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# **Sharing Tacit Knowledge Among Expert Teaching Professors and Mentees: Considerations for Career and Technical Education Teacher Educators**

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## **Abstract**

This case study provides viewpoints of knowledge sharing by expert teaching professors and their mentees. Professors who were recognized as expert teachers with an annual award at a mid-western USA university were the units of analysis of this study. Expert teaching professors had difficulty articulating much of their teaching expertise. The difficulty was rooted in three characteristics of teaching expertise. Sharing tacit knowledge was also noted as a difficult task because the nature of tacit knowledge prevented it from being articulated. Methods of sharing tacit knowledge were categorized in two ways: observation and “bringing it to surface.” Recommendations for additional study include examining knowledge sharing among expert and novice professors in career and technical education teacher education programs.

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### Introduction

Studies about expert teachers in higher education have produced consistent findings. The elements of expert teaching in higher education pertain to clarity of presentation (Havita, Barak, & Simhi, 2001; Kane, Sandretto, & Heath, 2004; Sherman, Armistead, Fowler, Barksdale & Reif, 1987), enthusiasm of teaching (Ekeler, 1994; Havita, Barak, & Simhi, 2001; Kane, Sandretto, & Heath, 2004; Pinsky, Monson, & Irby, 1998; Sherman et al., 1987), command of subject knowledge (Horan, 1991; Kane, Sandretto, & Heath, 2004; Sherman et al., 1987), preparation and organization (Havita, Barak, & Simhi, 2001; Kane, Sandretto, & Heath, 2004; Pinsky, Monson, & Irby, 1998; Sherman et al., 1987), stimulating the interest of students for engagement in learning (Havita, Barak, & Simhi, 2001; Horan, 1991; Sherman et al., 1987), understanding students, and creating a positive environment (Pinsky, Monson, & Irby, 1998), interpersonal relationship (Havita, Barak, & Simhi, 2001; Kane, Sandretto, & Heath, 2004), humor and approachability (Kane, Sandretto, & Heath, 2004).

The preceding studies provide a useful backdrop for the types of skills that expert teaching professors might display in classrooms. However, lacking from the literature are studies that depict how expert teaching professors do what they do. A key difference between expert teachers and novice teachers resides not with the “what they do” (their content knowledge), but with the “how they do” (their procedural knowledge). Expert teaching professors possess tacit knowledge of how they do their job, but if they are like other types of expert workers, they may struggle in their attempts to surface this knowledge and explain it to others (Polanyi, 1967).

Sternberg and Grigorenko (2001) define tacit knowledge as “knowledge which individuals use to perform effectively but which they may find hard to articulate” (p. 1). Following in the footsteps of Nonaka and Takeuchi (1995), several scholars have examined the benefits of sharing tacit knowledge within organizations and strategies for doing so. The relationship between tacit knowledge and explicit knowledge is controversial (Shim & Roth, 2006). Some researchers believe tacit knowledge may be codified, such as Berry

(1997), Hager (2000), and Nonaka and Takeuchi (1995). Some researchers assert that tacit knowledge and explicit knowledge exist on a continuum (Ambrosini & Bowman, 2001). Other scholars believe firmly that tacit knowledge cannot be codified (Cook & Brown, 1999; Tsoukas, 2002). Within the literature, a variety of perspectives and strategies may be found with regard to sharing tacit knowledge among organization members. The intent of this article is to bring to light contextual issues involving knowledge sharing among so called “expert” teaching professors and their mentees.

### **Problem Statement**

Professors possess deep knowledge in their content areas. Expert teaching professors also possess considerable tacit knowledge about processes used to effectively teach in their respective contexts. Little is known about how expert teaching professors share tacit knowledge about teaching with mentees. Without systemic ways to access expert teaching knowledge, professors and mentees can be left with trial and error attempts at surfacing this tacit knowledge, codifying it, and sharing it. Gaining insights about how expert teaching professors share tacit knowledge with mentees may help faculty members, faculty developers, administrators and others enhance opportunities for and remove barriers to sharing knowledge about excellent teaching. The central research question for this study is how do professors who are acknowledged to be expert teaching professors share their tacit knowledge with mentees?

### **Limitations of the Study**

Qualitative research is not intended to be used for generalizing to larger populations. This point is particularly relevant to the nature of this study and to the readership of this journal. The small number of participants of this study spanned several university departments and colleges. Participants were not limited to teacher education programs, and most certainly not limited to Career and Technical Education (CTE) teacher education programs (CTE, defined here to be an inclusive term of technology education, technical education,

and trade and industrial education). Although this study can provide insights to CTE teacher educators about the transfer of teaching knowledge between expert teaching professors and their mentees in the broad university context, readers are cautioned to recognize the unique elements of CTE teacher education contexts. For example, CTE teacher educators and their mentees may very well be more aware of educational jargon and instructional methods than professors in liberal arts and sciences, engineering, business and other non-teacher education areas of study.

