Online Communities of Practice: Teachers and Principals Reforming Instruction

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Introduction

This research provides insights about the effectiveness of an approach to professional development which incorporated an online community of practice with face-to-face sessions. The need for professional development at the middle school level is receiving increased attention. Teachers in middle schools often have not participated in programs specifically focused on the needs of children in the middle grades. Many teachers at this level lack training specific to the middle level philosophy and lack background knowledge to participate in leadership and collaborative activities at their schools (Petzko, 2002). In addition, many principals of middle schools are concerned about teachers at this level feeling like "second class citizens" to their elementary and secondary counterparts (Petzko, 2002). Because of these unique challenges, the National Staff Development Council has called for more teacher support and practical professional development (Flowers, Mertens & Mulhall, 2002; Killion, 1999).

One challenge faced by middle school principals is the facilitation of instructional reform which often calls for increased implementation of modern technologies. The importance of the school leader in providing support to teachers in effecting instructional reform has been documented (Akhavan, 2002; Drago-Severson, 2005; Fullan, 2004; Pelika, 2000). There is general agreement that strong leadership by the school principal is important in reforming instructional practice and helps in establishing a sense of collective efficacy. In light of these challenges and recommendations, the professional development that was the focus of this research combined face-to-face experiences with an online community of practice in which both principals and teachers participated.

The questions guiding this research were:

- What did principals learn about their teachers as a result of their participation in the online community of practice?
- What impact did this professional development experience have on middle school teachers?
    - How did participation in this experience influence teachers' sense of self-efficacy?
    - How did participation in this experience influence teachers' performance using instructional technology?
    - How is principal participation perceived by teachers?

Theoretical Framework

This research is informed by theory from four areas: self-efficacy, principal leadership, leadership style and communities of practice. Self-efficacy is defined as a person's beliefs about his or her capabilities to perform at a given level of attainment, or a person's influence over other people (Bandura, 1994). Self-efficacy can affect a person's life choices, motivation in an activity, success in an activity, and resilience to adversity (Bandura, 1994; Tschannen-Moran, Hoy & Hoy, 1998). For example, given the risk issues in reforming instructional practices, a teacher's sense of self-efficacy can affect implementation.

Leadership is a primary factor in establishing and maintaining successful professional development (McLaughlin, 1991) and building a sense of efficacy. Current research on the principal's role in school leadership suggests that to promote teacher learning and to prevent attrition, principals must build interpersonal relationships among

teachers (Blase & Blase, 2000; Bolman & Deal, 2002; Fleming, 1999; Fullan, 2002; McLaughlin, 1991; Morrissey, 2000) and emphasize the importance of continued teacher learning (Darling-Hammond, 2003; Elmore, 2002; Fullan, 2004). However, given the busy schedule and daily challenges of a K-12 principal, leading reform often proves difficult (Chan & Pool, 2002; Furman & Zibrida, 1990). In short, successful principals strive to foster healthy school climates by promoting collaboration and fostering teachers' professional learning (Drago-Severson, 2005).

Leadership is exemplified in varying ways, and a number of approaches have been identified, including transactional and transformational leadership. Transactional leadership is based on an exchange of services (by teachers) in return for a reward (salary, leave time, or resources) that is controlled by the leader (Eden, 1997; Liontos, 1992; Turan & Sny, 1996). Often concerned more with products than people, transactional leaders are described as leaders who motivate followers by appealing to their self-interest (Burns, 1978). In contrast, built upon the assumption that the association with a higher moral position is motivating, and that collaborative work is more effective than individual work, Burns (1978) defines transformational leadership as a process by which "leaders and followers raise one another to higher levels of morality and motivation" (Burns, 1978, p.20). The goals of a transformational leader in an educational setting include helping staff develop and maintain a collaborative, professional school culture, fostering teacher development, and helping teachers solve problems more effectively (Liontos, 1992). Transformational leaders are often concerned equally for both people and product. Many studies believe that the most effective leader

shows characteristics of both transactional and transformational leadership (Day, Harris & Hadfield, 2001; Eden, 1997; Smith, 1993).

