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OF EXPERT GOLF INSTRUCTORS

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ABSTRACT

EXPERTISE IN SPORT INSTRUCTION:
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The purpose of this study was to describe and analyze the pedagogical content knowledge of expert golf instructors. The study was guided by a conception of pedagogical content knowledge forwarded by Lee Shulman and colleagues. Qualitative research techniques were used to examine the instructors' conceptions of teaching, pedagogical content knowledge, and their instructional strategies for teaching the most fundamental skill in golf: the full swing. Data collection techniques included repeated observations, video taping of their lessons, a stimulated recall exercise, audio-taped interviews, and document analysis. Case studies were developed to describe and interpret the pedagogical content knowledge of these experts, using Grossman's model of pedagogical content knowledge as an interpretive framework. This investigation revealed a breadth of pedagogical content knowledge and a diverse set of instructional strategies worthy of consideration for

novice golf instructors, K-12 physical education teachers, physical education teacher educators, and others involved in the preparation of instructors in the sport of golf. Additional findings suggest a modification of Grossman's conceptual model that accounts for the instructors' overarching orientations toward their pedagogical practice. Implications and recommendations for the future study of expert teaching in golf and other sport settings are discussed.

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Chapter 1

THE PROBLEM AND ITS SIGNIFICANCE

Introduction and Background

The following story is told by Dr. Gary Wiren, Director of Golf Instruction for the Professional Golf Association (PGA) of America.

> A college-aged student of mine in the first few classes had developed some basic motion and a sense of rhythm to his swing, which was producing good success for him in moving the ball. He seemed to be getting the hang of 'feeling the swing'. After a warm-up period, he prepared to hit a few shots for his teacher-friend, an excellent varsity golfer. Being a little nervous, he resorted to instinct on his first shot, and right-handed it badly enough so that his left arm had collapsed, causing him to barely tick the top of the ball, sending it only a few feet from where he stood.
>
> "Oh, you bent your left arm," said his temporary mentor. "Don't bend your left arm on your next swing." The pupil didn't. But in attempting not to bend his left arm, his motion became restricted and he failed to get any weight transfer to the left on his down swing so that he ended up hitting some four inches behind the ball. The resulting distance bore striking resemblance to the first shot.
>
> "You stuck on your back foot," said the varsity golfer friend. "Don't stay on your back foot this time." Trying not to bend his arm and not to stay on his back foot during the next swing, our pupil lunged to his left side, promptly raising his head and right shoulder on the downswing and making it impossible for the clubhead to meet the ball anywhere but on the sole. He was three for three.
>
> "Oh, you raised your head up. Don't do that! Don't bend your arm, don't keep your weight on your back foot, don't raise your head", and on it went. In 15 minutes the pupil looked like a robot whose programming had gone haywire, not knowing what to do, only recognizing there were many things that he shouldn't do.

Wiren concludes, "Knowing the subject matter is not enough. Communicating it successfully to a variety of people is what puts the teacher to the test." This story reminds us

that effective teaching is based on much more than subject matter knowledge alone. This is an argument that has been echoed by many scholars in education over the years, and lies at the heart of this investigation.

The purpose of this dissertation study was to describe the pedagogical content knowledge of expert golf instructors. *Pedagogical content knowledge* (PCK) is a particular form of teacher knowledge that was first made explicit by Lee Shulman (1986) when he alerted the research community to a 'missing paradigm' in educational research. In the context of descriptions of effective and ineffective teaching practices that proliferated between the 1960's and 1980's, Shulman observed that important differences between teaching in one subject area and teaching in another had been overlooked. He believed that there was a missing program in the research on education. Shulman's conception of that missing paradigm was a systematic study of teachers' "cognitive understanding of their subject matter content and the relationships between such understandings and the instruction teachers provide for students" (1986, p. 25). PCK was characterized by Shulman as a form of teacher knowledge that "goes beyond knowledge of subject matter per se to the dimension of subject matter knowledge *for teaching*." (1986, p. 9).

Shulman went on to make several calls for research that would elucidate the practices of excellent practitioners within the framework of their particular content area. This program of research would not be "enamored with theory nor pragmatically opportunistic, but would somehow wend its way toward middle level theories and meaningful understandings of the practice of teaching in specific domains" (Leinhardt, G., 2001, p. 335). That is, according to Leinhardt, the field needed to examine the truly complex issues involved in trying to understand teaching, and do so in ways that recognized the effects of important contextual issues such as subject matter.

Pedagogical Content Knowledge

Pedagogical content knowledge is now recognized as one of several forms of teacher knowledge. Grossman (1990) provided a framework for the delineation of teacher knowledge. Her framework describes four domains of professional knowledge for teaching: a) subject matter knowledge, b) general pedagogical knowledge, c) pedagogical content knowledge (PCK), and d) knowledge of context. Lying in the center of this framework is the concept of PCK (Figure 1).

A Model of Teacher Knowledge

Grossman, P. (1990)

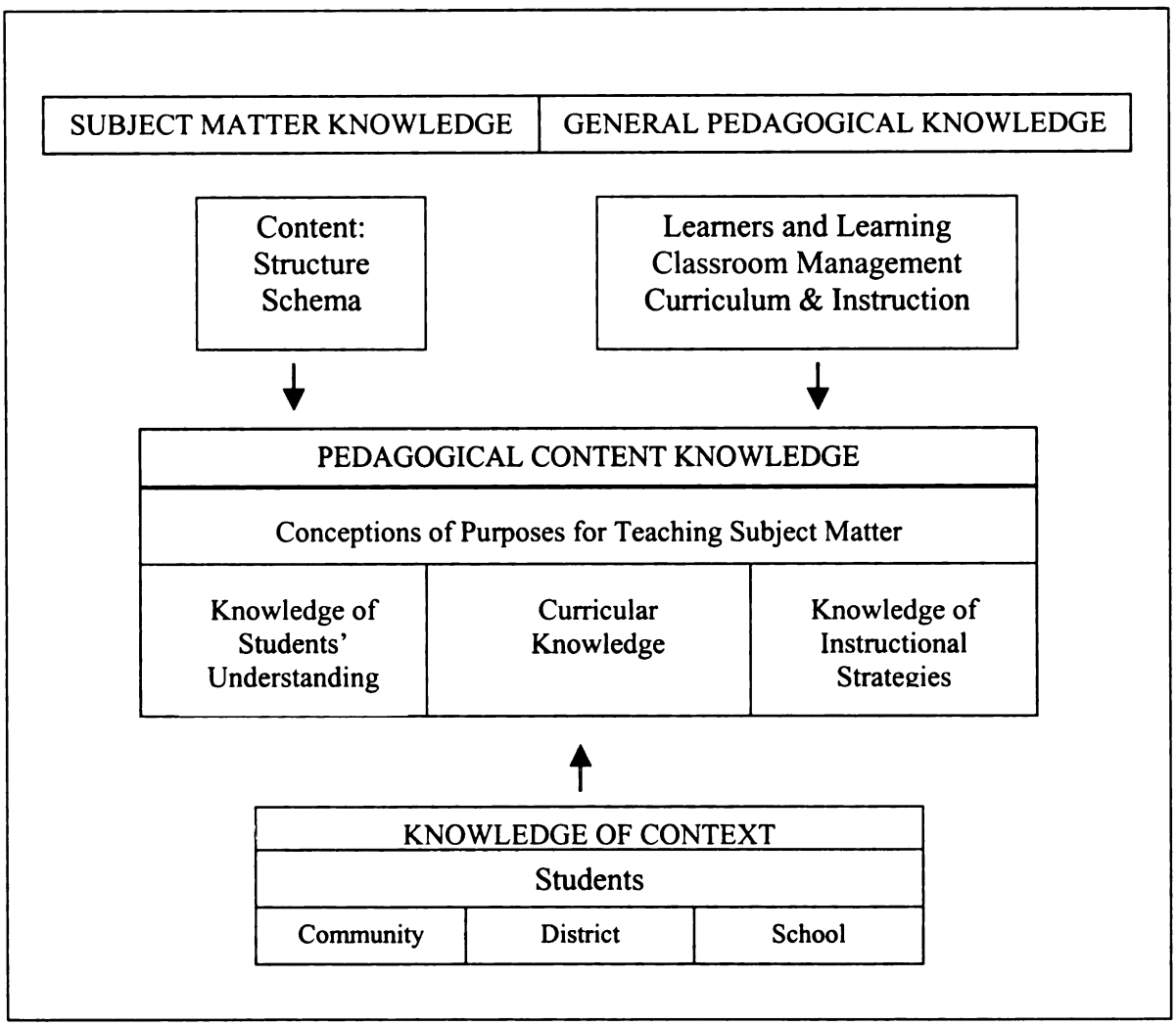


Figure 1. A Model of Teacher Knowledge

As can be seen from Figure 1, PCK lies at the heart of the Teacher Knowledge Model, and is influenced by each of the other components. PCK[4] has become a topic of substantial research in the academic areas of math, science, and literature, but this type of knowledge had for years gone largely uninvestigated by physical education and sport pedagogy researchers. Recently, however, efforts to frame research on teaching physical education using the concept of PCK have emerged in the literature (Barrett & Collie, 1996). For example, Griffey and Housner (1991) called for more physical education research aimed at the cognitive dimensions of instructional expertise. They noted that while expert coaches and teachers are often known for their rich understanding of representations that help students learn, this knowledge has neither been shared nor explored in a systematic way. Thus, they called for further research on teachers' and coaches' thought

[4] The construct of *pedagogical content knowledge* (PCK) is useful in describing that realm of teacher knowledge that is neither strictly pedagogical (instructional strategies) nor content (subject matter) specific. It is a teacher's understanding of how to help students understand specific subject matter. It includes knowledge of how particular subject matter topics, problems, and issues can be organized, represented, and adapted to the diverse interests and abilities of learners, and then presented for instruction. It is the kind of knowledge that helps teachers develop meaningful analogies, metaphors, examples, activities, and demonstrations that foster student success. It also refers to the "understanding of how particular topics are comprehended or typically misconstrued, are learned and likely to be forgotten." Shulman, 1986, p. 26). It has been argued (e.g., McDiarmid, Ball, & Anderson, 1989) that PCK is at the heart of effective teaching.

processes, verified with actual performance differences and observations of their practice. A major focus of this genre of research is to determine not only what teachers know about teaching their subject matter, but also the ways this knowledge is translated into meaningful learning activities. The present study was designed to contribute to this small, but growing research body.

Expertise in Teaching

A secondary purpose of this study was to consider alternative conceptions of pedagogical expertise as they emerged in the practice of the expert golf instructors. The majority of research on the topic of expertise in sport pedagogy has been framed from a technical, or behavioral perspective. Only recently have alternative views of expertise been explored, e.g., cognitive views. Therefore, an eye was kept on possible trends and patterns in the data that might cast light upon the multidimensional nature of pedagogical expertise that has been studied by some education researchers (Housner & French, 1994; Dodds, 1994). A doctoral study by You (1999) described pedagogical expertise in dance instruction along multiple dimensions, including the cognitive, clinical, technical, improvisational, humanistic, and artistic dimensions. These multiple conceptions of expertise were considered

throughout the data collection and analysis process of the present study.

Significance of the Study

This investigation was conceived with both practical and theoretical implications in mind. On a practical level, it was anticipated that the study of specific teaching strategies and golf-specific PCK of a group of experts would yield sufficient data to enable direct interpretation by novice golf instructors and physical education teachers. On another level, Housner and French (1994) had stressed the need to begin the examination of expert sport instructors in a manner that would synthesize our knowledge of sport pedagogy with the knowledge base underlying teacher preparation programs in physical education. Echoing Shulman's (1987) call, they also suggested that the pedagogical research on expertise should focus on the instructional processes associated with how knowledge and skills can be efficiently transformed and conveyed to learners. The present investigation of the PCK of expert golf instructors, therefore, may ultimately provide K-12 physical education teachers and teacher educators with valuable insight about golf instruction.

From a theoretical perspective, this study provided an opportunity to appraise Grossman's conception of PCK as a

heuristic device for understanding PCK among a group of expert golf instructors. Would a conceptualization of PCK that was derived from a study of English teachers be equally suitable for interpreting expert golf instruction? As explained in the final chapter, a few modifications to Grossman's PCK model were proposed based upon the study's findings.

Purposes

The two primary purposes of the study were: a) to enhance our understanding of the complex nature of PCK among expert golf instructors, and b) assess the concept of PCK as a useful heuristic device in sport pedagogy research. The focus of the investigation was on the PCK held by expert instructors in the sport of golf. The specific subject matter of interest in this study was the most fundamental skill in the game of golf - the full swing.

Research question

The overarching research question of this study was: "What are the characteristics and dimensions of pedagogical content knowledge among expert golf instructors relative to teaching the full swing?"

Sub questions were organized into five main categories:

Category 1: Conceptions of purposes and objectives for teaching students of diverse needs, levels of ability, e.g., beginners, intermediate, and advanced students:

A. How do experts' teaching goals and purposes change for different students?

B. How do experts accommodate a range of abilities, skills, interests among their students?

Category 2: Knowledge of student's understanding, conceptions, misconceptions of the elements of the full swing:

A. How do experts assess what their students know, or what skills the student brings to the instructional setting?

B. How do experts overcome common misconceptions, learning difficulties, and special challenges students have?

Category 3: Knowledge of curriculum and materials available for teaching the full swing:

A. What resources (books, manuals, videos) do experts use?

B. What knowledge is held by experts about progressions in skills and concepts?

Category 4: Knowledge of instructional strategies and representations for teaching content:

A. How do experts convey the particular subject matter to students (concepts and skills)?

B. What teaching strategies are employed?

C. What other learning activities, equipment, and teaching aids are used?

Category 5:

What other characteristics or dimensions of pedagogical content knowledge and expertise exist among these instructors, relative to full swing instruction?

An important characteristic of this study was the decision to examine the PCK of expert instructors in their work with *beginning* and *intermediate* level golf students as opposed to advanced or elite level students. There are a number of 'high-profile' expert golf instructors who work selectively with the most highly skilled golfers, but the majority of golf instruction is provided for the benefit of beginning and/or intermediate level students. In these instructional settings, the instructors are focused on teaching fundamental concepts and skills to the typical recreational golfer, and doing so in a fashion that meets their specific needs. For the purposes of this study, therefore, the search for participants was limited to those expert instructors who taught primarily with novice and intermediate level golfers.

Limitations

The study of expertise in teaching has been called difficult for a variety of reasons (O'Sullivan & Doutis, 1994). Some have questioned the criteria used for selecting participants in expert-novice studies, and thus have called for better standards in this endeavor (Housner, 1990). In the present study, the selection of expert instructors reflected a set of criteria that included, among others, recommendations from professional colleagues

familiar with their practice. While recommendations such as these can be very subjective, in this study they represented only one of a number of criteria derived from previous studies on expert instruction. These criteria are described in detail in Chapter Three.

Another difficulty in conducting research of this genre was that expert practitioners often lack the capacity to explain or articulate the basis for their expertise and skill. This problem can limit the depth of understanding that the researcher seeks to acquire about an individual's teaching practice and/or PCK. According to Schon (1983), much of the knowledge underlying an expert's practice is tacit, and remains that way unless the practitioner actively reflects upon his/her professional practice. Schon has referred to the inarticulateness among professionals who may actually be expert *performers* of their craft in the following quote:

> When we go about the spontaneous, intuitive performance of the actions of everyday life, we show ourselves to be knowledgeable in a special way. Often we cannot say what it is that we know. When we try to describe it we find ourselves at a loss, or we produce descriptions that are obviously inappropriate. Our knowing is ordinarily tacit, implicit in our patterns of action and in our feel for the stuff with which we are dealing. It seems right to say that our knowing is in our actions. (1983, p. 49).

The present study sought to describe the aggregate PCK of four instructors. Naturally, there were limitations as to how much of this knowledge could be tapped, but multiple data-gathering strategies were employed for the purpose of eliciting this knowledge. These techniques are described in detail in Chapter Three.

A final limitation in this study was one that is inherent in any qualitative research design. Due to the small number of subjects, the findings must be interpreted with care, e.g., within contextual parameters. As with all case study research, the findings here are not generalizable, in a statistical sense, beyond this group of subjects. However, the insight gained via detailed examination of these instructors' thoughts and actions may have important meaning for certain readers. Yin (1989) argues for the value of the case study research approach, asserting that case study findings might be deemed reasonably transferable by certain individuals who find themselves in similar circumstances.

Summary

The purpose of this chapter has been to provide background information relative to the study, establish the significance of this research, and define the purpose of the investigation. The constructs of *Pedagogical Content*

Knowledge (PCK) and *Expert Teaching* were defined, and the limitations of this genre of research were considered.

Chapter 2

REVIEW OF LITERATURE

Introduction

This review of literature is organized into three major sections: a) Research on expert teaching, including research on teacher knowledge, and a discussion of pedagogical content knowledge; b) Research on expertise in physical education and sport instruction; and, c) Data collection methods employed in the study of expert teaching.

Research on Expert Teaching

Background

The mysteries surrounding the notion of *expertise* in teaching have been a topic of scholarly inquiry since the early 1980's. The term *expert teaching* has multiple definitions, and alternative conceptions of expertise can be found in the literature. Dodds (1994) defined teaching expertise as "a global construct that refers to the ease with which teachers perform their work to maximize student learning" (p. 156). She noted that expert teachers have also developed and used teaching practices that optimize achievement across different student characteristics and conditions. Siedentop and Eldar (1994) viewed teaching

expertise as an extension of *effective teaching*. That is, expertise represents a level of performance that went beyond existing definitions of effective teaching. They suggested that for a teacher to be considered an expert, s/he must couple superior teaching skills along with an extensive understanding of the subject matter. Teachers, teacher educators, and researchers alike have all been engaged in related efforts aimed at describing and understanding the phenomenon of *expert teaching*.

The study of teacher expertise is a relatively new research enterprise that is focused on both cognitive and behavioral aspects of teachers' pedagogical practice (Berliner, 1987). The first studies of teachers' thought processes that were conducted in the 1980s represented a departure from the extensive process-product research of the previous two decades that focused on the behavioral correlates of effective teaching. Once it was determined that effective teaching practice had discernible characteristics (Brophy & Good, 1986), it was natural for researchers to search for distinctions between effectiveness and expertise. Expert teachers, it was reasoned, would promote even greater student learning and development, design and deliver content creatively, and

motivate learners in ways that extended beyond the level of effectiveness.

Recent research on expert-novice distinctions in the teaching profession suggests that expert teachers are actively engaged in a complex cognitive activity. That is, expert teachers notice many more aspects of the classroom than do novice teachers, are selective in their use of information during planning and interactive teaching, and make great use of instructional and management routines (Berliner, 1987, 1988; Calderhead, 1983, Leinhardt & Greeno, 1986). Master teachers can also perform their duties accurately and speedily while consciously attending to other functions.

Expert teachers clearly outperform novice teachers in the amount and detail of their respective knowledge bases. Berliner and colleagues (Carter, Cushing, Sabers, Stein, & Berliner, 1988) investigated subject matter knowledge and pedagogical content knowledge differences between experts and novices. The *cognitive schemata*[1] of expert teachers were typically found to be more elaborate, more complex,

[1] Research focusing on expert-novice teacher comparisons in the 1980s resulted in cognitive theories that attempted to explain the contrasting characteristics of these teachers. In this theory, teaching was represented as a complex cognitive skill composed of interrelated sets of organized actions called schemata (Leinhardt and Greeno, 1986).

more interconnected, and more easily accessible than those of novices.

Topics of Research on Expert Teaching

The research on expert teaching has addressed the following topics, among others: a) knowledge of subject matter, b) knowledge of pedagogy, c) decision-making skills, and d) pedagogical content knowledge. Findings in these four areas are reviewed in the following sections.

Knowledge of subject matter

Research comparing expert and novice teachers' knowledge of subject matter reveals that expert teachers' knowledge is more elaborated and more sophisticated than that of novice teachers (Ennis et al., 1991; Rink et al., 1994). For example, Ennis et al. (1991) examined the knowledge held by novices, student teachers, and expert teachers relative to physical education *movement curriculum* framework. The results showed that expert teachers taught more concepts than the other two groups. These studies also indicated that the structure of expert teachers' knowledge of subject matter was organized in more coherent and interconnected ways than novice teachers. Rink et al. (1994) investigated knowledge about effective teaching between pre-service teachers and teacher educators. The findings indicated that when compared to pre-service

teachers, the experts' knowledge of subject matter exhibited more coherent and more interconnected relations among concepts that included knowledge of effective teaching.

Knowledge of pedagogy

Findings in this area of research reveal that expert teachers' interpretation of classroom events is insightful and holistic, and experts tend to understand classroom practices in more meaningful ways than novices. They also are able to focus attention on multidimensional, simultaneous, and interrelated class activities, while novices were less sensitive to the meaning of class events. The interpretations of novices tended to be superficial, generic and piecemeal.

Researchers interpreted all of these findings to mean that expert teachers have more elaborated and interconnected schemata about pedagogical principles. Likewise, novice teachers' less pedagogical language and more generic language used in their descriptive interpretations of class was evidence of less complex, less interconnected schemata about pedagogy.

Decision Making

Expert and novice teachers differ in their thoughts and decision-making processes while teaching (Borko &

Livingston, 1989; Graham et al., 1993; Griffey & Housner, 1991). The thought processes of teachers are classified into three major categories: (a) teachers pre-active thoughts (planning), (b) teachers' interactive thoughts and decisions, and (c) teachers' post-active thoughts (reflection). To date, the comparison of expert and novice teachers' thought processes has focused primarily on the first two categories (Clark and Peterson, 1986).

