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**Learning and Collaboration in Professional Development  
for Career and Technical Education Teachers:  
A Qualitative Multi-Case Study**

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**Abstract**

*This multi-case study explored the learning and collaboration of six Career and Technical Education (CTE) teachers in two different types of professional development experiences: (a) a course on integrating reading, writing, and mathematics skills into CTE curricula, delivered by a master teacher; and (b) a small teacher study group that met regularly for the purpose of improving teaching practice. Both professional development experiences occurred at a comprehensive senior high school and involved CTE and academic teachers. The study found that different types of teacher learning and collaboration occurred, depending on the context, process, content and structure of the professional development experience. While the integration course emphasized building knowledge and pedagogical expertise about integration, the study group focused on building professional knowledge and community through sharing and support. Both professional development activities provided teachers with opportunities to collaborate and to grow as professionals.*

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## **Introduction**

For nearly two decades, federal legislation has focused on the integration of academic skills into career and technical education curricula to increase academic achievement among career and technical education (CTE) students. CTE teachers, however, may not have the necessary skills to accomplish such integration and effectively deliver integrated lessons to their students (Cramer, 2004; Silverberg, Warner, Fong, & Goodwin, 2004). The recent Carl D. Perkins Career and Technical Education Improvement Act of 2006 (a.k.a. Perkins IV) emphasizes the importance of integration and requires CTE teachers to participate in professional development to prepare them for integrating rigorous academic skills into their technical curricula. The legislation calls for professional development that is high quality, on-going and classroom-focused in order to impact classroom instruction and the teacher's performance in the classroom; it cannot be one-day or short-term workshops or conferences. Perkins IV also recommends CTE teachers participating jointly in professional development with their academic colleagues. With these new federal requirements, CTE teachers will need to participate in more professional development that is on-going, school-based and collaborative. Consequently, state administrators and local school district personnel may be looking for ways to provide their CTE teachers with staff development experiences that meets these federal guidelines.

Professional development that promotes teacher learning and growth is critical for career and technical educators now more than ever before. Over the past few decades CTE programs have shifted their focus on new approaches to student learning in an effort to improve student achievement (Lynch, 2000). Such a shift has challenged CTE teachers to not only update their programs but also transform themselves as educators (Berns & Erickson, 2001; Brown, 2002a, 2002b; Maurer, 2000). Programmatic changes such as integrated curriculum, contextual and applied learning, new technologies, Tech-Prep, school-to-work, and career clusters place new demands on career and technical educators and require them to assume new professional roles (Berns & Erickson, 2001; Brown,

2002a, 2002b; Maurer, 2000). In addition to the traditional role of technical expert, CTE teachers must act as coach, mentor, facilitator, collaborator, and technology advocate to help students develop the academic and technical knowledge and skills they need to be successful in the 21<sup>st</sup> century workforce (Berns & Erickson, 2001; Brown, 2002a, 2002b). Partnering with representatives of private industry, coordinating with administrators, working closely with parents and community organizations, and collaborating with peers requires CTE teachers to have collaborative skills and the ability to work as part of a team (Brown, 2002a, 2002b).

Participating in professional development that promotes collaboration and team learning will help CTE teachers to become more skilled practitioners capable of filling these complex roles. However, more than a decade ago researchers and educators were concerned that training alone is not enough for teachers to change themselves and their practice in response to complex educational reform (Little, 1993). The literature on professional development suggested that on-going, collaborative professional development within the context of the workplace is necessary for significant change to occur in teachers' practice (Darling-Hammond & McLaughlin, 1995; Fullan, 1995; Lieberman, 1995; Little, 1993); however, not all professional development is on-going and collaborative. Current professional development commonly takes a one-size-fits-all approach and is often designed in the most economical way (Diaz-Maggioli, 2004). Learning, when it does take place, tends to be individualistic and not shared with peers in the context of the classroom; such learning promotes a culture of isolation rather than one of cooperation (Diaz-Maggioli, 2004). Teachers themselves have complained about participating in traditional in-service training, particularly if it "smacks of 1-day workshops offered by outside 'experts' who know (and care) little about the particular and specific contexts of a given school" (Wilson & Berne, 1999, p. 197).

