded fairly evenly across the three tools. Approximately one-third of the group preferred paired emails with mentors for reflection, another third liked the online discussion, and the final six beginning teachers felt the individual reflections completed on the Palm encouraged the most meaningful reflection. The beginning teachers who valued the paired email with a mentor appreciated having a relationship with an experienced teacher who could help them through rough times and provide immediate feedback and responses to questions. These beginning teachers described how the paired reflections tended to be more personal as their mentors got to know them and what they needed as time went on. Those that preferred the group online discussion for reflection felt that the arrangement allowed for a wide variety of experience, perspectives, and suggestions. The beginning teachers described how it was nice to know that they were not alone in what they were experiencing, and were able to gain moral support, advice, and feedback to questions. Some first year teachers thought the online discussion was particularly beneficial when they had exhausted all possible resources at their school. Finally, the beginning teachers who were partial to individual reflections with the Palm expressed that these reflections were more personal to their class and school and allowed them to critically think about and analyze their practices. These teachers felt the individual reflections provided a way to look back on the school year and decide what they might do the same or differently next year. The beginning teachers also described how these reflections were the easiest to access and use wherever they desired.

<u>Overall, the beginning teachers agreed that the three technology tools had a positive impact on their teaching practice, with paired mentor emails having the most impact</u>

On the final survey for the project, all the beginning teachers agreed with little or no variation that the paired email with mentor, the group online discussion, and personal reflections on the Palm all had a positive impact on their teaching practice. When asked about each tool separately in the final interview, results varied slightly. Eighteen of the twenty teachers (90%) felt that the paired email with a mentor had a positive impact on their teaching practice. These beginning teachers were happy to have an experienced teacher to give them advice and ideas from outside of their school. They expressed the benefit of having someone to talk to who was both non-judgmental and non-biased when providing information or opinions. Fifteen of the twenty beginning teachers (75%) thought the personal reflections on their Palm had an impact on their teaching. These reflections allowed them the time to sit back and reflect, ultimately allowing them to learn from their experiences and honestly assess their strengths and weaknesses without having someone else read those individual reflections. Although all beginning teachers agreed that the group online discussion had a positive impact on the final survey, there was a less enthusiastic response in the interview as 13 of 20 teachers (65%) felt this tool had a positive impact on their practice. Those that agreed described how the online discussion was a great resource for advice and ideas. These beginning teachers were able to find possible solutions to their questions from the wealth of perspectives provided by the large number of people participating.

<u>The improved online discussion showed promise in the second initiative</u>

Survey results throughout the study with the second group of beginning teachers indicate that although online discussions were not favored as much as the paired email with mentors, they

were also not the least likely to encourage reflection. In fact, survey averages remained in the same range throughout the study, indicating that the beginning teachers in general agreed this tool encouraged meaningful reflection on their teaching. Results for all three technology tools from the second group can be found in Table 2.

Table 2.
Group Two Averages For Encouraging Reflection
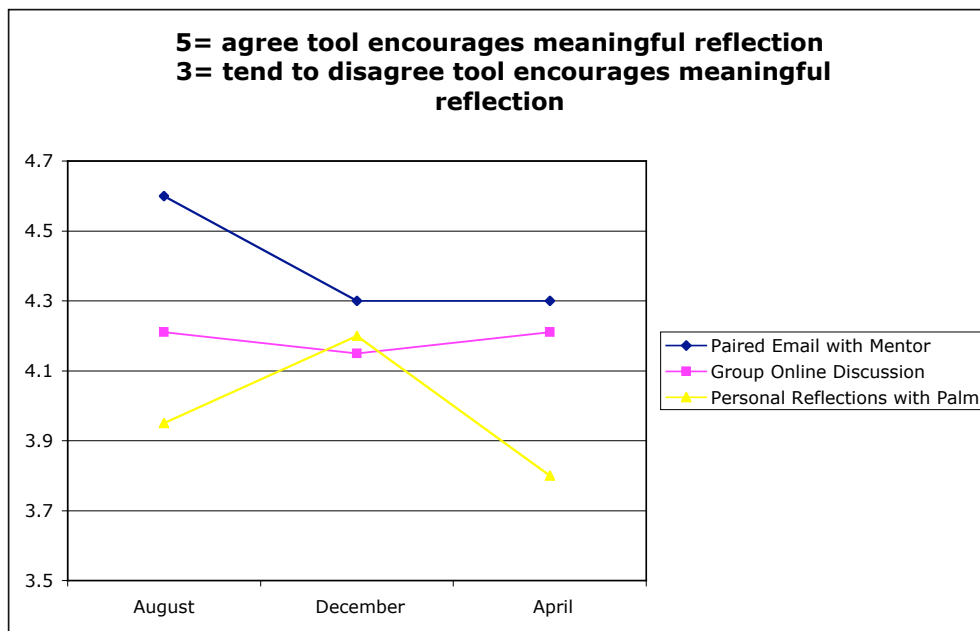
Having mentor teachers involved in the second year was a beneficial addition to the project

