

Train the Trainer: The Bricks in the Learning Community Scaffold of Professional Development

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Abstract—Professional development is the focus of this study. It reports on questionnaire data that examined the perceived effectiveness of the Train the Trainer model of technology professional development for elementary teachers. Eighty-three selected teachers called Information Technology Coaches received four half-day and one after-school in-service sessions. Subsequently, coaches shared the information and skills acquired during training with colleagues. Results indicated that participants felt comfortable as Information Technology Coaches and felt well prepared because of their technological professional development. Overall, participants perceived the Train the Trainer model to be effective. The outcomes of this study suggest that the use of the Train the Trainer model, a known professional development model, can be an integral and interdependent component of the newer more comprehensive learning community professional development model.

Keywords—change, education, learning community, professional development, school improvement, technology coach, Train the Trainer.

I. INTRODUCTION

THIS paper focuses on professional development as a general concern. Professional development in education is important because it is expected to improve teaching and learning in the classroom, and any tools that improve teacher effectiveness can serve as accountability strategies for school improvement initiatives. This paper presents the results of a study to investigate the application of the Train the Trainer professional development model to technology learning and explore its relationship with the currently vogue professional development model of learning communities. It is my premise that the Train the Trainer model can be effectively incorporated in the learning community model for teacher professional development by acting like the bricks (e.g., knowledge and skills acquired) that support the learning scaffold, as in Vygotsky's ladder of inference. Specifically, I argue that the knowledge and skills acquired during Train the Trainer events enhance the teaching and learning capacity of the members of a professional community, and the increased capacity serves to support other learning events that emerge

during the more comprehensive professional development model of learning communities. Ultimately, both the Train the Trainer and learning community models are expected to improve student achievement. I begin this paper with a brief overview of the two dominant models of professional development. I then provide information about the context of the study, I describe the study and present the results, and I conclude with a discussion about the potential relationship between the two models.

II. PROFESSIONAL DEVELOPMENT MODELS

Professional development takes various formats, such as curriculum development committees, professional study groups, workshops, networks, seminars, conferences, coaching, mentoring, in-service programs, professional portfolios, formal college or university courses, research activities, and professional learning communities [2], [15] and [28]. Some of these forms of professional development, such as workshops or portfolios, are self-explanatory because they describe specific events or products. Others require more definition because they might look different in different contexts. Mentoring, for example, is a staff development practice in which teachers share ideas and materials and support one another's growth and in which mentors help novice teachers to learn [1]. Mentoring is commonly assumed most effective for teachers in their first few years of teaching but it can also be used to motivate experienced teachers to renew skills. Furthermore, mentoring can be problematic when personality conflicts exist between the mentor and protégé, when trust is not possible, or when sharing is limited. This brief description of mentoring signals that, when professional development models reach a certain level of complexity, there is a need not just to define the model but also to track its effectiveness in particular contexts.

One of the more complex models of professional development is that of the learning community, which has, in recent years, become the model of choice for many school boards [18]-[21]. Its newness and complexity make it somewhat difficult to define clearly, but there are certain elements of the learning community model that are commonly agreed upon. A learning community is a group of individuals engaged actively in learning from one another following this set of characteristics:

- Collaborative mindset

- Focus on learning
- Focus on results
- Orientation toward action
- Collective inquiry
- Timely, relevant information
- Commitment to continuous improvement [19, p.

107]. Learning communities are viewed to be a powerful staff development approach to produce school improvement because they provide avenues for teachers to work and learn together to develop practices that are more effective. Teachers engaged in a learning community improve through collaborative inquiry and the learning resulting from sharing experiences. In addition, teachers' satisfaction is expected to increase because of support from colleagues [18]. Staffs focus their efforts on improving their teaching to enhance student learning and achievement. To accomplish this goal, teachers engage in collaboration and sharing of "best" practices, implement the practices and strategies, observe one another during implementation, and provide feedback [20]. Members reflect on the process and revise their practices as needed based on student outcomes. By using a reflective teaching model, teachers are engaged in action for improving their practice and they use relevant information, such as student outcomes, in a timely manner [19]. Shared and supportive leadership is another element of the learning community and requires the principal to share power with teachers. In this flattened power structure, teachers, and the principal, who are considered members of the same team, share ideas to improve school effectiveness [12]. All members of the learning community share a vision of what teaching and learning look like in the school and how the vision ties into improved student achievement [18]. The learning community is a setting where members can improve their capacity and use their skills to enhance the capacity of other colleagues by alternately leading and following one another in their journey [21]. In this process, educators learn from one another's practice and construct their knowledge based on these experiences in a work-based group called a community of practice [27]-[28].