If teachers are expected to change their teaching practices and reinvent themselves as educators, they need the opportunity to explore their understanding of teaching and learning with their peers—experimenting, reflecting, discussing, and assessing their

efforts as part of their daily routine (Darling-Hammond & McLaughlin, 1995; Lieberman, 1995; Little, 1993). This type of professional development expands the role of teacher into a teacher-learner who participates in a collaborative environment with other professionals; it should be structured so that it provides opportunities for teachers to share their knowledge and what they want to learn with other professionals within the contexts of their practice (Darling-Hammond & McLaughlin, 1995). Collaboration is necessary for on-going personal learning; without collaborative skills and relationships, teachers cannot bring about change in their practice (Fullan, 1995).

Finch (1999) suggested that CTE teachers are likely to change their teaching practice when they participate in professional development that involves them in all aspects of the reform, and when they receive assistance and support through the change process. Such professional development should emphasize teachers teaching teachers and collective or team development, be continuous rather than intermittent, and stress teacher autonomy and decision-making (Finch, 1999). In fact, professional teams and teachers teaching teachers are two approaches that can help teachers learn about integration strategies (Finch, 1999). Teachers teaching their peers has been a common form of professional development in the integration literature (Stasz, Kaganoff & Eden, 1994), and “a powerful way of linking professional development with team building” (Finch, 1999, p. 11). In addition to participating in teamwork and collaboration, teachers teaching teachers can also be used informally to help peers learn skills and knowledge associated with specific lessons (Finch, 1999). In their review of the literature, Rolheiser and her colleagues found that teachers teaching teachers can have positive outcomes, including increased opportunities for teacher leadership, increased communication, and increased learning among teachers; asking teachers to share classroom strategies with their peers reduces their isolation and promotes the sharing of knowledge and increases teacher reflection (Rolheiser, Ross & Hogaboam-Gray, 1999).

In addition to teachers teaching other teachers, educators, policymakers and researchers recently have explored the concept of

learning communities as another professional development model that can bring about positive changes in teacher practice. The National Staff Development Council (NSDC) (2001) included the concept of learning communities in its revised standards for staff development for all teachers. The NSDC learning community standard indicates that “the most powerful forms of staff development occur in ongoing teams that meet on a regular basis, preferably several times a week, for the purposes of learning, joint lesson planning, and problem solving” (<http://www.nsd.org/standards/learningcommunities.cfm>).

Such learning communities can provide opportunities for teachers to have on-going discussions, reflection and experimentation among peers that promote collaboration and learning; teachers can collectively deal with student issues and explore ways of improving their practice (McLaughlin & Talbert, 2001).

Models that involve team learning have developed in the past decade, but teachers often do not have the on-going support to implement a reform in their teaching practice, even after being involved in an intensive reform training program. The School-to-Work Professional Development Institute established at the University of Delaware, for example, developed a professional development program to assist teams of academic, vocational and special education teachers to design, implement and assess integration strategies (Eisenman, Hill, Bailey, & Dickison, 2003). The institute was based on the Classrooms that Work model (Ramsey, Stasz & Ormseth, 1997; Stasz, 1997), which focused on classroom observation, included a work-based learning experience, and was oriented to research-based practices (Eisenman et al., 2003). The program required year-long participation of which six summer weeks was spent in university classes, business externships, and experimental classroom-based sessions; and activities such as worksite observations, curriculum and instructional design; piloting lesson plans with students; and peer observation and feedback. The fall and spring participation included team meetings and teacher documentation of activities, outcomes and issues (Eisenman et al., 2003).

In spite of this intensive year-long effort, the teachers had difficulty forming and maintaining collaborative teams due to participant drop-out and limited time during the school year; however, the most promising aspects of the program appeared to be “those that facilitated teachers’ boundary-crossing...that encouraged participants to step beyond their isolated classroom-bound teaching and consider other communities of practice in relation to their own” (Eisenman et al., 2003, p. 93). While this professional development provided an intensive, holistic experience for teachers, the on-going support in the school environment was its weakest component. These work teams had the specific purpose of designing, implementing and assessing integration strategies, but the researchers found that members did not have the time or organizational support to work collaboratively throughout the school year on improving teacher practice (Eisenman, et al., 2003).