Data reported herein were gleaned from a larger study that broadly examined expert teaching professors (Shim, 2006). Themes that emerged from Shim's study included aspects of teaching expertise, mentoring processes, and mentoring functions of expert teaching professors. Additionally, two major themes from Shim's larger study pertained to the nature of tacit knowledge of expert teaching professors, and the nuances of articulating it. Findings specific to these latter themes and their supportive data are reported in this article. Readers are encouraged to review Shim's work for a broader and deeper analysis of tacit knowledge of expert teaching professors.

### **Theoretical Framework**

Symbolic interactionism and constructivism provide the theoretical framework of this study. Symbolic interactionism is a viewpoint concerning the interactions of human beings and the relationships of human beings with society and social objects (Charon, 1979). Human beings actively engage in creating the world of experience by shaping meanings that result from interaction through symbols (Denzin, 1992). Symbolic interactions help to create meaningful reality for human beings.

Consistent with symbolic interactionism is the learning theory referred to as constructivism. When learners interact with others, they actively construct knowledge that may be used functionally in a social context (Kerka, 1997). Cognitive apprenticeship is a constructivist method that has been used to help novices acquire expertise (Kerka, 1997). In traditional apprenticeship, the expert

demonstrates proper means of completing a task and helps the apprentice perform it by modeling, scaffolding, fading, and coaching (Collins, Brown, & Holum, 1991). In cognitive apprenticeship, experts model the strategies and activities required to solve problems by scaffolding, coaching, and correction (Duncan, 1996). In this study, the meaningful realities of the expert professors and their mentees were formed through symbolic interaction and their tacit knowledge about teaching was molded in context (Shim & Roth, 2006).

### **Methods of the Study**

The method for this research was case study. Professors who were recognized as expert teachers with an annual award at a mid-western USA university were the units of analysis of this study. These award winners at this university were designated as a Presidential Teaching Professor (PTP). Only full professors with tenure and at least 6 years of service at the university could be nominated for the PTP award. Nominees were considered to be among the most able and talented teachers at the university. Thirteen of the available thirty-four PTPs participated in this study. All participants had at least twenty years of teaching experience in higher education.

The participating PTPs recommended nine mentees to be interviewed for this study. In addition, a tenth interviewee was included because he had participated in a PTP's class for an entire semester and he had analyzed and shared the teaching expertise of the PTP. Among the nine mentees, seven were professors and three were graduate assistants who had taught students at this university.

Given the qualitative approach taken in this study, several procedures were used to establish trustworthiness of data: triangulation, member checks, peer examination, and surfacing researcher biases. To triangulate data, three sources of data were used to confirm emergent themes. Two sources of data were from interviews: the PTPs who shared their knowledge with mentees or novice professors, and the mentees or novice professors who received knowledge from the PTPs. Member checks were conducted

by taking the transcripts back to interviewees and asking them for their opinions regarding the accuracy of the data. In addition, participants were invited to provide further clarification of their comments or to provide additional information. In addition to the interview sources, university documents were examined that featured interviews and comments about the PTPs. As the findings emerged, two doctoral candidates were selected to review and discuss the interpretation of the data.

Data were analyzed simultaneously with data collection by focusing on the main research question. To satisfy the descriptive account, data were “compressed and linked together in a narrative that conveys the meaning the researcher has derived from studying the phenomenon” (Merriam, 1998, p. 179).

In addition to the descriptive analysis, themes that captured some persisting pattern that occurred in the “preponderance” of the data were developed to satisfy the interpretive intent of this study. The constant comparison method was used to construct themes. Although the constant comparison method of data analysis was generated by Glaser and Strauss as the method of developing grounded theory, it has been chosen by many researchers who were not intending to create substantive theory. The constant comparison method provides compatibility with the inductive, concept-building orientation of all qualitative research (Merriam, 1998, p. 159). The basic strategy of the method was to constantly compare a particular incident from an interview with another incident in the same set of data or in another to discover recurring regularities in the data (Merriam, 1998, p. 159).

Two major themes emerged from the data concerning (1) the tacit nature of the PTPs teaching expertise and (2) the nuances of articulating tacit expertise. Data supporting these two major themes were garnered from statements from 10 of the PTPs and 4 of the mentees. Examples of excerpts that supported these two themes are provided in the next two sections.

### Theme 1: The Tacit Nature of the PTPs’ Teaching Expertise

Several participants spoke to the notion of the tacit nature of teaching expertise. Excerpts from the transcripts that supported this

major theme included describing teaching as a mixture of art and science, the situational nature of teaching, the context dependency of teaching actions, the lack of awareness of performance, and the innate perspective of teaching expertise.