Not only were the mentor teachers available to share their expertise and insights with the beginning teachers, but they also were effectively modeling the use of technology in the process. The mentor teachers were engaged in email communication and also participated in the online discussions, which often encouraged the beginning teachers to continue as well. Thus, this tool became more of a way to share inquiry into practice within a professional culture (Hargreaves & Fullan, 2000). As indicated in the three previous triumphs, paired email with mentors was the highest ranked tool for both encouraging reflection and having a positive impact on teaching

practice. Also, repeating an online discussion with only first year teachers might have had limited success as it did in the previous year. Thus, involving mentor teachers in the project was a highly positive outcome of the project.

Tribulations from the second project

<u>The first year teachers often failed to fully utilize the expertise of their mentors</u>

Despite the fact that having mentor teachers involved greatly benefited the project in many ways, as stated in the final triumph above, the beginning teachers varied on whether they fully took advantage of this resource. Closer examination of the email correspondence between the mentors and beginning teachers indicated that some pairs held their relationship at a highly superficial level and simply used the opportunity to touch base from time to time. In these cases, questions were rarely asked and the level of reflection, if at all present, was minimal. Thus, it seemed that the beginning teachers considered their mentor to be an email friend, rather than a source of information and support. On the other hand, many of the mentor and beginning teacher pairs utilized this aspect of the project to its fullest potential. Some beginning teachers asked profound questions and advice from their mentor on deep and philosophical issues related to teaching. The mentors then stepped up to the occasion and were very honest in their assessments and suggestions. A few mentors offered to meet in person to talk or send materials to compliment what the beginning teacher would be teaching. Thus, the relationship didn't work at the optimal level in all mentor and beginning teacher pairings; but when it did work, it worked very effectively.

<u>Beginning teacher participation and interest varied with the three technology tools</u>

Although the requirements for participation in all three technology tools were clearly stated, not all beginning teachers fulfilled their obligations as suggested. The beginning teachers in this group tended to meet the expectations for the paired email with their mentor more so than with the other two tools. This was due in part to the fact that all emails between the pair were counted towards the total, whether or not they were initiated by the beginning teacher. Sixteen beginning teachers (80%) met or exceeded the expectations set forth for paired emails at the onset of the study. Thus, only four beginning teachers (20%) and their mentor failed to meet the expectations for the paired email. These pairs completed between 10-19 emails, in and some cases were just short of the 20 required. Individual reflections completed on the Palm were the second most likely requirement to be met, with fifteen beginning teachers (75%), meeting or exceeded the minimum number required. The remaining five beginning teachers (25%) all failed to meet the obligation during one or more semester, two of which had technical difficulties with equipment that caused this problem. Finally, online discussion participation was the least likely obligation for the beginning teachers to fulfill, with only eleven of twenty participants (55%) meeting or exceeding the minimum expectations. Thus, nine beginning teachers (45%) failed to complete the required number of entries to the online discussion, and five of those participants made less than half of the entries suggested.