### **Problem**

CTE teachers need professional development that facilitates their learning, collaboration skills, and strategies to help them integrate academic skills into their curricula, especially given the requirements set forth in Perkins IV. Such professional development needs to provide learning opportunities that help teachers to work collaboratively with other teachers (including academic teachers), experiment with different integration strategies, and modify their teaching practices based on what they have learned; however, more research is needed to better understand teacher learning and collaboration in different types of professional development experiences.

### **Purpose of the Study**

The purpose of this multi-case study research was to better understand and describe the types of learning and collaboration that CTE teachers experience by participating in two different types of professional development opportunities: a formal course on integration strategies delivered by a CTE master teacher (defined in this study as a secondary school career and technical educator with a

master's degree and several years of teaching experience), and a study group of six CTE teachers who met regularly to discuss issues related to teaching and student learning. This study describes how the CTE teachers' learning experiences in each of these professional developments activities were similar or different, and how each type of professional development provided opportunities for CTE teachers to collaborate with other teachers and make changes in their practice.

### **Conceptual Framework**

The purpose of professional development is to promote teacher learning and growth. Much of the literature suggests that, to improve teacher practice, teachers need professional development that provides on-going, classroom-based, learning experiences with other teachers in a supportive environment. Consequently, the conceptual framework for this study is based on the assumption that in-service teachers construct professional knowledge through their on-going interactions and experiences in the classroom and with other professionals.

Constructivist learning theory suggests that learning is a self-regulated process that occurs when individuals interact with their environment and organize, reflect on and integrate new information and experiences into their current cognitive structures (Fosnot & Perry, 2005). An important part of this process is constructing social and cultural meaning about the new information and experiences within the context of community, which provides consensus that such meanings are viable (Fosnot & Perry, 2005). The implication of constructivist theory to professional development is that new knowledge related to teacher practice is not transmitted to teachers in one-day in-service workshops; rather teachers must construct their own professional knowledge through contextually meaningful learning experiences.

Fosnot and Perry (2005) identified four key learning principles derived from constructivism that may be applied to professional development for teachers.

First, learning is a developmental process that requires the involvement of the learner. Teachers must be actively involved in



learning through discussing, questioning, experimenting, reflecting, and examining outcomes of their learning activities with other teachers. Second, learning involves disequilibrium, which challenges learners to explore other possibilities. Teachers must have opportunities to explore new teaching strategies, question their own beliefs about teaching and learning, and examine the beliefs and teaching strategies of their peers and other professionals. Third, reflective abstraction is the key to the learning process. Reflection through discussion and writing helps teachers to organize and make connections among their experiences. Finally, dialogue within a community of learners encourages further thinking. Teachers can share ideas with peers and generate approaches and strategies to problems they encounter in the classroom. This sharing helps teachers collectively to make meaning out of their learning experiences and socially construct professional knowledge. (pp. 33-34)

In addition to these basic constructivist principles of learning, a conceptual framework for studying professional development also should consider the environment in which learning takes place. In a review of research related to professional development for teachers, Loucks-Horsley and Matsumoto (1999) identified four key areas—content, process, structure and strategies, and context—that play a role in creating an environment that promotes teacher learning. The content of the professional development experience is the information that participants are expected to learn, and for teachers, it should be focused on practice to help them better understand their subject matter, their learners, and their teaching methods. Process involves how the content is to be learned and should consider how teachers create professional knowledge and apply it in their classrooms. Structure deals with how the content is organized for learning and what strategies are used to deliver it. Lastly, context includes the conditions under which the content is learned. Context considers the culture and climate of the learning environment (Loucks-Horsely & Matsumoto, 1999).

In summary, principles of constructivist learning theory, along with the four key elements that make up the learning environment, form a framework in which to explore how two

different types of professional development create different opportunities for teachers to learn and collaborate with their peers.

### **Research Questions**

Using a qualitative multi-case study design, the following questions were addressed:

1. What kinds of teacher learning occur in a formal integration course delivered by a CTE master teacher and in a teacher study group?
2. How do the learning experiences of participants in each professional development experience differ and how are they the same?
3. To what extent did collaboration occur among the teachers who participated in each professional development experience?

### **Methods**

The qualitative case study design was selected for this inquiry because of the researcher's interest to gain an in-depth understanding of two professional development situations and the meaning involved for those participating in them. Merriam (1998) acknowledged that case study sometimes serves as a sort of "catch-all" for research that is not a survey or an experiment. While case studies can be quantitative in nature, she asserted that they are more likely to be qualitative. However, Merriam differentiated case study from other forms of qualitative research because of its focus on intensive descriptions and analyses of a single unit or bounded system (e.g., individual, program, intervention).