Most PTPs answered the question, “How did you learn how to teach?” or “How did you gain your teaching expertise?” by explaining that they did not receive formal training to teach in higher education; PTPs learned through learning by doing, experience, previous jobs, or modeling. Their teaching expertise was not recognized as formal knowledge, but rather as a skill or just performing their job with their own unique style. They described the expertise that could not be articulated as a form of art. In this context, the meaning of art was that their skills were developed through intuition and experience and not from the following of a prescribed set of rules or facts. A PTP believed that teaching was a mixture of art and science. The art could not be explained or learned through the help of others.

*It's very subjective. Teaching is a very subjective business. That's why people say it's a mixture, an art and a science. You can learn the science part, but the art is a different matter, that's something that I don't think people could explain very well or help anyone else to necessarily learn.*

Another PTP explained their expertise as situational. Situational knowledge meant that knowledge was embodied in a specific situation, thus it might not be separated from the situation. A PTP used an analogy of dancing to explain his situational expertise.

*When I show other teachers and colleagues how I dance in a classroom, they can see the steps but it's not the same as the dance itself, which can only really exist there when I'm in the classroom with the students.*

A mentee of a PTP confirmed that the expertise of her mentor could not be detached from the context of the PTP's teaching practices.

*We can't put a series of steps on how to learn that, I just don't think we can. You can watch videotapes of Clara teaching. It's not the same as being in the classroom with Clara and watching the interactions before class, after class, during break, all of that is important, that's where the real learning is.*

The inattentiveness to their expertise was also found, when a PTP told his experience that he was observed and briefed by his colleague. The PTP said he was not aware of what he was doing, he was just doing it.

*My colleagues said, "Oh, well, what you're doing is you're following this whole process of student development, taking them to this stage of development to this stage of development..." I wasn't aware that I was doing that. I was just doing it. Sure enough, the questions that I was using did that, they asked different kinds of things; it had them comparing works, and it had them linking the work today with what we read yesterday and what we read the day before and pulling that old information into a revised form for today. I knew that I was doing that, but I didn't know that this was part of an educational process, so he was able to tell me things that I didn't know that I was doing, which was really very interesting.*

To a novice professor, the habitual and unexplainable expertise, it could seem like innate ability of a PTP, because it was so quick and deep. And it seemed to her that the expertise was not to be articulated in words.

*One of the examples that comes to my mind is reading people. I think Anny is excellent at reading people, and so when she's conducting a session, she picks up on cues from the audience obviously and from individuals. The other thing that she's really good at is thinking in depth quickly, so you can watch her engage in maybe a one-on-one session with a student and the student presents a draft of something. She can respond to such*

*a level of depth to get the person moving along in terms of her questioning, just brain-storming, whatever it takes in order to move the person forward.*

But there was one instance in this study that revealed the possibility of articulating tacit knowledge into words. A PTP was observed by a colleague who had a Ph.D. degree in education. The PTP was intrigued by his colleague's explanation of various aspects of his teaching. Some aspects of the PTP's teaching were not explainable in words to him, but his colleague explained his teaching behaviors by using educational jargon. He described the experience.

*Right, so it is hard to explain. He was able to explain to me things that I didn't know. Because he was in education, in the field of education, he had all sorts of research to back up his observations of what I was doing that I didn't know that I was doing. I certainly didn't have the language, because every discipline, you're in education, you have a language that goes along with your field that is different from the language that goes along with my field. He had a whole language to explain things I had no idea, I knew internally that I was doing something, but I didn't know how to explain it. That's just it, because teaching is an art and it's hard to stop the art to put it into words. It was an interesting experience.*

His colleague was able to transform the PTP's tacit knowledge into explicit knowledge, even though the explanation could not deliver the specific situation where the knowledge was used. It meant that some tacit knowledge could be transformed into explicit knowledge through the use of appropriate language. Therefore, language can supply terms to transform some tacit knowledge into explicit knowledge, taking into consideration the limits of language. So, some tacit knowledge has a relatively high potential to be articulated in words given the limits, but other tacit knowledge has relatively low or no potential to be transformed into explicit knowledge.