This model, however, is not without its limitations. Sometimes, for example, the school improvement process can become messy because it is a process of intense change. Change is difficult for most people because it is usually easier to maintain the status quo than to face the challenges of examining one's practice. Some of the problems that groups encounter in the difficult work of change, such as collaboration towards shared goals, are varied. For example, members may have a tendency to come to an agreement too fast without looking for the best solution, or they may assume negative intentions about others especially when those individuals are introducing new ideas, or conflicts may arise when confusion exists about members' authority as decision-makers whose role may be to inform, recommend, or decide on a specific issue [16]. Another problem is that, when learning communities are mandated through Board policies, it can appear that staff are co-opted into working as a learning community, which could lead to resistance by teachers or,

more seriously, to subversion of the teachers' endeavours. Furthermore, the learning community model could be somewhat conservative because of the problem of bringing new ideas into an intact group of people who work well together [14].

A second commonly used professional development model is the Train the Trainer model. This model focuses on bringing one or more lead teachers to central workshops, training them in specific skills or programs, and requiring them to train their colleagues at their home school in the demonstrated skills. This model is cost-effective because the central resources are used to train one teacher rather than all staff members. It is an efficient solution to professional development needs because a workshop for a small group of trainers can be easily prepared, and resources and materials can be more readily gathered for a limited target population. It is what may be termed a "quick and dirty" solution to a board's training and professional development needs. Teachers also appear to favour workshops that target "tricks-of-the-trade" as is the case in many Train the Trainer workshops [7]-[18]. A major limitation of the Train the Trainer model is that it does not provide the time for teachers to assimilate the knowledge, skills, philosophies, and concepts that are essential for a deep understanding and appropriate application of the training provided. In essence, a higher order in-depth application of the concepts and skills is not learned through the Train the Trainer training. Consequently, it is possible that the lead teachers are not prepared to deliver the training to their school colleagues because they are unable to understand the needs of their team and/or because they do not have a deep understanding of the material.

Despite these limitations, the Train the Trainer model continues to be used extensively, and my school board has used this model for training related to computer technology. Because I was aware of the limitations of the model, I set out to investigate its effectiveness for delivering computer-related training. In the following sections, I describe this investigation in some detail.

III. MINISTRY REQUIREMENTS AND BOARD RESPONSE

My research was conducted in response to a Ministry mandate concerning the use of computers in the classroom and the response by our school board to this mandate. In 1993, the Ontario Ministry of Education and Training produced the *Resource Guide: Computers Across the Curriculum: Junior Kindergarten to OACs*, which emerged in response to *Policy/Program Memorandum 116* [24]. The policy memorandum required all school boards to launch initiatives to integrate computers into all areas of the curriculum, and the resource guide provided a methodology for realizing this goal. The methodology was expected to assist school boards in designing flexible, long-term implementation plans for this change initiative, with the expectation that the supervisory officer would oversee and offer support during the process.

The methodology signalled a need for school-level planning to ensure that school plans were coordinated with the Ministry policies, with the plans provided by the province and school boards, and with regular annual planning and random audits.

In the school board where I taught, it was decided that the site-based plan would be devised by a planning team comprised of the principal and teachers from the various levels and areas of curriculum. These teacher representatives were titled the Information Technology Coaches, and they were the ones who received the training experience through in-service sessions. The board-level computer consultant managed the change process, organized the professional development sessions, and provided support with computer personnel available to assist on-site with workshop presentations.