Case study was used in this research to explore in-depth the complexities of learning and collaboration as experienced by CTE teachers in two different types of professional development experiences. Six teachers from different CTE programs in a comprehensive senior high school participated in one or both of the professional development opportunities offered on-site by a local university. The comprehensive senior high school had an enrollment

of approximately 1,000 students and was located in a predominately blue-collar city with a population of 32,500. Work-force preparation was an important consideration for this school as the city had over 11,400 workers in the manufacturing, healthcare, social services and education and retail areas. In addition to academic courses, the school offered programs in marketing education, family and consumer sciences, industrial technologies, health occupations, individual occupational training, and business English.

One professional development opportunity was a structured course, taught by a master CTE teacher, which focused on strategies for integrating reading, writing and mathematics skills into technical curricula. This course, designed around the needs of teachers as adult learners (Knowles, 1990), incorporated experimentation, reflection, and feedback among participants as they learned the various integration strategies over a four-month period. It was open to both CTE and academic educators to encourage collaboration among teachers in different disciplines. Participants could enroll for either academic or professional development credit. CTE participants received a \$250 stipend from their state agency for Career and Technical Education for successfully completing the course, while academic teachers received a \$250 stipend from the State Department of Education.

The second professional development opportunity was a teacher study group (Saavadra, 1996), which consisted of a group of CTE and academic teachers who got together regularly during the school year to discuss issues related to teaching and learning to improve their practice in the classroom. The study group was facilitated by the researcher and met nearly every two weeks from September to May for teachers to share and build their professional knowledge within the context of their practice. Participants could enroll for up to two professional development credits and received a \$100 stipend from their state agency for participating the entire year.

### **Data Collection and Analysis**

Data were collected over eight months from individual participant interviews, classroom observations, integration class and study group meeting notes, participant reflections and self-assessments, lesson plans and other artifacts from the teachers, and the researcher's field notes and reflections. Detailed field notes and reflections were maintained on a daily basis, along with an audit trail of when and how the data were collected and analyzed. Carefully constructed interview questions about a teacher's professional development experiences and learning were developed; and all interviews were prescheduled, tape-recorded and transcribed for accuracy.

The researcher reviewed the data and generated a list of more than 20 common data categories related to the participants' learning experiences and collaborative activities with other teachers. Data were sorted into these categories and then analyzed within the framework of content, process, structure and context to gain: (a) insights about the varied and unique contexts in which teachers learn; (b) a deeper understanding about the learning experiences of teachers in two different professional development activities, and (c) knowledge on the complex process of teacher learning and collaboration. As the researcher compared data in each category from case to case, similar to the step-by-step process described by Merriam (1998), similarities and differences among the participants' experiences in one or both of the professional development activities became evident. The researcher then synthesized data into several common themes about learning and collaboration in professional development activities in which the content, process, structure and context differed.

Six individual case studies were written up and several strategies were used to check the accuracy of the findings, including peer debriefing, member-checking and the use of rich description (Creswell, 2003). The cases were peer-reviewed by a faculty member familiar with the project, for feedback on the comprehensiveness of the cases and the literature regarding issues found within each case. In addition, each participant was given the opportunity to review his

or her case write-up and provide feedback regarding the accuracy of the data interpretations and the participant's understanding of his/her own learning. Feedback from peer faculty and participants was considered carefully during the on-going analysis, and appropriate changes and additions were made in the final analysis process. The six case-studies were introduced with vignettes written from the perspective of the participants (see Ely, 1991), and rich descriptions and detailed excerpts of data for each case were used to engage the readers to draw their own conclusions about the teachers' learning and collaboration in the professional development experiences (Creswell, 2003; Merriam, 1998).

### **Findings and Discussion**

The purpose of this study was to explore teacher learning and collaboration in two professional development experiences, which had very different content, process, context and structure. Table 1 briefly summarizes the content, process, structure and content for each of these professional development activities, and Table 2 provides a summary of the teacher learning and collaboration that occurred in each professional development setting.