Communities of practice is a term that describes a group of people in a professional environment who come together to share experience and expertise (Wenger & Snyder, 2000). Within these communities, there is no clear boundary between developing skills and developing new identities as leaders in a field. Both occur as the community interacts (Barab & Duffy, 2000). In short, participants in a community of practice learn together by focusing on problems that are directly related to their work (Wenger & Snyder, 2000). Online communities of practice allow teachers to collaborate across groups, across schools, and across time by eliminating physical limits (Dias, 1999). Teacher collaboration added to a traditional technology training program allows teachers to construct knowledge, not merely acquire knowledge (Dias, 1999). Teachers' collaboration not only leads to improving teacher knowledge and skills, but also to improving student knowledge and skill (Hawkes, 1999).

Research Methods

This study was designed as a comparative case study allowing the researchers to focus on contemporary events, while acknowledging the lack of control of behavioral events within the research setting (Yin, 2003). Quantitative and qualitative research approaches to data collection and analysis were implemented alternatively to provide triangulation and a more complete picture of the process.

Participants and Procedures.

Professional development, focused on the integration of technology into the curriculum, was conducted during the fall 2005 semester in two middle schools. The

schools, located in a community in the mid-south, were selected through homogeneous purposeful sampling. The schools were similar demographically and were chosen because of their ongoing commitment to professional development. The schools had similar scores on the state's assessment of school performance and were both considered "three star" (out of 5) schools in regards to test scores, attendance and dropout rates. In addition, both schools had a high population of regular education students. Only 9% of teachers at these schools had participated in the state's technology integration fifty-two hour professional development program. Teachers at these schools lacked the competencies necessary to successfully integrate technology into their teaching practices. School demographics are displayed in Table 1.

Table 1
Demographics of Cases

	School A	School B
Number of students	427	336
Percent of regular education students	88%	85%
Percent of students with disabilities	12%	16%
Percent of students on free or reduced lunch	22%	45%
Attendance rate	95.1%	95.1%
Dropout rate	0.0%	0.4%
Number of teachers in grades 6-8	24	16
School performance score	111.9	102.8
Mean years of teacher experience	15.2	12.1
Mean years of teachers at current school	7.8	5.4
Mean number of students per class in grades 6-8	21	24

Face-to-face training occurred twice per week for four weeks, for a total of eight face-to-face sessions. Teachers in grades six through eight, and principals of both schools, participated in the professional development activities. The content of the training sessions emerged from a needs assessment conducted with the schools' teachers, principals, and teacher-coach, or instructional mentor of the school. Based on the State

Department of Education's new curriculum, teachers worked in teams to create a cross-curricular, technology-enhanced unit plan as a culminating project for this experience. Topics for each professional development session are outlined in Table 2.

Table 2
Focus of Professional Development Sessions

Session	Focus
1	Introduction to Technology Integration: NETS-T, NETS-S, Introduction to Blackboard
2	Integrating technology into the Comprehensive Curriculum: choosing areas for integration
3	Integrating technology into the Comprehensive Curriculum: choosing areas for integration, Presenting knowledge using Microsoft Excel
4	Researching using Trackstar
5	Developing WebQuests
6	Developing WebQuests
7	Writing a technology enhanced, integrated unit plan
8	Writing a technology enhanced, integrated unit plan

Paired with this face-to-face training, teachers and principals participated in an online community of practice designed to enhance teacher collaboration and principal support. Four online communities were created. Math and science teachers formed one community at each school, while social studies and English teachers formed the other. In the online community, teachers participated in weekly discussions about topics pertaining to the face-to-face training, such as the National Educational Technology standards, and how teachers address these standards within the comprehensive curriculum. Specific prompts given in the online community each week are outlined in Table 3.