The Board's process for staff professional development was a three-year in-service training initiative using the Train the Trainer model which fulfilled the Ministry requirements of professional development, staff support, and evaluation by training the Information Technology Coaches, who would then train staff and share expertise. Technical resource personnel were provided who maintained the equipment and provided workshops on-site as needed. The coaches were expected to develop expertise in software and hardware use, to bring that expertise back to their colleagues, and to provide ongoing assistance and guidance to the staff and administrators in their schools.

This school board employed the Train the Trainer model to maximize the effectiveness of this initiative for technology professional development. Funds were designated (34 million dollars) from the Board's budget and the Ministry of Education and Training, to be spent over three years. One Information Technology Coach from each school received instruction within a Train the Trainer format. Initially, school principals identified the coaches in the fall of the first year of the technology professional development initiative and later, during the implementation process; coaches volunteered, were appointed, or were asked to fill these roles.

Coaches received three half-day in-service sessions the first year, one half-day in-service the second year, and one after-school training workshop the following year. For the sessions conducted during class time, a supply teacher was provided by the Board to cover the coaches' teaching assignments. Subsequently, the coaches were expected to share the information and skills learned through their training with school colleagues by carrying out workshops, one-to-one instruction, tutoring, and other activities with their division and staff at their home schools. The school-level sessions were supposed to be tailored to the needs expressed by staff at the home school in the area of technology knowledge and skill needs. In the final year of the initiative, eight million dollars were cut from the Board's budget, resulting in the termination of computer in-service funding and supply teacher coverage. Thus, coaches were no longer trained during working hours. They received instruction in after-school workshops and on-line training through First Class Client, an internal network.

For Information Technology Coaches, this required a further personal time commitment in addition to the after-school hours they spent providing in-service training for colleagues.

With the large decrease in the Board's budget, a method for updating and training teachers in the area of technology was required at minimal and effective cost. The Board still needed to meet the requirements described in *Memorandum 116* and to operate within budgetary limitations. The Train the Trainer model provided a path to this goal, but whether it was, an effective path was not known. This study was undertaken to examine the perception of participating Information Technology Coaches about the effectiveness of the model.

IV. METHODOLOGY

The purpose of the study was to examine the perceived success of the Train the Trainer model in delivering professional development for the integration of computer technology into all aspects of elementary school curriculum. The level of success was measured in terms of its effectiveness as perceived by the Information Technology Coaches, who rated the success in terms of three broad questions:

- Did coaches gain comfort with software and were they provided with follow-up strategies through in-service training?
- Were meeting with colleagues held at the school level?
- Were changes in colleagues' practice observed?

The population consisted of a group of elementary teachers in four divisions: Early Years, Primary, Junior, and Transition Years, all of whom served as Information Technology Coaches in their schools and who had received training in computer integration. All 83 Information Technology Coaches were sent a questionnaire that had been adapted from a similar survey designed and piloted one year earlier. The questionnaire had been locally developed because a search of the literature had failed to uncover a survey that assessed the Train the Trainer model of technology professional development. The questionnaire had four sections: Part A: A demographic profile of the in-school Information Technology Coach; Part B: Questions about the nature of the training sessions and the perceived quality of the participants' learning of the knowledge, skills, and training strategies; Part C: Questions regarding follow-up, including the existence and outcomes of on-site training sessions with colleagues; and Part D: Recommendations and future direction data.

Questionnaires were distributed by Board mail and returned within two months. After reminder notices were sent out to coaches, 70 surveys (84%) of the 83 distributed were returned. To accommodate data analysis, all the "yes" responses were assigned a value of 1, and "not sure" and "no" responses were grouped together and assigned a value of 2. Participants were categorized in two ways. First, they were categorized as "experts" (E) or "non-experts" (NE) depending on their own

assessment of their personal experience and expertise and only a subgroup of the sample population was used with 55 cases. Second, they were classified as “volunteers” (V) or “assigned” (A), based on whether they volunteered or were appointed or approached with the entire sample population used with 70 cases.

In order to assess the participants' overall attitude toward the Train the Trainer model, survey items were analyzed to determine the percentage of positive responses and to compare the groups. Percentage and frequency counts were used to identify Information Technology Coaches' perception about whether their knowledge and skills had improved through computer in-service training, comfort with software was gained through in-service training, follow-up strategies were provided in training, whether follow-up meetings with colleagues took place at the school level, and changes in practice were observed. To compare the groups of expert, non-expert, volunteer, and assigned, chi-square cross-tabulation analyses were performed across the groups. It was assumed that, if no difference was found between the volunteer and assigned groups and the expert and non-expert groups, then the treatment that is, the Train the Trainer model of technology professional development, was effective.