Pre-active Thoughts. Several differences exist in the preactive decision making of expert and novice teachers (Borko & Livingston, 1989; Graham et al., 1993; Griffey & Housner, 1991). First, the research suggests that expert teachers plan their lessons more quickly and efficiently than novices because they are able to incorporate information from their existing schema of teaching to fit a particular teaching situation (Livingston & Borko, 1989; Graham et al., 1993). Expert teachers' lesson plans, their actual lesson structures, and their explanations to students are better organized and delivered (Leinhardt & Greeno, 1986). Experts also move lessons along more fluidly, improvise more effectively, and have better developed pedagogical strategies. Experts also use lesson segments so that students can predict aspects of class and thus reduce demands on their cognitive processing abilities

(Leinhardt & Putnam, 1987). Novices, on the other hand, frequently run into difficulty and have lessons with "bumps and false starts" (Borko & Livingston, 1989).

Second, expert teachers typically base their planning decisions on their prior teaching experiences while novice teachers primarily use textbooks, teachers manuals, or teachers notebooks as planning resources. Expert teachers tend to plan their lessons mentally rather than writing their plans, while novice teachers tend to write their lesson plans in great detail (Livingston & Borko, 1989).

Third, expert teachers primarily focus on the general sequence of lesson activities while novice teachers are more concerned about how they present information to students and how they plan specific aspects of teaching, e.g., when to provide students with examples, when to ask them questions, and when to change topics in their lesson plans (Borko & Livingston, 1989).

Finally, expert teachers are better able than novice teachers to anticipate what topics or what content students might have difficulty understanding and can more accurately predict what kinds of situations they will encounter when teaching new content to students. Thus, experts are better able to make decisions about adjusting the lesson plan to

meet students' needs (Griffey & Housner, 1991; Housner & Griffey, 1985).

Interactive Thoughts and Decisions. Several important differences have been found in the interactive decision-making processes of expert and novice teachers. Research in this area has explored pedagogical reasoning skills by examining how expert and novice teachers respond to student learning, how they interact with students, and how they respond to environmental or contextual influences. (Graham et al., 1993; Housner & Griffey, 1985).

Expert teachers show a greater ability to make situational decisions and make adjustments to their teaching strategies and routines. These decisions are based on responses of students to instructional tasks as well as other events that may be occurring in the classroom (Clark & Peterson, 1986). In other words, teachers are constantly responding to unpredictable classroom events and are able to adapt their lessons to accommodate the needs and interests of students (Yinger, 1987). Novice teachers tend to maintain the order of their lesson plans even though the lessons may not be going well (Borko & Livingston, 1989; Graham et al., 1993).

Expert teachers are better than novice teachers in their ability to generate questions, answer questions, and

give examples on the spot to explain answers (Borko & Livingston, 1989). Experts are also better at maintaining their lessons and teaching towards the objectives they set regardless of students' questions and comments. Their lessons focus both students' interest and content (Borko & Livingston, 1989). In contrast, novice teachers lack the ability to answer students' questions on the spot if they are not prepared for such in their lesson plans. Their lessons are more often influenced by students' questions, comments, and behaviors (Borko & Livingston, 1989; Griffey & Housner, 1991).

Expert teachers present and reinforce fewer lesson tasks while using more teaching or learning cues, whereas novice teachers tend to give their students more tasks in one class session (Graham et al., 1993). This finding suggests that expert teachers spend more time helping their students explore and/or learn the content or skills (Griffey & Housner, 1991). Expert teachers seem to be more concerned with facilitating each individual student's acquisition of skills and knowledge through using their rich repository of instructional strategies, while novice teachers employ instructional strategies designed to maintain student attention and interest levels (Griffey & Housner, 1991). Finally, the proportion of time spent by

students in time off-task in expert teachers' classes is less than that of inexperienced teachers' classes (Griffey & Housner, 1991).

Post-active Thoughts. In their post-lesson thoughts, expert teachers have been found to spend more time reflecting on students' understanding of the content. They focus much more attention on how to facilitate their students to take active roles in identifying and solving problems. In contrast, the reflections of novice teachers are more concerned about specific classroom events, such as the use of examples and the chalkboard, and their own responses to student questions (Livingston & Borko, 1989). They also pay more attention to class management and behavior issues than do the expert teachers.

In summary, this body of research has provided useful information about the function of the interactive relationship between teachers' knowledge and cognitive processes in their decision-making about teaching. The differences between novice and expert teachers' decision making, to some extent, reveals the nature of sophisticated pedagogical reasoning and strategic skills. The researchers attribute the different thought processes underlying pre-active, interactive, and post-active decisions of expert and novice teachers to the differences

between expert and novice teachers' schemata about domain-specific activities.

However, the teacher's schemata may not comprehensively represent the type of knowledge necessary for expert teaching in actual classroom situations (Lampert & Clark, 1990). Expert teachers' knowledge of teaching is composed of a blend of declarative, procedural, and conditional forms of knowledge (Ennis, 1994). Teachers must not only *know that* certain actions will foster student success, they must also *know how* to act upon this knowledge, and in what circumstances to do so.

Pedagogical Content Knowledge

An important notion fundamental to our understanding of the cognitive dimension of teaching was the idea of pedagogical content knowledge (PCK). This new construct was offered in 1986 by Lee Shulman, who described PCK as the one category of teacher knowledge most likely to distinguish the understanding of someone who is a content specialist versus the true pedagogue (Shulman, 1987). The concept of *pedagogical reasoning* is an important concept relative to a characterization of expertise in teaching. Pedagogical reasoning is the process of "transforming subject matter knowledge into forms that are pedagogically powerful yet adaptive to the variations in ability and

background represented by the students" (Shulman, 1987, p.15). Shulman described it as "the blending of content and pedagogy into an understanding of how particular topics, problems, or issues are organized, represented and adapted to the diverse interests and abilities of learners for instruction" (1987, p. 8). Interestingly, the expert-novice research had discovered that the organizational schemata for PCK was virtually nonexistent in novices teachers' knowledge systems, a finding that explained some of the differences between novice and expert thinking during the complex cognitive processes of teaching (Anderson, 1982; Livingston & Borko, 1989).

In an extension of Shulman's original conception of pedagogical content knowledge (PCK), Grossman (1990, p. 5) proposed a model of teacher knowledge which identified four general components: general pedagogical knowledge, subject matter knowledge, pedagogical content knowledge, and knowledge of context. This model is presented in Figure 1.

At the center of this model lies PCK, which is thought to have the greatest impact on teachers' classroom actions. Shulman described PCK as "the most useful forms of (content) representation…, the most powerful analogies, illustrations, examples, explanations, and demonstrations - in a word, the ways of representing and formulating the

subject matter that makes it comprehensible for others (1986, p. 9). PCK is an intuitively appealing construct, and over the years it has been incorporated into the vocabulary of educational researchers and practitioners alike. Its degree of precision and heuristic power have been debated by scholars, and most researchers agree that the PCK construct has fuzzy boundaries. Nevertheless, it still creates a "home" for considering the unique knowledge that is held by teachers (Shulman, 1987, p. 8).

Several recent studies on physical education instruction have been framed around the concept of PCK. Walkwitz and Lee (1992) studied how veteran teachers transformed and used their knowledge about the mechanical aspects of throwing in their classroom instruction. Graber (1995) interviewed students to examine how student teachers from separate universities believed they used PCK in their lessons, as opposed to general pedagogical content knowledge. The study revealed that they had no particular training to do so. Rovegno (1992) also examined preservice teachers' notions of content knowledge, and PCK. Her research focused on how preservice teachers learned to integrate curricular concepts with teaching practice during field-based physical education courses.

Summary

In summary, the study of expert teaching has flourished throughout the past two decades as researchers have focused many related efforts on explaining and interpreting the phenomenon of expert teaching. Research agendas have included a) knowledge of subject matter, b) knowledge of pedagogy, c) decision-making skills, d) development of expertise, and e) teacher knowledge, including pedagogical content knowledge.

Research on Expert Teaching in Physical Education and Sport

Background

Research on the topic of instructional expertise in physical education and sport settings has expanded over the last 20 years. In a review of the behavioral and cognitive components of expertise in physical education, Dodds (1994) noted that many of the behavioral indicators of expertise in teaching physical education had been earlier identified as elements of *effective teaching* via the process-product research agenda (Housner, 1990; Silverman, 1991). These findings on effective teaching, however, are now viewed separately from those pertaining to representations of *expert teaching*.

Expertise in Physical Education

Manross and Templeton (1997) recently identified a number of characteristics describing expert physical education teachers. Paraphrased, they are: a) thorough and complete planning; b) focusing on individual student performance; c) developing an 'automaticity' of behavior; d) providing creative feedback; e) attaining command of subject matter; and f) using reflective practices. These six characteristics are described in greater detail below.

Thorough Planning. The instructional planning of expert teachers enables smooth, purposeful lessons, helping teachers to organize and manage class operations. Expert teachers strive to formulate a clear picture of what they are going to do in a lesson, and they often require information about their students that will help them in shaping an effective lesson that is targeted to the developmental needs and interests of students. One of the skills distinguishing expert teachers from novice teachers lies in their use of contingency plans that enable them to adapt to the ever-changing demands of the classroom environment. They may also stay in a particular position relative to the class to monitor students more effectively, or make different pedagogical moves in response to developing patterns during a class (Borko & Livingston, 1989).

Focusing on individual students. Expert physical education teachers have the ability to attend to individual student performance, in spite of the challenges presented to them by large, noisy, somewhat distracting learning environments.

Automaticity of Behavior. The teaching activities of expert teachers appear to be smooth, effortless, and almost routine, while the novice at times may appear detached. The expert teacher's instruction, therefore, seems intuitive, automatic, and fluid (Berliner, 1994). Experts can make more meaning of classroom events because they can recognize patterns skillfully as well as organize and interpret the information effectively in the context of their lessons (Pinheiro & Simon, 1992). Their classroom routines help students to move quickly from one activity to another, e.g., gaining attention, stopping activity, retrieving and distributing equipment, and performing other procedural activities.

Creative Feedback. Expert teachers find a variety of ways to respond to students' individual performances. They draw from years of experiences to offer spontaneous, credible, and creative feedback responses geared to the students' motivation and ability levels.

Command of Subject Matter. Not surprisingly, expert teachers have an extensive knowledge of the subjects they teach. Their knowledge of subject matter, pedagogical principles, and curriculum development is very sophisticated. The ability to synthesize their knowledge of a skill or concept into meaningful information for students to comprehend and use is also a characteristic of expertise. Expertise is highly specific to both context and subject matter. It is useful to talk about the expertise of an expert soccer teacher at the middle school level or an expert gymnastics teacher at the elementary level. However, the expertise shown in one subject and at one level may not generalize to other subjects and levels. (Leinhardt, 1989).

Reflective Teaching. Expert physical education teachers often do not see themselves as experts, because they believe they still have much to learn. They continually analyze their performance and seek ways to improve. In contrast, novice teachers often think they know most, if not all, they need to know in order to teach well. Expert teachers also discuss their teaching performance with other teachers. This kind of communication enhances their understanding of their subject matter, teaching practice, and class contexts.

Conclusions. Much of the research on expertise in the field of physical education supports the findings from the expertise research across other subject areas. Like teachers of academic content areas, expert physical education teachers appear to focus their attention on contextual cues directly related to skill learning, whereas novices are more intent on cues related to maintaining student attention and cooperation (Housner & Griffey, 1985). This finding would suggest that expert physical education teachers are more concerned with skill development of students while non-experts tend to focus on ensuring that students are simply active and well-behaved, or, 'busy, happy, and good' while attending physical education classes (Placek, 1983).

Another important conclusion in the research review of Manross and Templeton is that expertise is *performance oriented*. Expert teachers often may not be able to explain their own expertise. Instead, their expertise is in the *doing* rather than the *explaining* of it.

Expertise in Sport Instruction

From a historical perspective, the bulk of research on the topic of expert sport instruction has mirrored research trends in general education. The early interest in identifying the behavioral antecedents of successful

performance motivated many of the early studies in this field. Research of the 1970s and 1980s often employed techniques of systematic observation that were designed to code the instructional behaviors of teachers and coaches. These behaviors were ultimately interpreted as observable indicators of 'effective teaching'. For example, in a landmark study of former U.C.L.A. Head Basketball Coach John Wooden, Tharp and Gallimore (1976) used systematic observation techniques to discover that Wooden exhibited what were termed 'instructional behaviors' more than 50% of the total time he was observed in his basketball practices.

In an observational study of winning football coaches, Lacy and Darst (1985) reported that the behaviors they labeled as 'instructional' were used more than twice as often as any other behavior during the course of an entire season. Findings like these served to identify and classify the actions exhibited by coaches, using terms like management, communication, feedback, content development, modeling, praise/scolding, silence, 'hustles', and instruction. Systematic observation methods, therefore, enabled researchers to add to a growing knowledge base on effective instruction in sport and physical education.

While the research technique of systematic observation served an important function, i.e., experimental control,

and reliability throughout the research process, scholars soon recognized the limitations of this methodological approach (Darst, et.al, 1983). Based on the tradition of 'process-product research' in education (Brophy & Good, 1986), the systematic observation methods focused solely on observable events and behaviors, documenting only those events that could be visually or audibly detected and measured. As with similar process-product studies, the behaviors observed were typically correlated with achievement on standardized test results, or, in the case of sport coaches, with their won-loss records. This meant that the observers of these instructional behaviors were not concerned with understanding or interpreting any of the interactive thoughts and decisions that may have accompanied the teacher's actions.

This approach posed a dilemma for some researchers, who argued that if one could assume a relationship between a teacher's thought processes and their actions, then these thought processes deserved investigation on their own accord, via alternative research methodologies (Housner & French, 1994). It was this line of reasoning which had led educational researchers to pursue various programs of research on teachers' cognition, or thought processes, in the 1980s (Clark & Peterson, 1986).

Sport-specific Pedagogical Expertise

There exists a need for research that helps explain the nature of expert instruction on a 'sport-specific' level. To date, relatively few content experts in sport settings have been targeted for research, and, of those investigations that have studied expert instruction, most have employed systematic observation methods and analyzed effective coaching behaviors (Givens, 1998). Examples include Tharpe and Gallimore's (1976) study of former U.C.L.A. Basketball Coach John Wooden's instructional behaviors and Lacy and Darst's (1985) study of winning high school football coaches. As with subsequent research studies of this genre, the focus was on the observation of overt coaching behaviors by expert coaches. While helpful in providing a systematic analysis of these coaches' behaviors, one missing element in these studies was an investigation of the cognitive components of their coaching actions, in other words, the interactive thought processes of the coaches themselves. Sport specific pedagogical content knowledge, as utilized by expert instructors in sport settings, is not well-understood, and thus represents an uncharted area of research. We actually know very little about the substance of knowledge underlying expert teaching in physical education and what teachers actually

know or need to know about teaching (Housner & French, 1994). Knowledge of teaching styles, subject matter, and pedagogical content knowledge have yet to become the focus of systematic study in sport and physical education research, suggesting a need for studies that are designed to unpack and delineate the various types of knowledge that serve as the foundation for expert teaching and coaching.

Of interest to this researcher, therefore, is the interpretation of just how expert instructors' knowledge is effectively transformed and conveyed to learners in specific sport and/or physical activity settings. In other words, the pedagogical content knowledge of expert teachers needs to become the subject of systematic study. There is much to learn about how expert instructors think about their practice, and how they apply their rich pedagogical content knowledge.

Data Collection Methods

Multiple data collection techniques have been employed in studies on expert teaching. Semantic ordered trees and cognitive mapping techniques have often been employed in research examining the differences in schemata between expert and novice teachers. Researchers would prompt teachers with a set of starter words and ask them to figure

out relevant categories then come up with links to connect categories. The scope and complexity of the teachers' networks would represent an individuals' declarative knowledge.

"Think aloud" and recall protocols have been used to study teachers' knowledge of student characteristics and classroom techniques. The "think aloud" method meant that a teacher was required to describe his/her thoughts while engaged in an actual teaching task (Swanson et al., 1990). The teachers' talk was recorded, transcribed, and coded. The protocols of this recall technique consisted of asking subjects to recall general and specific information while responding to research questions (Carter et al., 1987).

Interpretations of classroom events by teachers have been studied by asking the subjects to view specific video-taped teaching episodes designed by the researchers (Graham et al., 1993). Researchers then presented the subjects with specific questions and asked them to make either written or verbal responses to specific questions. The verbal responses were audio-taped and were transcribed for analysis, while the written responses were analyzed in terms of quantity and topics discussed.

Pedagogical practices of physical education teachers and sport coaches have also been observed systematically

via multiple observation rubrics (Darst et al.,1989), although these instruments are typically designed to quantify the classroom behaviors of teachers without interpreting them. More recently, an increasing amount of research on teaching has shifted from quantifying teacher behaviors toward exploring the nature of teachers' expertise and pedagogical knowledge from a cognitive perspective (Calderhead, 1983; Feiman-Nemser & Buchmann, 1986; Leinhart & Greeno, 1986; Livingston & Borko, 1989; Schon, 1983; Shulman, 1987). Teachers are now viewed as active, intelligent professionals who are constantly utilizing an active decision-making process based on their skills and knowledge in order to carry out instruction. The analysis of teachers' cognition, therefore, becomes an important area for research.

A review of physical education pedagogy revealed that researchers have historically relied on data collected through the traditional measures of teaching effectiveness, e.g., Academic Learning Time - Physical Education (ALT-PE) data (Dodds, 1994). Physical education and sport pedagogy researchers have yet to explore the more global dimensions of teaching expertise such as those used by science/math education researchers. Dodds (1994) recommended that physical education researchers look beyond the earlier

indicators of effective teaching and shift their attention to the more global dimensions of expert teaching, e.g., multidimensionality, or simultaneity (Sabers et al., 1991), or improvisational performance (Borko & Livingston, 1989; Leinhardt & Putnam, 1987). These are prominent in other expert-novice studies outside of the physical education field.

Because of the complex nature of teaching, and the potential for assessing and interpreting teaching practices differently or in potentially unreliable ways, Chen (1997) recommends the use of multiple data collection methods. This strategy would enable a synthesis of data, e.g., self-report data, observational data, and qualitative data.

Chen (1997) developed and validated two instruments to help study the differences between teaching practices of expert and novice teachers from constructivist perspectives: The Educational Games Observation Rubric (EGOR) and the Teaching Practices Inventory for Elementary Physical Education (TPI-EPE). The TPI-EPE instrument is a self-report inventory to assess the extent to which a teacher perceives his/her own teaching practices to be associated with expertise in constructivist-oriented teaching. The EGOR was designed as an observational instrument to assess the extent to which a teacher's

teaching practices were associated with expertise in teaching physical education lessons from constructivist perspectives.

The support for using rich case studies to frame expert-novice cognitive processes and pedagogical knowledge has also been evident in the literature. The case study research method is defined as a form of empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used (Yin, 1984, p. 23). Evidence for case studies may come from multiple sources: documents, archival records, interviews, direct observation, participant-observation, and physical artifacts. The use of each of these sources calls for different skills and methodological procedures.

Critics of the case study method believe that the study of a small number of cases can offer no grounds for establishing reliability or generality of findings. Others dismiss case study research as useful only as an exploratory tool. Yet researchers continue to use the case study research method with success in carefully planned and crafted studies of real-life situations, issues, and problems. Reports on case studies from many disciplines are

widely available in the literature. Grossman (1990), for example, provided six rich teacher case studies as a model for examining pedagogical expertise. She studied English teachers of primary or secondary education focusing on the pedagogical content knowledge of each teacher and the sources for that knowledge. This research method has been used by many others in the field of education (Livingston & Borko, 1989; Carter et al., 1988).

Summary

The multiple streams of research described in this review clearly indicate the existence of common ways of talking about expertise across a variety of instructional contexts, including physical education and sport settings. This research has suggested that teaching expertise is performance oriented, consists of both cognitive and behavioral components, and is linked to the characteristics of effective teaching examined in early work. Future research on the topic of expertise in sport and physical education must account for the complex nature of teaching and learning, and should focus on specific subject matter as it is taught or conveyed for particular learners across various contexts.

Chapter 3

RESEARCH DESIGN AND METHODS

Introduction

The purpose of the study was to describe and interpret the teaching practice and pedagogical content knowledge (Shulman, 1986) of four expert golf instructors. In this chapter the methods and procedures selected for this study are discussed, including the research design, theoretical framework, the participants, the research process, data collection procedures, analytical procedures, role of the researcher, and issues related to data trustworthiness.

Research Design

In an effort to describe and analyze the PCK held by expert golf instructors, this investigation sought to create rich descriptions of the four expert instructors participating in the study. A multiple qualitative case study design was employed for the purpose of constructing detailed descriptions of the teaching practices and PCK held by the participating instructors. Single case and cross-case analytical procedures were used in order to treat the data systematically, and to ensure that appropriate conclusions were reached. The rationale for selecting this research design was based on the tenets of

qualitative research as explained by Patton (1990), Creswell (1998), and others.

Qualitative case studies are very common in educational research. They are particularly useful when one needs to understand a particular situation, problem, or person in depth, and when one case can yield a great deal of information (Patton, 1990). According to Merriam (1998), the qualitative case study is defined as an intensive, holistic description and analysis of a single instance, phenomenon, or social unit" (p. 21). Qualitative case study research typically gives us narrative descriptions and interpretations of a particular setting and the interactions of its participants. It is not intended to generate behavioral change nor measure experimental effects, but instead it helps us focus on an in-depth analysis of a particular phenomenon.