Table 3
Weekly Discussion Board Prompts

Week	Prompt
1	What do you believe are the two most important technology standards for your students and your content area? Given an example of how you can meet these standards in your classroom.
2	Please post the parts of the comprehensive curriculum identified for use with technology integration. How will using areas from science, math, and

	language, social studies work?
3	Directed browsing activities such as Trackstar and WebQuests are designed to allow students to research using the Internet safely. What concerns do you have with students and Internet safety and how could these concerns be addressed? Scenario: 7th grade students in groups of 3 are working on a WebQuest on the Civil War in the computer lab. Although they are told to only use the resources listed, you find 2 students checking scores on lsusports.net. What do you do?
4	How does your student assessment in your unit plan address the guiding questions as identified by the comprehensive curriculum?

Data Collection

Data were gathered through both quantitative and qualitative strategies.

Quantitative data were gathered from two sources

- a self-efficacy survey
- performance on the culminating project, a technology-enhanced unit plan

The self-efficacy survey was adapted from six instruments (Box; Christensen, 1997; Knezek & Christensen, 1997; Schwarzer & Jerusalem, 1993; Schwarzer, Schmitz & Daytner, 1999; Norris & Box, 2005). This Likert-scale survey, entitled Teachers Using Technology, was designed to determine: stage of technology implementation, attitude toward using technology in the classroom, and self-efficacy in relation to using technology in the classroom.

As a culminating activity, teachers were required to develop an interdisciplinary curriculum unit. Rubrics, scored from zero to three, measured the quality of the unit plans in six areas including curriculum and standards, objectives, learning activities, integration of technology, alignment with technology standards, and assessment procedures.

Qualitative data were gathered through four strategies.

- Principal interviews were conducted at the conclusion of the experience.
- Focus group interviews with each team of teachers were conducted at the end of the experience.
- Teacher self-report questionnaires were completed at the middle and end of the experience.
- A content analysis of the threaded discussions in the online community was conducted after the experience concluded.

Data Analysis

The analyses of the principal interviews, focus group interviews, teacher self-reports, and a content of the threaded discussions in the online community were conducted through constant comparative analysis (Glaser & Strauss, 1976). Using this method, the threaded discussions, interview data, focus group data, and self-report were segmented and coded according to significant themes and patterns.

Quantitative data were analyzed using statistical procedures. After cleaning and coding the data, responses to the self-efficacy survey were analyzed using MANCOVA. The independent variable of schools was tested against four factors measured by the self-efficacy survey: teachers' attitudes toward using computers as instructional tools, teachers' competence with using technology as an instructional tool, teachers' attitude about their need for technology professional development, and teachers' confidence in utilizing new innovations. The composite pretest scores for each factor were used as covariates, controlling for any pre-existing differences between schools. Curriculum unit plans were compared by using an independent means t-test to compare the total mean scores earned by the teachers at Schools A and B.

Research Results

Challenges and Benefits for Principals

During interviews, principals identified both challenges and benefits associated with their participation in this professional development experience. Most discussed were the benefits associated with principals learning about teachers. Specifically, principals gained knowledge about their teachers' beliefs about using technology and about their teachers' reactions to the professional development experience. Challenges included principals' lack of proficiency in using the online community delivery system, the difficulty of facilitating full participation of all teachers in the online environment, and time constraints. A summary of benefits and challenges can be found in Table 4.

Table 4
Principal's Perceptions of Benefits and Challenges of the Online Community

Benefits	Learning about teachers' beliefs about technology integration
	Learning about teachers' reactions to professional development focused on technology
	Learning about teachers' technology competencies with technology
	Learning about teachers' motivation to use technology
	Participating any time, any place
	Communicating between teachers and principal
Challenges	Revealing lack of principal proficiency with technology
	Facilitating full participation by all faculty
	Discovering time constraints

At the most basic level, one benefit discussed by both principals was the fact that they participated in the teachers' professional development from their office, at any time during the school day. The principal in School B stated that "…it was kind of sporadic when I would get on, but usually early in the morning or late in the afternoon. It was easier for me to participate in this because it was at my own time."

