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Evidence of Pedagogical Content Knowledge Among High School Band Directors and University Applied Music Teachers in the Context of Student Self-Evaluation

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EVIDENCE OF PEDAGOGICAL CONTENT KNOWLEDGE AMONG HIGH SCHOOL
BAND DIRECTORS AND UNIVERSITY APPLIED MUSIC TEACHERS IN
THE CONTEXT OF STUDENT SELF-EVALUATION

A Thesis

Submitted to the Graduate Faculty of
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Music

in

The School of Music

by
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Abstract

The purpose of this study was threefold: (a) to seek evidence of pedagogical content knowledge (PCK) in high school band directors' (generalists) and applied music teachers' (specialists) evaluations of musical performance; (b) explore the similarities and differences between generalists' and specialists' perspectives on PCK; and (c) compare the evidences of PCK to student musicians' self-evaluations of same performances. A basic interpretive qualitative approach with data collected through a think-aloud procedure applied to evaluation of solo music performance videos revealed four themes indicative of PCK—Aural Concept, Conveying Information, Effecting Change, and Uncertainty—and attendant sub-themes.

Generalists and specialists provided a rich trove of evidence of PCK. Several findings appear to be unique to PCK in music, among them teacher uncertainty and the sheer variety of pedagogical means available to experienced teachers. Generalists and specialists were remarkably the same in their verbalizations about student performance, casting doubt on whether the generalist/specialist dichotomy is real relative to experienced teachers' dealings with PCK in music. Apparent differences in educational and performance background did not result in actual differences in the way that teachers responded to the same evaluative tasks and the ways they thought from the perspective of PCK. The difference in verbalizations between teachers and students, not surprisingly, was wide. The magnitude of the gap, indicative of students' pedagogical needs, was striking.

Introduction

Plato once said that music “is a more potent instrument than any other for education” (Plato, 380 BC, p. 344), and historian Henry Adams stated that “a teacher affects eternity; he can never tell where his influence stops” (Adams, 1907, p. 290). Both of these statements can be applied to the importance of the music teacher, whether a high school band director or a university applied music teacher. Despite both having similar university experiences in general studies and a musicianship core, the rest of the content within their college education is quite different. The National Association of Schools of Music (NASM, 2013) describes music education majors as needing to have the “ability to teach music at various levels to different age groups and in a variety of classroom and ensemble settings in ways that develop knowledge of how music works syntactically as a communication medium and developmentally as an agent of civilization,” and performance majors as needing to have “comprehensive capabilities in the major performing medium including the ability to work independently to prepare performances at the highest possible level” (NASM, 2013). Therefore the music education major might be viewed as a generalist while the music performance major might be viewed as a specialist. Often the roles these two groups assume in the professional world mirror this generalist/specialist dichotomy.

This is a study about pedagogical content knowledge and the extent to which high school band directors (generalists) and university applied music teachers (specialists) use it to guide their thinking relative to the evaluation of music performance. Shulman (1987) contends that for teaching to be effective, knowledge is not enough, that in fact a certain kind of knowledge—pedagogical content knowledge—is necessary. Shulman defined pedagogical content knowledge (PCK) 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, and presented for instruction.” He continued: “pedagogical content knowledge is the category most likely to distinguish the understanding of the content specialist from that of the pedagogue” (Shulman, 1987, p. 8).

In music, investigators have studied the presence of PCK among preservice music educators (Ballantyne, 2006; Ballantyne & Packer, 2004; Millican, 2014) and secondary band and orchestra directors (Millican, 2008, 2013) and in private lessons (Henninger, Flowers & Council, 2006), but have yet to describe how the PCK of high school band directors and applied music teachers might manifest itself in high school instrumental performance evaluations. In addition, previous research has not examined the relationship between PCK and high school musicians’ self-evaluations of music performance.

Review of Literature

The following review of literature represents a compilation of scholarly findings related to PCK, applied music teaching, and the evaluation of music performances. Literature coverage reflects that which is most reflective of PCK and its manifestation within the teaching of preservice, expert, and applied music teachers.

Pedagogical Content Knowledge

Previous research has suggested that PCK is present within the methods of teachers of all subjects and grade levels (Shulman, 1986). The studies included in this portion of the review of literature define PCK (Shulman, 1987) and present evidence of the presence of PCK in the thinking and teaching of preservice music educators (Ballantyne & Packer, 2004; Haston & Leon-Guerro, 2008; Millican, 2014), private lesson teachers (Henninger, Flowers, & Council, 2006), secondary music educators (Millican 2008, 2013), and music and non-music professors (Fernández-Balboa & Stiehl, 1995).

Shulman (1987) addressed the question: What knowledge do effective teachers use? The answer to this question was the result of many hours of observing effective classroom teachers and how they combined various elements of knowledge and skill. Shulman arranged these combinations of knowledge into content knowledge, general pedagogical knowledge, curriculum knowledge, pedagogical content knowledge, knowledge of learners and their characteristics, knowledge of educational contexts, knowledge of educational ends, and how they function in the classroom (Shulman, 1987, p. 8). PCK was determined to be of the utmost importance because it is a combination of content knowledge, curriculum knowledge, general pedagogical knowledge, and knowledge of learners and their characteristics. Specifically, PCK was defined as: “how

particular topics, problems, or issues are organized, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction” (Shulman, 1987, p. 8). Often, PCK is what separates music educators from professional musicians who teach, as music educators have to combine their musical knowledge with teaching skills (Millican, 2008). Few studies have investigated PCK within the context of music education.

Haston & Leon-Guerro (2008) explored the sources of preservice instrumental music teachers’ acquisition of PCK. The study focused on identifying examples of PCK within preservice teachers’ teaching and the sources to which preservice teachers attributed their PCK. Video recordings of preservice teachers conducting a rehearsal were collected and analyzed for events that demonstrated PCK. Exemplary excerpts were selected and reviewed with each participant. Preservice teachers were asked why they stopped the rehearsal, what they were trying to accomplish, and if they recalled where they learned that pedagogical technique. They identified observation, methods courses, and cooperating teachers as primary sources of PCK. Despite this, no prominent source of PCK was found. Haston & Leon-Guerro recommended that determining where preservice teachers go to access PCK is the first step in designing college methods courses to better account for PCK.

Ballantyne and Packer (2004) defined music PCK as “knowledge of music teaching techniques, engaging students with music in a meaningful way, implementing the music curriculum effectively, assessing students’ abilities in the various aspects of music, explaining and demonstrating musical concepts” (p. 302). They investigated the knowledge and skills that novice music teachers believe to be essential to function effectively in the classroom by analyzing 76 secondary instrumental music educators’ responses to a questionnaire. The questionnaire specifically addressed whether they believed their undergraduate music education

was relevant for a first-year teacher, their overall satisfaction with their undergraduate music education, the level of importance of 24 items relating to the knowledge and skills of music educators, and how well their teacher preparation program addressed these 24 items. The 24 items fell under the categories of music knowledge and skills, non-pedagogical professional knowledge and skills, general education knowledge and skills, and pedagogical content knowledge and skills. Participants rated PCK as important but rated their experience with it in their teacher preparation as ineffective. The findings suggest that teacher preparation programs should place greater emphasis in developing PCK and less emphasis on general pedagogical knowledge.