An analysis of whether each individual beginning teacher met the requirements in all areas revealed that fulfilling obligations with all three technology tools was rare. Only 6 of the 20 beginning teachers (30%) met the full requirements in individual reflections, paired email, and online discussions. There were a total of ten beginning teacher participants (50%) who met requirements in two of the three technology areas. The area most likely to not be met among

these ten beginning teachers was the online discussion. Most problematic, however, was the fact that 4 of the 20 beginning teachers (20%) failed to meet requirements with two of the three technology tools. All four of these participants did not make the minimum number of online discussion entries, and lacked participation in another area as well. Two of these beginning teachers were a concern throughout the academic year. Several attempts were made to hold these individuals accountable, usually creating an increase in activity that would decline yet again at a later time. As with all groups, however, it is presumed that some beginning teachers may be more excited and willing to use the technologies than others.

<u>Incompatible systems and access issues continued to be problematic</u>

Similar to the initial project, some beginning teachers had technology problems due to access and incompatibility issues. Again, the district systems did not always allow access to the online discussion board and in many cases would not allow synchronization of the Palm Pilot with the school computers. This was particularly problematic for one beginning teacher who did not have a computer at home and had to visit a friend's home whenever she wanted to access the discussion board. Also several times during the onset of the project, beginning and mentor teachers alike would forget their password for the online discussion or need the direct link to gain access. These problems, for the most part, were ironed out early. Other problems were specific to the individual teacher as in the case of one email pair that weren't getting each other's messages due to blocked private email services. Finally, although more an issue of preference and ability and less of access problems, some of the beginning teachers gave up on their Palm device the first time they had any problems. They simply chose not to use the device rather than seek help or assistance for its proper utilization.

<u>A completely electronic project requires teachers to be competent collectors of data</u>

The entire second year of this project was managed electronically, with only one introductory meeting. Beginning teachers were asked to keep up with the schedule of reflections every other week and send them at each semester's end. The mentor teachers were asked to do the same with the email correspondence. Data received as a result was not always accurate, and often missing information. For the most part, the beginning teachers completed their reflections and sent them in as scheduled. The only problems noted were the few cases in which they failed to do all ten reflections during a semester, or neglected to date their entries.

Email correspondence from the mentor teacher was more difficult to make sense of as often the documents included emails that were repeated, without dates, or in non-sequential order. In several cases, it became obvious that certain emails were missing, especially when a person was answering a question that was not documented as being asked. Others included only the emails from the mentor to the beginning teacher as they kept a copy of what they wrote but failed to include the emails from the beginning teacher to them. Finally, two mentor teachers chose to print out copies of the email correspondence rather than save them in electronic format. It became very clear that an increased emphasis needs to be placed on the collection of data in a project such as this. Especially when working with technology, it becomes important to make sure that all involved have the skills and expertise necessary to not only complete their obligations, but also manage the data in such a way that it is presentable and accurate at a later time.

Implications for Future Projects: Where do we go from here?

After taking a retrospective look at the entire PT3 project with beginning teachers over the course of two years, it becomes necessary to assess the overall triumphs and tribulations and continue the discussion of how we can strive to use technology in meaningful ways with first year teachers in future projects and programs. In sum, all of the five technology tools employed across the two years hold promise for use in eliciting and encouraging reflective practice with beginning teachers. In the first project, videotaping and portfolio development established themselves as viable tools for use with this population. The beginning teachers tended to value these more private and personal reflections on their teaching practice. Another individual reflective tool introduced in the second year, personal reflection with the Palm pilot, was not favored as highly yet many beginning teachers found a great value in having these private reflections on their strengths and weaknesses throughout their initial year of teaching. Thus, these three technology tools each offered a chance for the beginning teacher to reflect individually and thus had a positive impact on their teaching practice. All three might be considered in future projects as tools to encourage this type of individual reflection that is undoubtedly necessary for beginning teachers' development, while at the same time utilizing key technologies in the process.