On a deeper level, the most discussed benefit of this experience was principal communication with teachers. Although each principal discussed the subject very differently, both principals commented on the online interaction between principal and teacher. The principal at School A focused on opening lines of communication and dialogue with teachers. "I think that talking to them is probably the biggest thing." School A's principal used the online community to speak with her teachers about integrating technology and about how their philosophy of teaching can enhance the integration of technology. During the online interactions, Principal A shared her own insight into discussions and praised the efforts of teachers trying new ways of integrating technology.

The principal at School B spoke of the online communication in a different way, focusing on the fact that the interactions allowed her to see what teachers were doing in their classrooms:

> I think it (the online community) got me closer to what they are actually doing in the classroom. Just by what they were posting and what I was reading made me feel more involved. We do the walk-through observations, but in 5 or 10 minute walk-throughs, you don't get what they were telling me online. So, I think it really involved me more.

Principal B saw the online community as a way to understand more fully what the teachers were doing in the classroom and what they were learning from the professional development experience. Concerned about teachers integrating the new curriculum, Principal B emphasized the importance of the online community allowing her further insight into her teachers' lessons:

> Just the fact that I could see them telling me how they are using that curriculum and what you were teaching them to implement those activities just opened up, like I said, so much more than I could get than just through walk-throughs or an official observation. Observations are one sitting, and with this (the online

community) I could really see how they were using it (technology and the curriculum) across the board.

Influence of Professional Development on Teachers

Four forms of data were analyzed to address the impact of the experience on teachers: teacher self-reports, the teacher self-efficacy survey, teacher focus group interviews, and unit plans created by each team of teachers. Details of participation in the online community are identified below in Table 5.

Table 5
Composition of and Participation in the Online Community Groups

	School A	School B
Mean number of postings per teacher	7.6	6.3
Range of teacher postings	2-16	2-12
Mean number of postings by principal	11.5	15.5
Number of online community groups	2	2
Number of teachers in each group	13/10	9/6
Number of females	13/9	8/5
Number of males	0/1	1/1

During the four-week experience, individual teachers posted between two and sixteen times at School A, and two and twelve times at School B. The mean number of postings by Principal A was 11.5, and Principal B was 15.5. Four influences on teachers emerged: self-efficacy, competency with instructional technology, curriculum development, and collaboration.

Self-Efficacy

To measure teacher self-efficacy, a survey was given to all participants at the beginning and end of the experience. Questions from the self-efficacy survey were determined to fall into four categories. Mean scores for each category are identified below in Table 6.

Table 6
Mean Scores on Self-Efficacy Instrument

Area	Mean Score Pretest School A	Mean Score Pretest School B	Mean Score Posttest School A	Mean Score Posttest School B
Attitude toward using computers as instructional tools	4.11	4.69	4.38	4.02*
Competence with using technology as an instructional tool	4.74	3.95	4.83	4.59*
Attitude about the need for technology professional development	3.91	4.06	3.87	3.86
Confidence in utilizing new innovations	4.27	4.50	4.43	4.12*

Notes: 1=Strongly Disagree to 5=Strongly Agree

*p<.01

A MANCOVA was conducted to compare the two schools on the four factors described above. The independent variable was schools. The dependent variables were the posttest scores on each factor. Pretest scores on each factor were used as covariates, controlling for any preexisting differences between schools. All covariates were linear in nature, and other assumptions such as normality and homogeneity of slope were tested, and it was determined that an analysis of covariance was appropriate.

Wilks' lambda, which tested the difference between the two schools for four dependent factors, was significant ($F_{(4,23)} = 93.548$, p=.000). This showed a significant difference between the two schools in growth of self-efficacy factors. Teachers at School A demonstrated a more positive growth in self-efficacy than teachers at School B. Univariate analyses for each factor revealed a significant difference between the two schools on factors one, two, and four: teachers' attitude toward using computers as instructional tools, teachers' competence with using technology as an instructional tool and teachers' confidence in utilizing new innovations ($F_{(1,29)} = 19.23, 15.15, 3.47$;

p=.000, .000, .006). Interestingly, the mean score on factors one and four increased at School A, while it decreased at School B.