Theoretical Framework

Shulman's conception of PCK and Grossman's representation of teacher knowledge (see Figure 1) provided the theoretical framework for this study. The primary goals of the study were to describe the PCK and teaching practice of these instructors, and to interpret those findings via multiple case studies and cross-case analysis. The analytical process employed Grossman's Model of Teacher

Knowledge (see Figure 1), but consideration was given to alternative theoretical models relating to pedagogical expertise. In the end, the analytic process supported Grossman's framework, but a few modifications were proposed. The analysis also produced findings that were best interpreted through a conception of pedagogical expertise known as the *multidimensionality of expertise* (Dodds, 1994; You, 1999).

Participant Selection

There were many important considerations in the selection of participants for this study. The most important one was to select a pool of subjects who not only were expert teachers of the golf swing, but were also capable of reflecting upon their teaching practice and articulating those reflections. The study was restricted geographically to the state of Michigan, and it targeted instructors who were actively teaching in both individual and group instructional settings. A preliminary pool of six candidates for the study was identified. The selection of this pool of candidates reflected a set of criteria used previously in this type of research, i.e., research on expertise comparing expert versus novice instructors. The following criteria were used: (a) Professional awards or recognition: nominees and/or winners of teaching awards or

other forms of professional recognition; (b) Professional association memberships and/or certifications; (c) Longevity in teaching: individuals who have been teaching or coaching for at least 12 years; (d) Publications authored on the subject of golf instruction; (e) Record of success and satisfaction by students at local, regional, national levels; (f) Informal recognition by their teaching peers and by their respective communities.

A preliminary interview of these instructors was conducted to determine which candidates would emerge as the best sources of information for this investigation. The intent in reducing the pool of candidates was to eliminate from consideration those individuals who were either inarticulate about their teaching practice, or disinterested in reflecting upon their teaching, or were unavailable on a regular basis to participate. This form of "purposeful sampling" is recommended by Merriam (1998) who noted that purposeful sampling is based on the assumption that the investigator wants to discover, understand, and gain insight, and therefore must select a sample from which the most can be learned. The participating instructors in this study, then, were selected in part for their potential to become "information-rich" cases.

The students of these instructors were all considered to be at the novice (beginner) level of ability or at an intermediate level. The students ranged in age from twelve into their mid-sixties, and they included both male and female students. Written consent from all participants (students and instructors) was sought and obtained. The sample consent forms and letter of request are included in Appendices A, B, and C.

Research Process

Subsequent to receiving approval from the University Committee on Research Involving Human Subjects (Appendix D), four expert golf instructors were successfully recruited via telephone contact, letters, and personal visitation in April and May of 2001. Data collection began shortly thereafter. Data were collected over a four-month period from May through August. There were 3-5 on-site observations of each instructor, lasting from 2-4 hours per visit. Formal interviews were scheduled and conducted before the first observation. Informal conversations with the instructors and their students occurred throughout the observation/videotaping process, and a second formal interview was conducted following the final observation/video-taping session. Each lesson observed was either 30 or 60 minutes in length. Most

lessons were videotaped for subsequent analysis. A document analysis also took place throughout the course of the investigation. Field notes were also taken throughout the data collection process.

As is common with qualitative research studies, the volume of collected data was great. Over the course of the investigation, it became apparent that the analytic focus of the study needed to be sharpened. Therefore, the original research question, "What are the qualitative characteristics of pedagogical expertise among expert golf instructors?" was modified to reflect a focused effort to closely examine the PCK of expert golf instructors. The revised research question became, "What are the characteristics of PCK of expert golf instructors?". Accordingly, the interview protocols were modified to reflect the intensified focus on PCK.

Data Collection Procedures

The data collection procedures consisted of: (a) semi-structured pre-observation interviews; (b) document review; (c) naturalistic observations of lessons in authentic settings; (d) video taping of 4-5 lessons; (e) a stimulated recall exercise (Carter, et al., 1988); (f) structured post-observation interviews; and, (g) field note writing.

The data obtained through the interviews and observations provided depth and detailed information. They offered rich descriptions of situations, people and interactions, together with quotations from the instructors about their thoughts and experiences.

Interviews

The interviews were comprised of a set of common questions intended to elicit their thoughts and feelings about their lessons, and more specifically, their PCK of the full swing. Follow-up questions were open-ended and non-directive with probing cues used to provide clarification of the participants' responses. The two formal interviews with the instructors lasted from 45-60 minutes each, while the informal conversations, and the stimulated recall exercise lasted from 15-30 minutes each.

Both the pre-observation interview guide (Appendix E) and the post-observation interview guide (Appendix F) were created for this study by modifying a set of questions used originally in studies by Borko and Livingston (1989) and Morine-Dershimer (1978-1979) and supplementing them with new questions based upon the PCK framework (Grossman, 1990). In the first interview I explored the biographies of each instructor together with their philosophical

approach to teaching, their planning strategies, any instructional manuals or other materials that may have accompanied their instruction, and their current instructional setting. Post-observation interviews were intended to elicit their PCK of the full golf swing and to gain further understanding of their respective pedagogical approaches.

The interview questions had been pilot tested on a PGA certified golf instructor who did not participate in the study due to scheduling conflicts. The pilot test allowed for a review of the questions for clarity, sequencing, and completeness. All interviews were audio taped, and the text was transcribed. These transcripts then served as a primary data source, together with field notes taken by the investigator.

Documents

Documents that were analyzed to supplement the data included copies of planning documents, e.g., lesson plans and any instructional manuals used by the teacher. Few of these were in evidence.

Videotaped Observations

In order to create a permanent record of the observations, a videotape record was made of four or five lessons of each instructor. During these lessons, the

instructors were equipped with a portable wireless microphone that was clipped to their clothing. The investigator was stationed at a distance approximately 20-25 feet away from the instructors and their students. This position was judged to be far enough away from the lesson activities so that any distraction was minimized, but was also close enough so that the wireless microphone system could capture the verbal exchanges between instructor and student. On occasion, the camera was re-positioned to view the lesson from another angle.

Stimulated Recall Exercise

During the post-lesson interview, segments of their videotaped lessons were shown to the instructors. These segments were intended to provoke reflection on certain aspects of their teaching. The primary objective of this exercise was to elicit PCK related to Category 4 of the PCK framework described in Chapter One. (Knowledge of Instructional Strategies). The instructors were asked to comment on their teaching actions that featured the presentation of new information or ideas to their students, or that challenged students to acquire, or reshape their understanding of the fundamental skills and concepts of the full swing.

Data Analysis Procedures

The purpose of the data analysis process was to construct detailed and comprehensive descriptions of the participants' PCK and teaching practice. Analysis of the data began immediately, as the observations and interviews began to yield findings of interest. The data analysis procedures fell into five modes (Marshall & Rossman, 1989): (a) managing the data; (b) generating categories, themes, or patterns; (c) testing the emergent hypotheses against the data; (d) seeking alternative explanations of the data; and (e) writing the report.

As a preliminary data management strategy, the data were transcribed, coded, and organized in a computer database. Tape-recorded interviews were coded as soon as transcriptions were completed. Video taped lessons were viewed and coded repeatedly. Field notes taken during the data collection and data analysis process were repeatedly culled, categorized, and/or synthesized in a manner that yielded a set of repeating themes or patterns. This process enabled comparisons with those findings derived from the coding of the audio and videotaped data.

The computer database was developed throughout the course of the coding process. This database contained coded *chunks* of data that were categorized according to the

four broad dimensions of Grossman's (1990) PCK conceptual framework. Relationships between segments of data were cross-referenced by linking them via the "hypertext" capability of the database program. Throughout this process, a set of analytic memos was kept. These memos served as an audit trail by recording emerging questions, noting patterns in the data and documenting analytic decisions.

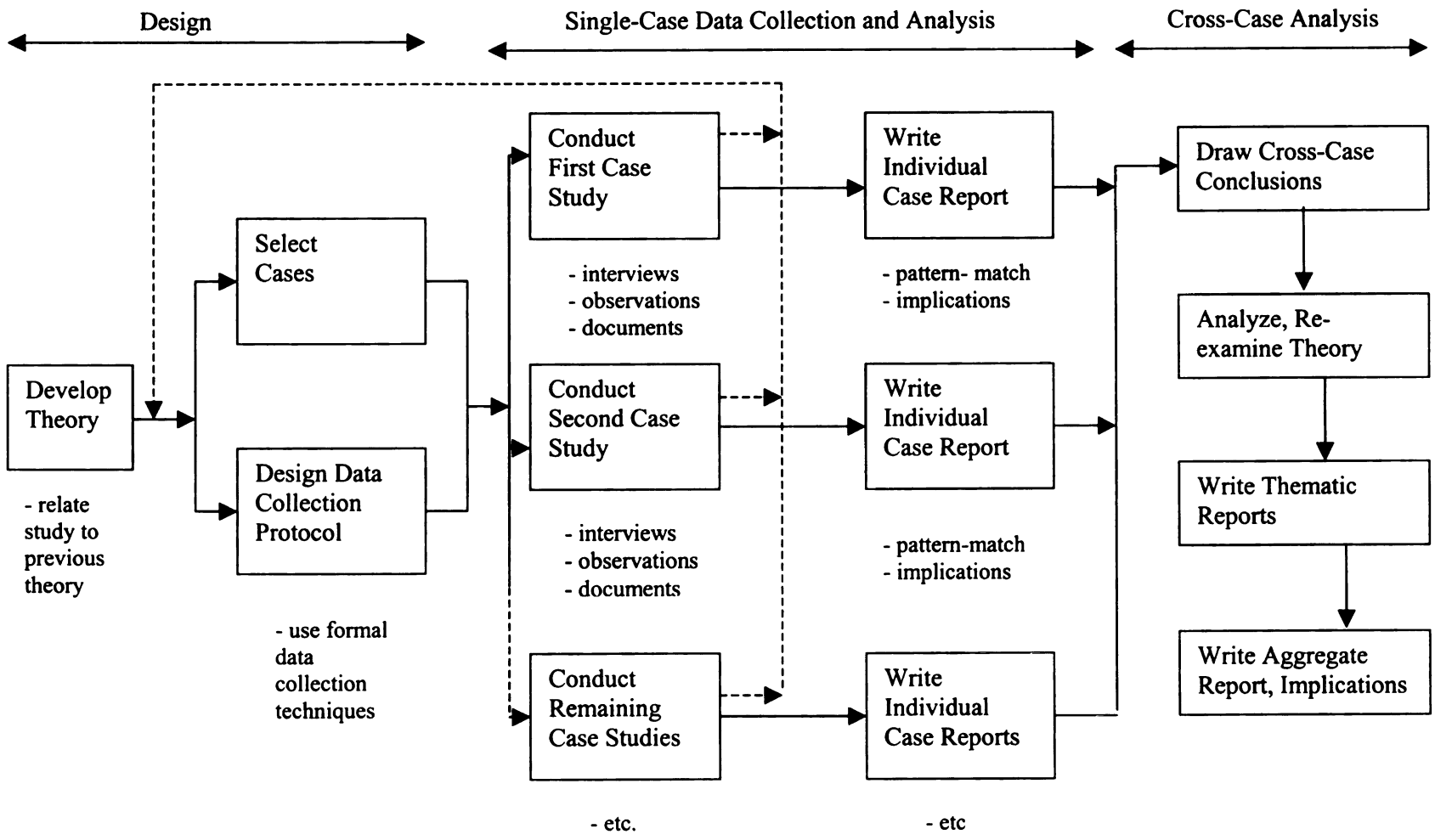
The investigator chose to perform all of the transcription duties. As a result, he became more familiar with the data than might have been otherwise possible. Subtle responses, e.g., voice inflections, exclamations, pauses, or other emotive signals by the participants represented important sources of information, and these could only be interpreted by listening to the actual voices of the interviewees. An interpretation of the textual data devoid of these audio-taped records would have yielded a less meaningful set of interview data.

Throughout the initial coding stage, and continuing through the subsequent analytical process, the researcher sought patterns, themes, and/or meaningful trends in the data, constantly looking for relevant and meaningful categories to help interpret the findings. All data were analyzed via constant comparative analysis (Glaser &

Strauss, 1967), meaning that initial conceptions and guiding hypotheses were considered against the data as they were collected, coded, and analyzed. Cross-references between categorized data were also noted. Some of these conceptions were eventually discarded, and others surfaced and were strengthened by supporting data. Critical findings were defined, relationships among the findings were established and integrated for theoretical interpretation. The cyclical process of multiple case study data analysis is illustrated in Figure 2.

Based on the emerging themes, the analysis produced sufficient data to construct three case studies that highlighted their PCK and offered rich illustrations of how they conducted and reflected upon their teaching practice. Single case analyses generated answers to the research questions, and salient themes were noted. A subsequent cross-case analysis uncovered interesting patterns across the cases, bringing out similarities and variations.

While the three case studies offered a glimpse into the rich PCK and the particular pedagogical orientations of these expert instructors, they could not describe the great breadth of their knowledge. Therefore, the data were reviewed again in an attempt to generate a collective


Design
Single-Case Data Collection and Analysis
Cross-Case Analysis
Develop Theory
- relate study to previous theory
Select Cases
Design Data Collection Protocol
- use formal data collection techniques
Conduct First Case Study
- interviews
- observations
- documents
Conduct Second Case Study
- interviews
- observations
- documents
Conduct Remaining Case Studies
- etc.
Write Individual Case Report
- pattern- match
- implications
Write Individual Case Report
- pattern-match
- implications
Write Individual Case Reports
- etc
Draw Cross-Case Conclusions
Analyze, Re-examine Theory
Write Thematic Reports
Write Aggregate Report, Implications

summary of the four instructors' PCK.

Role of the Researcher

In view of the potential for researcher bias that may have developed because of frequent interaction with the participants, the researcher tried to assume an air of detachment and a consistent degree of formality with the participants. The researcher endeavored to conduct this investigation in a manner that facilitated a spirit of educational inquiry among the participants. He assured them that no risk to them was present.

It is impossible to be devoid of subjectivity in doing research. It has been acknowledged by some researchers (Patton, 1990) that all researchers take sides, or are partisans for one view or another. Therefore, truly value-free interpretive research does not exist. Consequently, the recognition and acknowledgement of potential biases were considered in a reflective manner throughout the research process. A research journal and interpretive memos were kept to document the decision-making throughout the research process.

The researcher's own interest in the study stemmed from a lifelong passion for the game of golf as well as long-held professional interests in the dynamic processes of teaching and learning. Having played the game for over

25 years and having also taught the golf swing to beginning and intermediate students, he brought an informed perspective to this particular study. This is a valuable asset when it comes to the interpretation of other teachers' pedagogy.

Trustworthiness

Trustworthiness is the degree to which the findings of a qualitative study are deemed dependable, credible, and transferable (Guba, 1981). Unlike statistical analyses, there are very few fixed formulas or recipes to guide case study analysis (Yin, 1989). Therefore, much of the analysis for the present study depended on the researcher's own rigorous thought processes and critical analysis, together with adequate presentation of evidence and consideration of alternative interpretations.

Several measures were taken to increase the trustworthiness of the data analysis and interpretations. Subjects were selected with whom the investigator had no prior relationship. This strategy eliminated one potential threat to validity that might have arisen from a personal bias towards these individuals. In an effort to minimize researcher bias during the interviews and observations, the investigator utilized formal interview guides and employed

a structured method of taking field notes (Schatzman & Strauss, 1973).

A level of credibility of the data analysis process was established by using the strategies of member checks, peer debriefing, and triangulation (Guba, 1981). The first member check consisted of returning interview transcripts to the instructors, providing them an opportunity to modify or clarify any aspect of their responses. The second involved the instructors reading a manuscript draft to verify the researcher's interpretations.

The strategy of peer-debriefing was also employed during the analytic phase of the study. Peer debriefing consists of inviting other researchers or colleagues to challenge both the interpretations of the data and/or the methodological procedures adopted. As proposed, two meetings were scheduled with a qualified individual for this function. Segments of the videotaped lessons were reviewed on two occasions by a university professor who was both familiar with pedagogical theory and had recently been certified as a golf instructor. This individual was introduced to the coding scheme and asked to code a segment of the videotaped data. His coded data were then compared to that of the primary investigator, and very few differences were found between the two.

A second instance of peer-debriefing occurred when early interpretations by the investigator were compared with those of a fifth (non-participating) expert instructor. This instructor was helpful in confirming these early interpretations made by the investigator.

The methodological triangulation in this study, (interviews, field observations, and document analysis) enabled cross checking of the data sources. By using all of these strategies, the investigator reduced the chances that the findings of this study would be based on indiosyncratic data.

Throughout the data analysis process, a methodological problem faced by the qualitative researcher is to determine how to identify the salient themes or patterns that emerge from the instructors' actions in teaching, interview responses, and their reflections. The identification of these critical ideas, and the assignment of a relative weight to them requires a careful and deliberate analysis of the data. A few criteria were helpful in determining the relative significance of various segments of the data. First, the order in which the instructors said things about their teaching indicated one level of significance. Ideas that surfaced first were assigned greater weight. Second, the repetitiveness of comments by instructors was an

indication of an important theme. Third, internal emphasis, whereby the instructors explicitly labeled a particular idea as relevant or meaningful to them, offered additional evidence of significance.

Another concern in qualitative research is the problem of reactivity, i.e., the influence of the researcher on the setting or on the individuals being studied. Because the total elimination of this effect is not possible in qualitative research, the goal was to understand it and to use it productively. Two interview questions were included in the post-lesson interview protocol to elicit the instructors' perspective on this issue, and the investigator remained sensitive to the participants' responses to these questions. Two of the four instructors disclosed that the presence of the video camera had created "a little" discomfort for them and thus posed an early distraction. It caused them to "think twice before acting" during the first recorded lesson. However, they both eventually adapted to the camera's presence and said that subsequent lessons proceeded in a manner that felt "normal" to them.

Summary

The purpose of this study was to describe and interpret the teaching practice and PCK (Shulman, 1986) of

four expert golf instructors. For the purpose of creating rich descriptions of their PCK, three case studies were written and a cross-case analysis was conducted. The data were managed and analyzed in accordance with the tenets of qualitative research methodology.

Chapter 4

CASE STUDIES

Introduction

Three case studies are presented in this chapter that describe the teaching practice and PCK of the four participating expert golf instructors. The first two case studies offer evidence of the instructors' PCK in the first two knowledge domains described in Grossman's PCK model. The third case study addresses the third and fourth domains while offering a view of two instructors' PCK, comparing their philosophical approaches toward teaching the full swing. Each of these three case studies reveals particular pedagogical strengths, highlights interrelationships between knowledge domains, and offers insight into the multidimensionality of their pedagogical expertise.

Description of the Instructors

The participating expert instructors taught primarily in private lesson settings, although they would occasionally offer group lessons. It has become a common business practice for the expert golf instructor to spend most of his/her time working in private lesson settings. The demand for their services is strong, and prospective students are willing to pay nearly one hundred dollars

for a one-hour lesson. When group lessons are offered at a lower price, the lessons are usually taught by teaching assistants or apprentice instructors. Consequently, while an effort was made in this study to observe group lessons, most of the investigator's observations were of individual lessons.

The criteria and procedures used for selecting the expert instructors were described in detail in Chapter 3. Table 1 (below) provides a brief description of each of the four instructors, all of whom are identified by pseudonyms.

Table 1. Description of Instructors

Instructor:	**Traci**	**Dan**	**Shirley**	**Jan**
Current Position/ Title:	Teaching Professional	Director, Golf Academy	Teaching Profes-sional	Director, School of Golf Instruction
Current Location:	Suburban Municipal Golf Course	Collegetown Practice Facility	Suburban Public Golf Course	University town Golf Course and Practice Facility
Total Years Teaching:	18	22	30	16
Education/ Degrees:	B. Ed., Secondary Education M.B.A.	B. Ed., Golf Course Management	H. S. Diploma	B. A., Liberal Studies
Awards, Recog-nition:	MI teacher of the year award, Clinician, Presenter, Ntl. Conferences	MI teacher of the year award, Clinician, Presenter, Ntl. Conferences	Regional recog-nition, Clinician, Conference Speaker	Nominee, Golf Magazine Top 100 U.S. Golf Instructors, Clinician

Traci - The Empathetic Enthusiast

It is a sunny Saturday morning in June at the Fernwood Golf Course and Recreation Facility. A group of young professional colleagues have assembled on this day for a corporate golf outing, awaiting their second of three group lessons with Traci R., head teaching professional at the local public golf course. Ten students, most of them beginners, are on the practice tee, stretching their bodies in anticipation of the arrival of their instructor. They seem a little anxious, each of them gripping their own club, finding their own personal space for a few, tentative practice swings. There is little conversation among them. The loud voice heard approaching from the clubhouse is that of their instructor, who strides in, accompanied by a teaching assistant and another student. After exchanging a few pleasantries with the group, she begins the formal lesson.

"Last week we went over putting. Today we're talking about the full swing. We're cramming it in a little bit today, trying to get you all ready for our tournament next week." While she talks to the group, she and her assistant are arranging the equipment. She moves a very large bucket of golf balls to the middle of the practice tee. "I've got

lots and lots of balls for you to practice with out here today…so you can't leave early!" she says jokingly. "Alright!" one student replies in sarcasm, feigning her joy at the prospect of a lengthy practice session. Several in the group laugh at this exchange.

Traci now has the attention of the group, and she begins the formal lesson. "OK, remember last week? We went back with the club," she says, while demonstrating a partial backswing. "And then we just tossed it down the line. To begin with, hit a few of these, five at a time, and then we'll have you switch with your partner. Remember how we extended the club back this way, and then we just tossed it down the line. We're not throwing it out this way, (she demonstrates an exaggerated 'over the top' swing motion) but just tossing it underhand. Any questions on that? OK."