V. RESULTS

The first question of interest in this study was the perception of the participants about the success of the Train the Trainer model for providing in-service professional development [26]. The questionnaire addressed this issue through the question: “Do you feel that you improved your computer knowledge or skills through the tutorial format of the training?” The comfort of the Information Technology Coaches in their role was examined through the question: “Are you comfortable with your role?” To examine whether coaches were comfortable with the software presented at training, the following questions were asked: “Could you comfortably operate the software after the tutorials?” and “Did the tutorials address the integration of software into the curriculum?” To determine if the coaches were adequately prepared with strategies to train other staff members, they were asked, “Were viable strategies for follow-up activities with your school colleagues presented in the sessions?”

The second general area of interest was the extent to which the coaches initiated training at the home school. This issue was important, as it was the goal of training that participants would return to school and train their colleagues. The questionnaire addressed this through one question: “Did you have follow-up meetings at school with your division colleagues?” Finally, the impact of training was determined through the final question: “In your opinion, have more teachers in your division begun to integrate computers into the curriculum since your interaction with them?”

Each of these questions was subjected to percentage and frequency counts, and group comparison was conducted through chi-square analysis. The results of these analyses are

presented in Table 1. A profile of respondents revealed that a large number of participants volunteered (61.4%, $n=40$) and the remainder in the “assigned” category were “appointed” or “asked” to be trainers (38.6%, $n=27$). Teachers were found in equal numbers in the expert (49.1%, $n=27$) and non-expert (50.9%, $n=28$) groups. Both the volunteers and assigned coaches felt that their knowledge or skills improved through computer in-service training with volunteers at (86.0%, $n=37$) and assigned at (70.4%, $n=19$) which is evident because there were no statistically significant differences between these groups ($X^2=5.76$, $p>0.05$). A similar finding was observed for the experts at (81.5%, $n=22$) and non-experts at (78.6%, $n=22$) with no significant differences between the two groups ($X^2=2.09$, $p>0.05$). All participants felt the training enhanced their knowledge or skills and one can assume that this finding indicates that the Train the Trainer model is perceived to be effective by participants.

On the question of role comfort, there was no statistically significant difference between the experts at (74.1%, $n=20$) and non-experts at (78.6%, $n=22$) ($X^2=0.28$, $p>0.05$), indicating that both groups were comfortable in their roles, which could indicate that the training was sufficiently well done that even non-experts felt comfortable as technology coaches. This finding is supported by the experts (66.7%, $n=18$) and non-experts (85.7%, $n=24$) indicating high levels of support around gaining comfort with software through technology training sessions ($X^2=2.79$, $p>0.05$). The results yielded only one statistically significant difference ($X^2=6.37$, $*p<0.05$) between the volunteer (83.7%, $n=36$) and assigned (59.3%, $n=16$) categories of Information Technology Coaches for the question of their comfort in their role. The result suggests that volunteers had a greater role comfort than individuals who were asked or assigned. This finding is expected and the statistically significant result holds up this expected result. The volunteers (79.1%, $n=34$) and assigned (59.3%, $n=16$) members were also comfortable with software through their training ($X^2=3.51$, $p>0.05$). Both experts (59.3%, $n=16$) and non-experts (60.7%, $n=17$), as well as, volunteers (58.1%, $n=25$) and assigned (63.0%, $n=17$), felt that integration of software into the curriculum was discussed with no statistically significant differences statistically in their opinions ($X^2_{E/NE}=0.27$, $p>0.05$; $X^2_{V/A}=0.19$, $p>0.05$). For all groups a high number felt that follow-up strategies were presented during training with experts (48.1%, $n=13$), non-experts (39.3%, $n=11$), volunteers (46.5%, $n=20$), and assigned (37.0%, $n=10$) all reporting similar results ($X^2_{E/NE}=1.35$, $p>0.05$; $X^2_{V/A}=0.61$, $p>0.05$). Meetings at the school level were held in high most cases as revealed by the high positive responses of all category members: experts (81.5%, $n=22$), non-experts (71.4%, $n=20$), volunteers (74.4%, $n=32$), and assigned (74.1%, $n=20$) with no differences between the groups ($X^2_{E/NE}=0.77$, $p>0.05$; $X^2_{V/A}=0.001$, $p>0.05$). This particular finding indicates that participants followed through with their mandate to act as trainers at the school level by holding meetings with colleagues and indirectly supports the success of the Train the