Millican (2014) also studied PCK and preservice teachers. He investigated the PCK of 206 preservice instrumental music teachers by presenting video recordings of beginning band students playing excerpts from their method books. The preservice teachers identified performance problems and offered potential solutions to the causes of those problems. They had difficulty providing diagnoses and solutions to performance problems. The most common solutions for performance problems were generalized recommendations to “address” or “work on” the problems. Several participants made assumptions about the student performers’ background, teachers, and attitudes without supporting data. Like Ballantyne and Packer (2004), Millican concluded that there should be more emphasis on PCK within methods courses.

Henninger, Flowers, and Council (2006) examined the effects of the pedagogical techniques used by preservice and experienced music teachers on performance quality within an introductory applied lesson. Nine experienced teachers and 15 preservice teachers taught an adult beginner to play ‘Mary Had a Little Lamb’ on a wind instrument. Based on the ratings of the adjudicators, no significant difference was found between pupils taught by preservice or

experienced teachers. The experienced teachers had their students use only mouthpieces at the beginning of their lessons, and all but one of the preservice teachers began with limited equipment. The majority of the preservice teachers showed their student how to assemble/disassemble the instrument, compared to only two experienced teachers including it within their lessons. A portion of the teachers were interviewed about their perceptions of the lesson. Analysis of participants' decisions to teach notation revealed that experienced teachers approached the lessons with a long-term perspective (chose to teach notation simultaneously with performance technique), and preservice teachers with a short-term perspective (focusing solely on teaching 'Mary had a Little Lamb' and not addressing notation). The results of this study suggest that differences exist in the pedagogical techniques of experienced and inexperienced instrumental music educators.

Millican (2008) investigated the perceptions of secondary school band and orchestra directors regarding the importance of knowledge and skill categories required of an effective instrumental music teacher by using a framework modeled after Shulman (1986, 1987). Band and orchestra teachers in secondary schools ($N = 214$) completed an online survey ranking the importance of various knowledge and skill categories. PCK, content knowledge, and general pedagogical knowledge were consistently ranked the highest. Results established the applicability of Schulman's PCK framework to music education.

Duke (1994) outlined a framework for observing and analyzing large ensemble rehearsals. Rehearsal frames are defined as an observation unit that allows observers to analyze how teachers bring about improvement in specific aspects of instrumental performance. Each rehearsal frame represents a segment of time devoted to the accomplishment of a specific goal. Extended rehearsal frames include the decontextualization and/or remediation of the target

through various means of practicing (slow, partial, altered) or the execution of a related exercise, which may be accompanied by verbal directions or modeling of the desired outcome. The final step of a rehearsal frame consists of recontextualizing the improved aspect of performance into the original context. Rehearsal frame analysis is connected to PCK in that it shows how instruction divides itself by content target and how each target is approached through a sequence of teacher and student actions. It reveals the nature and quality of the interaction between teacher and students. Rehearsal frames reveal how appropriate a teacher's response is to a student's performance. This directly relates to Shulman's definition of PCK as "how particular topics, problems, or issues are organized, represented, and adapted to the diverse interests and abilities of learners and presented for instruction" (Shulman, 1987, p. 8).

Millican (2013) applied Shulman's PCK framework to explore expert middle school band directors' thought processes while viewing student musical performances. Four band directors identified performance problems and described the steps they would take to correct them while viewing videotaped performances of beginning sixth-grade band students. The most common elements of PCK were:

- Mental Image/Model
- Understand outcomes of manipulating variables to positively affect student performances
- Gather and interpret specific data from students to interpret their performances
- Develop specific rules, procedures, and guidelines to help students master principles of performance
- Make conscious decisions about sequencing instruction and they prioritize which issues they choose to address

- Anticipate and predict student problems
- Engage students by having them compare their performances with teacher and peer models
- Engage students with specific, deliberate questions leading to awareness of the physical processes of making music
- Use representations to help students understand musical concepts
- Understand common student misconceptions and misrepresentations

This was the first study to provide specific ways in which music teachers apply PCK.

Researchers eventually began to look for evidence of PCK in higher education.

Fernández-Balboa and Stiehl (1995) attempted to describe the nature of PCK among music and non-music college professors. Ten professors from various disciplines (one of them being music) were asked to describe how they taught and their experiences in the classroom. Five common components of PCK emerged: knowledge of the subject matter, students, numerous instructional strategies, teaching context, and teaching purposes. Professors felt that their knowledge of the subject matter had to always evolve and grow and the ability to detect students' boredom/frustration levels and misunderstandings of the subject matter. Instructional strategies focused on classroom environment, using various delivery strategies, modeling, questioning, making content applicable to realistic situations, and teaching basic terminology. Not only does this study describe the PCK of college professors, it also shows that PCK manifests itself in teachers without any training in education.

Applied Music Lessons

High school band directors often encourage their students to study with a private teacher in order to improve their individual skills as musicians, yet the majority of these teachers lack

formal teacher training (Fredrickson, Gavin, & Moore, 2011). The research described here focuses on lack of teacher training (Fredrickson, 2007a, 2007b; Persson, 1994, Villarreal, 2010), perception of applied teacher behaviors (Duke, 1987), modification of specified teacher behaviors (Benson, 1989), teacher behavior and rehearsal frames (Colprit, 2003), use of imagery (Watson, 2008), and effective teaching techniques (Duke & Simmons, 2006).

Fredrickson (2007a) found applied music teachers had only occasional learning experiences that focused on the pedagogy of teaching students in a private lesson setting, and that doctoral performance majors experience personal frustrations related to teaching and problems related to basic cause-and-effect teaching interactions with their students (Fredrickson, 2007b). Villarreal (2010) found that applied music teachers believed they would have benefited from more direction on private lesson teaching in their undergraduate or graduate program.

Persson (1984) compared the teaching styles of applied music teachers to assess their effectiveness as rated by their students. Seven teachers were studied through participant observation along with 47 students who were interviewed over a three-week period. Results showed that the teachers used a limited amount of pedagogical strategy and knowledge. Teachers' stubbornness, insensitivity to individual needs, unreasonable demands and dominance, along with unbalanced instructional strategies were deemed as probable causes of students' stress.

Early research on applied music teaching focused on the amount of time spent in teacher and student behaviors but did not investigate applied teachers' pedagogical techniques. Duke (1987) compared the perceptions of 50 trained and 50 untrained observers' proportions of lesson time and teacher activity within an individual applied bassoon lesson. Half of the participants received behavior modification music training, but both groups were asked to estimate the

amount of time spent in student/teacher talk, student/teacher performance, and teacher approvals/disapprovals, instruction, and performance. The lesson consisted of 21% teacher performance, 36% student performance, 41% teacher talk, and 2% student talk. A breakdown of teacher activity revealed 20% performance, 52% instruction, 13% disapproval, and 15% approval. The most notable of several results was that both observer groups overestimated the percentage of teacher disapproval and underestimated the percentage of teacher approval. These errors in estimation raise questions about how teacher feedback is perceived.