While a few of the students continue to practice the swing motion they have just observed, Traci sets up five learning stations by laying out five 3-foot long fluorescent green strings, tied at each end to golf tees inserted into the ground. "OK. Why don't five of us move in here, and your partner will just stand behind you." The first five students assume their positions in the tee box, and Traci issues them their tees as they take a few

practice swings. They begin to swing at the balls. She focuses on one student, who has been standing over her first ball for at least ten seconds, adjusting her stance and grip several times in the duration. She finally makes a hesitant attempt at her first full swing, with a stiff, uncomfortable movement. She misses the ball completely - a whiff. "Good, but now relax," Traci responds immediately, moving closer and lowering her voice to a quiet, soothing tone, nearly a whisper. The student laughs at herself nervously, seeming to acknowledge Traci's observation of her nervousness, and her awkward swing motion. She gathers herself, and then begins to settle into a stance for another try. This task appears to be very hard work for this woman.

Five seconds pass, as she adjusts her stance only once this time. The second swing attempt is a bit longer, but the ball is struck by the 'toe' of the club head, causing it to shoot out at a 45-degree angle to the intended target line. "OK," Traci says. "It went way over there. Now remember to aim it down that green line," she says, referring to the fluorescent string on the ground. As she speaks, Traci tees up another ball for her student, then moves around to a position directly next to her, standing shoulder to shoulder. She reaches back across her

students' body with her left hand, and grabs the club just below her students' grip. She then guides the club back and brings it forward for her student, while her student keeps both hands on the club. While manipulating the club for her, Traci says, "First go back, then move your arms over there." "Ohhhh!" OK!" her student exclaims, immediately noticing the difference. "Relax. You're trying to be (too much) in control," Traci says.

A student calls out for Traci's help. "I'll be there in just a minute!" she says. The third swing attempt by the first student produces another whiff, and Traci says, "Down", while demonstrating the desired movement. "Toss it way down here," lowering her voice again to a near whisper, and demonstrating the motion she wants to convey. "You're tossing it with your shoulders, would you toss a ball like this - with your shoulders?" "I would toss it like this," replies the student, showing her the underarm tossing motion. "Right. Correct!" Traci says, emphatically. Just toss it down the line with your hands." She swings again, with a longer swing. "Better!" "That feels a lot better!" the student says. "See? We got them (the arms) moved away from your body."

Traci glances quickly at another student, just in time to observe a well-struck ball. "Woooo! Look at you!" she calls out. Her first student tries to swing again, this time making solid contact with the ball and sending it about 50 yards down the range.

In the span of this three-minute lesson segment, one gains insight into Traci's personable teaching style and rapport with her students. Several aspects of her pedagogical approach are remarkable. Her friendly, easy-going nature has an immediate *calming* effect on her students. She also sets relaxed tone for the lesson by telling jokes, humorous stories, or by just chatting with those around her. She is thus able to keep open the channels for communication with her students. This may contribute to her ability to quickly and accurately determine her students' motivations, interests, and goals for learning[1].

Empathy for the Learner

Traci's friendly banter with her students at the beginning of the lesson immediately sets the tone for her

[1] The first category of pedagogical content knowledge includes the information and beliefs about the purposes of teaching a subject at different grade levels (Grossman, 1990). These conceptions reflect a teacher's objectives for teaching particular subject matter to specific groups of students, modifying goals for students of diverse needs, interests, abilities, and accommodating differences in students' needs, abilities, skills, interests. For purposes of this study, 'levels of ability' were interpreted as beginning, intermediate, and advanced skill levels.

lesson. She understands the fear and nervousness that can virtually paralyze a beginning student who is trying to learn a new motor skill. Traci has been there. As a college basketball player, she suffered a serious injury to her back and neck, one that forced her to relearn all of her basic motor skills, including her golf swing. She reflected on her injury and how it shaped her perspective on teaching.

> I think that to be a good teacher you need to have patience. In my younger years I didn't have a lot of patience with people. Now I think that I do because when I injured my back I wrecked my left side and I had to learn to do a lot of things all over again - like walking, talking, sight and other stuff. So I know what patience is, and how I know how hard it is to have to start over.

This difficult learning process would ultimately make her more effective as a golf instructor, because of the empathy she develops for her beginning students. Her understanding of the nature of the learning process combines with her patience and supportiveness for her beginning students. However, Traci's expertise is not limited to her work with beginning students.

In her role as a teaching professional at a public golf facility, Traci works with golfers of all ability levels, and must address their diverse interests. She seems to have a special knack for helping novice golfers

develop their own understanding of the fundamentals of the full swing as well as the right *feel* for the swing.

> From what I've seen out there, a lot of teaching professionals don't seem to understand why their student's can't learn. They'll tell me, 'How can they be so dumb? I just told them everything!' And I think that those instructors lose, not intentionally, but they lose empathy for what it is like to be a learner instead of always being the giver of the information.

Traci's non-threatening teaching style seems to work particularly well with her novice students. She displays a casual, friendly attitude with all of them, and her manner reveals her empathy for the beginning students who typically struggle with the complex mechanics of the golf swing. She shared the following:

> I decided long ago that I was always going to be a learner somehow, so I have always, from day one, taken up something new every year, just to be taking lessons. Last year it was skiing, the year before that it was running. I also take cooking lessons. I have to put myself in the role of a student to know what the shoes are like for my students. Because they're nervous, you know, hands wet and shaky. Nobody likes change, and change has got to happen to make a new swing movement work.

Addressing Individual Needs

Traci demonstrates her genuine interest in her students as individuals first, taking ample time to inquire about their work, families, hobbies, etc., before delving into the technical aspects of the lesson. She quickly

assesses the interest and ability level of her students and seamlessly adapts her teaching goals to help her students achieve their own goals.

Among her students on this day (her lesson was designed for a group of corporate colleagues) is a married couple, both of them warming up on their respective practice tees. Traci noticed a problem that they shared. "You two are a perfect match. You both like using your shoulders, and that's just too much work! It's like taking your two little ones on vacation." They both laugh, and it is apparent that she has touched them on a personal level. She then offers them the technical instruction they need. Traci shared how important she believed it was for her to get to know her students on a personal basis at the beginning of a lesson.

> During the first 5 minutes, when they come out to the lesson tee, I talk to them a lot, I let them hit some balls, I want to see their set up, I want to see their mechanics, but I also don't know what else they have brought to the tee that day. You know… are they excited? Or are they sad? Are they elated? Or are they mad? Did they get fired recently, or were they just told they were going to be a parent for the first time? You try and see what kind of mood they're in. And (simultaneously) I'm watching their set-up, I'm watching the ball flight, I'm watching their pre-shot routine. In those five minutes, I'm accomplishing a lot of stuff, plus trying to make them comfortable with me there."

Traci's personal approach appears to work for both her and her students, as they all seem to enjoy themselves during the lesson.

Flexible Style

Traci's style of teaching, by her own description, is quite flexible. She is able to adapt her instructional approach and her objectives to suit the unique interests and abilities of her students, while also maintaining the general organizational structure in her lessons.

> I think I teach both ways. You have to be a little of both (flexible and structured). I think you have to develop your way of teaching to the student's needs. And I think I am more of a developmental teacher than a band-aid teacher, in the way I see the overall picture, not just what's happening at that moment.

She elaborated on her pedagogical approach:

I think I'm unique in that in my teaching method, I try to look at everybody differently. I also compare my teaching approach to being like a doctor. I mean, if the doctor sees twenty patients in a day, I hope that if I am the twentieth one that he is as alert with me as he was with the first. That's how I try to treat my students. You know, if I were taking my son to the doctor I would want the same attention as the first patient got. And, yes, it's a business, but to me it's more important to build friendships, build bridges, and show them I really care, and many times my students have arrived and told me that they didn't do their homework, and I'm willing to say, "OK, let me just watch you for ten minutes and then let's reschedule". Do I lose money? Yes, but do I build a bond with them and show them that I'm interested in their improvement? Yes. So, once you start losing the identity of the student, and they become a dollar figure, you'd better get out of the business."

Over the years, Traci has developed and refined her diagnostic and perceptual skills. She takes pride in both her ability to accurately diagnose mechanical swing problems, and her ability to quickly acquire important background knowledge about her students and their interests[2]. She enjoys the challenge of guessing her students' professional occupations, based on their golf swing technique and their conceptions of the swing. Traci spoke of her ability to determine the professional occupations of her students, based solely upon their own swing mechanics.

> I think you've also got to take their profession into account. Dentists are very short with their golf swings because they work in very constricted areas. Architects and engineers are very precise, they want everything to be point A to point B. Lawyers and accountants - and I'm an accountant - I'd say they are kind of, I mean, they are just very stiff…in their swing. I can usually guess what they do for a living because you can tell a lot about them from their swings.

Traci maintains her flexible stance throughout the lesson and shows her willingness to help her students achieve *their own* personal goals. She carries on a steady conversation with her class that lasts for the duration of the lesson, and the topic of conversation will often cover

[2] This domain includes the teacher's knowledge of student understanding, including assessing and addressing student conceptions, misconceptions of the subject matter.

a range of topics, but, surprisingly, relatively little with respect to the technical elements of the golf swing.

> That's a big point for me because I am trying to relax my students, and you can't give them too much… But then I also have some real high-tech students that are very technical, terminology-wise, and they want to get right to that focus, so we can go that way too.

As her Saturday morning group lesson progresses, Traci manages to keep her students entertained with her wit and good humor. Observing a mechanical swing flaw that she has seen with two other students today, she intervenes by teasing the student in a good-natured way, chanting in a nursery-rhyme-like cadence, "You're swinging too much with your shoulders… Lady in purple… Shoulder swinger! Shoulder swinger!" Having captured the attention of the entire class with the good-natured ribbing, she then offers the critical piece of instruction. "Now let the *hands* swing it down. There you go!"

Her students all laugh at this friendly exchange, but they have all learned an important concept as well. Traci maintains the humorous commentary for the duration of the 30-minute lesson. The group warms to her style. They seem more interested in having a good time together rather than in perfecting their golf swings. Traci reminds the group, "This is supposed to be relaxation everyone, remember?

It's not the bosses' head you're trying to hit!" She reacts to another one of her student's swings. "Does this one like to be in control?" she asks the group. "Is she a control freak? An A-Type?" "A-plus," someone replies. "A-triple plus!", another one shouts. They all laugh together, and Traci seems to have achieved her goal of establishing a relaxed learning environment, and making this group lesson an enjoyable experience for them.

Conclusion

In order to understand and appreciate both the teaching practice and the PCK held by Traci, one needs to understand that she is a very personable individual who has a special talent for creating a personal rapport with her students. This rapport creates a level of trust, and it enables Traci to get closer to her students, while also freeing them to reveal more of their own fears and concerns to her. The mutual understanding that emerges between Traci and her students enables her to quickly and accurately ascertain those goals and objectives for learning that have the greatest meaning for her students. This form of knowledge is found in Category A of Grossman's PCK model (1990): knowledge of the purposes and goals of instruction. She is thus very adept at devising an

instructional experience most suitable to the individual student.

Another finding that emerges from the examination of Traci's practice is that an important dimension of her teaching expertise lies in her *humanism* as a teacher. She is able to weave her compassionate nature together with her rich knowledge of her students. As a result, she lends support to a conception of expertise that features great empathy and compassion for the student. She has traveled the road of the novice learner many times, and continues to do so in her own life. She remains sensitive to her students' individual needs and interests, so that she can match those needs with a lesson designed to suit those interests on any given day. Her own life experiences enable her to shape her pedagogical approach to match either the interest level or skill/ability level that her students bring to the lesson tee.

Later that day, during a lesson with a young man who aspires to become the 'second man' on his college golf team, Traci modified her instructional approach to focus immediately on a few of his mechanical deficiencies. This student was much more business-like, goal-oriented, and he appreciated the detailed technical instruction given to him.

Traci holds a special appreciation for the difficult challenges that confront the beginning golfer, and she assures her students that she will be on their side, supporting them in their quest to become a better golfer. Traci's compassionate nature gives her a special appeal to her beginning students who seem appreciative of her warm, friendly manner. While she is also capable of demonstrating her technical know-how, it is truly those qualities of compassion, dedication, and humanism as an instructor, woven together with her ability to personalize her lessons, that uniquely define her pedagogical expertise, and lend credence to her status as an expert golf instructor.

Dan - A Partner in Discovery

In this case study, we examine the second component of Grossman's PCK model, and also expand upon her definition to account for the nature of the subject matter at hand. We will consider the teacher's knowledge of student understanding[1] of the subject matter, i.e., their conceptual understanding of the full swing, together with their physical capacity to execute the skill correctly. We will also see how a video analysis software program is adapted to perform multiple pedagogical functions simultaneously. In particular, we see one instructor's unusual capacity for assessing his students' difficulties, conceptions and/or misconceptions of the golf swing. Finally, we see an example of a pedagogical approach that truly engages the students in an active, collaborative learning process.

The Academy

Dan is the Director of the Stephens Golf Academy (pseudonym), which has been in operation for the past 12 years. His golf academy has become quite popular in recent years, as evidenced by the long waiting list to schedule a lesson with him. Students must register up to 6 weeks in

[1] Domain B: Knowledge of student understanding - assessing and addressing student conceptions, misconceptions, of the subject matter.

advance before they can be placed on Dan's calendar. As popular as he is, though, Dan steadfastly refuses to increase the price of his lessons. Nor does he limit his services to just the highly talented golfer; he works with students of all ability levels. He typically teaches private lessons with his students, although he will occasionally teach a group lesson.

The Diagnosis

Huddled together in front of a single computer monitor, two men are staring intently at an image of a male golfer, captured in 'freeze-frame', half-way through his down-swing. The instructor begins to draw a line on the image with his virtual highlighter pen. "Now we're just gonna look at your impact position…right here," he says, while tracing the golfer's arms and the club, highlighting the angle formed by the arms and the shaft of the golf club at the moment of impact.

"Notice that?" asks the instructor. "See how your club head is out in front at the point of impact?" "Yeah," the student replies without hesitation. "OK, good," says Dan. "The first step for you is knowing what's happening with which component. So what we're trying to do is establish where you are now. Then we're gonna say, 'OK, if we get to choose any (impact) position in the world, what

would we want it to be?' That's what we're gonna do now, because I believe that if you have a vision of where you are now, and a vision of where you'd like to be, then you can get there. You really can!" Dan's student seems interested, attentive. "Let's compare two different swings." He manipulates the software program to produce a split-screen view with the student's image on the right side and an image of a younger Jack Nicklaus (in his prime) displayed on the left. Both golfers are captured at the very top of their respective back swings. "This is going to be very conceptual," he says, preparing his student for the ensuing analytical exercise. "Now I want you to look over here at his shaft as it comes down." He clicks the mouse four times and the video of Nicklaus' swing advances by four frames. "Now see how his hands are even with his right hip? And notice how the angle of the club shaft is still up here?" He advances the image forward with a few more clicks until Nicklaus' club has reached the point of impact. "Now see how it looks like he's trying to hit it with the butt end of the handle in front of the club head?" "Yep," his student replies. "O.K. Now we're going to look at your swing. At this point, where your club is near your right hip line, we can see how the club has already started pointing down and is nearing a straight line. So at the

point of impact you can't help but go beyond (the desired position) cause there's momentum in the club head." His student nods his head, and tells the instructor, "I see that," seeming to understand the underlying cause of his swing trouble.

In the short span of a few minutes at the outset of this private lesson, the instructor, Dan Stephens, Director of the Stephens Golf Academy in Collegetown, MI, has already provided his student with an invaluable learning experience, and he has performed several important pedagogical tasks.

As proposed by Grossman's PCK framework, the second component of a teacher's pedagogical content knowledge includes the instructor's knowledge of their students' abilities, knowledge, and skills, accompanied by an understanding of the common misconceptions held by students and how to overcome learning challenges, difficulties, and misconceptions. In this lesson, Dan has already performed a quick assessment of his student's skill level and general abilities, and he has diagnosed and prioritized his student's most pressing mechanical problems, with the assistance of some digital video technology.

Dan has recently obtained a state-of-the-art golf swing video analyzer. He is one of a very few PGA teaching professionals in the state of Michigan who has acquired this particular system. His students receive one on one instruction in his 'video studio', a covered room located at one end of his practice facility. This temperature-controlled studio is equipped with a sophisticated swing analysis program that incorporates two digital video cameras and the most sophisticated swing analysis software available today. Dan has learned to use this sophisticated video system extensively because it helps him perform several important pedagogical functions.

It obviously works as a powerful assessment and diagnostic tool, providing the instructor with graphic evidence of the potential sources of trouble for his students. The average golf instructor, sans the video swing analysis tool, must rely upon a keen eye and a thorough understanding of the 'laws of ball flight', in order to make an inference about their students' swing flaws. That is, the golf instructor must often make a determination of the nature of the swing flaw from the feedback provided by the direction and flight path of the ball that is struck by the golfers' swing. The speed of the down swing movement makes it impossible for the naked

eye to detect each of the critical components as they are performed. With the advent of the digital video swing analyzer, however, the instructor can now actually see each component unfold in full detail, from two angles in either a slow motion replay or freeze-frame mode.

What's more, he is now able to share this visual feedback with his students immediately, thereby providing evidence to support his diagnosis. Dan felt that his swing analysis software helped him perform this invaluable function in ways that were previously impossible to achieve, thereby making the learning experience much more meaningful.

Dan explained that his students would often have trouble interpreting their own sense of 'feel' of a particular movement, and they would doubt the accuracy of his assessment as determined via naked eye. Now, with the indisputable evidence provided by the video system to support his own visual analysis, Dan no longer faces that battle. This was important, as he explained, because his students would generally respond very positively to the video images.

> With the video, it puts us on the same side. I mean, if I'm trying to convince a student that he's over the top or over the plane, or whatever, and he doesn't believe me, he's probably saying to himself, 'I don't

> think that guy really sees it right; I don't think I'm doing *that*.' But if I show him his image on the computer screen, he says, 'Is that me?' I'd say, 'Yes, that's you.' Then he'd say, 'Well that can't be me!' And I'd say, 'That looks like your hat, doesn't it?' He'd say, 'Yeah, but I don't swing like that!' I'd say, 'I think you do. Let's watch it again. You think that's you now?' 'Yup,' he says, 'But I don't swing like that! I'd say again, "I think you do." He'll finally say, 'OK. We gotta fix that.' And I'd say, 'Yeah, I think you're right'.

An important additional benefit of using the video system as an assessment tool is that it unites Dan and his students in a collaborative process of discovery. He and his student will approach the process of skill learning via a repeated series of visual observations, collaborative analyses, and swing trials. By sharing with his students the responsibility for analyzing their swing mechanics, Dan is deliberately engaging them in the problem-solving process, placing the responsibility for learning upon the shoulders of the student.

> I mean, then we're on the same team now, and I'm not criticizing him, ripping his swing apart. I never expect my students to take my word for it. I'll say, 'Let's look at the video. What do you see?' So whenever I can use *their* eyes to come up with the answer, that's much better. When I have to use my own eyes and tell them what I see, I don't think that's as good as when they use their eyes, and they come up with their own conclusions.

The video analysis system provides both Dan and his student a valuable form of feedback, via repeated, multi-angled

displays of the student's golf swing. This form of feedback has proven to be very convincing for Dan's students. Prior to the advent of this computer program, Dan's students had to rely upon his naked eye to observe and detect any swing flaws. Even with his trained eye, Dan admitted that it was difficult to determine all of the technical flaws that might exist in a particular swing.

Among Dan's considerable repertoire of pedagogical skills is his ability to anticipate and accommodate the unique problems and needs that each of his students brings to the lesson. He first looks for the source of their swing problems with the aid of his video system, and then conducts the rest of the lesson in a manner that gets the student involved in the analytical process.

After moving outside from his studio to the practice tee, Dan says to his student, I'll bet that you not only hit the ball high and short, but you also will hit it fat sometimes, right?" "Yeah", he replies. "Way too often." Dan then starts his student with short, partial swings, in order to teach him/her the desired feel at impact position. Throughout his lessons, Dan would frequently anticipate questions by his students, and would say, "Now you'd probably ask me...'What about this, or that?' Then I'd tell you we would expect that to happen, or something

similar."

By posing these questions, Dan seemed to be encouraging his students to generate their own questions, or to be more reflective about the learning experience. He was able to anticipate and acknowledge their concerns, dilemmas, and fears, thus giving them permission for any possible confusion they might be experiencing at the moment. This strategy appeared to create a learning environment in which Dan's students felt comfortable about asking questions.

Dan's considerable experience (22 years) enabled him to anticipate his students' problems, likely due to the fact that he had seen them repeated so many times previously. Another result of asking these questions was that Dan provided his students with a model for critical analysis. He explained how he incorporates problem-solving experiences into his lessons:

> I'll usually do research. My research begins by putting myself into the position that my students get themselves into, and then I try to understand how their swing works from their perspective. But what we learn here is, or should be, 'How do we approach problem-solving in any situation? How would *I* do it?' You know, I like to learn more about it myself!
>
> "I tell my students, 'We're working at this together.' Some of the best ideas come from them. I just think that if we tap into our creativity, who is to say we have to be limited by mine or my lack of it? Why

don't we use yours, too? You know, you may come up with a good idea that says, 'Dan, now why don't we do it this way?' I'd say, you know, I wished I had thought of it. I'd say, let's try it, I think that might work!"

Conclusion

As with all good golf instructors, Dan routinely performs a comprehensive assessment for his students early in his lesson. However, a student of Dan's will likely acquire a much more comprehensive understanding of their swing after a few lessons with him. They will do more than listen to the instructor's interpretation and diagnosis of their swing mechanics. Instead, they are likely to join with him in a shared process of problem solving. In this way, with the help of his digital video swing analyzer, Dan displays an unusual capability for assessing his students' difficulties, conceptions and/or misconceptions of the golf swing. Beyond that, however, Dan recognizes the added pedagogical value derived from engaging his students in an active, collaborative learning process.