#### **Research Question 1—What kinds of teacher learning occurred in the formal integration course delivered by a CTE master teacher and in the small teacher study group?**

The teachers who participated in the integration course learned about integration and how to integrate their technical curricula with reading, writing, and math integration strategies. In particular, they learned useful integration strategies that they could apply to their classroom practice and how to develop rubrics to assess integrated learning. The master teacher felt that the integration course was meaningful to the teachers because of its practical application: "Teachers' outcomes are focused not only on the integration but on the application because they prepare lessons that they use immediately in their class" (Interview, 11/27/06). One teacher noted that she was able to pick up numerous strategies throughout the

Table 1

Comparison of Learning Environments of the Integration Course and the Study Group

Learning Environment	Integration Course	Study Group
Content	Specific instructional strategies for integrating reading, writing and math into the curriculum and authentic assessments of learning such strategies	Specific ideas and strategies to build upon teacher knowledge, including classroom strategies, learning approaches, classroom management, and student motivation.
Process	Modeling, experimentation and reflection	Conversations and story-telling about classroom experiences; reflection
Structure	Formal course structure; master teacher as facilitator; class meetings scheduled to meet teachers' needs; syllabus, activities and assessments related to teachers' own classrooms; formal reflection paper	Informal group facilitated by researcher; regularly scheduled meetings that accommodated teachers' schedules, loosely structured for sharing and topic discussion time; choice in topics to be discussed; reflection journal
Context	Course supported by administration for professional development; structured collaboration for development and use of integrated lessons and feedback on strategies; respect for teachers' as professionals; inclusive environment	Study group supported by administration for professional development; established group norms; informal venue for collaborating through communication with peers and sharing of pedagogical knowledge; respect for teachers' professional knowledge and experiences; safe environment for taking risks; inclusive environment

Table 2

Summary of Teacher Learning and Collaboration in the Integration Course and the Study Group

Summary of Learning and Collaboration		
	Integration Course	Study Group
Teacher Learning	Learned about integration; obtained useful information for classroom practice; gained confidence in using integration strategies; increased pedagogical knowledge and expertise	Obtained useful information for classroom practice; increased pedagogical knowledge and expertise; made meaning out of classroom experiences; gained a better understanding of students; developed professional identities as teachers
Teacher Collaboration	Worked with academic teachers to integrate reading, writing, and math strategies into curricula	Developed professional relationships by obtaining and giving support; creating community

course to help her teaching and “assess [student] comprehension more” fully (Final Reflection Paper, 12/05/06). Another teacher wrote that she found strategies that she could use that “actually helped students” (Integration Course Survey, 12/05/06).

The master teacher modeled these strategies, and some of the teachers in the course commented that the modeling helped them to learn how to use the strategies in their classroom. For example, the health occupations teacher commented about one of her attempts at using an integration strategy from the course:

I learned that by modeling and giving examples, I had so much success with student understanding. I had fewer questions than with other assignments. (Reflection Journal, 11/17/06)

The family and consumer sciences teacher explained how the modeling helped her and other course participants further develop their understanding of the integration methods:

Being responsible for modeling three techniques, we needed to develop a more thorough understanding to demonstrate it to the class. Likewise, seeing the methods demonstrated, clarified the method and furthered my understanding. (Feedback, 03/27/07)

The teachers were encouraged to model, experiment and reflect as they applied the integration strategies in their classrooms. One individual occupational training teacher explained how her experimentation with reading strategies made a difference in her students' performance:

I really have enjoyed the different reading strategies and have used them in my classes in a number of different ways. I have found that the students did much better on test scores when they did paired reading and worked with each other on the reading assignments. (Final Reflection Paper, 12/05/06)

In addition to experimentation, reflection is an important aspect of the experiential learning cycle (Kolb, 1984). The health occupations teacher explained how reflecting on her lessons helped her to become a more thoughtful teacher:

Reflecting on what was done made me realize...that a lot of the students did not know the essential math needed....Last year when I presented this lesson, I just gave them the assignment without much instruction....Now that I look back, I see and understand why they were struggling. (Final Reflection Paper, 12/05/06)

In the process of learning by doing and reflecting, the teachers developed more confidence in their abilities to design and deliver integrated lesson plans. The master teacher explained that the teachers gained an "increased awareness of what integration is and how it impacts our classes" (Interview, 11/27/06). Building their confidence as competent CTE teachers who could effectively integrate their lessons was an important aspect of their learning. One teacher commented that she felt "more freedom to try things...experiment a little bit, [and] to be open a little more" (Interview, 10/24/06).