Benson (1989) focused on the effect of observation and analysis on the use of sequential patterns within applied music lessons. Two model videos and one experimental video were made of three teachers teaching a violin lesson to students between 10 and 12 years old. The experimental teacher viewed and analyzed the videos and was asked to focus on improving presentations of musical tasks and specific reinforcement. The second video of the experimental video was compared to the model videos and the first experimental teacher's video. The experimental teacher increased time spent in musical tasks from 28% to 43%, specific musical task presentations increased from 16% to 33%, and specific reinforcement rose dramatically from 46% to 86%. Results showed that applied teachers could benefit from pinpointing behaviors, self-observation, and analysis to improve their teaching.

Colprit (2003) examined teacher and student behavior in 48 violin and cello lessons taught by 12 expert Suzuki string teachers. Video excerpts from 48 lessons were divided into 338 rehearsal frames. Each rehearsal frame represented the teachers' choice of objective or lesson focus and lasted for however long the lesson stayed with that objective. Teachers' directives regarding physical behaviors resulted in 48% unsuccessful student performance trials. Teachers' directives of musical results resulted in 52% unsuccessful student performance trials. When

teaching more advanced students, teachers tended to present tasks as descriptions and used “do it” statements instead of providing a prescription to fix the problem. The finding most reflective of PCK was that instruction was differentiated according to performance level and difficulty of music, which is an indication that teachers were aware of students’ playing abilities.

In recent years there has been a growing interest in the use of imagery in applied music lessons. Watson (2008) analyzed the application of literary devices that address the technical aspects of playing woodwind, brass, and string instruments with specific focus on rhythm, beat, articulation, pitch, and posture. Watson defined imagery as “visually descriptive or figurative language” (Merriam-Webster’s online dictionary, n.d.). Watson gathered 16 music educators through her advertisements of the study via email discussion groups, an email listserve, a website, and a newsletter. Music educators provided examples of literary devices that they use in the classroom and in applied music lessons. Music educators had the tendency to use onomatopoeia in regards to rhythm, and imagery, simile, and analogy for articulation, posture, pitch, intonation, and sound production. Watson came to the conclusion that music educators regularly depend on literary devices as a pedagogical tool in applied music lessons.

In a study of three expert college applied music teachers, Duke and Simmons (2006) described several aspects of teaching that illustrated the connection between content knowledge and how it is communicated to students. Twenty-five hours of video recordings of private lessons taught by oboist Richard Killmer, violist Donald McInnes, and pianist Nelita True were analyzed. Nineteen common elements of instruction were found in the lessons of all three teachers and were categorized into Effecting Change, Conveying Information, and Goals and Expectations. Those most reflective of PCK were:

- Teachers' decisions were guided by a mental auditory image, and used modeling to demonstrate the image to the student
- Instruction was differentiated to students' playing abilities and resulted in immediate improvement
- Teachers referenced students' work from previous lessons and compared past and present performances
- Teachers expected perfection out of their students, resulting in students repeating passages multiple times until perfection was achieved
- Teachers constantly expressed their opinions of students' performances with the goal of fostering independent musicianship

Performance Evaluation

High school band directors and university applied music teachers are expected to evaluate the music performance whether played on the teachers' primary or non=primary instrument. High school band directors evaluate performances of all students within a rehearsal setting and in individual auditions. University applied music teachers evaluate students of the same instrument and jury performances of students within the same instrument family. Research shows that a band director's major instrument has little effect on evaluating performances (Fiske, 1975), teaching experience effects performance evaluation more than major instrument (DeCarbo, 1984; Hewitt and Smith, 2004), and university applied music teachers' major instrument has no effect on performance evaluation, but has high correlations with students' peer evaluations (Bergee, 1993, 1997).

A judge's performance specialty area has little effect on the overall assessment of music performances. Fiske (1975) looked to see whether judges' specialty areas of brass, nonbrass, wind, and nonwind influenced their performance assessment of trumpet students. Thirty-two high school trumpet players were recorded playing two phrases each, resulting in a total of 64 individual phrases. Judges provided ratings for intonation, rhythm, interpretation, technique, and overall. Results indicated no significant differences in ratings between brass/nonbrass specialties and again between wind/nonwind specialties. Fiske concluded that any competent musician, regardless of specialty area, can make accurate judgments in the selection and rejection of players, but specialists should be used in the assessment of individual performance traits, especially technique.

DeCarbo (1984) found similar results by examining the effect of major instrument and teaching experience on the error detection skills of 56 middle and high school band directors. The directors took an error detection test consisting of 8 music compositions of different style periods arranged for two-, three-, and four-parts. Recordings of the compositions included various combinations of performance errors of rhythmic accuracy, balance, dynamics, and style. Directors studied the scores, listened to recordings, and had 30 seconds to identify the measure, part, type of error, and the exact error performed. Analysis of directors' test scores showed that only teaching experience, not major instrument, had a significant impact on error detection ability.

Other researchers have investigated the effects of teaching experience and major instrument. Hewitt and Smith (2004) investigated the effect of teaching experience and major instrument on preservice and experienced teachers' performance evaluations of middle school trumpet players. Similar to DeCarbo (1984), Hewitt and Smith found that evaluators' major

instrument had no effect on performance evaluations. With the exception of tone and intonation, teaching experience did not have a significant impact on performance evaluations. Differences of tone and intonation evaluations led Hewitt and Smith to suggest that these areas may be more subjective and difficult than other aspects of music performance.

Bergee (1993) compared faculty, peer, and self-evaluation of applied brass jury performances. Two brass faculty panels evaluated brass jury performances using Bergee's Brass Performance Rating Scale (BPRS) in three different instances. The BPRS consisted of Likert-type questions concerning interpretation/musical effect, tone quality/intonation, technique, and rhythm/tempo. Students used the BPRS to evaluate the same performances, along with evaluating their own. Analysis showed a high correlation between faculty and peer evaluations with musical effectiveness, technique, tone quality, and intonation. Students consistently evaluated themselves higher than the outside panel of judges. Bergee (1997) extended the previous study by comparing faculty, peer, and self-evaluation of woodwind, brass, percussion, strings, and voice jury performances. Faculty interjudge reliability ranged from .23 to .93, and peer evaluations ranged from .83 to .89. Like the previous study, high correlations were found between faculty and peer evaluations, but low correlations with self-evaluation. No significant differences in self-evaluation were found in either faculty members' concentration or years of students' playing experience.

Student Self-Evaluation

Self-evaluation of music performances is deemed important by the music education profession. Band directors often expect their students to individually practice their ensemble music outside of the rehearsal setting. Such practice requires students to constantly self-evaluate

and use strategies to improve their musical performance. The 2014 National Coalition for Core Arts Standards states that students should “develop, apply, and refine appropriate rehearsal strategies to address individual and ensemble challenges in a varied repertoire of music” (NCCAS, 2014, p. 4). Students’ self-evaluation accuracy differs with grade level (Hewitt, 2005, 2007), and is not significantly affected by self-evaluation instruction (Hewitt, 2002, 2011). In addition, students lack the knowledge of the appropriate use of practice strategies (Oare, 2012).