### ***Concluding Thoughts: The Tacit Nature of the PTPs' Teaching Expertise***

The art of teaching, situational teaching, habitual teaching, and unconscious or subconscious teaching practices were tacit knowledge of PTPs' teaching expertise. These processes were difficult to be articulated in words, even though they were transformed into explicit knowledge to some degree. The PTPs had difficulty sharing their expertise with colleagues or mentees. These findings are consistent with Polanyi's (1967) seminal work that identified a form of knowledge known as the tacit dimension and suggested that "We can know more than we can tell" (p. 4). These findings are also aligned with Leonard and Sensiper (1998) explanations of the barriers that exist in sharing tacit knowledge. This study found the process of PTPs teaching to be natural, that is, seamless and flowing smoothly. PTPs have refined "natural teaching" through ample experience and incessant efforts to improve teaching. This natural teaching is aligned with Dreyfus and Dreyfus (1986) description of fluid performance as the main characteristic of expert performance. Fluid performance happens when experts perform their work without consciously thinking about situations and alternative ways.

#### Theme 2: The Nuances of Articulating Tacit Expertise

The second major theme that emerged from the data pertained to the nuances of articulating tacit expertise. Concepts within the transcript excerpts that supported this theme included doubting the possibility of sharing tacit knowledge, strategies for surfacing tacit knowledge, modeling and observing actions, using probing questions, describing intentions, and reflecting on actions.

Sharing tacit knowledge is difficult, because the nature of tacit knowledge and the difficulty of articulating it expose the arduous communication challenges between the possessor of the tacit knowledge and a person who wants to learn the tacit knowledge. One PTP believed that tacit knowledge could not be taught because it could not be articulated.

*I can't teach what I can't articulate. I'm not sure what the art is really. I've seen people who have tried to emulate my teaching style, and it hasn't always worked for them. So, part of it I think is tied to the individual, and I can see it, I can recognize it I guess in other people, but I don't know that I can tell someone else how to develop that necessarily.*

However, some interviewees had their own ways to share tacit knowledge. Their sharing methods could be categorized into two ways. One way was to involve partners in real practices without transforming the tacit teaching expertise into explicit knowledge. This way was based upon an assumption that the tacit knowledge could not be easily articulated or transformed into explicit knowledge. The other way was making the tacit knowledge come to the surface in ways that allowed his/her partners to recognize the tacit knowledge. The underlying assumption of this approach was that some parts of tacit knowledge could be transformed by applying metacognitive skills, storytelling, or metaphors. Interviewees more frequently mentioned the first way than the second way. Some interviewees mentioned a mixture of the two approaches.

A way to involve partners in real practices was via observation of experts teaching. A PTP tried to explain how he could share his expertise that could not be articulated. His intent was to show his raw practices and allow his partners to see where his tacit knowledge resided.

*Let me use an example. Do you know Mother Theresa? ...There was a question asked her, "How do you do this, you're working with the poorest of the poor?" She was one who grew up in a wealthy family, and she gave everything up to go work for all of these horribly poor people in India. Her answer always was, "Come and see. Come and see what we do." That, you can't really articulate. I can't really articulate. I can say that I go into a classroom and I get excited about it...but to see how it actually works, you have to come and see, just sit in. I have told*

*people that, if you want to see it, just sit in the back of the room, or sit in one of the groups and be part of it.*

A PTP also surmised that intensive modeling by the expert teacher could be a way of sharing tacit knowledge with an observer. However she did not prefer that way, because it underrepresented the notion that a teacher's personality supplied the strength to teaching.

*One way it would be an intensive modeling so that you say, "I'm doing it, watch what I do and do it exactly the way I do." So, that would be one way to try to do that. But since everyone is different, my way wouldn't work for everyone else, so I wouldn't want to do it that way. I have seen other people do it, this is the way to do it, do it exactly the way that I do...But, to say to everybody, "Do it just the way that I do," wouldn't work because everybody's personality is different. Part of teaching involves using your personality. Your strengths of teaching are the strengths of your personality.*

A mentee depicted a situation in which she believed that she had acquired tacit knowledge from her mentor. The mentee was convinced that she could understand the tacit knowledge because she watched her mentor's action as a holistic process without breaking down the mentor's action. The interpretation and understanding of the situation, and other situations, were left to observers, because the tacit knowledge was not separated from teaching situations of the PTPs, and that tacit knowledge could not be articulated. Thus, it took a long time for a novice to capture the tacit knowledge of an expert teacher, and various situations needed to be observed.

A mentee was certain that her observation of her mentor's real practices in various situations for a long time period helped her to grasp her mentor's tacit knowledge with regard to caring for students.

*That statement doesn't show you how to care, but if you spend time with her, you observe how she implements that caring. That's what you can't often put into words exactly because it*

*varies according to student, but the value of caring and how she did that, I could view, I could feel, I could see. Do you understand what I'm saying? You could make a statement that teachers should be caring, you know she could have said that to me and it wouldn't have meant anything, but because I saw her as a teacher care for many students in many different ways, that's knowledge that I use on a daily basis now as a professor.*

Observation of PTP's practices in real situations was relatively free from the intention of PTPs, because the PTPs' teaching in the real situation was intended for the students in the classes. However, demonstration brought about a more focused intention from the experts about specific expertise that was difficult to explain, because demonstration was for the understanding of observers. A mentee of a PTP in the music department said that observation of her PTP's demonstration, even though the practice pertained to playing music and not teaching, was a way of sharing ideas that could not be expressed by words. She explained that the mixture of various motions could not be separated from each other and this mixture would be difficult to articulate in words.