Another teacher explained, “I learned how to better implement reading strategies into my class and provide students with a variety of opportunities to make sure that the students got the information” (Final Reflection Paper, 12/05/06). She also reflected on how some of the writing activities helped to improve her skills along with her students.

Finally, the teachers’ final integration project was an authentic assessment activity that included developing integrated lessons and an evaluation rubric to be used in the classroom, and providing feedback on student performance from the lessons. The use of classroom-related activities in the integration course helped to make the professional development experience more meaningful to the teachers. One participant commented, “Everything that I created I used in my class and for most will continue to use” (Final Reflection Paper, 12/05/06).

Overall, the CTE teachers in the integration course learned and applied strategies for integration, they increased their confidence in using the strategies in their classrooms, and in some cases, they increased their academic content knowledge as they experimented and discussed the strategies with their peers. The integration course helped the teachers to enhance their pedagogical knowledge, particularly as it related to integrating academics into their curriculum.

The study group provided a different type of learning for teachers. Although they were not learning specific integration strategies, the teachers found that the study group was an informal venue for sharing classroom knowledge and resources and for developing professional relationships. One teacher noted that the study group “was constructed in a manner that promoted professionalism and an environment that was warm and friendly” (Study Group Self-Assessment, 12/11/06).

It was in this environment that the teachers learned about practice through conversations and personal stories, a way for teachers to make meaning out of their classroom experiences (Clark & Florio-Ruane, 2001). The teachers shared stories about their students’ lack of motivation, responses to lessons, and attitudes about school, learning and work. This talk was not only a way for teachers

to vent their frustrations and concerns but also a way for them to understand their students better and to think about changes they could make in their practice to improve student learning. The industrial technologies teacher, for example, explained how other teachers helped him to better understand his experiences with a difficult student:

Something that, to me, really helped was hearing that other teachers have the same problems....I thought it was just me and then after talking with [another CTE teacher]I...learned quite a bit, and I think he [the student] has a lot of problems going on of his own, too. (Interview, 11/27/06)

In addition, the teachers discussed topics related to instruction, assessment, and broader educational issues, including student motivation, learning principles and different approaches to teaching. They exchanged ideas and reflected on how to use strategies and classroom activities, how to motivate and engage students, and how to manage difficult behavior.

One teacher explained the value in this type of discussion: “[The] group often reaffirms an individual when we share lessons by [saying], ‘That was a great idea,’ but it is also an opportunity when others say, ‘But have you tried this?’” (Feedback, 03/27/07). She shared a rubric assignment and two student essays with the group; she wanted feedback on whether she was “on track” grading the essays. The feedback from a colleague helped her to see that her grading was similar to how the other teachers, including academic teachers, would have evaluated the assignment, which was reassuring for her. In summary, the teachers’ conversations in the study group were learning opportunities to share and expand their pedagogical knowledge, expertise and professional support.

**Research Question 2—How did the learning experiences of participants in each professional development experience differ and how were they the same?**

Both the integration course and the study group provided teachers opportunities to learn and improve their practice. While the integration course focused more on building content knowledge and

pedagogical expertise related to a specific topic (i.e., integration), the study group offered teachers opportunities to direct their own learning and explore classroom issues that were most pressing on their minds. The integration course provided structured opportunities for discussion, experimentation and feedback on integration and related assessment strategies; the study group had opportunities for discussion and reflection, and less-structured opportunities for experimentation (which some teachers did on their own) and feedback (which teachers readily gave). One teacher felt that the study group needed more structure and direction, but the others appreciated the flexibility that the study group provided. While not as focused as the integration course on course content, the opportunities for pedagogical learning were more diverse in the study group.