Teacher Competencies with Instructional Technology

When asked which specific technology competencies were gained during this professional development experience, teachers at both schools identified several areas where proficiency was gained. These areas are identified and defined in Table 7.

Table 7
Teacher Competencies Gained

Using technology as a productivity tool	Teachers using technology to make a useful product; students using technology to display knowledge	I did the timelines twice. Once with Rosa Parks and once with American history. They (the students) really did well…I just walked them through it. (We used) Excel in graphing survey results from class newspaper reports.
Using technology as a research tool	Teachers using technology to gain information; students safely using the Internet to conduct research	Like the WebQuest, you look at one and see all of the work that goes into it and then think, 'I can't do that.' I've done that when looking at them. I've used them before and thought, oh, I could never make one of those, and we did! And it was not that difficult! Granted, you made it a bit easier because you gave us a template, but I'll always have that template, and now I could stray if I needed to. The template just gave me the jump start to what I needed to do.
Using technology as a communication tool	Teachers using the online community to collaborate and share ideas with other teachers and their principal	Sharing new ideas on Blackboard (the online community). Using Trackstar and WebQuest got me interested in other ways I can use technology. Ms. Smith got into the conversation and told me of a grant I could write to get about thirty computers. I don't think I would have had that opportunity without Blackboard because I don't get to really interact with the teachers at other grade levels that much, and it was nice to, you know, she offered to help me out and give me more information, so it really go things going for me.

Curriculum Development

Teacher collaborative, technology-enhanced unit plans were submitted and evaluated by an educational technology consultant with the state's educational technology center. In order to compare the total scores of unit plans developed in the two schools, an independent means t-test was conducted and revealed a significant difference between means ($t_{(10)} = -2.272$, $p=.046$). There was a significant difference between the qualities of the unit plans in favor of School B. All teachers were believed to be aware of the possibilities for the use of technology to support professional practice. Teachers also showed the use of basic productivity tools and Internet resources with students.

Teachers' Perceptions of Principal Collaboration

Four issues emerged when teachers discussed their reaction to principal participation in this experience:

- teacher insights into values of their principals,
- pressure associated with the experience,
- teacher perception of the role assumed by principals,
- and professional support given to teachers by the principals.

Teachers at School A valued the suggestions made by their principal, feeling that her comments added depth to each discussion. Conversely, teachers at School B were often disappointed in many of their principal's comments, finding many of the postings such as "I hope you're enjoying this experience" too impersonal. Teachers at both schools noted that by simply allowing participation in the professional development, principals were showing their desire for a higher level of technology integration, as well as an importance for using technology with students. However, teachers at School B

described their principal as valuing professional development and technology, but still emphasizing daily routines and rules over any other issues. Pressure given by School A's principal during this experience was consistently seen as positive. Teachers were less consistent with reacting to the pressures given by School B's principal. She was often seen as aggressive, and teachers discussed how they felt she was "watching" their online conversations.

Both principals were viewed as role models in this experience. Teachers at both schools commented on the fact that both principals were learning about technology with them and valued that participation. School A's teachers expressed the importance of their principal showing herself as a role model during face-to-face sessions, while teachers at School B expressed the need for this physical interaction during the professional development experience. Lastly, when feedback was given in the online community by principals, teachers at School A were more receptive than teachers at School B.

Other Benefits and Challenges

During focus groups, teachers identified many other benefits and challenges associated with participating in this professional development experience. Benefits identified by teachers included principal support shown during the online community, confidence gained about integrating technology, competencies gained using technology, materials gained, collaboration among teachers, and the motivational values using technology. Challenges identified by teachers included technology hardware availability, problems associated with the new curriculum, and time constraints.