Trainer model of technology in-service training to achieve its goals. Changes in teacher practice around the use of technology were noted in high positive results for all participant groups, expert (70.4%, $n=19$), non-expert (53.6%, $n=15$), volunteer (58.1%, $n=25$), and assigned (63.0%, $n=17$) and no significant differences between them ($X^2_{E/NE}=2.14$, $p>0.05$; $X^2_{V/A}=3.38$, $p>0.05$), which supports the efficacy of the model to impact teachers and their technology use at the school level.

The proposed hypothesis for this study suggested that if the treatment were perceived to be successful, there would be no statistically significant difference between the two groups of participants with respect to the selected measures. In fact, except for the statistically significant difference between volunteers and assigned on role comfort, this was the result obtained. For all of the identified measures the volunteers/assigned and expert/non-expert groups did not differ in a statistically significant manner in their perceptions about the effectiveness of the training. From this finding, one can assume that the Train the Trainer model of professional development training was perceived by the participants to be effective in teaching them the relevant skills and knowledge and in preparing them to train their colleagues in their home school.

VI. DISCUSSION

This study presents teachers' perceived effectiveness of the Train the Trainer model through self-report data, which might be different from the actual effectiveness of the model and which cannot be generalized. Having acknowledged this study's limitations, it is important to consider the information learned that is relevant. First, it is noteworthy that the majority of the teachers reported that their knowledge or skills were improved because of the Train the Trainer technology staff development. Second, all groups were comfortable in the role of Information Technology Coach with volunteers more comfortable than assigned coaches. Third, all groups felt that software curriculum integration was discussed during training and that follow-up strategies were provided, meetings were held at home schools, and changes in teacher practice with technology integration took place. These self-reported findings suggest that the teachers in this study perceived the Train the Trainer model to be an effective tool for staff technology professional development.

[9] suggest that staff in-service training that is enhanced, on-site, created by teachers, directed at the goals of the organization, and on-going, when coupled with standards of performance for students, will survive the budget reductions currently faced in education. They argue that because teachers are responsible for the implementation of any change initiatives in their school, good professional development experiences are essential for reform.

In Washington D.C. a project was begun in 1983 within eight schools that had computer laboratories. These pilot project schools each had an Apple computer, a videodisc

player, and a telecommunications link to Stanford University's education network, which was a sophisticated list of equipment for 1983. Unfortunately, there was a problem, in that the equipment was still boxed after 18 months because of teacher fear, lack of knowledge, and resistance to change. To address the problems of technology implementation encountered at the school level, the board committed to staff technology development by creating the Centre for Instructional Technology and Training with a substantial training budget. Due to the success encountered in this project, the training budget continued yearly and was twice the software and hardware budget, which demonstrates the board's commitment to staff technology development.

In an assessment of this large-scale project to train teachers in technology use, [3] found the following to have contributed to the success of the training: reliance on principles of effective training, teachers training teachers, support from administration, a vision, and a dedicated ongoing focus to teacher education. Similarly, [29, p. 4] suggests that training success depends on the trainers who need to integrate technology early for effect. He argues that the Train the Trainer professional development model trains staff to use technology in teaching and learning, so that the focus is not solely on the software and hardware but is on its "seamless" integration into curriculum.

The findings of my study support Siegel's contention because teachers found the Train the Trainer model of technology in-service training to be effective for helping them learn relevant knowledge and skills to integrate the software into their curriculum and to help their colleagues do so, as well. They viewed the training as providing them with new skills and abilities to deal with the required changes regarding computer integration.