An additional pedagogical advantage offered to Dan via his video analysis system is the immediate access he is afforded to multiple 'models of expert performance'. The software program includes digitized video clips of several of famous PGA and LPGA touring professionals, e.g. Jack

Nicklaus, Annika Sorenstam, and others. He utilizes the computer images of selected professionals as a way of representing or demonstrating the critical swing components and concepts that he is trying to convey. In this way, Dan is able to represent the fundamentals of the full swing in a (visual) form that is more accessible to his students, thus building a bridge between his own sophisticated understanding and the developing understanding of his student. This feature was especially useful in enabling him to illustrate for his student the difference between a correct and an incorrect 'impact position'. This final pedagogical strategy can be more accurately classified within the fourth domain of Grossman's PCK model[2].

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[2] Domain D: Knowledge of instructional strategies and representations for teaching content.

Jan and Shirley: MORAD meets The Ferris Wheel

The final case study presents a description of the remaining two components of Grossman's PCK framework as manifested in the practice of the last two expert instructors: knowledge of curriculum and instructional strategies. Several examples of their curricular knowledge and their knowledge of instructional strategies and representations are described and explained. By studying their work simultaneously, we see further evidence of the multidimensional nature of pedagogical expertise in golf instruction.

Although the four major components of Grossman's PCK framework are depicted as discrete elements when displayed graphically (Figure 1), it should be understood that, in practice, all four components of the model actually overlap, operate in concert with, and have influence on each other. In order to illustrate this relationship, this case study considers the final two PCK components together. These two components of PCK are also virtually inseparable in teaching practice. That is, a teacher's curricular knowledge, no matter how extensive, is rendered meaningless unless it can be transformed into engaging learning experiences for students via effective teaching strategies.

Similarly, even the most engaging instructional activities may fail to produce the desired learning outcomes unless situated within a broader curricular framework. The interdependent nature of these two elements suggested that they be examined with consideration given to each other.

The swing

Among the many dilemmas confounding the average golfer today is the existence of a large number of credible, yet competing points of view or philosophical conceptions of the full golf swing. As with other sports skills, like the batter's swing in baseball or the tennis backhand, a student can find many competing theories regarding the execution of these skills as well as conflicting philosophical approaches in the teaching of the fundamental movements involved. In golf, the teaching approach adopted will usually serve as a complement to the preferred swing model, and visa versa. That is, the drills or learning activities implemented typically reflect the instructors' theoretical conceptions of the full swing and their orientation toward teaching.

Historically, a multitude of instructors have achieved success by using swing models and teaching approaches that differ greatly from one another, suggesting that there are alternative pathways through a complex thicket. These

instructors can all make legitimate claims about the correctness of their approach with their own students. Not surprisingly, a few contrasting pedagogical approaches and conceptions of the full swing were found among the four expert instructors who participated in this study. In examining the practice of Jan and Shirley, with a focus on their curricular knowledge and their knowledge of instructional strategies, we encounter some of these differences.

Jan and MORAD

The Golfing Machine Model

As an instructor who possesses a rich understanding of a particular swing model, and a vast repertoire of carefully sequenced progressions and associated learning activities, Jan can be considered a 'technical master' of his profession. With 16 years of experience in teaching this particular model, Jan now possesses a rich technical understanding of this swing model as well as the associated drills and learning activities that help him teach it to others. The model itself was developed in the early 1980s after years of biomechanical analysis and research, and it first emerged in print in the book entitled "The Golfing Machine" (1983). It was this swing model that Jan learned

first as a young player, and it still shapes his practice as an instructor today. Jan explained how important it was for an instructor to have a clear model and systematic approach to teaching it.

> I believe that an expert golf instructor needs to have a thorough understanding and a complete knowledge of the swing model they are trying to present…*and* they must know what physical training routines work best to improve their students' games.

The Golfing Machine swing model that Jan uses with his students today is also known as the MORAD system. Jan recalled his introduction to this system.

> My college coach was a Golfing Machine instructor, and so we would drive up state together to see Ben Doyle, who was the first certified Golfing Machine instructor, and probably the world's authority on teaching that system. So that was the only system that I really knew back then. It dealt with angles, geometry, basic mechanics, and I was very rigid in the approach that MORAD has. Really not knowing anything…I was only 21 years old.

Today, Jan's knowledge of the swing model is on full display during his lessons. He encourages his students to move toward mastery of the golf swing as conceptualized within MORAD system. The discourse that takes place during Jan's lessons is one that is punctuated by an extensive technical vocabulary. He uses many terms and phrases that convey very precise meanings to his students. For example, during one segment of the lesson, he used terms such as

"axis tilt", "approach speed", "clubshaft planes", "delivery paths", and "downstroke sequences".

The technical nature of Jan's language reflects the terminology found in the original Golfing Machine manual. This text has been described by some as a work of golf engineering, with an emphasis on the geometry, physics, and biomechanical principles of the swing. Jan has also published his own illustrated technical manual, an interpretation of the MORAD model. He gives a copy of this manual to each of his students.

Drills and Progressions

Jan's knowledge of an appropriate learning progression for a particular component of the swing model was evident as he sequenced a 'Tai Chi' movement drill for his student, Steve.

> I like to teach the slow motion drill so that you can begin to get the feel of the new movement," he told Steve. During this drill, Jan began to notice that Steve was misjudging the desired swing speed for the Tai Chi drill, swinging too fast to achieve the necessary short-term result. "Let's pick this one up incrementally. Let's go at 50% speed," Jan said. Steve swings again. "This one will be at 60%. He swings again. "OK. Let's go to 70%." Another swing. "80%. O.K. Go ahead and bring it up to here..." He makes a slight adjustment to the club in Steve's back swing position. "OK, now go ninety." Steve swings. "At first, it feels exaggerated, but eventually you'll get it so that it feels like one movement."

Jan then grabbed a club of his own, stepped into a position behind Steve on the tee, and then prepared him to take a few swings in unison with him.

> I've got to get you timed up. Let's hit a couple shots together. I'll go a thousand one, a thousand two, a thousand three, and we will swing together...Ready? They attempted to swing in unison, but Steve's swing was obviously at a much quicker pace than Jans', although he cannot see or perceive this difference. "OK? That's a good one to look at," says Jan. "Let's look at the video.

They moved back to the portable video camera and started to analyze both of these swings.

Jan had observed that Steve had severely misjudged his own swing speed during this drill. Realizing that the effectiveness of his student's future 'Tai Chi' homework practice sessions would be jeopardized unless he learned to swing much slower, Jan needed to quickly find a way to represent for his student the difference between his current conception or feel of the proper speed and the actual swing speed that Jan felt needed to be prescribed. The use of Jans' video camcorder helped achieve this objective.

At another point later in Steve's lesson, the following exchange revealed Jan's knowledge of how to help his student to make a few important changes to his back swing movement. He broke down the swing movement into

several parts, and prescribed extensive practice on just those parts of the swing, before returning to work on the 'whole' swing. He concluded the lesson with his student with the following.

> I know this drill is 'piece-y'. I know its segmented, and that the flow is disrupted… but frankly, by segmenting it, it lets you know where you should be at each position. You need to *feel* the weight of the club at this point."

In this short summary, Jan has used a specific drill designed to convey to his student the 'feel' associated with the proper club position at various stages of the swing. He also reminded his student of the need to train those movements with repetitive practice. The combination of Jan's intricate knowledge of the swing model and his knowledge of students' abilities enables him to modify his drills to suit the individual needs of the student. He altered the Tai Chi drill slightly for his next student by having him progress from a slow motion swing without the ball, to a full speed drill with the ball, using clubs of various lengths. Jan began by instructing this student to begin by taking four consecutive swings at a slow motion pace - without the ball in place.

> "Alright, no ball. Good right arm delivery, so we're trying to time the delivery of the right arm with the

pivot. "Yup." (The student swings.) "Again, all one pattern. Good." The student swings a few more times with the same club. "OK, now with the ball at that same speed. (The student swings again). "Finish it. What club was that, an 8 iron? Use this 6 iron now...same thing. Good, now half speed. Not any faster. For anything faster than that I get two dollars. I'm gonna be rich at the end of the day! (Swing) Finish it. Alright, new club, don't look at the number...(he hands him a new club) Same speed, same movement...several more swings...Again...that was good..."

This progression was used at the beginning of the lesson, and while his student was swinging without a ball, Jan observed him from three different angles.

"Take a practice swing for me. Again...One more time...Right here there's a little break." Then he moved the video camera to spot where he could observe from a different angle. "You see, when going at a slow speed, we should really have better downswing paths. So when you practice this at full speed, you should be working on downswing path and arm exits, right? Make sense? "Yeah."

Flexible Instructional Strategies

Jan demonstrated an extensive repertoire of teaching strategies while working with his students. He selected these learning activities based on a quick assessment of his students' needs, recognizing that his students have diverse backgrounds and a myriad of needs. Jan compared his teaching approach to that of a football coach who must constantly be ready to modify his strategy in response to changing and unpredictable circumstances.

> Sometimes I think that I'm like the defensive coordinator (in football), and the student is the offense. So if I show you on video and I explain it to you, I'll let you try, and if I can't 'beat you with my base defense'. I've got to jump in and start adding more and more things. Meaning that I'll just react to where the deficiencies are, so I'll add an impact drill, for example. You can *show* a student how, using yourself as a model, you can show them on video, hold up pictures, or you can put them in the right position...You can use all the bells and whistles. I'll just keep running more 'blitzes' and different 'coverages' until I get the results that I want.

Metaphors, Analogies

One of the skills that comprises a teacher's instructional repertoire is the careful selection and use of language, e.g., metaphors and analogies, which represent or convey meaningful ideas, concepts, or skills (Shulman, 1986). Jan's approach, while rich in technical vocabulary, did not feature many metaphors or analogies.

> "Obviously there are the three learning modes for the student - auditory, visual, and kinesthetic - and they are all part of the learning experience. I know there are guys who teach like that (using metaphors and analogies), but I have a hard time with that, and it's mainly because of the training I've had. With all my mentors, it's always been about establishing a position, learn that position, and equate that to what it feels like to you".

So while Jan did not use metaphorical language to a great extent, he did employ a rich technical vocabulary. The MORAD system included many terms and phrases that conveyed a very precise meaning to his students.

Equipment and teaching aids

A typical lesson with Jan will likely find him using one or more of his many teaching aids. He totes a large duffle bag out to the tee each morning that holds several of his devices, such as the impact bag - a heavy beanbag that provides resistance at the bottom of the swing to help the student maintain the alignment of his/her left arm, left wrist, and club shaft at the point of impact. Other kinesthetic training items used by Jan included straps to keep their elbows together and devices to keep their arms extended on the backswing.

> I use all kinds of things, rods, sticks, a plane board (shaped from a foam exercise mat), that I hold up for them to get an idea that all these elements need to line up properly on the back swing. I've got other aids - like a mirror, you can take the mirror out to let a student actually see how to line up everything

> correctly. You just keep working until you find something that helps the student learn and they say, 'Wow, that really helps. Thanks!'.

Jan also used a portable video camcorder system that helped him analyze swing mechanics and provide immediate visual feedback to his students. "I think that the teacher who doesn't teach with a video camera is actually robbing the student of one of the valuable learning tools. So I think that an expert has got to teach with a camera. The movements in the golf swing are happening so fast, especially the complexities of impact, issues with the hand and the shaft, and clubface position at impact. That makes having the video very important.

> You know there's actually instructors who have taken that one step further, and now they have ball-launch monitors and all kinds of high-tech equipment that will indicate exactly what that face is doing, and exactly the angle of attack of the club, and all of those things. Now maybe a beginning golfer doesn't need to see all of these things until later on, but I think that ultimately the student needs to see it. Because it is very difficult for me to convince a student that their spine is changing 20 degrees during the swing, until you can actually show it to them.

Developing the Feel of the Swing

Jan believed that the most important goal of his instruction was to create a learning experience for his students in which they could develop a sense of feel for the proper swing movements. He recalled the advice of one of his first teaching mentors.

> Jim always stressed this to me. One of the first things he said when I was first thinking about getting into teaching, he said, 'Jan, I'll give you one tip', and I'll always remember this. He said, 'Let the student learn their feel from the correct mechanics. So put them in the right spot, and let them *feel* what that's like, because what it *feels* like for me is completely different from what it *feels* like to Tom, Dick, and Harry. And that stuck with me.

Jan also stressed the importance of *active involvement* on the part of his students, often referring to the importance of *engaging* his students in the learning process.

> If I'm *telling* you what the motion should feel like, you are not really engaged. So if my teaching doesn't put you in the right spot and force you to get involved, I don't think you are going to learn as quickly. You know, just like in a group class for beginners, I would ask, 'What's this part of the club called? OK, now, What's this? The shaft or the grip?' So, you know, when I teach group lessons, I make them repeat back to me, you know, like, 'What are your three check points here? What is your swing thought here?' I don't want them to go brain dead.

Jan also recognized the use of his portable video system as an opportunity to engage his students in the learning process. He explained that it offered an alternative "learning mode" for his students.

Summary

Jan's teaching practice featured a deep understanding of a research-based swing model, the use of an accompanying technical manual and vocabulary, numerous drills (and various modifications thereof), and a multitude of teaching

aids, including a portable video system. An important aspect of Jans' philosophy of the full swing is that he believed that the MORAD model, together with the various drills associated with it, were an especially good match for his personality.

> The thing that is so great is that this system fits my personality, that is, how I want it to be, you know, I want to have concrete check-points. I want to know the hows and whys. Don't tell me that something has to happen without providing a rationale for it. You know, if my left arm angle, or the club shaft, needs to be at 10 degrees inside the target line on the downswing, tell me why. But I think that all these things I've learned through MORAD, as well as from all the other guys who teach the system, have really made it easier for me to teach.

Jan shared that he has probably 'softened' a bit over the years in his approach to teaching the MORAD swing model, making adjustments for students who may be somewhat deficient with respect to some aspect of their physical capabilities.

> It's the only way I know how to do it. I don't know any other way. I still have deep rooted feelings for the system, but I've learned more about physical deficiencies, like muscular strength and flexibility...some players just cannot get to model, so what you do is explain to each player, 'You have these deficiencies, so you have to build a pattern that makes it easier to have a non-compensating golf swing.'

Jan prefers to work with students who can commit to taking lessons over an extended period of time. He knows that lasting changes in his students' full swing techniques require a sustained effort at training and regular practice by the student.

Shirley and the Ferris Wheel

The swing model

Shirley's conceptions of the golf swing are much less visible to the casual observer. She generally avoids the use of specialized, technical jargon that is found in many golf manuals and texts. Shirley does not refer to *swing plane angles*, *downstroke sequences*, and *delivery paths* with her students. Instead, she speaks in laypersons' terms, choosing instead to communicate with them in whatever language she believes will be most meaningful to *them*.

In a group lesson she conducted for three young boys, ages 11-12, Shirley demonstrated this approach. After finishing a lesson segment on the short game, she returned to the tee with her three students for a review of the full swing key components.

"Alright, this will be a good review for us." She takes a club and steps out in front of the group. Are you

watching? You be the teachers. OK, watch me." She purposely takes an awkward back swing, pauses at the top, and then asks them, "What's wrong here?" One of the boys replies, "It's laying on your back and your foot is lifted up." "So it should be up here? Like a nice high *ferris wheel*?" she asks." "Yeah." "OK, everyone tell me, what leg is my *power leg*?" "Your back one," they respond. "Alright, and we're doing better with our *happy feet*, not moving all over. You're getting better, a lot better. *Big circles* though," she says as she swings the club through to the finish position. "*Big circles*... and I wanna see your *power leg*." OK, everyone have some tees?" she asks as the boys reassume their position. Nice *big circles*, now. That is so much better. I am so glad you got away from those happy feet.

A casual observer of Shirley's lessons might be misled by the apparent simplicity of her instructional approach. She seems to exemplify the phrase "less is more", as she makes minimal use of detailed, technical language. However, the relative *invisibility* of her technical know-how may not necessarily correlate with a lack conceptual understanding of the full swing. Instead, it more likely reveals a certain *wisdom* about just how much information her students might be able to grasp, and how to represent

that information to them at precisely the right moment, and in ways that make sense for them.

While Jan's knowledge of the swing model was typically in full view, Shirley's knowledge would only surface selectively, and even then, in a form or language that might not persuade an observer of her grasp of modern swing theory and techniques. Shirley reflected briefly on her teaching approach.

> I think one of the keys to my teaching is that I don't always teach by using the technical golf terms. It's not always so A,B,C. I kind of do it with unique, funny situations. And my students will sometimes say something to me that helps them relate an idea to *their* bodies, and so I'll just go with that.

Flexible Teaching Strategies

Another lesson segment illustrates Shirley's ability to adapt her instructional strategies to accommodate the needs and abilities of her students. Instead of recommending a major change in the swing mechanics for this student, Shirley chose to recommend only minor adjustments, thus allowing this student to retain one of her favored movements. The student was a mature woman, in her sixties, who started her lesson with Shirley by reminding her that she had taken a lesson from Shirley a few years ago. She reminded Shirley about her unorthodox follow-through and

finish position, one that would likely be labeled incorrect by most professionals.

"Remember," the student says to Shirley, "I have a natural thing that I do on my follow through. I kind of walk into the ball after I hit it. I know I should stop doing it, but…watch, I'll show you." She then swings at the first ball and hits a solid shot, but the ball flies far to the right of her target. On her follow through, she steps with her right foot across her left, and finishes with her weight on that right foot, as if walking down the fairway towards the target.

"Oh I see," says Shirley. "You advance after you've hit it. But was that a pretty good hit, wasn't it?"
"Yeah, I guess that was OK," the woman replies.
"Alright…and you've been doing that for a long time, haven't you? Kind of walking past it?" "It sort of feels natural to me." "Well if it feels natural, maybe we'll leave it alone!"

Later in the lesson, Shirley discovers a problem with the woman's foot placement:
"Let's aim for that flag out there at the 100-yard mark. I think you can definitely shave a few shots off of that 55 you've been shooting." She hits a few more balls, during which time Shirley notices that her feet are misaligned.

"Now get your target lined up. It looks like you are lined up to the right. You might want to check that. " The woman realigns her stance and swings again. "Now that was a nice hit," says Shirley. "OK. The only thing I saw differently was your left arm, on your arc on the back swing. You didn't drop your club so much. Like this, watch me." Shirley switches places with her student to demonstrate.

"You took the club back like this (she demonstrates a proper back swing motion and then stops before reaching the top). You are about right here, which is fine, but when you get here, it might be that maybe you are trying to get more power, and you're going back so far, that you are losing that good stretch right here (she points to her elbow). And about walking into the ball…I know you've been doing that for a long time… "Yes, I've done that forever, you know." "So we should probably just let that go. That might be a good thing for you to keep…just a good follow through."

A few minutes later, Shirley addresses another source of trouble for this student: the position of the ball at address. She walks around from behind her student to a position on her side in order to view her midline.

"Did you know that you keep changing your ball placement?" There is no reply. "Do you know where it is supposed to be? Proper placement for most of us with that club is to play the ball right here, just inside the left toe. You're playing it nearer your right foot." "Oh really?" "Yes, and here's what it would look like. (She demonstrates the incorrect ball position relative to her stance.) "OK go ahead and set up again. That's good. Now square your hips up…and the ball should be placed right here."

Up to this point in the lesson, Shirley has probably spotted a number of deficiencies in her stance and her swing, but she has selected only 2-3 on which to focus attention, while ignoring others like the negligible influence of her unorthodox follow through motion. Her student is happy to have hit a few shots further and straighter with her 7-wood than she had hit them in a long time. Shirley seems to have won the confidence of her student. She swings again, and hits her best shot of the day.

"I think you have something there," the woman tells Shirley. "I think that *we do* have something there," Shirley replies. "Now tell me two things that you did right that time so that you can remember and take them back

with you to the club." "I tried to be in the right position and take it back not quite so far." "OK." She then hits three consecutive shots down the middle. As the lesson comes to an end, her student reflects on a previous lesson she had taken with Shirley.

"That's what I liked about my last lesson from you. No fancy stuff. And what I fear is that some guys (instructors) are gonna look at the way that I swing and throw there hands up in the air and say, 'Just quit!'" Shirley responds, "Oh no, no, no!… Now, just like the last one. You just hit that one *way* past a hundred yards."

Representations and Metaphors

Shirley takes a slightly different pedagogical approach with each of her students. She even spoke of the different strategies she uses with junior golfers of varying ages. "With junior golfers I use different concepts depending on their age and their attitudes. I think age and attitude in junior golfers makes a big difference in how I am going to teach."

She compared the golf swing motion to that of a ferris wheel for her younger students.

> If I have a group of kids that are younger, I try to relate to what they will know about, to try to create a good back swing. I try to figure out something that's fun for them, and a ferris wheel is fun. And

most of them have been on a ferris wheel. So I use a concept like "picking somebody up" and then you take the clubhead back when "you're going for a ride" and then you try to take them all the way up high (on the ferris wheel) so that you see the entire Fair Ground, and that really allows them to take a big back swing and then I say 'OK now, give everybody a good ride', and that brings it all the way through. I also had a group of kids that somehow picked up on the phrase, 'orange slice', when talking about a sliced golf shot. We used that phrase from there on, and they loved it."

As far as junior golfers and their hands (grip), I use this with all students, just a good hand shake position, and I think most pros still do that, with just a few changes here and there. And then, you get the kids who are 16-17 years old, which means sometimes they don't want to be here in the first place, so now I'm not just teaching them, I also have to work with their personalities. And I usually can test that probably within ten minutes. Within a half-hour lesson...and most pros teach within a half hour...before I even think about teaching them, I have to quickly figure out their personality. And I've been getting better at that over the last ten years or so. I've been teaching for close to thirty years. So that's probably why I am getting to know personalities, and that *really* does help in my teaching.