Hewitt (2002) sought to describe middle school students’ self-evaluation tendencies, the effect of a model on student self-evaluation, and to identify a potential relationship between music performance achievement and self-evaluation accuracy. Over a six-week period, forty-one middle school wind players evaluated themselves using the Woodwind Brass Solo Evaluation Form (WBSEF) (Saunders & Holahan, 1997) along with either the presence or absence of an aural model. Intonation was consistently rated as the highest musical element throughout the study, but its scores decreased over time. This shows that students may have difficulty understanding the concept of intonation and its role in solo performance. The presence of an aural model did not raise students’ self-evaluation accuracy. Despite the presence of a model recording, students were not as discriminating as the judges and consistently overestimated their performance accuracy. Low correlations between music performance and self-evaluation accuracy indicated that students’ performance ability is unrelated to their ability to evaluate themselves.

There are similarities between middle and high school students’ self-evaluation accuracy. Hewitt (2005) asked 92 middle and 51 high school musicians to self-evaluate performance during rehearsals. Analysis of students’ and experts’ evaluation showed that high school students were more accurate than middle school students in self- evaluations of all areas except melody

and rhythm. Middle and high school students were the most accurate in their evaluation of melody and least accurate in evaluation of technique/articulation, but they ranked other music elements differently. High school students most accurately self-evaluated melody followed by tempo, rhythm, interpretation, tone, intonation, and technique/articulation. Hewitt suggested that both groups rated technique/articulation the lowest because students focus least on it while performing, resulting it becoming a difficult area for them to evaluate.

Hewitt (2007) continued this line of research and examined the influence of primary performance instrument and education level on brass/nonbrass middle, high, and college students' evaluations of six middle school trumpet performances. Students evaluated tone, melodic accuracy, intonation, rhythmic accuracy, tempo, and interpretation, using the WBSEF. Results showed that major instrument had no effect on students' performance evaluations. Middle, high, and college students evaluated the performances differently in all aspects except interpretation. Middle and high school students' evaluations were very similar and raised the question of whether there is any difference at all between middle and high school students' evaluation abilities or whether in-depth music instruction in the collegiate environment creates their evaluation ability.

Hewitt (2011) explored the effects of self-evaluation instruction on student self-evaluation, music performance, and self-evaluation accuracy with 211 middle school band students assigned to one of three treatment groups: self-evaluation instruction (SE-I), self-evaluation only (SE-O), or no self-evaluation (SE-No) for a 5-week period. Self-evaluation instruction consisted of students creating a rubric for specific performance areas, teacher modeling of rubrics within the context of a student performance, teacher-led discussion, students' identification of performance goals, students self-evaluating using their rubrics, teacher

feedback of students' self-evaluation and performance, and a final student performance focused on the topics discussed throughout the week. Results showed that students of all treatment groups improved their performances similarly, and that self-evaluation instruction had little impact on students' music performance and self-evaluation accuracy. Unlike the fifth-, sixth-, and seventh-grade students, eighth grade students' scores remained similar throughout, indicating that self-evaluation may be a skill that improves as students' performance ability improves.

Oare (2012) sought to describe the decision-making processes of nine middle school students' practice sessions. Students were asked to conduct a normal 20-minute practice session followed by students reflecting on their practice session using a think-aloud protocol. Students were asked to discuss goals they had while practicing, practice strategies, self-assessment process, and their feelings of efficacy. Analysis revealed that themes of motivation, goals, strategies, and assessment are interrelated and form a model of student practice. Students' goals were vague, resulting in students unable to determine when their goal had been reached. All students had practicing strategies, but lacked clear understanding as when to appropriately use them. None of the students had any strategies for improving their tone quality. Students were able to recognize mistakes, but had difficulty diagnosing their causes and prescribing solutions to fix them.

With band directors cast as generalists and applied teachers as specialists, the purpose of the present study was threefold: (a) to seek evidence of PCK in music teacher generalists' and music teacher specialists' evaluations of musical performance; (b) explore the similarities and differences between generalists' and specialists' perspectives on PCK; and (c) compare the evidences of PCK to student musicians' self-evaluations of same performances.

In order to achieve these purposes, three guiding questions were developed:

- Question 1: In response to video recordings of student performances, what evidences of PCK exist in the evaluations of generalists and specialists?
- Question 2: In comparisons of verbalizations, what are the qualitative similarities and differences between generalists and specialists?
- Question 3: In comparisons of verbalizations, what is the nature of the distance between teacher knowledge and student need?

Method

This examination of PCK among music teacher generalists and specialists was structured as a Basic Interpretive Qualitative Study (Merriam, 2002). Verbal protocol analysis or a think aloud procedure provided the data for this study. Precedent for this process was found in the research of Ericsson and Simon (1993) and in music from London (1982), Bundra (1993), Zerull (1993), and Younker and Smith (1996). Institutional Review Board guidelines were followed and exemption from institutional oversight granted (see Appendix A).

Participants

Two accomplished high school band directors, two university applied music teachers, and four high school musicians served as participants. The band directors have extensive experience as school music teachers in the southern United States. They lead large, thriving programs with multiple bands. Over the years, their bands have received consistent superior ratings at large ensemble events. For comparative purposes, I cast the band directors, who both hold music education degrees, as generalists. The National Association of Schools of Music (NASM, 2013) describes music education majors as needing to have the “ability to teach music at various levels to different age groups and in a variety of classroom and ensemble settings in ways that develop knowledge of how music works syntactically as a communication medium and developmentally as an agent of civilization” (pp. 119-120). From this description, it is logical to assume that the school band director’s knowledge and skill are broad and “generalizable” to a variety of teaching and learning contexts.

Two university applied music teachers, both tenure-track faculty in a comprehensive School of Music at a large university in the southern U. S., were selected to match the primary

instrument of the high school band directors. The applied teachers have extensive experience in that role. They have national reputations as accomplished performers and teachers of one instrument; they actively perform in solo and chamber music settings. I cast the applied teachers, who both hold performance degrees, as specialists. NASM (2013) describes performance majors as needing to have “comprehensive capabilities in the major performing medium including the ability to work independently to prepare performances at the highest possible level” (p. 110). From this description, it is logical to assume that the university applied music teacher’s knowledge and skill are focused and deeply rooted in a limited range of teaching and learning contexts. Despite repeated efforts to do so, I was unable to schedule time with the clarinet applied teacher to complete her observation and evaluation of the saxophone student’s performance. She completed the clarinet video but did not complete the saxophone video. Table 1 presents teacher participants by pseudonym, teacher type, and primary instrument

Table 1
Teacher Participants

Name	Teacher Type	Primary Instrument
Cindy G.	Generalist	Clarinet
Howard G.	Generalist	Horn
Chloe S.	Specialist	Clarinet
Henry S.	Specialist	Horn

Note. Pseudonyms have been assigned in order to protect the identity of participants. For ease of teacher identity in the text below, given names begin with C to indicate clarinet or H to indicate horn. Surname initials indicate specialist (S) or generalist (G).

Four high school wind instrument musicians were selected to participate in the study based on the performance quality of their recorded honor band audition music. Table 2 presents student participants by pseudonym, instrument, grade, age, and private lesson status.