*Or, sometimes you can't explain it and he just plays it because I mean the great thing about music is you tend to express things you can't express with words, so sometimes you really can't explain something and he'll be like, let me play this part for you and you try this as well because I mean there are some motions you just can't describe sometimes, it's like a hodgepodge of all these motions put together.*

Observation did not guarantee acquiring tacit expertise. Observers would need to apply knowledge over time. A mentee mentioned that she observed her mentor's teaching for two years when they taught a course together. But, only after eight years of teaching experience did she feel she could "walk into a group and be comfortable and liven things up" in her classes. It meant that observation needed to be accompanied by time and it did not guarantee the observer's acquisition of tacit knowledge. And the

observer's command of the tacit expertise needed ample practice. The mentee explained how she gained the expertise.

*I think just now, so after eight years, I'm starting to come to the point where I feel excited to walk into a classroom and feel confident that I can sort of bring a group through a learning experience without saying, "And now we will do this, and now we will do that." It's still not as natural for me, I don't know if I'll ever get to where she is, because it's not who I am, but I certainly learned a lot by watching how to relax and enjoy what happens and not feel the pressures of having to be the expert.*

Observation was a passive way to communicate tacit knowledge. However, "Bring it to surface" (BIS) was a more active one. BIS meant transforming tacit knowledge into a better communicable form. It transformed expert raw practices in cases where tacit knowledge was buried in situations or at a subconscious level. Interviewees of this project presented several ways of BIS. The interview method was one of them. An interviewer works with an expert, observes the practices, and asks questions during or after the expert's work.

*One of the things that I learned as I explored that field, and I'm convinced is still very true, is that very often experts in whatever field it may be are quite unable to explain how they do their job, what it is exactly what they know, and what we learned in engineering expert systems over the years is that somebody has to be the outside observer watching that person do whatever it is that they're so good at and interrupting if necessary or at the end of a particular period of activity say, "Alright, you did this, why? Why did you do it that way instead of some other way?" In working together, an expert observer, an interviewer, and a true expert can very frequently capture what neither one of them can do alone.*

Another PTP insisted that the questions should be probing, targeted, and specific questions. To be able to ask those questions,

interviewers should have enough knowledge to identify targets for the questions and to probe deeply. When those questions provoked an expert to reflect upon his or her tacit aspects of teaching, the expert tried to bring them to the surface to his or her conscious level. The PTP used a metacognitive skill for BIS, when he was asked those questions. The metacognitive skill was “talking out loud” about the questions, which enabled him to think deeply, to make buried things become exposed, and to provoke the questioner to explore related concepts.

*I don't think I have an example, but sometimes just talking out loud...talking about the situation, and I might not know where I'm going with the explanation, I'm using talk as a metacognitive strategy. I'm talking about something, to see if something will surface, to help the person understand something. So it's more of a talking out loud on a behavior, not sure where I'm going with it, but maybe something will surface that will help me explain it, or help the other person understand it. I guess that's a way I might try to get at something that I know, but is hard to express.*

Another way for BIS was through the use of metaphor. When something was impossible to be described in a direct way in words, some PTPs adopted something else which was the same in a particular way. The particular way was to help a communication partner to presume the nature of the something that could not be articulated in a direct way.

*I tend to give a lot of examples. I tend to sort of go through an example or say it's like, create a metaphor, it's like this, I sort of metaphorically think or give a visual example because I think visually.*

The example of using metaphor was found in a PTP's description of teaching. When the PTP was asked to explain the art form of her delivery to me, she used a metaphor of cooking to help me understand the delivery.

*I had one come in and wanted to see something, and I taught something and it was just flat. Sometimes you're on, and sometimes you're off. It was like I'm not sure, whether it was my timing or delivery, but it was like just bland. It was like eating a meal with no spices at all. Maybe that's what teaching is, adding some spice to the content, maybe that's it! Maybe it's not an art form, it's a cooking form. You have the content being all the ingredients, and then how you present it, that's the spice. That gets them in the kitchen. It's not the pot boiling that sound, it's the smell of the spices that lure people into the kitchen, right? Maybe that's what they remember, the delivery part of whatever.*

Storytelling was also used by a PTP, when he wanted to deliver his feeling or his understanding of beauty of music pieces, which was not directly articulated in words. The story was not abstract but specific. He presented an example of that kind of story for explaining his sad feeling about music.