The value of the Train the Trainer model lies primarily in its use of trained colleagues in subsequent professional development because this kind of ongoing support offsets the financial barrier of one to three days of professional development per annum [23]. The relationship between the trainers and their colleagues provides a forum for continued collegial sharing, which researchers suggest is an effective mode of professional development. [17] suggests that the most powerful method to enhance colleagues' practice is by coaching teachers in their daily practice. For example, [27] state, "experts are recognizing that one component of the most successful new models of professional development is *technology* that supports 'anytime, anywhere' learning communities where educators can converse, collaborate, and share best practices" (p.35). In this method, care is taken by trainer experts to inform staff about good practices that present "research-based, substantive, and significant content" [12, p.1].

The current environment of change poses substantial challenges for educators, boards, students, and the Ministry of Education and Training. Consequently, boards need to examine effective professional development strategies. The Train the Trainer model appears to be well suited for handling

changes like the replacement of curriculum consultants, who are being released at an alarming rate due to government-imposed restructuring. For example, in my school board, their number was reduced from 11 to 4.5 in one year. In the future, with ever-decreasing budgets, individuals will need to take responsibility for their own professional learning and to be flexible and open to new instructional methodologies and tools. This model provides the functional tools and continuous support for the successful implementation of future change innovations.

Furthermore, I propose that the Train the Trainer model can be combined with other models to provide more effective means for teacher training. Often, the Ministry of Education and Training tries to enforce “new” methods for professional development that cycle around as current “fads” or “saviours” of education. These models become the “vogue” or fashion horse for school boards trying to follow the policy mandates, but for teachers, the clothes according to Vogue may not fit properly and they will resist change if they believe that “this too shall pass”. Teachers are currently involved in a great deal of education reform that began in the early 1980s, and they become frustrated by “new” initiatives that cycle around and are forced upon them for a couple of years and then disappear into the abyss of unused curriculum and policy documents that are shelved until they are reborn at a future date. The Train the Trainer model, by contrast, has been around for many years and is a known and comfortable model for most teachers. Its familiarity makes it a useful strategy that can be effectively incorporated into the current “fad” of professional learning communities. The Train the Trainer model is useful for fast delivery of specific knowledge and skills like software adoption and its integration into curriculum. This infusion of knowledge and skills can then be used within the more complex, collaborative, and encompassing professional development model of learning communities. Within the learning community, the entry-level knowledge and skills brought by the teacher trainers can be further built up to extend technology integration into all areas of curriculum, to improve student achievement, and to inform the school improvement planning and success for all students. Simply described, the learning community model scaffolds learning among members of the group by building upon the teachers’ capacities, which can be achieved by training one teacher in technology who returns to share the acquired skills and knowledge with the other members of the learning community. The knowledge acquired through the Train the Trainer format builds on prior knowledge and prepares teachers to apply and to share their learning in their own context [4].

The Train the Trainer model probably should not be the only model used because, as [12] suggests, content delivery alone is insufficient to change most teachers’ practice. DuFour argues that mastery of new knowledge and skills necessitates frequent opportunities for practice and feedback. He proposes that the most significant factor affecting the adoption of professional development initiatives is the school context, that

is, the beliefs, values, and norms that comprise the school’s culture. With the “right” culture, professional development and growth in teaching and learning flourishes, and [12] contends that the learning community provides the “best” context because it creates a culture of learning (pp.1-3).

If sufficient attention is paid to the development of effective collaborative teams, the learning community provides good school spaces and effective contexts for professional development to occur. The Train the Trainer model enriches the context by bringing new skills and knowledge to the team. The Gestalt theory, “the whole is greater than the sum of its parts,” describes the impact that can be achieved with a method of professional development delivery that combines the infusion of information in the Train the Trainer model within the collective inquiry, shared learning, and critical analysis of the learning community. As [8] contend, a “blend of competencies, areas of expertise, and roles embedded into the architecture [of a professional development model] adds power and utility to the model” (p. 3).

According to [8], one of the weaknesses of the Train the Trainer model that is compensated for in the learning community model is that of the typical disconnect between the training session and classroom practice. When trainers take a portion of the theory presented and use it out of context, it can be inappropriately applied [6]. However, when pedagogy rooted in educational research is discussed and built up among colleagues, the theory is more likely to be appropriately applied to yield improved student achievement.