Table 2
Student Participants

Name	Instrument	Grade	Age	Private Lessons?
Cassie	Clarinet	12	18	Yes
Sam	Saxophone	10	16	No
Hannah	Horn	12	18	No
Tina	Trombone	12	18	No

Note. Pseudonyms have been assigned in order to protect the identity of participants. For ease of student identity in the text below, given names begin with C for clarinet, S for saxophone, H for horn, and T for trombone.

Stimulus Videos

My aim was to create two stimulus videos, one to be shown to the woodwind generalist/specialist pair and the other to be shown to the brass generalist/specialist pair. Both videos would show two students in performance. One video would show a student playing clarinet followed by a student playing an instrument in the woodwind family (flute, oboe, saxophone, or bassoon). The other video would show a student playing French horn followed by a student playing an instrument in the brass family (trumpet, trombone, euphonium, or tuba). As shown in Table 3, the generalist/specialist teacher pair whose primary instrument was clarinet would view the woodwind video and the generalist/specialist pair whose primary instrument was horn would view the brass video. For each generalist/specialist pair, this would provide the opportunity to evaluate a familiar instrument and a less familiar instrument in the same family of instruments, thus duplicating the university woodwind or brass “jury” system of performance evaluation.

Table 3
Instruments Used on Stimulus Videos

	Woodwind Video		Brass Video	
	PI	NPI	PI	NPI
Specialist (AT)	Cl	Alto Sax	Hn	Trb
Generalist (BD)	Cl	Alto Sax	Hn	Trb

Note. PI = principal instrument, NPI = non-principal instrument, AT = applied teacher, BD = band director. Stimulus videos showed high school students playing horn, trombone, clarinet, and alto saxophone.

In the development of the video stimuli, the quality of student performance was of primary concern. In order that the videos functioned as optimal stimuli for uncovering evidence of the analytical thinking inherent in PCK, student performances would have to be flawed but not too flawed. My aim was to find performances flawed enough to elicit extensive evaluative commentary from teachers and avoid videos so flawed that teachers would dismissively blame lack of preparation. Therefore, with permission from three local high school band directors, I collected a “library” of 50 student performance videos in order to increase the likelihood that I would find four research-appropriate videos.

Recording sessions were scheduled for the week of the audition. This was strategic in that it insured that students would be as prepared as possible and therefore able to perform the music to the best of their ability. A Zoom Q2 HD Handy Video Recorder in a room removed from extraneous sound. After adjusting the video camera, followed by a student warm-up, all students were given the following directions: “Thank you for participating in this study. Please play straight through your etude. I want you to be at your best, so if you would like to play it two or three times, I will use the best performance. Any questions?”

After the 50 videos were recorded, I reviewed each of them with two priorities in mind. The first priority was to find research-appropriate clarinet and horn performances to go along

with the primary instruments of the generalists and specialists. The second priority was to find research-appropriate woodwind and brass videos of non-primary instruments.

Four high school wind instrument musicians were chosen for use in this study because their performances were well-prepared, but exhibited small-scale to moderate deficiencies in one or more of the following performance areas: (a) tone quality/intonation, (b) technique, c) rhythm/tempo, (d) interpretation/musical effect (Bergee, 1993). On the videos, each student performed a lyrical and a technical etude (see Table 4). Student performers were unfamiliar to both the generalists and specialists. Procedurally, the generalists and specialists evaluated video recordings of high school musicians performing music alone. In addition, the high school musicians self-evaluated their own performances.

The videos constituted “scenes” (Spradley, 1979) that served as stimuli for evaluative commentary. The videos were created using the video editing software iMovie. The teachers viewed close-up views of students’ faces at angles that allowed for detailed scrutiny of embouchures. The view did not show the upper torso, so the full breathing mechanism, instrument hold, and finger/slide technique were invisible to observers. Once it was set for each student performer, the view remained unchanged throughout both etudes.

Table 4
Etudes Performed on Stimulus Videos

Instrument	Type of Etude	Book	Etude
Alto Saxophone	Lyrical	Ferling (n. d.)	Andante (p. 7)
Alto Saxophone	Technical	Ferling (n. d.)	Allegro moderato (p. 22)

(Table 4 Continued)

Instrument	Type of Etude	Book	Etude
Clarinet	Lyrical	Voxman (1989)	Andante, D Major. Mazas. (p. 18)
Clarinet	Technical	Voxman (1989)	Allegro, c minor. Gambaro (p. 25)
Horn	Lyrical	Pottag (1958)	No. 7, Andante (p. 19)
Horn	Technical	Pottag (1958)	No. 12, Allegro moderato (p. 22)
Trombone	Lyrical	Voxman (1989)	Allegretto, b-flat minor (p. 25)
Trombone	Technical	Voxman (1989)	Andante con moto, G Major (p. 26)

Data Collection and Procedures

Verbal protocol analysis or a think aloud procedure provided the data for this study (Ericsson & Simon, 1993). Four individual video observation sessions with the teachers lasted a total of 4 hrs. Four individual video observations with students lasted a total of 2 hrs. I transcribed the video observation sessions by hand, which resulted in 25 pages of single-spaced text.

The procedures for this study took place in a room removed from extraneous sound. The room was set up with two chairs and a table. Copies of the etudes were provided to use as a reference throughout the video observation session. Videos were viewed on a 13" Apple Mac Book Pro using Philips SPA8210 Speakers. Participants' commentary was recorded using a Samson Go Mic and Garage Band sequencing software. The total time of the entire task was approximately one hour for each adult participant observer and 30 minutes for each student participant observer.

The following script was read to each teacher before viewing the video:

“I’m interested in knowing what you, as a teacher, are thinking as you listen and watch this video. What performance qualities strike you as being positive? Which ones as negative? And for the negative, what is your complete assessment? I would like you to diagnose the problem and talk about solutions as if this were your student that you were holding to a first-chair all-state performance standard. In other words, I hope you will share your thoughts by thinking aloud about performance strengths and weaknesses, and for the weaknesses, diagnosing the problems and prescribing possible solutions. At the end of the first viewing, I will ask you for your general impressions of the student’s performance. From then on you will be able to watch the video as many times as you like and stop it anytime you have thoughts about strengths and weaknesses. There are some intermittent sounds throughout the recording that are caused by the acoustical resonance of the room, not the student's performance. I urge you to stop the video every time you have a thought about the performance. We can re-play parts of the video if you think it will help me understand more clearly what your are thinking. What you are thinking is the purpose of this study. Do you have any questions? If you would like to do a practice trial, I can provide one for you, otherwise we will begin.”

The following script was read to each student before viewing his or her video:

I’m interested in knowing what you are thinking as you listen and watch this video. What performance qualities strike you as being positive? Which ones as negative? And for the negative, what is your complete assessment? I’d like you to diagnose the problem and talk about a solution as if you heard this while practicing. In other words, I hope you will share your thoughts by thinking aloud about performance strengths and weaknesses, and for the weaknesses, diagnosing the problems and prescribing possible solutions. You will be able to watch the video as many times as you like. After the first viewing, I will ask you for your general impressions of your performance. From then on you will be able to watch the video as many times as you like and stop it (using the space bar) anytime you have a thought about your performance. We can re-play parts of the video if you think it will help me understand more clearly what you are thinking. Do you have any questions? We will begin with a practice video.