*I just heard one on the radio today that I might tell a student of mine if I have something very sad in the music. I just heard on the radio from Iraq, a woman who was the leader of a charity organization in Iraq was kidnapped, you must have heard on the radio about all the people who have been kidnapped and they get their head cut off. I heard her on the radio today, crying, begging for her life, they had that on the radio, on the TV station...It was terrible, I hated hearing it, I felt very sick and sad when I heard it. I would tell that kind of story to my student if there was a sad moment in the piece of music, for example, Mozart or one of the other composers.*

Whether it was observation or BIS, reflection on the experts' practices needed to follow. Sharing tacit knowledge seemed to require more intended, focused, and longer reflection than sharing explicit knowledge, because it was difficult to find articulated cues and explanations about tacit knowledge. Thus, time was needed for reflection on the tacit knowledge.

*If they are still not understanding it, I don't know, maybe give them time to think about it and come back and ask questions. When you're presenting stuff to students, sometimes they don't get it right at that moment, but they do after thinking about it and reflecting on it and giving it some time to sink in or working in it in whatever you prescribed for them to practice. So, while they're in class with you, they might not be sure they understand, but once they go home and do the reading and do whatever the activity is and come back, they have gotten it. Sometimes it is that time that passes, whatever short period of time that might be that really helps people do their own work on it.*

Reflection by the novice should be accompanied with practice, because sharing tacit knowledge becomes a process of creating knowledge for novices. Through practice, they could experience the process of tacit knowledge, and reflect on their practices. Experiencing process was critical because tacit knowledge was procedural knowledge. Through the reflection and practice, novices can create their own tacit teaching expertise based upon their personality and preference, because teaching is art and the art is personal expression. A PTP explained why the process was a personal creation of tacit knowledge.

*You cannot give them a recipe on how to do it, you can not give them detailed instructions. You can have them build their knowledge and background and then they have to work it out themselves. You give them supervision, you give them guidance, you give them suggestions. [Why can't you give those things?] Because it is a kind of art and art is a personal expression. First of all there are many theories, and students have to learn about all of those theories, but you can't really base yours on all these theories at once. You have to choose a path. The first thing is that they have to have a lot of learning so they can choose a path.*

The fact that sharing tacit knowledge was creating personal knowledge was supported by the notion that sharing tacit knowledge of art was constructing personal ideas. When a music PTP tried to

share his ideas of music (his tacit knowledge) with his mentee, the mentee constructed her own ideas of the music, even though both the PTP and the mentee experienced the same music at the same time.

*I mean the way he plays something he could be thinking something in his mind and then when he plays I could be thinking something else in my mind all from the same piece all from the same way he played, but that's just because we think different and then I take what I want and I take the parts most relevant to me and then I work from there.*

The challenge for the PTP and the mentee is that the tacit knowledge associated with expert teaching will reside differently in each person's mind. It can be altered in the communication process – both in conveyance and reception.

### ***Concluding Thoughts: The Nuances of Articulating Tacit Expertise***

PTPs had difficulty in articulating much of their teaching expertise. The difficulty was rooted in three characteristics of teaching expertise. The first characteristic was that a considerable amount of the teaching expertise is in the form of art. This characteristic is aligned with Schon's (1983) search for an epistemology that can explain "practice implicit in the artistic, intuitive processes which some practitioners do bring to situations of uncertainty, instability, uniqueness, and value conflict" (p. 49). In accordance with Schon, one can argue that the practice implicit in the artistic processes is the core characteristic of tacit knowledge. The uniqueness and uncertainty of problems embedded in the expert teacher's context are the places where tacit knowledge is used.

The second characteristic is that teaching is situated in a specific situation, thus it is difficult to separate from the situation. This characteristic is consistent with Zheng's (2005) assertion that sharing expertise is deeply influenced by the culture and work setting. In the case of university work settings, Shim and Roth (2006) suggested that universities need to provide professors with safe ways to

overcome cultural and physical barriers for sharing teaching expertise. Even then, it is worth noting that organizations cannot extinguish all of the barriers to knowledge sharing because many of them reside outside the boundaries of organizational action (Sharma & Grover, 2004).

The third characteristic was that teaching expertise was habitual, and thus became the target of subsidiary awareness. That is, PTPs were inattentive to their teaching expertise without being asked to explain it. This characteristic is consistent with Tsoukas (2002) interpretations of Polanyi's (1967) seminal writing. Shim (2006) provided a practical interpretation of this characteristic. Through the formation of tacit knowledge, an expert worker, for example, will focus on tools when s/he is in the process of learning the tools; will become unconscious of the tools through practice and repetition; and will eventually uncritically accept the tools. Through this process, the knower becomes unable to articulate the essence of his/her tacit knowledge.