Summary

Shirley's pedagogical approach with her students reveals a much more flexible stance toward teaching the fundamentals of the full swing. While it may not have been readily apparent to a casual observer, it became evident during the course of this investigation that Shirley held a clear conception of what a functional swing should look like for any particular student. She noted that even amongst PGA tour professionals, one finds drastic differences in swing

shapes and movements. However, one fundamental characteristic of all good golf swings is that they consistently return the club face squarely to the ball at the point of impact.

Shirley's conception of the full swing model appear to hold much more latitude for variation than did Jan's. In fact, among the four instructors examined in this study, Jan and Shirley would likely find themselves situated at opposite ends of a continuum describing the relative degrees of structure vs. flexibility in their swing philosophies.

As with their distinct swing conceptions, these two instructors also differed in their teaching strategies. Jan's lessons reflected a more systematic approach than Shirley's. Shirley's lessons were flavored with colorful phrases and metaphors that reflected the interests and abilities of her students. Hers was the more flexible approach.

Conclusion

The success experienced by these two accomplished instructors offers evidence that alternative conceptions of the golf swing can, indeed, coexist, as can a diverse assortment of teaching strategies. Contrasting philosophical approaches toward teaching the full swing

have particular characteristics that are well-suited to the needs of an individual student. An important implication of this finding is that the best result may occur when a student locates an instructor whose swing conceptions and instructional approach most closely resonate with their own abilities, skills, and interests. This finding, among others, will be discussed in Chapter Five.

Chapter 5

AGGREGATE FINDINGS AND ANALYSIS

Introduction

The purpose of this investigation was to examine the pedagogical content knowledge (PCK) of expert golf instructors. The goals of the study were to describe the PCK and teaching practice of these instructors via case study presentation, and to interpret the findings through a cross-case analysis. The case study method was useful for providing rich descriptions of various aspects of their teaching practice, but was limited in its capacity to document the full scope of these expert teachers' knowledge. Accordingly, this chapter will present a comprehensive summary of the expert instructors' PCK via cross-case analysis. Examples are presented in the next section that highlight the commonalities and contrasts among the instructors.

In the final section, the results are explored further and juxtaposed against Grossman's PCK conceptual framework (1990). Additional findings are considered, and modifications to this framework are proposed to reflect a synthesis of these findings. Implications and recommendations for future research in the area of sport

PCK are discussed.

Expert Instructors' Pedagogical Content Knowledge

Category A. The first category of Grossman's PCK model includes the instructor's conceptions of their purposes and objectives for teaching students of diverse needs, skills, interests, and levels of general ability. This domain includes the information and beliefs about the purposes of teaching a subject at different grade levels (Grossman, 1990). These conceptions reflect a teacher's objectives for teaching particular subject matter to specific groups of students, modifying goals for students of diverse needs, interests, abilities, and accommodating differences in students' needs, abilities, skills, interests. For purposes of this study, the 'levels of ability' were recognized as beginning, intermediate, and advanced levels. Answers were sought to these questions:

1. How do expert instructors' purposes and instructional goals change for different students?

2. How do experts accommodate a range of abilities, skills, interests?

A summary of the four instructors' PCK in this domain offers the following findings.

The case study of Traci provided an in-depth description of one instructors' rich PCK in this first

area. While her capacity in this area was particularly outstanding, the other three expert instructors also demonstrated the ability to accommodate diverse interests and varied needs among their students. Because of their acquired status as 'expert instructors' within the golf profession, these instructors were observed teaching in mostly private lesson settings. This meant that they had been afforded repeated opportunities to learn and develop those ***diagnostic skills and strategies*** that enabled them to determine the appropriate course of action for a particular student. These instructors had also developed an ***acute perceptual awareness*** of the various purposes to be served via their golf instruction and an understanding of the associated strategies used to create meaningful learning experiences for their students. Some of those skills are described as follows.

The instructors all devoted substantial time and effort during their lessons in determining an appropriate set of goals for their students. This task was accomplished, in part, by direct observation, video assessment, informal conversation, and written survey methods. Instructors also questioned their students directly to determine their students' perceptions of their most pressing needs and interests. This assessment process

was an ongoing task for these instructors because oftentimes the students' own learning objectives would shift as they acquired new knowledge or skills. The shifting nature of these purposes and goals for instruction required constant monitoring and a degree of perceptiveness by the instructors.

For example, one of Shirley's strengths lay in her capacity to listen and learn from her students about their own full swing difficulties. She would adopt a different instructional posture for different students, depending on what she perceived as their unique needs and personalities.

> I'm not just teaching a skill to a student, I am working with their personalities. Before I can even think about teaching them, I have to quickly figure out their personalities.

Certain ***personality traits*** of the instructors themselves, e.g., empathy, were particularly noticeable during the lessons of these instructors. Sincerity, supportiveness, friendliness, and humor also appeared to improve communication between teacher and student, helping them to determine the most relevant purposes and goals for instruction. This ability might be considered analogous to a physician's ***"bedside manner"***.

Not surprisingly, the expert instructors identified their ***primary instructional goals*** as: a) the acquisition

and/or development of greater understanding about the full swing, and b) the physical capacity to perform the skill of the full swing correctly. This finding supports those of Rovegno (1992) and Schempp et al. (1998), who identified similar goals among physical education teachers. The expert instructors addressed the obvious skill level differences between beginning and advanced level golf students.

A variety of complementary instructional goals were also found among the four expert golf instructors. Of particular interest was how diverse those needs could be. These goals were found in those lessons where the needs, interests, or motivation of a particular student may have dictated a unique instructional approach. The instructors recognized these differences in interest and motivation, as they occurred among students within the same classification of playing ability. These differences required the formulation of alternative goals and instructional approaches.

The instructors shared a common understanding about their students' own ***expectations***, i.e., that the vast majority of their students held expectations of themselves as learners that were, ultimately, unrealistic. The instructors knew that the majority of their 'average

ability' students desired either a quick reduction in their handicap by a few strokes, or else were looking for a 'quick fix' for a particular swing ailment. Unfortunately, only a small proportion of these students would actually be willing and/or able to make the necessary long-term commitment needed to making substantial improvements. The majority of students are unable to do so. As a consequence, the instructors were often confronted with the challenge of modifying (usually lowering) their students' expectations, and then re-orienting them to the learning experience in light of renewed expectations. Therefore, communication skills, diplomacy and a certain degree of artistry became important. As Traci demonstrated in her group lesson, her humanistic qualities and friendly rapport with her students enabled her to decipher and address the most important objectives for learning that her students held for themselves.

Category B. The second category of PCK included the teacher's knowledge of their students' understanding of particular topics within a subject matter (Grossman, 1990). Teachers need to know what conceptions or misconceptions their students might hold, and they need to anticipate difficulties that their students will likely encounter. Answers were sought to the following questions:

1. How do the instructors assess what students know about the golf swing, or what skills they brought to the lesson?
2. What are the conceptions and misconceptions students hold regarding the golf swing?
3. How do these instructors overcome learning difficulties, challenges?

1. Assessing what students know, or what skills they possess:

All of the instructors recognized the importance of ***accurate observations, diagnoses, and analyses*** of their students' swing movements. They employed a variety of strategies designed to help them assess students' skills and knowledge. These included formal surveys, interviews, informal conversation, visual observation, video-tape swing analysis, drills, and other activities specifically designed to help the instructor assess their students' abilities.

The case study of Dan provides a detailed description of how the digital video swing analysis system could be used to provide indisputable evidence of his students' mechanical tendencies. His adaptive use of the technology also demonstrated an expert teacher's ability to transform the traditional assessment process into an engaging learning experience that involved ***self-assessment*** by the student.

2. Conceptions and misconceptions:

The list of common misconceptions about the golf swing held by students is too extensive to present in this chapter. A list of these has been compiled and is presented in Appendix F. A few general misconceptions held by many students will be highlighted here.

One of the misconceptions all four instructors agreed upon concerned the average student's misunderstanding of the ***motor skill learning process***. Each of these instructors recognized the inherent difficulties and challenges facing the average golf student. The instructors all referred to the common misconception that their students held about the skill learning process, i.e., the general misconception that permanent changes and improvement in one's golf swing could be realized after only a few lessons and a modest investment of their time and effort.

Many of the students felt that if they could conceptualize the causes of their faulty swings, and then learn the associated remedial strategies, then they would be capable of immediately translating this knowledge into an improved full swing performance. What the instructors understood, however, is that the successful acquisition, refinement, and mature performance of a complex motor skill like the golf swing requires from the student a sustained

effort at quality practice and training. The instructors realized that a small minority of students will actually commit themselves to the necessary practice regimen. As Shirley explained:

> When I'm teaching adults I try to tell them that their mind knows what I'm trying to tell them, but their bodies do not… People really need to take more than just a few lessons…and that is a common problem in teaching, that they cannot practice often enough for their bodies to learn what I am trying to get them to do.

Shirley addressed the need for regular and frequent practice in order for significant improvements to occur, like those she had observed in her regular students.

> Teaching my returning students is wonderful, because when I tell them to do something, their bodies do react totally the way I want them to. Like when I teach my lessons with the community college class...I know that I can get some of those students hitting it better just because they have more experience.

Traci also recognized the nature of this problem. She explained that the lack of sufficient practice time would often undermine the efforts of beginning golfers.

> I think the biggest thing is recognizing that the average person wants to improve their game, but they don't really have enough time to do it. Other things in their life creep up, family, work, other intangibles get in their way. So I try to keep my teaching strategies toward things they can take with them.

The views shared here suggest that the expert instructors understand that expectations for a student's success must be tempered by an acute ***awareness of the difficulties*** that the average student will encounter due to a lack of quality practice time[1]. Despite this problem, these four instructors continued to support each of their students' efforts in the face of such predictably adverse conditions, searching for the type of learning experience that offered their students the greatest chance for improvement.

3. Overcoming learning difficulties:

While the four instructors in this study shared a common understanding of many of the problems students encounter, they held somewhat divergent philosophical views on how to deal with these problems. For example, with the problem of the unrealistic expectations held by many of their students, some instructors were more demanding of their students, particularly if these students were 'regular clients'. A few of Jan's students, for example, had committed to him for an on-going series of lessons. He felt justified, therefore, in prescribing major changes in their swing mechanics. At the same time, however, he would caution them about the inherent difficulty of the learning

[1] The second component (B) of pedagogical content knowledge includes the teacher's knowledge of the student understanding (i.e., student's conceptions and/or misconceptions of the full swing).

tasks he had just prescribed. He offered this thought to an adult student, who indicated that she was becoming frustrated at her lack of progress, despite her intense practice routine.

> If I can offer any solace to you, it's that, as we get older, the process of learning neurological motor skills, like the kinesiological movements of the golf swing that are so complex, becomes very difficult because there are so many moving parts and so many things we have to check and account for…and there's a lot of things to think about. So I do empathize with you…

Jan helped another student make an important distinction between the two separate learning processes that he labeled ***training* and *practice***.

> Let's distinguish between *training* and *practicing*," he tells her. *Training* is a total disregard for the outcome of the shot while we're out here on the range. Training is an all-out assault on the mechanics that you want to learn. When you play, or if you decide to practice, *practice* is really trying to maintain good ball flight…in any way, shape, or form possible. Training means you can top shots and have mis-hits as long as you have the right mechanics.

Dan explained that he was hesitant to prescribe large-scale mechanical changes and full-swing overhauls for people who, in his opinion, were not likely to commit to the necessary training regimen to ingrain those fundamental swing changes.

> I'll say, 'OK, these are the things that are important. We want to impact the ball this way. Can

> you do that?' So I want to reinforce the things that he does right. You know...a guy can have less than a perfect swing method but if he really believes in it, and he trusts it, then he's gonna be twice as good as a guy who isn't as committed to his swing.

Dan showed an understanding for his students as they struggled to acquire a new movement or make a change in their swing pattern. He also made sure they understood the rationale for any prescribed change in their swing. After asking one student to alter his grip position on the club, Dan tried to reassure him:

> I know that feels bad, but if you could imagine that this grip won't *always* feel that Tracible. You know, at first, when I change a person's hand, I have all the empathy in the world for that 'cause I know that it makes a person feel distracted, but I feel like you do need to adjust that (grip) to get you into a more natural position so the club can just flow...

The process of learning a complex motor skill like a golf swing can be very frustrating for the average golfer. The swing motion involves a coordinated, rhythmic movement, one that needs to be 'grooved', or habitualized via repetitive practice. The expert teachers in this study fully understood the many difficulties inherent in this process, and they often played the role of cheerleader for their students. They offered a good deal of counseling or coaching in their lessons, ***providing emotional support and***

encouragement when the difficulties became a source of frustration to them.

These instructors had their own strategies for sustaining student interest and optimism in the face of repeated failure. Dan showed these strengths, as he demonstrated a unique talent for providing timely encouragement to his students, often exhorting them to greater achievement than they believed possible. He demonstrated this ability several times over the course of a day. In one instance, Dan seemed to recognize that his student was struggling a bit with learning to achieve a new impact position.

> I hope this is not too elementary, but what we're going to do is to build something from its most basic point, something we can build on, I hope... His student interrupted, "Believe me. I'm ready to try anything right now." OK good...because you'll be able to do it. I mean, I *know* you'll be able to! I've got to make you want to do it, and I've got to help you with the right movements but I really believe, if I'm capable of teaching it, that you *can* do it!

Dan went on to explain the details of the movement, implementing a drill in which he challenged his student to re-learn a part of his swing while using a new grip position.

Another of Traci's strategies was to ***redirect her students' attention*** away from the occasional 'whiffed' or

topped shot by responding with a comment that was unrelated to the errant swing. She explained that she did not want her students thinking about these inevitable errors. Instead, she would find an alternative thought upon which they could focus. These were usually positive swing thoughts or they might even be thoughts about topics unrelated to golf.

Category C. The third category of the PCK model includes the teacher's knowledge of curriculum and course design, knowledge of resources available for teaching the subject matter, and knowledge of learning progressions associated with the skill(s) and concepts involved. Curriculum resources typically include such items as books, equipment, and teaching aids. Answers were sought to the following questions:

1. What conceptions or theories of the golf swing are held by these instructors?
2. What resources (books, manuals, videos) do these experts use to help them understand and teach the full swing?
3. What knowledge do these experts have about skill progressions associated with the full swing?

1. Full swing theories:

The breadth of information available today on golf "swing mechanics" is overwhelming. A scan of the available resources on golf instruction (PGA Teaching Manual, 2000) reveals that there are literally thousands of books,

manuals, periodicals, videos, web sites, research articles, Master's Degree theses (17), and doctoral dissertations (41) pertaining to the sport of golf. The majority of these resources contain instructional information on the fundamentals of the full swing. A cable television channel was recently created that is devoted exclusively to the sport of golf, and a substantial portion of its programming content features full swing lessons.

The sheer volume of information available to golfers today actually poses a dilemma for many of them. The overabundance of technical information available about the golf swing can actually serve to confuse the average golfer. This is especially true when the expert advice is being offered by individuals who hold vastly different philosophical views on the swing. The more time a student invests in seeking answers to his/her particular swing problem, the more confused s/he is likely to become.

This problem is created by the existence of so many ***competing theoretical views*** of the golf swing today. As explained in the third case study, there are a number of theories or schools of thought about the golf swing. So it was not a surprise in this study to discover differences in opinion among the four expert instructors regarding their conceptions of the full golf swing. These differences

ultimately influenced the character of the learning experience for their students, leading to different instructional approaches by the four instructors as they worked with a diversity of students. One of the implications of this finding for the average golf student is that s/he should attempt to locate an instructor whose swing conception and teaching philosophy provide a reasonable match for their unique learning needs and characteristics. The match between the student's learning style, or preferences, and the philosophical approach of the instructor is an important factor in the ultimate success of the experience.

2. Resources Used:

Resources used by these experts to help them understand and teach the full swing included the Professional Golfers' Association (PGA) Teaching Manual (2000) and the PGA Specialty Certification Program Candidate Manual (1998). These ***publications*** provide a comprehensive description of the full swing and its fundamental components. Another source of curriculum knowledge for each of these instructors was accumulated wisdom that had been passed on to them by their ***mentors*** when they were novice golf instructors. Each of the four

experts spoke at length about the tremendous influence that certain individuals had upon their teaching philosophy. In Jan's case, a significant portion of his knowledge of the full swing had been translated into print, and shared with his students via an instructional manual.

3. Skill progressions:

Each of the instructors demonstrated a working knowledge of ***sequential learning progressions*** designed to improve their students' swings in the most efficient manner possible. Dan and Jan both used drills that involved partial swings, or slow-motion swings. These drills were designed to teach the proper feel of the swing at certain points.

Another example of a skill progression was demonstrated in the instructors' strategic ***'club selection'***. All of the instructors followed the same general protocol in terms of club selection. They typically asked their students to begin the lesson by swinging a short iron, usually the seven-iron. The seven-iron was much easier to control than the clubs with longer shafts, and it provided ample loft to get the ball airborne, an important issue for beginning golfers. Following a segment of practice with the 7-iron, the instructors would then progressively challenge their

students with the longer-shafted clubs, reverting back to a shorter club should difficulties arise.

The strategic *use of golf tees* by these instructors was another way for them to **control the difficulty of their student's learning task**. They insisted that their novice students use tees when hitting from the grass practice tees, inserting them into the ground at progressively lower heights as their students learned to strike the ball more consistently. The instructors knew that by teeing the ball higher, they would effectively reduce the difficulty of the task at hand, enhancing their students' chances of success. This small adjustment became especially important when a student needed to alter some aspect of his/her swing motion, thus disrupting his/her accustomed rhythm and causing mis-hits or whiffed shots. The instructors would progressively raise or lower the height of the tee to accommodate each golfers' skill level.

Category D. The fourth category of the PCK model includes the teacher's knowledge of instructional strategies, representations, and materials for teaching the golf swing (Grossman, 1990). Because the mastery of the golf swing involves learning in both the cognitive and psychomotor domains, consideration was given to those

strategies aimed at teaching across both of these domains. Answers were sought to the following two questions:

1. What teaching strategies, verbal representations, metaphors, and/or other expressions are used by expert instructors to promote increased understanding of the full swing by their students?

2. What specific drills, instructional materials, and/or teaching aids are used to convey the kinesthetic feel associated with correctly performing the full swing?

1. Teaching for Understanding- As we learned in the third case study, numerous conceptual models for understanding the golf swing have emerged and evolved over the years, as have pedagogical strategies for teaching those swing models. Therefore, one can find a wide array of effective pedagogical strategies in use today. Some instructors will adhere tightly to a particular swing model, while other instructors will adopt a more flexible approach, striving to assist their students in finding the swing motion that best suits their unique abilities and characteristics. These alternative approaches have led to teaching strategies which vary accordingly. Several examples of these strategies are presented in Appendix G. In summary, they are described as follows.

Verbal strategies employed by these expert instructors included explanations, instructional cues, analogies, metaphors, anecdotal stories, and even 'pep talks' which

were all aimed at creating positive mental images in the minds of the students. Some of these strategies were planned and appeared to be part of a lesson routine, e.g., explanations and cues. For the most part, however, the use of metaphors, analogies, and anecdotal stories seemed unrehearsed, enacted in response to situational demands, and requiring the experts to improvise and react spontaneously.

Visual display of the students' own swing motions was enhanced by the use of portable camcorder systems and computer software programs which gave students immediate ***feedback*** about their own performance and also offered videotaped demonstrations of model swings by PGA professionals. ***Demonstrations*** by the instructors were also used for the same purposes.

2. Teaching Kinesthetic Feel:

Among the many teaching activities used by the expert instructors to teach their students proper 'feel' were an assortment of ***swing drills***. Examples of these drills are described in Appendix G. One teaching activity used primarily with novice students by three of the four instructors was the ***physical manipulation*** of their students' bodies and/or their golf club. By actually taking hold of an arm, shoulders, hips, or the club, the

instructors would control their students' movements. As a result, the students would experience the desired feel for the correct movement. The instructors often positioned their body parts to foster the correct full swing motion.

Materials used by these instructors included a variety of ***instructional aids*** designed to teach certain movements and develop within the student a particular 'feel' for the movement. A list of these resources is included in Appendix G.

Summary of Pedagogical Content Knowledge

In summary, these instructors demonstrated their rich knowledge across all four dimensions of Grossman's PCK model. Summarized, they included knowledge in the following areas:

Category A. General Orientation, Knowledge of Purposes:

Teachers exhibited and/or understood:

1. multiple diagnostic skills and strategies.
2. acute perceptual awareness.
3. effective relationship skills.

Category B. Knowledge of Student Understanding, Conceptions, Misconceptions, Learning Difficulties: Teachers understood

Teachers exhibited and/or understood:

1. students' unrealistic expectations.
2. accurate observations, diagnoses, and analyses.
3. engaging student in process of self-assessment.
4. student misunderstandings of the motor skill learning process.

5. awareness of conceptual and biomechanical difficulties.
6. effective training and practice regimens.
7. how to provide emotional support and encouragement.
8. redirection of students' focus away from errors.
9. persistence in the face of adversity.

Category C. Curricular Knowledge:

Teachers exhibited and/or understood:

1. competing theoretical views.
2. various publications, resources.
3. importance of their mentors' influence.
4. use of sequential learning progressions:
   a. club selection in training and practice settings.
   b. use of golf tees in training and practice settings.
   c. drill sequences.

Category D. Instructional Strategies:

Teachers exhibited and/or understood:

1. verbal strategies - representations and feedback.
2. visual display techniques.
3. demonstrations by instructor or by others on video.
4. swing drills.
5. physical manipulation.
6. instructional aids.

In the following section, these findings are synthesized with others, and Grossman's PCK model is critically examined for its applicability as a heuristic for understanding PCK in golf instruction.