At the conclusion of this script, students watched a practice video in order to become acclimated to the task. It consisted of a performance by a different and unknown student playing the same instrument.

In the video observation sessions, I intended for the teachers and students to discuss what they saw and heard as much as possible without my input. In cases in which it appeared that they could elaborate, but had not, I was prepared to elicit more information about performance

diagnosis and/or prescription. Examples: ““That’s interesting. Tell me more.” Or “What steps would you take to correct the student’s staccato articulation?” Therefore, I functioned as one medium through which information was gathered. Below is an example of an attempt by me to tap further into one student’s thinking:

S: That was like a lawnmower. I: What? Why? S: It was really blatty. I: What specifically was blatty? S: The tone. I: How would you fix that? S: Just practice low notes. I: How would you practice those? S: Play them chromatically down. I: How would that fix your low notes? S: It would make it more natural so I wouldn't have to try as much. Learn how to control it. Repetition.

At the conclusion of each video excerpt, one question was asked of all generalists, specialists, and students: “Is there anything more you can say to help me understand your thinking about this performance?”

The procedure as described above was a result of pilot-testing with a doctoral student in music education who had extensive experience as a high school band director. The feedback provided led to revision and improvement of the procedure and discussion process.

Analysis

Schatzman and Strauss (1973) claim that qualitative data analysis primarily entails classifying things, persons, and events and the properties that characterize them. Typically throughout the data analysis process, researchers index or code their data using as many categories as possible (Jacob, 1987). They seek to identify and describe patterns and themes from the perspective of the participant(s), then attempt to understand and explain these patterns and themes (Agar, 1980). In the present study, all video observation sessions were transcribed by hand. Data were organized categorically and chronologically, reviewed repeatedly, and continually coded for evidence of PCK within the framework of the research questions. Similar or redundant codes were aggregated into themes (Creswell, 2013).

Triangulation was achieved by examining multiple data sources (generalists and specialists responses, student responses) for evidence to support themes. These multiple data sources were also compared to results in relevant research literature. I also analyzed the transcripts from the perspective of my experience as a school music teacher. Across a 5-year period, I led two large programs with multiple bands that received consistent superior and excellent ratings at large ensemble events.

Through these means I was able to represent the nuances of PCK in music teacher generalists' and specialists evaluations of student performance. Additionally, I was able to represent the differences between teachers' PCK and students need for PCK.

Results

The purpose of this study was to seek evidence of pedagogical content knowledge (PCK) in generalists' and specialists' evaluations of musical performance; explore the similarities and differences between generalists' and specialists' perspectives on PCK; and compare the evidences to student musicians' self-evaluations of same performances. This results section is organized according to the research questions in sub-sections titled: Evidence of PCK among Generalists and Specialists, Comparisons of Generalists and Specialists, and Comparisons of Teachers and Students.

Evidence of PCK Among Generalists and Specialists

Four themes emerged that appear to be related to PCK in music. Aural Concept, Conveying Information, Effecting Change, Uncertainty, and attendant sub-themes are presented below.

Aural Concept.

Examination of music teacher generalists' and specialists' verbalizations revealed aural concept as a theme that appears to be one indicator of PCK. Teachers have an internal sense of the goal in sound. For example, Cindy G. clearly referenced an aural image of a characteristic clarinet tone quality: "It's just something that's in my head. When I hear it I know it. When it's almost there I know it. I guess the adjectives would be dark, like molasses, syrupy, and a thick, warm, dark sound." Millican's (2013) findings similarly identified the use of auditory images by generalists.

Likewise, the generalists have "sound in their heads." Henry S. described horn tone quality as follows: "Where I can hear center and when you can really identify exactly that the note is in the sweet spot. When you hear that on horn, you hear a host of overtones. You hear the

overtones and tone and pitch are usually closely related.” Previous research found that specialists refer to an aural model (Duke & Simmons, 2006). Colprit (2003) suggested that specialists need to know the physical actions necessary to match the aural model in performance.

Conveying Information.

Examination of participant verbalizations revealed another theme, conveying information, that appears to be an indicator of PCK in music. Conveying information was home to three autonomous sub-themes—directives, metaphor and analogy, and modeling, and a fourth sub-theme—knowledge of cause and effect relationships—which seemed to serve as a mechanism for determining the use of directives, metaphor and analogy, and modeling.

Directives.

Frequently, music teacher generalists and specialists talked like they were giving specific instructions and expecting that the instructions would be the only feedback necessary for improved student performance. For example, Cindy G. gave directives in regards to dynamics: “I would tell her to play the lower note louder, crescendo on the lower note, and baby the top note.” Previous investigation shows that generalists tell the students what to do and that students are expected to make an in-the-moment adjustment (Millican, 2013).

Likewise, Chloe S. addressed phrasing using a directive: “I’d have her do that and go back and play the phrase again and tell her to keep your ear under it the whole way and see how nice it is for that C-sharp to really arrive and settle in on a lower place.” Duke and Simmons (2006) found that specialists chose lesson targets that were achievable in the short term. They have students repeat passages until they are consistently played correct. Colprit (2003) noted a progression in specialists’ task presentation. In explaining this directives-to-descriptions progression, she said, “as the level of difficulty increases, teachers tend to present tasks as

descriptions of how the music should sound rather than as ‘do it’ statements [or directives], and that accurate student response may require a higher level of critical thinking” (p. 58).

Metaphor and Analogy.

Music teacher generalists and specialists take advantage of the rhetorical effect of metaphors and analogies as they convey information to student musicians. For example, Cindy G., addressed a technical aspect of wind playing by comparing the weight of a grace note to ballerina shoes:

This should be more delicate. Be the ballerina with the toe shoes. That's a little bitty ornament. It's not a big deal. Anything to make them visualize some way in their head and then in their ear that that's the smaller sounding note and it's a smaller. It's just a smaller note. It's more delicate.

Middle school band directors also use imagery to help improve student performance (Millican, 2013).

Young horn players tend to have unfocused airstreams while playing softly. Henry S's correction came in the form of an analogy: “Maintain resonance like a singer and have a yawn feeling in the back of their throat.” Chloe S. provided an analogy to describe tone quality. She compared clarinet tone quality to the shape of a pear:

You can tell a child that there's a big pear sitting in a room. Whatever color they want it to be. I'll ask them what color is it, just to get them to visualize it. Then I'll say, ‘Ok, so here's our pear. Here's the top end of it and here's the bottom end of it. Now sing me that pear in your sound.’ BOOM, that child will be able to do it. Move out of their way and let them use their imagination.

Watson (2008) concluded that “teachers clearly depend on many types of literary devices such as metaphor, simile, analogy, onomatopoeia and imagery as pedagogical tools for teaching the technical aspects of playing an instrument” (p.15).

Modeling.