Sharing tacit knowledge was often recognized as an impossible task because the nature of tacit knowledge prevented it from being articulated. However, methods of sharing tacit knowledge were categorized in two ways: observation and BIS. Observation was more frequently mentioned by interviewees than BIS. Sometimes, both methods were mixed to share tacit knowledge. Sharing tacit knowledge through observation was a lengthy process. Observation had merit in that it allowed observers to absorb the teaching situation holistically. This finding is aligned with assertions by Nonaka and Takeuchi (1995) that observation is a key method for sharing tacit knowledge in organizations.

However, the observation-only method transferred the responsibility of understanding tacit knowledge to the observers. Thus, observers might interpret tacit knowledge regardless of the intention of the PTPs, because the PTPs did not provide cues for the observers. BIS needed various communication and metacognitive skills for sharing, such as probing, metaphors, storytelling, and visualization. These skills are consistent with the suggestion of Nonaka and Konno (1998) that through dialogue an individual's mental models and skills are converted into common terms and

concepts. Two processes operate in concert: individuals share the mental models of others, but they also reflect and analyze their own mental models. In the case of this study, dialogue involved metacognitive tools such as probing, metaphors, storytelling and visualization.

To enhance the sharing of tacit knowledge in this study, reflection and personal practice were necessary in both observation and BIS. Through reflection and practice, sharing became more than merely mimicking the experts' tacit knowledge, it was creating novices' tacit knowledge.

### **Implications for Career and Technical Education Teacher Educators**

A recent editorial piece by an editor of JITE noted that university classrooms can be lonely places (Burns, 2006). She noted the challenges of teaching a diverse set of students, of planning relevant class sessions, and surviving the ambiguities of a university culture. Career and technical education teacher educators probably have additional challenges that are not faced by other university professors. CTE professors are commonly teaching in laboratories that include hands-on learning with a variety of tools and equipment. Instructional methods can involve demonstration, modeling, practice, repetition, and so forth. Within these classroom and laboratory settings CTE teacher educators refine their skills as professors over time. Many of them eventually take on mentoring roles for those new to the professorial ranks.

The fact that CTE teacher educators work in unique contexts cannot be overstated in the relevance of this study to the readership of this journal. Burns (2005) explained that the Trade and Industrial (T & I) teachers that she has worked with tend to alter their simple, dualistic perspectives over time as to whether or not teaching is an art or a science. They come to recognize that the actions of teachers are context dependent. She explains "They have discovered that many of their decisions about teaching strategies, their responses to student misbehavior, or their selection of materials and assessment techniques, often must take into consideration more subjective

judgments” (p. 3). One of the authors of this study spent considerable time as a T & I teacher educator. He served as an “itinerant T & I teacher educator” traveling around a rural state helping new T & I teachers struggle through their first year of teaching. He also taught two-week “survival skills” training workshops in the summer for new T & I teachers who were pulled directly out of trades/industries and thrust into the unknown world of secondary level teaching. These new teachers relied greatly on establishing mentoring relationships with experienced teachers in their schools. Similar to these T & I teachers, novice CTE teacher educators learn over time to make subjective judgments in their roles as university professors. They learn their roles and garner knowledge about professorial work through application of theory, from observing and talking to other professors, and from trial and error.

Studies are needed that examine the unique cultures and other environmental factors of CTE teacher education programs that might hinder or help knowledge sharing among expert and novice professors. Several features of CTE programs could come into play. The graying of the CTE professoriate could be an issue with large generational factors affecting interactions among expert and novice CTE teacher educators. The small sizes of CTE programs and the merging previously segregated vocational and technical teacher education programs could also affect interactions. One could argue that the learning curve for novice CTE teacher educators is greater than other new professors, given that CTE teacher educators might not only have to meet typical teaching responsibilities, but also have to learn about supplying and maintaining technical laboratories, visiting student teachers, advising student organizations, and understanding the state’s credentialing system for teacher certification. Within this milieu, the novice CTE teacher educators will need to identify expert professors and seek out ways of gleaning tacit knowledge from them.