Conclusion

School A's principal showed characteristics of a transformational leader during this experience (Bogler, 200; Eden, 1997; Leithwood, 1992; Leithwood & Jantzi, 2000; Seyfarth, 1999). She strove to attain three goals: helping her staff members develop and maintain a collaborative school culture, fostering teacher development, and helping teachers solve problems together more effectively. Studies have shown that this type of leadership leads to teachers' developing a higher level of commitment to the school and their career, higher job satisfaction for teachers, and improved school culture (Bogler, 2001; Leithwood & Jantzi, 2000). By displaying characteristics of transformational leadership, she gave her teachers at School A the encouragement needed to internalize the importance of the experience, and the importance of peer collaboration within the experience.

The principal at School B can be characterized as a more of a transactional leader (Day, Harris & Hadfield, 2001; Eden, 1997). Her support was most often professional in nature, emphasizing the importance of "newsworthy lessons" and emphasizing the importance of teachers successfully completing the experience. Her leadership was based on the exchange of teachers participating in the experience to gain a reward. She emphasized the importance of teachers gaining the CLU's (Continuing Learning Units) that were given at the conclusion of the experience. With this transactional leadership, she showed great ability to maintain the organization of her school, with emphasis on the day-to-day operations that must be carried out within her school (Day, Harris & Hadfield, 2001; Eden, 1997; Leithwood, 1992). However, by displaying this type of leadership,

teachers at School B failed to receive the internal rewards that teachers at School A received.

At School A, the emphasis was on valuing the content of the experience and the relationships that could come from the experience. At School B, the emphasis was on the completion professional development and the unit plan that came from the professional development. This distinction caused teachers at the schools to have contrasting experiences during this program. Teachers at School A perceived the experience in a more positive manner, displaying a positive growth in attitude toward using computers as instructional tools, and gaining confidence in utilizing new innovations, while confidence in utilizing new innovation decreased for teachers at School B. However, the culminating activity produced by teachers was of higher quality at School B. Therefore, at School A, where transformational leadership characteristics were evident, teachers gained confidence in utilizing new innovations; however, at School B, where transactional leadership characteristics were seen, teachers had greater quality to the culminating activity of this experience. These findings support those of Eden (1997) where it was found that the most effective leaders display characteristics of transactional leadership and transformational leadership. "In innovative schools transformational leadership is relatively successful when it manages to incorporate transactional leadership practices in a way that is sensitive to the teachers" (Eden, 1997, p.260).

Implications for Practice

This research showed that an online community of practice, added to existing face-to-face technology professional development, can be used at schools to increase communication and collaboration among teachers and to allow principals to support

teachers and to be involved in a professional development experience. Key aspects that led to the success of this experience were:

- Starting with a needs assessment- teachers and principals had a voice in the topics to be delivered during the experience.
- Introducing the experience- both principals in this experience gave attention to the opening of the experience. Principals used emails and face-to-face announcements to establish a positive mind set for the experience.
- Facilitating the online discussions- the use of thought-provoking weekly discussion board prompts and the availability of useful and relevant resources for each topic discussed.
- Leading the learning- the attention of principals to both the personal and professional support of their teachers and the attention to effective production during the experience.

Face-to-face sessions used in this experience were delivered two times per week for four weeks. However, some teachers expressed the desire for a different schedule. Many teachers wanted the experience to be once per week, extending the training to eight weeks. Still more teachers expressed the desire to have the experience during summer holidays, where sessions could be longer than the given forty-five minute teaming sessions and would allow them to focus exclusively on the professional development. Teachers also suggested changes for the composition of the online community. Although the community was effective within a school, teachers and principals in this study voiced the need for an online community that encompassed more teachers within the school district.

The online community in this study provided an opportunity for principals to increase communication with their teachers and allowed principals to gain further insight into what teachers were learning and producing during professional development. Findings from this and future research could be used to design online communities of practice that facilitate the professional development of teachers.

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