Synthesis of Findings

A synthesis of the findings emerging from this study of expert golf instructors' PCK led to the following conclusions. First, the construct of PCK conceived by

Shulman (1986) proved to be a useful heuristic device for guiding the description and interpretation of the pedagogical practice of golf instructors. Second, the data gathered in this study suggest a substantial amount of integration and varying degrees of mutual influence between each of the four PCK components. These phenomena are not addressed in Grossman's (1990) representation of PCK. Third, the four PCK components, in turn, are also influenced by the complementary forms of teacher knowledge as described in the larger Teacher Knowledge Framework (Figure 1), i.e., knowledge of context, general pedagogical knowledge, and subject matter knowledge. Thus, the PCK of the instructor cannot be completely understood as a distinct entity, without consideration given to the other forms of teacher knowledge depicted in Grossman's Teacher Knowledge Model (Figure 1).

Fourth, the emergence of salient themes from the data cast a different light on the complex nature of these instructors' pedagogical expertise. The data reveal a picture of expertise as a multifaceted amalgam, or blend, of pedagogical knowledge and skills. These four findings were synthesized, and led to a proposed modification of the portion of Grossman's Teacher Knowledge Model that depicts

PCK. These modifications also reflect the nature of the subject matter at hand - the full swing in golf.

The Pedagogical Content Knowledge Model

In general, Grossman's conception of PCK proved useful in the examination and analysis of pedagogical practice by expert golf instructors. The data gathered were organized according to the four components of PCK defined in Grossman's model (Figure 1). As a heuristic device for explaining and interpreting PCK as an important dimension of teaching expertise, the Grossman model served its purpose. However, a few shortcomings of this model became apparent during the research process. First, it did not offer an adequate depiction of the relationships between the four PCK components and their relative influence upon each other. Second, this model did not account for the important effect of each instructor's overarching orientations toward teaching the golf swing. These overarching orientations and the relationships between PCK components are discussed below and included in the revised PCK model.

Relationships Between PCK Components

Throughout the data collection and analysis process, repeated instances of linkages, interconnections, and relationships between the four PCK components were

discovered. These repeated findings argue for the existence of an interdependent relationship between the four major components. This relationship is depicted in a revised PCK model conceived for golf instruction (Figure 3).

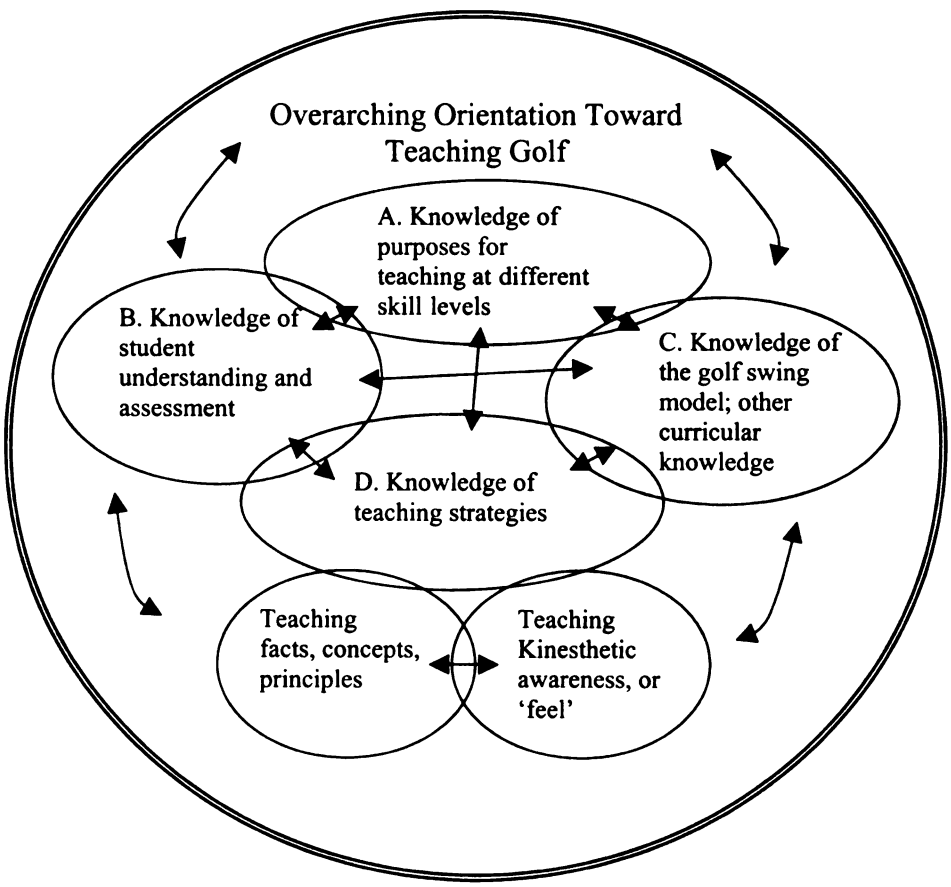

Figure 3. A Model Illustrating Pedagogical Content Knowledge for Golf Instruction.

In practice, the four knowledge components were complementary, overlapping, and had mutual influence upon each other. For example, when adapting their instruction

to suit the unique needs of their individual students, (Component B) these instructors drew upon their extensive knowledge or repertoire of instructional strategies (Component D) to create a learning experience that fit the situation. For example, Sheila was able to adapt her instructional approach to accommodate an unorthodox follow-through motion by one of her older students. She recognized that, although the follow-through of this particular student did not reflect contemporary views about the ideal finish position, this particular student was uninterested in making significant changes to her swing mechanics. Sheila needed to weigh the needs of her student against what she knew about the mechanics underlying the 'ideal finish position' and make a decision that would satisfy her student and maximize her opportunities for success on the golf course.

The existence of knowledge in one category, therefore, was often interrelated with knowledge in at least one other category. This finding would support previous research which describes the act of teaching as a highly complex cognitive activity in which teachers must apply their knowledge from across multiple domains (Leinhart & Greeno, 1986; Wilson, & Shulman, 1987). The expert teachers in this study demonstrated their ability to synthesize their PCK

quickly and act appropriately upon it. In practice, therefore, an expert teacher's PCK can be conceived as a composite of these associated knowledge components.

PCK Within the Teacher Knowledge Framwork

The findings of this investigation lend support to the general structure of Grossman's Teacher Knowledge Framework. Specifically, the study of these expert instructors revealed relationships between the four-part PCK construct and the complementary forms of teacher knowledge that Grossman identified and depicted in her Framework of Teacher Knowledge (Figure 1), i.e., knowledge of context, knowledge of general pedagogy, and knowledge of subject matter. These other forms of knowledge must be considered when examining and interpreting PCK.

For example, there were a number of special circumstances surrounding the practice of each of the instructors that contributed to shaping the unique character of their pedagogy. In the cases of Jan and Dan, the mere presence of the video equipment altered the learning experience for their students in substantive ways. The instructors' own practice was also influenced by the availability of these tools. Thus, each of the four learning environments in this study possessed its own distinctive contextual characteristics which interacted in

some unique way with the teacher's PCK to shape the overall teaching and learning experience.

Overarching Orientations Toward Teaching Golf

Throughout the course of this research study, a few salient themes became evident to the investigator. These themes were integrated with the PCK data gathered, and corroborated with previous research findings in the analytical process. One important finding that emerged from this analytical process is that each of the instructors displayed his/her own unique ***overarching orientation*** toward his/her teaching practice. This orientation became more distinguishable over the course of the investigation.

Teachers' orientations toward teaching reflect their general way of viewing or conceptualizing teaching their subject matter. These orientations are shaped in part by their knowledge, beliefs, and values (Ennis, 1994) and are reflected in their general style and approach to teaching (Mosston & Ashworth, 1990). A range of orientations toward teaching in sport and physical education settings has been identified in the literature. More specifically, the orientations of these four golf instructors were likely shaped by their life experiences, including playing experience, professional development opportunities,

apprenticeships, and their own teaching experiences. It is not surprising, then, that this study revealed the existence of a wide range of diverse teaching styles and instructional orientations among even a small group (4) of expert instructors.

As depicted in the PCK for Golf Model (see Figure 3), an instructor's overarching orientation toward teaching will exert influence on every other aspect of his/her PCK as well as his/her practice. As described in the third case study, there are a number of alternative conceptions of the golf swing which lend themselves to contrasting teaching approaches. Jan and Shirley both took different approaches to teaching the golf swing, yet they had each experienced a substantial degree of success[2] with their contrasting approaches.

It is worth noting that the four expert instructors' teaching approaches did not always produce the same results for all students. As Jan shared in his interview, he was not averse to abruptly canceling a lesson if he felt that he and his student were not making progress toward their goals. Shirley had also found that she had greater success with certain kinds of students. So it appears that an

[2] *Success* in this instance is defined as student satisfaction with the lessons.

influencing factor in the ultimate success of a golf lesson may lie in finding the appropriate match between the instructor's teaching orientation and the student's needs and characteristics, with the onus on the instructor to identify whom they can help and whom they need to refer elsewhere.

Multidimensionality of Pedagogical Expertise

Previous research studies on the topic of expert teaching have characterized pedagogical expertise as having a multidimensional character (Dodds, 1994; Housner & French, 1994). This view posits that a definition of expert teaching must reflect a much broader view of teaching, embracing the multidimensionality of teaching. In this view, teachers are likely to demonstrate their own pedagogical strengths, but not necessarily in the same ways or to the same extent over time. You's (1999) study presented five dimensions of pedagogical expertise (cognitive, clinical, technical, improvisational, and humanistic)[3].

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[3] Multiple dimensions of expertise (You, 1999):

> In the *cognitive dimension* of expertise, the expert teacher displays extensive knowledge and skills, a command of pedagogical content knowledge, and skillful decision-making.
>
> In the *clinical dimension* of expertise, the expert teacher displays an enhanced ability to diagnose problems, to represent fundamental problems to students, and uses conditional strategies for solving problems.

The findings of this study support this *multidimensional view* of pedagogical expertise. Although this particular investigation was focused on one aspect of teacher knowledge, PCK, which can be placed within the cognitive dimension of teaching expertise, various other dimensions of expertise surfaced throughout the course of the study.

Reconstructing PCK Model for Golf Instruction

The following framework is proposed for a reconstruction of the PCK model for expert golf instructors. Building upon the work of Grossman's study of English teachers (1990) and Magnussen, Krajcik, and Borko's (1999) study of science teaching, it suggests a few modifications to earlier PCK models, taking into account those particular characteristics that are unique to the teaching of a complex sport skill such as the golf swing. This framework

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In the *technical dimension* of expertise, the teacher displays many behavioral indicators of 'effective teaching', e.g. establishing routines, planning systematically, teaching approach, , a variety of assessment techniques, use of metaphor, and using reflective practices.

Fourth, the *improvisational dimension* of expertise in teaching dance embraced three themes in this study: flexible teaching, spontaneous teaching, and creative learning environment and equipment.

Fifth, the *humanistic dimension* of expertise in teaching dance, the expert dance teacher revealed student-centered teaching, teaching dance techniques, teaching accountability, and teaching as a mission.

consists of the same four general components which comprise Grossman's model, but a fifth component is included which accounts for an instructors' overarching orientations toward teaching the golf swing. Those components are:

A. Overarching orientations toward teaching the golf swing.
B. Knowledge of purposes and goals for teaching at different levels.
C. Knowledge of student understanding and assessment.
D. Knowledge of the golf swing model (and curricular knowledge).
E. Knowledge of teaching strategies.

The proposed framework is depicted in Figure 3, and is described conceptually below.

A. Overarching Orientations Toward Teaching the Golf Swing

1. Philosophical approach to teaching, including pedagogical beliefs and assumptions.
2. Predominant teaching style(s).
3. Theoretical conception of their particular swing model.

A conceptual framework describing pedagogical content knowledge in golf instruction would be incomplete without addressing the teacher's overarching orientations toward teaching golf. Magnussen, et.al, (1999) define an orientation as a general way of viewing or conceptualizing one's teaching, to include a teacher's existing knowledge and beliefs about teaching, his/her preferred or predominant teaching style, and his/her theoretical conception of the golf swing. The significance of this

overarching component is that it acknowledges the influence of one's practical knowledge and philosophical beliefs. An orientation toward teaching can serve as a "conceptual map" that guides instructional decisions about issues such as prioritizing daily objectives, making choices about instructional activities, selecting of curriculum resources, and assessing student learning (Borko & Putnam, 1996).

The instructors in this study had developed their own particular teaching style that was founded upon their conception of the full swing and their own understanding of how best to teach it - an understanding that had been shaped and refined over many years of playing and teaching experience. The instructors also referred to the important influence of their mentors upon their development as teachers. The amalgamation of all of these experiences and influences helped to shape their overarching orientations toward teaching.

B. Knowledge of purposes and goals for teaching

1. Knowledge of purposes, goals for students at different levels of ability (Beg, Int., Adv.).
2. Adapting teaching goals for different skill levels.
3. Accommodating the range of student abilities, needs, and interests.

This component includes the instructor's knowledge of the purposes of instruction for students of various levels of skill, ability, and interest. Extensive knowledge in this area enables the teacher to provide meaningful experiences for a diverse population of students. Ultimately, the match between the student's learning needs, or preferences, and the philosophical approach of the instructor becomes an important factor in determining the ultimate success of the learning experience.

C. Knowledge of student's understanding of the full swing

1. Knowledge of *cognitive* conceptions, misconceptions, or other difficulties students may have when learning the full swing.
2. Knowledge of motor skill acquisition process, including principles of feedback, practice, training, etc.
3. Knowledge of skill assessment techniques, including direct observation and video analysis techniques.

The modifications to the Grossman model are proposed in this section in order to account for the instructors' knowledge of the learning process across both the cognitive and psychomotor domains. This PCK element includes knowledge of the common problems that students are most likely to encounter, and knowledge of the popular myths and misconceptions about the golf swing that exist, e.g., "You lifted your head", or "Keep your left arm straight". This knowledge component also includes the instructors'

understanding of motivational factors underlying a student's participation, and knowledge of the 'emotional highs' or 'lows' that can affect student learning. The ability to encourage students to persist in the face of repeated failure or to risk making a change in their swing can be difficult in the face of anticipated failure. Dan provided an example of his capacity in this area via an occasional "pep talk".

Each instructor displayed a deep understanding of the nature of the learning process as specifically related to the golf swing. Repeated references by all four instructors to *student involvement* and *engagement* by the students in the learning process suggested an understanding of learning as an "active process of knowledge and skill acquisition" on the part of each student. Their teaching practices supported these statements, particularly those of Dan and Jan, who worked intensively with their students to help them analyze their swings with the video equipment.

D. Knowledge of the golf swing model and other curricular knowledge

1. Knowledge of various full swing models.
2. Knowledge of the specific swing model employed and associated manuals, books, videos.
3. Knowledge of swing-related skill progressions.

This component includes knowledge of a wide range of curricular approaches (full swing models) as well as detailed knowledge of the preferred swing model taught by the instructor and related curriculum materials. It also includes the knowledge about both horizontal and vertical progressions for the subject matter. Horizontal curricula include closely-related skills and knowledge, e.g. 'short game' concepts and skills. Vertical progressions are progressions in skills and concepts specifically related to the full swing.

E. Knowledge of instructional strategies and representations for teaching content

1. Knowledge of specific learning activities and drills designed to teach movement patterns and kinesthetic feel.
2. Knowledge of instructional strategies or representations designed to teach facts, concepts, principles.
3. Knowledge of instructional materials, aids, and equipment.

This final component includes all instructional strategies used by the instructor to help his/her students understand important ideas, concepts, and principles. It also includes strategies designed to promote kinesthetic awareness or 'feel' for the swing and to help them develop the most efficient swing motion.

Summary

In summary, the examination of the four PCK components cannot be accurately interpreted without recognition of the interrelationship of these knowledge components in practice. Nor can they be fully understood without an acknowledgement of the overarching teaching orientations of these instructors. While Grossman's model serves as a useful conceptual guide, its graphical representation does not account for the mutual influence each of these components have upon one another. A meaningful interpretation of expert teaching must acknowledge the complex nature of teachers' PCK and how the multiple strands of knowledge are truly woven together.

This assertion is supported by descriptions of expertise in the literature, i.e., that experts have sophisticated and elaborate knowledge of class management, subject matter, pedagogical principles, and curriculum development (Rink, French, Lee, Solomon, & Lynn, 1994; Ennis, Mueller, & Zhu, 1991); and they have the ability to synthesize their knowledge of a skill or concept into meaningful information for their students to comprehend and use (Siedentop & Eldar, 1994). Having multiple and alternative ways of representing information and skills helps the expert teacher assist their students in

understanding new concepts and acquiring new skills. Finally, the overarching orientations of these expert instructors held influence over every aspect of his/her PCK and teaching practice. These orientations were highly individualistic and personal in nature. Therefore, they are resistant to codification or formal analysis. However, they did emerge in this investigation as a significant factor in shaping the pedagogical expertise of these expert instructors.

Conclusions, Implications, and Recommendations

Building the Knowledge Base for Teaching

A great deal of descriptive data was collected during this study that did not find their way into the final presentation. The knowledge and teaching repertoires of expert teachers are too rich and extensive to be fully described and presented via text format alone. An inherent difficulty in attempting to interpret teachers' practice is that often the individual cannot articulate all that they know about teaching. While the researcher has attempted to present the best evidence to be found that describes their PCK, much of their knowledge remains, in fact, inert, or as Schon (1983) described it, "knowledge in action".

Therefore, in order to make this knowledge more easily

accessible to future teachers, it is recommended that future sport pedagogy researchers create a digital video database of teaching strategies and representations of PCK across different sport and physical activities. Teaching vignettes could be captured, edited, and categorized according to the PCK model. The subtleties, nuances, and skillful timing of these instructors in their practice would be displayed to offer robust representations of the skill and artistry of expert teachers. This video database would represent an evolving knowledge base for golf instruction, one that would allow novice instructors to view effective teaching strategies specific to golf, while also considering contextual influences and other forms of teacher knowledge. New technologies are now available which make this a worthwhile undertaking. The PCK conceptual framework could evolve further in ways that would give younger teachers a valuable way to think about developing their own competency as a teacher.

Exploring Multidimensionality in Expert Teaching

Research efforts exploring the nature of expertise in teaching are broadening in scope. The focus on teachers' behaviors, knowledge, or cognitive processes is widening to include other dimensions of teachers' practice. Theories such Yinger's (1987) view of teaching as a form of

improvisational performance or You's (1999) assertions about the *multidimensionality*[3] of pedagogical expertise deserve further exploration.

An important implication of this study of teachers' practice and PCK lies in the discovery of the *interplay* between their knowledge, their beliefs (which impact both what and how teachers teach), and their actions. In fact, pedagogical expertise has been conceptualized as the synthesis of teachers' knowledge and beliefs (Ennis, 1994). The beliefs of teachers impact how teachers design teaching and learning objectives, how teachers make instructional decisions, how teachers organize curriculum, how teachers employ instructional strategies and activities in their practice to achieve the learning tasks, and how teachers evaluate student learning (Clark & Peterson, 1986; Ennis, 1994). In other words, teachers' beliefs about teaching determine when, how, and why teachers utilize their knowledge to structure their teaching practices (Ennis, 1994). Both research and common sense alike dictate that the nature of expertise in teaching can best be investigated and understood when actual teaching practices are carefully examined and those beliefs about teaching examined more completely. This *interplay* between the

[3] See definition on pages 138-139.

beliefs, knowledge, and orientations of sport instructors should be investigated further.

Constructivist Perspectives on Teaching Practice

Historically, effective teaching practice among physical education teachers and sport instructors has been defined by the general principles and guidelines derived from process-product research, a body of research that assumes a behavioral view of the teaching/learning process. Therefore, traditional conceptions of sport and physical education instructional expertise reflect this behavioral perspective. Researchers have discovered, however, that teachers holding different beliefs about teaching and learning will establish different kinds of teaching practices (Yager, 1991), and teachers will tend to teach in accordance with their own beliefs about how students learn (Ennis, 1994).

The call for educational reform in recent years has given rise to alternative conceptions of teaching and learning. Constructivist learning theory[4] has been increasingly influential in shaping teaching practices

[4] *Constructivism* theory characterizes learning as an active process in which the individual actively seeks out and constructs information in relation to the task at hand and the environmental conditions prevailing at any given time (Kirk & Macdonald, 1998). Constructivist learning theory is concerned with the connections that learners make between context and their existing theories or prior experience with a given task or phenomenon (Anderson, 1994).

across all subject areas during the past decade (Rovegno, 1992; Florio-Ruane & Lensmire, 1990; Chen, 1997). However, research on expert teaching in physical education and sport settings has paid relatively little attention to constructivist-oriented teaching practices of expert teachers. In one study of expert and novice physical education teachers' use of constructivist-oriented teaching practices, significant differences were found (Chen, 1997).

The constructivist perspective holds promise for the development of instructional strategies that would focus on teaching for understanding, with an eye toward situational factors that may promote or inhibit learning (Kirk et al., 1999). If used to complement to the predominantly behavioral perspective on learning found in research on physical education and sport, constructivist learning theory may offer an important alternative perspective for understanding the complex nature of the teaching and learning process (Anderson, 1994). Future investigations into the teaching practices of expert sport instructors should explore this theoretical perspective.

Sport-specific Research

Future studies of sport-related PCK must also consider the unique nature and characteristics of the specific sport or physical activity being studied. Attempts to generalize

pedagogical research findings across the diverse array of sports/physical activities may contribute to an oversimplified view of the teaching process. The reduction of the inherently complex and multidimensional act of teaching to a set of generic pedagogical guidelines is analogous to recommending generic pedagogical strategies for all academic subject matter. Future research on expert teaching and teachers' PCK should limit its scope to the specific sport or physical activity being studied. Finally, it is hoped that the results of this investigation will add a new perspective to the existing knowledge base for golf instruction, and will stimulate further research to uncover and describe sport/activity-specific pedagogical content knowledge.