### References

- Ambrosini, V., & Bowman, C. (2001). Tacit knowledge: Some suggestions for operationalization. *Journal of Management Studies*, 38(6), 811-829.
- Berry, D. (1997). *How implicit is implicit learning?* New York: Oxford University Press.
- Brewer, E. (2005). Professor's role in motivating students to attend class. *Journal of Industrial Teacher Education*, 42(3), 23-47.
- Burns, J. (2006). It's about staying alive...and staying alive professionally. *Journal of Industrial Teacher Education*, 43(2), 3-6.
- Burns, J. (2005). Is teaching an art or a science? *Journal of Industrial Teacher Education*, 42(3), 3-5.
- Charon, J. M. (1979). *Symbolic interactionism: An introduction*. Englewood Cliffs, NJ: Prentice-Hall.
- Collins, A., Brown, J. S., & Holum, A. (1991). Cognitive apprenticeship: Making thinking visible. *American Educator*, 15(3), 6-11, 38-46.
- Cook, S. D. N., & Brown, J. S. (1999). Bridging epistemologies: The generative dance between organizational knowledge and organizational knowing. *Organization Science*, 10, 381-400.
- Denzin, N. K. (1992). *Symbolic interactionism and cultural studies: The politics of interpretation*. Cambridge, MA: Blackwell.
- Dreyfus, L. & Dreyfus, S. E. (1986). *Mind over machine*. Oxford: Basil Blackwell.
- Duncan, S. L. S. (1996). Cognitive apprenticeship in classroom instruction: Implications for industrial and technical teacher education. *Journal of Industrial Teacher Education*, 33(3), 66-86.
- Ekeler, W. J. (1994). The lecture method. In K. W. Prichard, and R. M. Sawyer (Eds.), *Handbook of college teaching: Theory and applications*, (pp. 85-98). Westport, CT: Greenwood Press.
- Hager, P. (2000). Know-how and workplace practical judgment. *Journal of Philosophy of Education*, 34(2), 281-296.

- Havita, N., Barak, R., & Simhi, E. (2001). Exemplary university teachers: Knowledge and beliefs regarding effective teaching dimensions and strategies. *The Journal of Higher Education*, 72(6). 699-729.
- Horan, M. (1991). Attributes of Exemplary Community College Teachers: A Review of the Literature. ERIC Document Reproduction Service No. ED 346 900.
- Ipe, M. (2005). Knowledge sharing in organizations: An analysis of motivators and inhibitors. In T. Egan & M.L. Morris (Eds.) *Proceedings of the Academy of Human Resource Development*, (pp. 399-406). Bowling Green, OH: Academy of Human Resource Development.
- Kane, R., Sandretto, S., & Heath, C. (2004). An investigation into excellent tertiary teaching: Emphasizing reflective practice. *Higher Education*, 47. 283-310.
- Kerka, S. (1997). *Constructivism, workplace learning, and vocation education* (Report No. EDOCE97181). Columbus, OH: Clearinghouse on Adult, Career, and Vocational Education (ERIC Document Reproduction Service No. Ed407573). Retrieved March 6, 2004, from <http://www.ericdigests.org/1998-1/learning.htm>
- Leonard, D., & Sensiper, S. (1998). The role of tacit knowledge in group innovation. *California Management Review*, 40(3), 112-132.
- Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company*. New York: Oxford University Press.
- Polanyi, M. (1967). *The tacit dimension*. London: Routledge and Kegan Paul.
- Pinsky, L. E., Monson, D., & Irby, D. M. (1998). How excellent teachers are made: Reflecting on success to improve teaching. *Advances in Health Sciences Education* 3. 207-215.
- Schon, D. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books.

- Sharma, H., & Grover, D. (2004). Knowledge management: A human perspective. In Y. Moon, A. Osman-Gani, K. Shinil, G. Roth, & H. Oh (Eds.). *Human resource development in Asia: Harmony and Partnership (Edited Proceedings of the 3<sup>rd</sup> Conference of the Asian AHRD Chapter)*, (pp. 50-57). Seoul: Korea Academy of Human Resource Development.
- Sherman, T., Armistead, L. P., Fowler, F, Barksdale, M. A., & Reif, G. (1987). The quest for excellence in university teaching. *Journal of Higher Education*, 58(1). 66-84.
- Shim, H. (2006). *Transfer of knowledge between expert professors and their mentees*. Unpublished doctoral dissertation, Northern Illinois University, DeKalb.
- Shim, H., & Roth, G. L. (2006). Expert professors and sharing tacit knowledge with mentees. In M. Ismail, A. Osman Gani, S. Ahmad, A. Abdullah, I. Ismail, & J. Othman (Eds.) *Human Resource Development in Asia: Thriving on dynamism and change* (pp. 492- 500). Putrajaya, Malaysia: Universiti Putra Malaysia.
- Tsoukas, H. (2002). *Do we really understand tacit knowledge?* Paper presented in the Knowledge Economy and Society Seminar, LSE Department of Information System, June 14, 2002.
- Zheng, W. (2005). An integrative literature review of organizational culture factors that facilitate knowledge management: Implications for HRD. In T. Egan & M.L. Morris (Eds.) *Proceedings of the Academy of Human Resource Development*, (pp. 497-504). Bowling Green, OH: Academy of Human Resource Development.