[6] describes the importance of developing four levels of theory. He contends that the first two levels, “understanding theory and theory in use,” can be obtained by reading journals, attending in-service sessions, and mentoring with experienced trainers [6, p. 4]. The third and fourth levels of theory, “theory in context and generalized theory,” are built through sharing and dialoguing with other teachers and research [6, p. 4]. His argument supports [11] presentation of the learning community context as the most effective culture in which to develop these higher levels, and it supports the idea of the Train the Trainer model as effective for building the first level. [6] believes that professionals need to develop a coherent theory basis to their practice that is partially achieved through reading and talking with colleagues. [6] work supports my proposal

of a combined professional development model that incorporates the Train the Trainer model within the learning community model, which then facilitates this necessary step in professional development that integrates theory with practice and that is geared toward improved teaching and learning, enhanced student achievement, and learning for all.

APPENDIX

TABLE I

INDEPENDENT VARIABLES	TRAINER TYPE	YES	NO/NOT SURE	X ²	df
Knowledge or skills improved through computer in-service training	Expert:	81.5% (n=22)	18.5% (n=5)	2.09	2, p<0.35
	Non-Expert:	78.6% (n=22)	21.4% (n=6)		
	Volunteer:	86.0% (n=37)	14.0% (n=6)	5.76	2, p<0.06
	Assigned:	70.4% (n=19)	29.6% (n=8)		
Comfort in the role and assumption	Expert:	74.1% (n=20)	25.9% (n=7)	0.28	2, p<0.87
	Non-Expert:	78.6% (n=22)	21.4% (n=6)		
	Volunteer:	83.7% (n=36)	61.5% (n=16)	*5.98	2, p<0.05
	Assigned:	16.3% (n=7)	38.5% (n=10)		
Comfort with software gained through in-service training	Expert:	66.7% (n=18)	33.3% (n=9)	2.79	2, p<0.25
	Non-Expert:	85.7% (n=24)	14.2% (n=4)		
	Volunteer:	79.1% (n=34)	21.0% (n=9)	3.50	2, p<0.17
	Assigned:	59.3% (n=16)	40.7% (n=11)		
Integration of software with curriculum discussed	Expert:	59.3% (n=16)	40.7% (n=11)	0.27	2, p<0.87
	Non-Expert:	60.7% (n=17)	39.3% (n=11)		
	Volunteer:	58.1% (n=25)	41.9% (n=18)	0.19	2, p<0.91
	Assigned:	63.0% (n=17)	37.0% (n=10)		
Follow-up Strategies provided in training	Expert:	48.1% (n=13)	51.8% (n=14)	1.35	2, p<0.51
	Non-Expert:	39.3% (n=11)	60.7% (n=17)		
	Volunteer:	46.5% (n=20)	53.5% (n=23)	0.61	2, p<0.74
INDEPENDENT VARIABLES	TRAINER TYPE	YES	NO/NOT SURE	X ²	df
Follow-up Strategies provided in training	Assigned:	37.0% (n=10)	62.9% (n=17)		
Meeting with colleagues at the school level	Expert:	81.5% (n=22)	18.5% (n=5)	0.77	1, p<0.38
	Non-Expert:	71.4% (n=20)	28.6% (n=8)		
	Volunteer:	74.4%	25.6%	0.00	1,

	r:	(n=32)	(n=11)	1	p<0.97
	Assigned:	74.1% (n=20)	25.9% (n=7)		
Changes in practice observed	Expert:	70.4% (n=19)	29.6% (n=8)	2.14	2, p<0.34
	Non-Expert:	53.6% (n=15)	46.4% (n=13)		
	Volunteer:	58.1% (n=25)	41.9% (n=18)	3.38	2, p<0.18
	Assigned:	63.0% (n=17)	37.0% (n=10)		

*p<0.05

ACKNOWLEDGMENT

I want to acknowledge and thank Dr. Coral Mitchell for her support as my advisor throughout the doctoral process. In addition, I want to thank my parents Rosaria and Joseph Pancucci for their continual love, support, and encouragement.

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