Both professional development opportunities helped teachers work together as professionals. The master teacher explained that the integration course provided an “opportunity to collaborate...outside of our departments” which was beneficial because “we’ve had the chance to work with people we normally don’t” (Interview, 11/27/06). Likewise, she believed that the study group was

a great idea and opportunity because people can actually sit down and...communicate about issues....Sometimes just talking about things, understanding what other people are doing...can be beneficial. (Interview, 11/27/06)

In many respects, the two professional development experiences were complementary; together, they provided collective learning opportunities that met the complex and diverse needs of the teachers who participated. By working together, teachers got the opportunity to learn from each other and reflect upon their practice. The integration course provided structured learning opportunities about integration, while the study group, which met biweekly throughout the school year, provided on-going opportunity for discussion, reflection and peer support. As the master teacher summed it up,

I think [in] teaching, by nature, we get pretty isolated, and so having that group setting, or the learning community, or whatever it might be, is an opportunity, not only to learn, but to reflect.” (Interview, 11/27/06)

**Research Question 3—To what extent did collaboration occur among the teachers who participated in each experience?**

The integration course provided an environment that offered structured collaboration in and out of class as teachers developed their integrated lessons and applied what they had learned in their classroom. First of all, the integration course was open to both CTE and academic teachers, which encouraged collaboration among disciplines. The master teacher noted that “the best part of the integration class is to lay a platform for professionals to work together and really talk about some issues” (Interview, 11/27/06). As integration strategies were discussed, the English and math teachers offered their expertise in their content areas, while the CTE teachers shared their ideas about applying the integration strategies in a contextualized fashion. The academic teachers supported and provided ideas to the CTE teachers on how to evaluate writing and math, and the CTE teachers shared activities that effectively integrated reading, writing and math skills in learning situations.

The individual occupations training teacher thought that having the English and math teachers in the integration course was helpful because she could benefit from their experiences (Interview, 10/24/06), and the consumer and family sciences teacher liked the mix of participants because they offered different perspectives:

I liked the idea that we had people who weren't in CTE and also...somebody that was at the college level...to gain some insight from them.” (Interview, 10/24/06)

In addition to the collaboration among the course participants, three guest speakers (also educators) came to class to discuss integration strategies for their specific academic area (i.e., reading, writing or math). The teachers found some of this information enlightening and helpful to their learning about integration. It was an opportunity for the teachers to meet a specialist—someone they could call if they needed help with integrating a particular content area. One teacher shared, “When [the language arts guest speaker] came in and showed some strategies using other people's reading materials, I thought that was great” (Interview, 10/24/06).

Finally, teachers were given time to collaborate with their colleagues as they prepared their final integration projects, which included the integrated lessons, an evaluation rubric, and teacher feedback on student performance from the lessons. The integration course, from start to finish, was a collaborative learning experience for the teachers who participated.

The study group provided an informal venue for collaborating through communication with peers and sharing of professional knowledge. The fall 2006 study group was open only to CTE teachers, who shared information and supported each other in their discussions during and after the study group session. The teachers felt that this informal collaboration was very beneficial because it helped them feel more connected and less isolated from other teachers. The health occupations teacher explained that hearing “what’s going on” with other teachers was “comforting” and helped her not to “feel so alone” (Interview, 10/18/06).

Some teachers felt that the collaboration helped them to address problems with particular students and learn new instructional strategies and activities that they could use in their classrooms. One teacher discovered that he was not alone in experiencing problems with difficult students and the students’ inappropriate behaviors were not necessarily directed at him or initiated from being in his class:

I actually had a problem with a student that the other teachers had in class before, so we talked about what they did and how they handled certain situations with this student. (Study Group Self-Assessment, 12/11/06)

Because the teachers felt that the study group was a safe environment, they took risks and shared lessons that didn’t work well and asked for suggestions and help from their peers. The family and consumer sciences teacher found the study group to be a safe place to take such risks: “Though we’re a small group, people are free to talk and admit that they have weaknesses in certain areas” (Interview, 10/24/06). This environment remained safe when the study group was opened to teachers outside the CTE department (three non-CTE teachers joined the group). Open sharing and discussion continued in the enlarged study group.

The environment of openness, respect, and on-going communication among the study group members encouraged informal collaboration through the sharing of classroom stories, activities, and strategies. In this collegial environment the teachers established and strengthened their professional relationships with peers by giving and receiving support to each other, and in doing so they began to create a sense of community among group members. The study group was an opportunity for teachers to build community through their sharing of professional knowledge and supporting one another.