Repeatedly, music teacher generalists and specialists alike stated their intentions to use modeling as a pedagogical tool. At times during observation sessions, they provided actual vocal models. Generalists reported that they would model by singing and playing their instrument. Howard G. stated that he would use modeling to encourage proper note length: “Sometimes she [the student playing horn] is putting more space after the slurs and sometimes less space. It needs to be consistent. I would model that for her or sing it and have her try and model that.” Cindy G. mentioned that she would model dynamic contrast: “I would hold the louder volume a little longer and decay more on the last two notes of that phrase. I would sing it for her and if that didn’t work I would play it.” Millican (2013) found modeling to an aspect of generalists’ PCK.

Similarly, Chloe S. would model both excellent and poor examples of legato articulation: “I would play back and forth to her something that was slurred without glitches or bumps, and then play the exactly same phrase again but with deep legato so she could hear the tone humming all of the time.” Colprit (2003) stated that modeling is effective because there are instances in which spoken language may not always be an adequate method to describe an aural idea. Duke and Simmons (2006) showed how specialists utilize modeling in private lessons. Fernández-Balboa and Stiehl (1995) found that both music and non-music professors used modeling as an instructional strategy.

Knowledge of Cause and Effect Relationships.

Both generalists and specialists demonstrated a clear understanding of the probable consequences of a specific change in student performance. For example, Howard G. noted a relationship between articulation and airspeed: “She’s not articulating that first note clearly. She’s hahhhing, using slow air. Getting into that she needs to tongue it more clearly and center the

note.” Millican (2013) found that generalists have an understanding of cause and effect relationships in adjusting students’ performances.

Henry S. when asked to further describe Tina’s breathing during the trombone lyrical etude said, “That needs to be a better breath. She was quite late to the downbeat and that breath made noise. Any time you make noise when inhaling that indicates tension. The quieter the breath, the less tension there is.” The idea that specialists understand the outcomes of manipulating physical aspects of student performance supports the findings of Duke & Simmons (2006).

Knowledge of cause and effect relationships seemed to function as a mechanism for determining the use of the previous sub-themes: directives, metaphor and analogy, and modeling. This relationship is depicted in Figure 1. Generalists and specialists exhibited extensive knowledge of the techniques of the instruments as well as knowledge of students’ music performance needs. Teachers’ verbalizations often seemed guided by an ability to predict the student response or range of responses likely to occur under this or that condition. One might imagine teachers doing rapid mental calculations of “if/then” conditionals (i.e., “If I do or say this, the student will do that.”). It is from this understanding that both groups of teachers made in-the-moment decisions to use directives, metaphor and analogy, or modeling as a means to convey information to students that they deem will be effective in communicating their expectations.

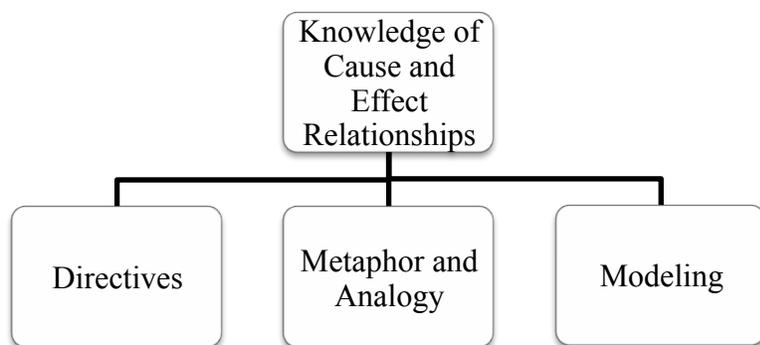


Figure 1. Knowledge of Cause and Effect Relationships as a Stimulus for Conveying Information

Effecting Change.

Examination of participant verbalizations revealed effecting change as a third theme that appears to be an indicator of PCK in music. Effecting change was home to three autonomous sub-themes—decontextualization, sequencing instruction, and open-ended questions, and a fourth sub-theme—knowledge of student tendencies—which seemed to serve as a mechanism for determining the use of decontextualization, sequencing instruction, and open-ended questioning.

Decontextualization.

Decontextualization is the act of taking a targeted skill in need of amelioration out of context in order to develop more skill. This happens through various forms of practicing (slow, partial, altered), related exercises, and to promote transfer through successive approximations (Duke, 1994). Generalists and specialists would choose to lead students in decontextualizing performance targets, with the out of context activities happening both with and without instruments. Howard G. recommended a related exercise: “I would do some exercises where I would have her play some full volume stuff. Really getting some volume out of the instrument. At first that's going to be really nasty, brassy and overdone. I'd work that down overtime.”

In like manner, Chloe S. focused on the relationship of airspeed and the emotion of a musical passage:

Something you can do is to have kids say piiZA, then just ZA ZA, then take a breath and just Z Z. You can hear if someone is muscling his or her support. It'll sound really hard and steely. PIIIIZZA, Z Z Z, Ah Ah Ah. I'd get her doing that.

The goal of decontextualization without an instrument is that the student will transfer the concept to playing the instrument (Duke, 1994).

Sequencing Instruction.

In generalists' and specialists' video observation sessions, it became clear that they prioritized some musical elements and behaviors over others and prioritized what they wanted to address first. For example, Cindy G. described how she would address saxophone articulation in a sequenced way:

Getting a good sound is more important than the articulation. It's kinda like there's levels of that. We want the foundation of the house built first and then the rest of the house. The foundation is tone quality, then correct notes and rhythms. Then I think that the other stuff kinda is all mixed-up, whether that's dynamics, style, or articulation.

Millican (2013) identified sequencing of instruction as an act of PCK among generalists.

When asked to go further in-depth concerning horn articulation, Henry S. revealed sequenced thinking in his description of the concept:

. . . I look at playing as a hierarchy. The first thing is music. I would need to ascertain if she knows the rhythm. I need to find out if she even conceives of the note starting in the right place. That's the first step. If that doesn't solve the problem, the next step is to dive into what she is doing with her air. That would be practicing just moving the air, experimenting with some articulation things if she needs it. Just air horn. Just practicing air and articulations. Maybe moving some things around with how she uses her tongue. Better to deal with just the air. If all of that doesn't work, then you have to deal with some embouchure things. That's a whole can of worms that is best left unopened if possible, although this young woman has an extremely low embouchure and a suspiciously weak high range. Those things together usually indicate that the embouchure is low although there are some great players that play really low.

Duke (1994) suggested that teachers should have “a hierarchy of performance goals and emphasize fundamental aspects of playing with less-experienced musicians” (pp. 87-88).

Previous research has shown that specialists ignore some performance issues until underlying fundamentals are addressed (Duke & Simmons, 2006).

Open-Ended Questioning.

Prominent in generalists’ and specialists’ verbalizations was open-ended questioning of student musicians to foster individual musicianship. Cindy G. demonstrated it while addressing dynamics:

I would ask him what he thinks that plan should be. You have to look from here to here and see what you think. Start softer. May be even making him write out the number system. What's your volume level here? A 1, 0, or a 2? What's your volume level at this spot and this spot? Inside the note you should have more than one number. Let him do it a little bit. Let him look at it himself and have him map it. Don't tell him what he wrote is wrong. Have him play what he wrote and I bet it's better. I might tweak it some more, but I bet it's better just thinking about it.

Millican (2013) identified teacher questioning as an act of PCK by generalists as they used questioning to draw students to focus on the physical processes of making music.