In the second project, paired email with mentors was considered to be a very effective tool, and encouraged beginning teacher reflection with another who could offer experience and expertise on related teaching issues. This type of communication was highly valued by the beginning teachers for both reflective purposes and impact on their teaching practice. Also, employing mentors to be participants in the online discussion improved the conversation and promoted a forum for a community of learning experiences. Involving mentors in the second

year had such a profound impact that in some ways they represent what may have been missing in the initial project. Additional investigations of how mentors can be utilized as partners with the beginning teachers, while at the same time serving as models for effective uses of technology, are needed to further explore these issues.

Across the two academic years, the online discussion evolved into a tool that is becoming increasingly effective. The second year participants suggested that the online discussion site be made easier to navigate and perhaps organized more effectively, which will be considered in future projects. However, tremendous progress was made across the two years and suggestions for how to offer such online discussions in the future can be made accordingly. Table 3 synthesizes the results by project. It should be noted that the mentor teacher entries to the online discussion in the second project have been removed in this analysis.

Table 3.
Online Discussion Comparison by Project

	Initial Project	Second Project
Number of First Year Teachers	10	20
Total First Year Teacher Entries	66	343
Average Entries per Participant	6.6	17.15
Range of Entries per Participant	2-18	6-25
Required Number of Entries	minimum of 3	minimum of 20
Percentage Meeting Minimum	90%	55%
Percentage Over Minimum	80%	25%
Entry Range per Month	0-17	12-52
Highest Participation Month	January	December
Lowest Participation Month	April	January

As shown in Table 3, increasing the number of entries required per first year teacher raised the average entries in the second project significantly. However, 90% of the beginning teachers in the initial project met or exceeded the minimum number of entries required, compared to only 55% in the second group. Thus, it can be suggested that simply asking for three entries throughout the study is too few, while twenty may be too many. This number must be reconsidered in future projects, perhaps settling on some amount in between the two, such as 12-15 entries per participant. In both groups, the highest participation months were those in which each individual project required them to participate. Despite the fact that January received the highest number of entries in the first project and the fewest in the second, the second project was able to maintain its momentum throughout the school year. This would mostly effectively be achieved in future projects by staggering the requirements to ensure participation throughout the academic year. However, it may be ascertained at a later time that beginning teachers find value in this tool more at certain times of the year. It seems reasonable that they might be apt, for example, to need more assistance at the beginning of the year. A more flexible participation schedule might allow for gaining further insights into this possibility.

After experimenting with five different technology tools that each had a positive impact on the beginning teachers involved, it becomes apparent that teachers should be given a choice of possibilities rather than mandating that certain tools be used. It may be feasible to expose beginning teachers to a variety of individual reflective tools (such as the choice between videotaping teaching, portfolio development, and reflection using the Palm), a paired tool such as email with a mentor, and a group tool such as the online discussion for them to choose from. Ultimately, if they are given the technology resources and expertise, then they may opt to use them more or less depending on their needs. On the other hand there remains a lurking

possibility that, if given the choice, busy first year teachers might choose to not use any of the technologies. This is where incentives for participation are key in orchestrating a beginning teachers' involvement in learning to use these technologies. Through PT3 funding, each of the beginning teachers was given a monetary sum for participation and was also provided with a Palm pilot device and accessories for their work in the project. These incentives, along with a genuine interest in technology on the part of most participants, brought them to the table and allowed for exposure to each of the technology tools. It is hoped that this introduction enabled them to become familiar with the features and advantages of each of the technology tools so that they might continue to use such tools in the future.

However, simply exposing beginning teachers to technology tools for a limited amount of time does not necessarily guarantee that these teachers will continue to use these tools throughout their career. To truly transform teacher education, beginning teachers must be provided on-going and sustained support designed to further inspire and prepare them to become effective users of technology. Introducing beginning teachers to specific technology tools to use for reflective purposes during their first year of teaching is a promising start. Future work is needed to continue to give teachers rich technology experiences that allow them to realize the full potential these tools have to offer their continuing professional development.

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