### **Significance of Findings for CTE Teachers**

In this era of mandatory educational reform, professional development for teachers has become an important component of the reform process. Teachers not only need to learn about innovations and programs but also how to assume new roles as educators and change their teaching practice to implement reforms to bring about improvements in student learning. Career and technical education teachers, in particular, have been tasked with complex changes through Perkins legislation. Such changes involve not only creating curricula that incorporate state and industry standards, but also academic skills to better prepare students for the 21<sup>st</sup> century workplace and for postsecondary education, which many occupations require.

CTE teachers have been tasked with integrating reading, writing and math skills into their technical curricula, which requires changes not only in the way they teach in their classrooms but how they think about teaching in general. To bring about change in CTE teacher practice, professional development should introduce teachers to integration and help them learn how to implement integration and related assessment strategies in their classroom. In addition, because these changes take time and require support and feedback from peers, professional development needs to be on-going and collaborative.

The findings of this multi-case study on teacher learning and collaboration suggest that the integration course, which was designed

to help CTE teachers to experiment, reflect, and model integration strategies within the context of their classroom, and which provided them with opportunities to collaborate with academic colleagues in the process, was an effective way for these teachers to learn about integration strategies, practice them, and incorporate them into their practice. Study participants consistently reported that experimentation and reflection, along with peer feedback, helped them as teachers to gain confidence in their abilities to integrate their curriculum, deliver it to their students, and assess the outcomes. Such a professional development experience, designed and delivered around the unique needs of adult learners, accomplished the introduction of an innovation to CTE teachers and provided them with the experiences they needed to practice, collaborate, and apply to their practice what they learned about the innovation.

The teacher study group, on the other hand, provided a different context for learning, was structured differently, and the content was more teacher-driven. This professional development experience was not designed to introduce an innovation or reform for teachers to learn and practice; rather it provided teachers with meaningful opportunities to get together as professionals to explore day-to-day issues from their classrooms and to discuss how to enhance their practice in different classroom situations. Communicating, supporting and sharing with colleagues over the academic year not only helped the teachers to think about improving their practice but also provided them with opportunities for continual professional growth.

The study group professional development experience complements the integration course because it is well-suited for providing the on-going support and collaboration that is needed for teachers who have been introduced to a reform innovation and must make complex changes in their practice over the long-term. Adapting an innovation such as integration is complex and varies depending on the classroom context. Teachers need flexibility and professional judgment to make adaptations and enhancements, and they need feedback and support from their professional colleagues as they work through this process. The study group can provide this collaboration and support on an on-going basis. Together, the more formal

structure of the integration course and the on-going and flexible study group environment, provide a meaningful design for professional development for CTE teachers who must learn how to integrate academics into their technical curricula and adjust their practice to improve student achievement.

### **Recommendations for Future Research**

This multi-case study is one brief glimpse into the different types of teacher learning and collaboration that can occur within the context of a formal course on integration and within the informal learning of a teacher study group. In this study, learning and collaboration were bound within the contexts of the teachers and their different professional development experiences. The rich descriptions help to show connections and common themes across and among the varied cases in this study; however, it is the readers' responsibility to take what they have learned and apply it to their situations, if they think it is applicable (Merriam, 1998).

The two professional development experiences in this study offered different types of learning and collaboration for both CTE and academic teachers, and in many ways, these learning and collaboration experiences were complementary for the teachers. On-going learning and collaboration is needed for teachers to improve their practice. While the integration course focused on specific pedagogical knowledge, such as strategies for integrating reading, writing, and math skills into a technical curriculum, and increased content knowledge of these academic areas, the study group was structured around conversations about on-going issues that teachers face in their classrooms, such as student motivation and behavior, different approaches to learning, and effective strategies and activities for cooperative learning. Together, both professional development experiences offered teachers a variety of experiences that can help them grow as professionals in all respects—in their content area, their pedagogy, their knowledge and understanding of students, their professional relationships, and their ability to collaborate. While the integration course is a one-time opportunity,



the teacher study group is an on-going professional development activity that can continue throughout the school year.

Further research is needed to more deeply understand how these different professional development environments enable different types of learning. This research was a multi-case study of six career and technical educators in a comprehensive high school, but there are many other contexts that merit exploration, such as technical schools, academies, urban high schools and middle schools. In addition, additional research on the different content, process, structure and context of professional development could help educators better understand the different experiences that provide meaningful professional learning for teachers.

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