APPENDICES

APPENDIX A

Instructors' Informed Consent Form

APPENDIX A

Instructors' Informed Consent Form

You are being asked to participate in this doctoral research study by Robert H. Benham, who is examining the teaching practice of expert golf instructors. The investigator will collect qualitative data from participant's responses to interview questions, observations of the instructors' teaching sessions, and from analyzing pertinent documentation. The interviews and instructional sessions will be video taped in order to supplement the investigator's field notes.

All information obtained from this research will remain confidential. The names and teaching programs of all participants will remain anonymous. Should this study be published, instructors' names and institutions will not be identified in the study without written approval. The privacy of all participants will be protected to the maximum extent allowable by law. Participants are under no obligation to the investigator and may terminate involvement in the study at any time.

Additionally, if participants have questions regarding their role and rights as a subject of research, or if they have any concerns about the research, they may contact the Institutional Review Board (IRB) directly. Their address is:
David E. Wright, Ph.D. Chair,
University Committee on Research Involving Human Subjects
Michigan State University
(517) 355-2180

I hereby consent to voluntarily participate and cooperate in this study.

Participant's Name Date

APPENDIX B

Students' Informed Consent Form

Appendix B

Students' Informed Consent Form

You are being asked to participate in this doctoral research study by Robert H. Benham, who is examining the teaching practice of three expert golf instructors. The investigator will video tape a few lessons in order to supplement his field notes. There is a chance that the video camera might capture images of several students during this process.

All information obtained from this research (including videotapes) will remain confidential. The names of students and teaching programs will remain anonymous. The video tape will be viewed only by the investigator and the instructor. It will be kept in a secure location at all times. Should this study be published, instructors' and students' names and institutions will not be identified in the study without written approval. The privacy of all participants will be protected to the maximum extent allowable by law. Participants are under no obligation to the investigator and may terminate involvement in the study at any time. Participants may contact the researcher in the event that they want to discuss any questions about the research. (Contact Info: Robert Benham, 1825 N. Harrison, E.Lansing, MI 48823; (517)351-9438; benhamro@msu.edu)

Additionally, if participants have questions regarding their role and rights as a subject of research, or if they have any concerns about the research, they may contact the Institutional Review Board (IRB) directly. Their address is:
David E. Wright, Ph.D. Chair,
University Committee on Research Involving Human Subjects
Michigan State University
(517) 355-2180

I hereby consent to voluntarily participate and cooperate in this study.

Participant's Name Date

APPENDIX C

Letter of Introduction and Invitation

APPENDIX C

Letter of Introduction and Invitation

May, 2001

Dear Instructor,

I am a doctoral candidate at Michigan State University in the Department of Kinesiology. As partial fulfillment for a Doctor of Philosophy degree in Kinesiology, I am working on my dissertation study. This study will be a qualitative analysis of expert golf instructors.

You and a few other instructors are being invited to participate in this study. The purpose of this study is to observe the teaching practice of expert golf instructors and explore their *pedagogical content knowledge* by examining planning strategies, teaching plans, and post-lesson thoughts and reflections. Pedagogical content knowledge has been defined as that special knowledge that is the unique domain of teachers, i.e., *how one effectively teaches certain skills to particular learners in particular contexts.*

I would like to observe a few group lessons that you may be offering to either beginning or advanced-beginning students and that might be scheduled in May and June, 2001. In order to capture these lessons for subsequent analysis, I will need to video tape them. This method will involve the incidental videotaping of your students, and I will seek their permission beforehand to do this. The videos will be seen only by you and I.

Your participation is strictly voluntary, and all information about you will remain confidential. Your name and the name of your company will not be identified in this study without your permission.

The results of this study will add to the knowledge base about expert golf instruction, and they may be published in the future. If so, any decisions about identifying you or your company will be left to your discretion.

Thank you for your consideration. I will call you in a few days to discuss your interest and the study in more detail. I look forward to having you participate in this study in the near future.

Sincerely,

Robert H. Benham
Doctoral Candidate
Michigan State University
Department of Kinesiology

APPENDIX D

Pre-Observation Interview Guide

Appendix D

Pre-Observation Interview Guide

Biographical Questions

1. How did you first become interested in golf?
2. How much golf have you played professionally?
3. How did you become a teacher of golf?
4. How long have you been teaching golf professionally?
5. Are there any people who were particularly influential to you as a novice golf instructor?
6. What role did your mentors play in your development?

Philosophical Questions

1. Could you comment on your own teaching philosophy?
2. What philosophical views do you hold about teaching the full swing to beginners and intermediate students?
3. How did you arrive at this philosophy?
4. What do you think makes for an *expert* golf instructor?
5. How is *expertise* in teaching golf developed?
6. How do you continue to grow professionally or improve in your own teaching practice?

PCK Questions (Component C - Curricular Knowledge)

1. Tell me about your full swing philosophy.
2. What are its basic tenets?
3. How do you break down the skill for beginners?
4. What (progressive) drills do you employ?
5. Do you use any instructional resources (books, etc.)?

APPENDIX E

Post-Observation Interview Guide

Appendix E

Post-observation Interview Guide

Pedagogical Content Knowledge: Component A

1. How do your goals for teaching vary for students at different skill levels?
2. How do you accommodate the wide range of skills and abilities among your students?
3. How do you address the needs of the individual student?

Pedagogical Content Knowledge: Component B

1. How do you assess your students' skills or knowledge?
2. What are the classic problems or dilemmas related to teaching the full swing that you contend with?
3. How do you deal with this?
4. How do you counteract the natural mistakes or most common errors made by your students?
5. When you see several mistakes at once, it might be tempting to correct all of them. What are the most important flaws to correct first?

Dimensions of Teaching and Learning

1. What stands out about the lesson I observed today?
2. Do you feel particularly good about any aspect of the lesson? What? Why?
3. Did any aspect of the lesson particularly concern you? What? Why?

Impact of the investigator on the research

1. Did my presence in your class have any effect on your teaching or your planning? If so, to what extent?
2. Did your participation in this research project, in general, have any effect on your teaching or your planning? What effect?

Probes that follow the initial questions will be generally non-directive; e.g. "Anything else?" or "Can you tell me more about that?" The intent of the probes is to fully explore the teacher's thoughts without putting ideas into their heads.

APPENDIX F

Common Problems, Myths and Misconceptions

Appendix F

Common Problems, Myths and Misconceptions[1]

1. ***Misunderstanding of the motor skill learning process. Leading to unrealistic expectations.*** Each of these instructors recognized the inherent difficulties and challenges facing the average golf student, few of whom understood the requirements for effective practice of motor skills. Most students greatly underestimate how much practice time is required for a new swing movement to become firmly established. As Traci explained to one of her students:

> I guarantee you can do it, but we'll have to build into it by getting on the range so you build into it.... It's like I told a lady today. Making a change is like losing weight. You know, like when people go on these fast gourmet diets? And they end up putting more weight back on quicker and everything. But if you lose weight the *right* way you lose it and it *stays* off. It's the same with the golf swing. You take it, practice it, and work on the swing, not on the course, but here on the range, and it stays with you.

2. **Focusing on the actual result of each swing attempt (ball flight) vs. focusing on the *skill form or movement acquisition process.*** Each of these instructors employed strategies to redirect their students' attention away from the occasional 'whiff' or errant shot. It is a challenge for students to control their emotional reactions to their mistakes, and sometimes these reactions inhibit the learning process.

3. **The belief that females' breasts get in the way.** Traci explains:

> I do a national seminar called 'The Myths of the Swing'. A big misconception out there is that females' breasts get in the way of their swing, but they absolutely don't get in the way if they learn to turn properly. If they turn, like, I think you saw me today put the club in somebody's stomach, and they had to extend their arms out, into a triangle, then they have to move, and the breasts don't get in the way of the swing. So it's a big myth. They get in the way if they get into a controlling mode, and if they don't move their torso and their hands go across their chests.

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[1] These examples represent knowledge within "Category B" of the PCK Model.

4. ***The 'Yo-Yo Effect'.*** Traci explains:

> Another myth is that beginners think their job is to get the ball in the air. A lot of beginners just want to advance the ball and get it in the air, so they get into the 'yo-yo effect', where they might be 5-6 inches tall in reality, but when they set up they're 5-4, and when they take away the swing they try to go up to six foot, and coming back down they try to help it get it up, they go down to 5-2, instead of staying at 5-4 at set up, take it back, and stay at the height, their spine comes out of it, so the people will say, 'Oh, you raised your head', but it wasn't the head, it was their body elements, the movement of their spine up and down, so I call that the 'yo-yo effect'.

5. **The reverse weight shift.** Traci explains:

> That is where they keep the weight on their left foot for too long. When they take the club back and lift their arms, which reverses the weight back to her left side (for a right-hander). When they swing down all their power is unleashing the club from the left side, and they have nothing to hit the ball with.

6. **Poor impact position,** caused by the 'early release' of the club on the downswing. This was a problem encountered frequently by the instructors. In Dave's lessons, he questioned his students about their problem, which was described by two of his students as "not getting any distance" and "not *letting the club go"* as it passed through the impact position". He utilized the video analyzer to work with the students in diagnosing and correcting this problem. In the ideal impact position, the hands were positioned slightly *ahead* of the ball.

7. **"Keeping our heads still" or "Keeping your eye on the ball".** Sheila explains:

> I used to teach those when I was first starting to teach, you know, keep your head down, look at the ball, look at the ball… Well, what happens with that thought is, people focus on keeping their head down so much that it doesn't allow their body to twist and turn. Yes, we want the head to be *steady,* but you don't want to keep your head down so long that you cannot complete what you've started. Meaning you have motion on your back swing and you need to continue that motion on your follow through. So, yes, your head should be steady, but not perfectly still.

8. **"Keeping the left arm straight" on the backswing.** Sheila explains:

The left arm should really just be extended, and when people think, 'straight', they tend to lock it in. So I don't like that concept. If you 'lock in', I mean you *lock* any part of your body, then you're gonna be too tense and too tight…and again it's an age thing. People in their 50's or 60's, and older (A2), can only turn so far. Or they might have shoulder problems. So I also have to deal with health problems in my teaching.

9. **"Swing path misconceptions"**, or how students think about the path of the club head as delivered through impact. John explains:

> Many students have an incorrect conceptualization of what happens when the ball hits the club. A lot of players think they need to swing down the target line to hit a straight shot. On the contrary…the arc of the clubhead needs to be traveling from inside toward the ball, or on an inside arc to the ball.

10. **"Weight shift misconceptions".** John explains:

> I think that the predominant misconception that I see, based on my teaching philosophy, is that weight shift is of great concern to a lot of students. The biggest misconception about weight shift is rotation. If you set up properly and turn properly, the weight should travel from a 50-50 split to 60-40 left, cause I think if you are rotating in a three-dimensional space, with correct spine tilt, axis tilt, and all the correct movements, that the weight will move on your feet if you turn properly. But you are asking a beginning or intermediate player to think about, "OK now, the more you move laterally, you try to move your weight from one foot to the other", I think that is just too complex neurogically for them to handle as well as the kinesiological movement of it. I never talk about weight shift. If you turn like this where's your weight? That is part of the system - fewer moving parts. Because the more lateral movement the player exhibits, the more it is going to affect impact…and the more it is going to change their conceptualization of what happens at the bottom of the swing. I mean, the more you move sideways the more damaging effect it has.

APPENDIX G

Instructional Strategies

Appendix G

Instructional Strategies, Learning Aids, Resources

Described in this appendix are the instructional strategies employed by the four experts who participated in this study. These strategies were observed in person by the investigator and/or during the videotape analysis process. Many of the strategies were discussed with the instructors during the post-observation interview.

These instructional strategies included activities such as demonstrations or verbal representations designed to teach facts, concepts, or principles related to the full swing. They also included activities and drills designed to teach kinesthetic awareness or 'feel' for the swing. Also described in this appendix are several teaching resources and learning aids used by the instructors.

Strategies Used to Convey Fundamental Ideas, Concepts, and Principles of the Golf Swing

One strategy employed by all four of the experts involved their use of ***analogies*** and ***metaphors*** when trying to convey *concepts* to their students included the following:

1. As we learned in her case study, Shirley spoke of a *ferris wheel* when describing the circular back swing movement, and she used the term *crooked road* to describe an improperly bent left elbow. She found these metaphors particularly helpful with her younger students.

2. Traci used another **metaphor** in her explanation of how clubhead speed is generated on the downswing:

> When teaching them about clubhead speed…I put my hands to my side and I go around in this big circle. You can't go very fast, but if you put your arms up like airplane wings, they can twirl around. If you put a club in your hands, it really twirls and you're like a helicopter. How do you stop yourself? By pulling it in. So the reason we want to clear the hips is so that they can get more fire power away from their body. That's where the power is.

3. Dan used a basketball **analogy** in order to communicate an important concept to his young students. This concept involved the process of learning a motor skill over a period of time and the importance of progressing from simple movements to more complex movements over a period of time. Dan understood the need for students to make gradual progress from one level of difficulty to the next level in a sequential order. He explained:

> I use a basketball analogy all the time. If a person came to me and said, 'Dan, I want to be the team's 3-point shooter, but I haven't played basketball before.' If I'm the coach, I'd say, 'Well, it might not be this afternoon, but we're going to keep that goal in mind and we intend for you to eventually get there', OK? But this is the approach that we are going to have to take if you are going to accomplish that goal. First, we're not going to start our development at the three-point line. We are going to start close in, next to the basket, and we are going to start with good, sound shooting technique. And when the ball starts going in, we'll know that it's time that we might be able to back out. And if I can make it from three feet, then I've got good reason to believe I might be able to make it from five feet. But if I can't make it from ten feet, I'm not going out to twenty feet. OK? We're working our way towards the three point line, but we need to build confidence in the movement as we go.
>
> Which is what happens when a player goes to the driving range, and pulls out their driver. You see, players who aren't capable of hitting it… they just can't, and they just get demoralized. I'd say, 'Man, that's like shooting from the three point line! Why would we ever start from out there? I mean, who would expect you to hit that (difficult) club good. No one. I mean, you'd get demoralized if I started you at the 3-point line. You'd shoot and miss all the time, and you would start ruining your technique trying to get it there, and you just wouldn't get any better.

Drills and Learning Activities used to Teach Kinesthetic Feel.

1. Traci used many different strategies designed to help her students develop the proper feel for the swing. She compared the downswing motion of the golf swing to an underhand toss motion. This analogy was especially helpful for her adult beginning students:

> OK, you all remember last week, we talked about 'parallel back', and then we just 'tossed it down the line'. Hit a few of those now, five at a time, while your partner watches you.
>
> OK. That time you 'tossed it' with your shoulders (incorrectly). Now, would you use your shoulders to toss a ball?

She referred her students to this fundamental motor skill because the feel and movement of the downswing motion is similar to that of the underhand toss. This is a subtle, yet powerful way of expressing the problem in terms to which many novices can relate.

2. Traci's instructional strategies also included providing for her students a target line as a ***visual cue***.

> I think using *target lines* is the first thing you have to do. You have to show them they need to hit at something, not just hit to an open area, and so we always use the strings out there. I think that a lot of people just come onto the range and just hit balls. I think that we have to focus on the fact there is a target out there. And the target is putting the ball in the cup. So I think that working down the target line is very, very important.

Traci would line up two fluorescent green-colored strings - parallel with each other - to provide the proper target lines for her students. One string would represent the line of intended ball flight and the other would provide a guide for foot placement.

3. Another strategy that Traci used involved the ***physical manipulation*** of her students in order to help them experience various body movements during the swing. She did not hesitate to take hold of an arm, hand, shoulder, hips, and place them into positions that promoted more effective full swing movements.

Dan enjoyed the challenge of creating **drills** that would fit the unique circumstances each lesson provided. In addition to his explanations and demonstrations, Dan provided his students with multiple swing exercises designed to reshape their swing pattern and promote a new swing 'feel'.

> You know, I would say every week I use a drill that I've never used before. Only because I probably just thought of it, or because it seemed to fit this guy's situation...because every student is unique, everybody is a little different. I might say,

"I've never seen that before, and then I'd say, "OK, now let me think about it. Hmmm. How am I gonna…from that position, dictate this shape". You know what I mean? So a lot of drills, I've only used on one person.

One of the common problems encountered by beginning golfers is known as the "early release" of the club on the down swing. An early release robs the golfer of much of his/her potential power, ultimately shortening the distance of their shots. Dan employed several **drills** to help his students overcome the "early release" problem.

4. One of these drills involved re-positioning the golfer's feet at the address position in order to create a closed stance, in which the golfer's front (left) foot is positioned further forward than the rear (right) foot. He would then ask the golfer to swing 'normally'. Dan explained that swinging from this position forced the golfer to alter his/her release pattern.

5. Another **drill** for the "early release" problem involved forcing the student to hit the ball underneath a barrier, in the form of a long string or a rope, stretched across two poles at a height of 3 feet and placed approximately 10 feet in front of the tee box. Dan explained that by forcing the golfer to hit the ball underneath this barrier, he was promoting a delayed release of the clubhead.

6. Traci used a **one-hand swing drill** with her students. One of them was having difficulty with her right hand rotation on the down swing. Traci had her practice swinging the club with her right hand only so that she could feel the weight of the club pulling through the swing.

> Let the club pull you at this point. You take it back but let it pull you on the down swing." OK. Just one hand. Hit a few. This is a difficult drill and you are doing great with it. See the difference? We want the club more in your fingers, which will loosen up your wrist. As you come under, let it release.

Dan believed strongly in the use of **barriers** to teach proper feel. He explained how, by inserting two club shafts into the ground he could position the barrier

in just the right position to force his student to reshape his swing.

> I like to put (the student) in a position to *feel* the correct move. Now he gets a great feel for it. I'm not doing that just to get his arms to swing that way. The person who swings way over the plane... his body gets way out here like this, and that's why pulls his club over the plane, but when I put this barrier here, he doesn't feel inclined to do that, cause he thinks the club is going to go in there. He actually stays back so his club can fit under the barrier and now he's feeling a different sequence.

Demonstrations and Explanations

All instructors provided their students with visual representations or demonstrations of the swing. They also offered detailed explanations of important swing concepts. Features of these instructional strategies are described below:

1. A strategy of Traci's involved **positioning** herself strategically between her student and their target. When **demonstrating** key points for her students, Traci was conscious of her position. She described her rationale for positioning herself strategically during the lesson:

> When you watch me teach, I stand to the side and in front of them. I will observe from behind sometimes, but when I go into teaching and explaining something I always stand between them and the target. I do that because when they turn I want them always seeing the target, and not turning away from it. So if I demonstrate something with them and have them repeat it with me, I'm always, if it's a right-handed golfer, standing in front to their left, and if it's a left-handed golfer, I'm standing to their right, so that they're looking down the target line and they're also looking right at me.

2. All of the instructors provided **demonstrations** at various points in their lessons. Some of those demonstrations were performed as feedback to the students, where the instructor would mimic a student's faulty swing. Other demonstrations offered a visual cue for the student on how to execute the swing properly.

3. The use of the **video analysis system** by Dan also enabled him to provide effective demonstrations of the full swing for his students.

Knowledge of Instructional Materials, Aids, and Equipment

1. Both Jan and Dan made extensive use of sophisticated ***video systems*** as a learning tool that served multiple purposes. They felt that the feedback provided by the video system was a key element in their lessons. Dan explained that the instant replay and the freeze-frame features of the video system enabled him to convince his students of their unique swing deficiencies. It was especially useful in enabling them to illustrate the difference between a correct and incorrect impact position. Dan explained that many students have difficulty interpreting the 'feel' of an incorrect movement, and therefore sometimes doubt the accuracy of his assessment:

> This puts us both on the same side. I mean if I show a guy and I'm trying to convince him that he's over the top or over the plane or whatever, and he doesn't believe me, he's saying to himself, 'I don't think that guy really sees it right; I don't think I'm doing that.' But if I show him, he says, 'Is that me?' You know, like, he'd say, 'Well that's not me!'. I'd say, 'That looks like your hat.' He'd say, 'But I don't swing like that.' I'd say, 'I think you do. Let's watch it again. You think that's you?' 'Yup,' he says, 'But I don't do that. I'd say, I think you do.' He says, 'We gotta fix that.' And I'd say, 'Yeah, I think you're right'. I mean, then we're on the same team now. I'm not ripping him apart.

2. Traci talked about a learning aid she used to help students develop the desired swing feel:

> One thing I use is a modified 3-wood shaft, with a five-foot long shaft on it, to teach someone what clubhead speed feels like…I have to sometimes *show* them what the correct feel is like. Like with grip changes. If I change somebody's grip, I have a white-out marker that I use to outline their new grip so that when they leave me they have something with them that they can use to see the difference

3. Traci and Dan also both used a grip training device, a club with a molded grip that formed slots for placement of the student's fingers. This device would force the student to place their hands in a fundamentally-correct position during the training session.

4. Jan described several of his instructional aids:

> …like the impact bag. It provides resistance down at the bottom so that they can hit a solid object and hold their left arm and left wrist and club shaft in alignment.
>
> …straps, and other things I would classify as kinesthetic training items. The straps are used to keep their elbows tight. I also have devices to put on their arms so their arms don't bend too much. Other things, like rods, sticks, a plane board made of foam that I hold up there so that they get an idea of how all these parts need to line up on the back swing. I've got other things like a mirror, you can hold a mirror out to let a student see how to line up all the components. You just keep going and going and going till you find something that works!

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