Chloe S. modeled her use of open ended-questions when addressing tone quality: “Can that be happier? Can that be rounder? Can that be sadder? Can you hear more of the shape of a zucchini through that?” Fernández-Balboa and Stiehl (1995) found that college professors used questioning as an instructional strategy.

Knowledge of Student Tendencies.

Both generalists and specialists demonstrated their knowledge of student misconceptions as related to musical elements and used this knowledge to make broad generalizations among various students and contexts. Teacher decisions appeared to be “governed” at least in part by these generalizations. Howard G. described students’ tendency to rush rhythms: “The metronome

would help with this. The problem with this and kids like this is that they rush the long notes. They need to be patient. You have to emphasize the fact that they need to count carefully through that.” Cindy G. described typical high school saxophone tone quality and technique: “He’s a very typical high school student. I have had thousands of them over the years. I’ve had some worse, some better, that just don’t have the control of their fingers yet or their tone yet.” Generalists tend to utilize their knowledge of student misconceptions when evaluating students’ musical performances and Millican (2013) identified this as an element of PCK.

Henry S. talked about how students often sacrifice tone quality in soft dynamics: “Most students, typically young ones, just squeeze and get a bad, weak sound at soft dynamics. That comes into how the face works and all that stuff.” Fernández-Balboa and Stiehl (1995) found knowledge of students as an aspect of college professors’ PCK.

Knowledge of student tendencies seemed to function as a mechanism for determining the use of the previous sub-themes: decontextualization, sequencing of instruction, and open-ended questioning. This relationship is depicted in Figure 2. Generalists and specialists understood the errors that commonly during student learning and used this knowledge to make broad generalizations among various students and contexts. Teacher decisions about decontextualization, sequencing, and questioning appeared to be “governed” at least in part by these generalizations.

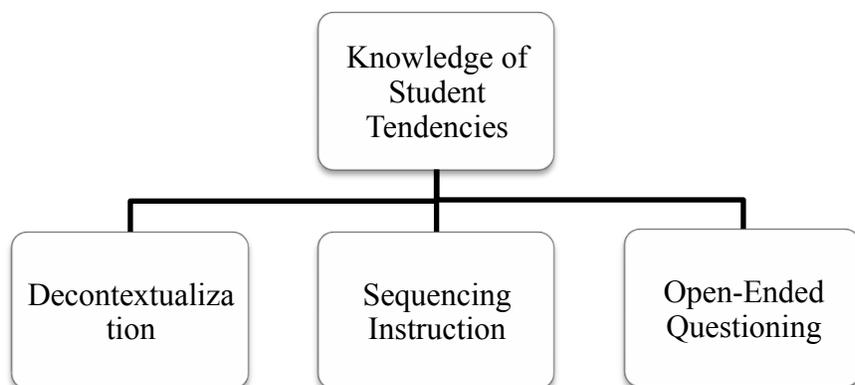


Figure 2. Knowledge of Student Tendencies as a Stimulus for Effecting Change

Uncertainty.

Examination of teachers' verbalizations revealed uncertainty as a fourth theme that appears indicative of PCK in music and one that is unique in the music PCK literature.

Uncertainty was home to two sub-themes—uncertainty as a dead end and uncertainty leading to experimentation.

Uncertainty as a Dead End.

Relative to his knowledge of the non-primary instrument, Henry S. freely expressed his lack of knowledge and experience in some details of trombone pedagogy:

I don't think her slide is getting to the right place at the right time, quickly enough on a regular basis. This is where I would immediately call out for help because I don't understand what slide technique needs to be used by hearing it or watching it. I would need a real trombonist to help me.

Fiske (1975) concluded that a competent musician, regardless of specialty area, can make accurate global judgments in, for example, selecting or rejecting musicians, but recommended that specialists be used in the assessment of individual performance traits, especially technique.

This example of the “dead end” perspective on teacher uncertainty is laudable for the teacher’s resourcefulness in problem solving (getting help from one with more expertise) and comfort with vulnerability in confronting uncertainty.

Uncertainty Leading to Experimentation.

Although in the majority of instances generalists and specialists were confident in their diagnoses and prescriptions of student performances, there were several instances in which both generalists and specialists expressed uncertainty in their prescriptions for problems of embouchure, tone quality, and musicality and chose to experiment in order to try to find solutions. Howard G. commented on Hannah’s horn mouthpiece placement: “The mouthpiece is set pretty low on her upper lip. I would have her put more mouthpiece on her upper lip. I’m not sure that it would change anything, but it might.” Cindy G. expressed uncertainty regarding Sam’s tone quality: “I’m not sure that his corners here are firm enough. I felt like there were some places that it felt like he didn’t have enough control and lost control of the tone. I would talk to him about vibrato and see if that helps.” Chloe S. said she would experiment with the execution of an ornament: “I would have her sing it and we would experiment with it and decide if it should be fast or slow.” Henry S. said he would try multiple approaches to diagnose why Hannah was struggling with notes in the high range: “First, I’d try to get her to hear the concert C’s the high G’s and see if that remedies it. If that didn’t work, then we’d work on some airspeed things to get that squared away and see if that remedies it.”

These examples of an “experimental attitude” perspective on teacher uncertainty are laudable, again, for the teacher’s resourcefulness in problem solving and comfort with vulnerability in confronting uncertainty. Problem solving, in these cases, frequently involved

teachers in thought processes that began with what they knew—the fundamental “givens” of instrument technique, for example, standard mouthpiece placement, standard embouchure characteristics, and the known aspects of high register brass playing. In problem solving, teachers either moved students in successive approximations toward or if necessary away from the standard fundamental conditions. This experimental attitude may be a derivative of extensive teaching experience that provided generalists and specialists ample opportunities to teach students of various cognitive levels and performance abilities. Such contexts required teachers to use a trial-and-error approach to positively impact students’ musical performances. The methods that generalists and specialists have acquired over time has created a “tool box” of sorts in which teachers use to experiment. Multiple authorities espouse the potential of some uncertainty to foster the provisional and flexible thinking so central to music teaching expertise (e.g., Bowman, 2002; Byo, 2011). This willingness to try different methods and not be discouraged may be part of what makes effective teachers effective.

Comparison of Generalists and Specialists

As revealed above, much evidence of PCK was found in the verbalizations of both music teacher generalists and specialists. A comparison of teacher types shows generalists and specialists to be alike in their verbalizations about PCK. In the design of this study, the comparison of the apparently dichotomous generalist and specialist was intentional. The apparent dichotomy does not appear to be real as the two teacher types were remarkably the same in their verbalizations about student performance. Apparent differences in educational and performance background did not result in actual differences in the way that teachers responded to the same evaluative tasks and the ways they thought relative to PCK. This similarity is manifest in the themes and sub-themes reported above. Additionally, it was manifest more broadly during first

viewings of the videos for which generalists and specialists listened and watched straight through, with no stop. They were then asked to make general evaluative comments. Generalists' and specialists' responses to the first viewing tended to address multiple music elements and performance issues in like manner, with little to no prompting from me. The length of verbalizations and amount of detail shared by them in response to the first viewing surprised me, especially given the fact that they were aware that a second viewing would provide one (or more) opportunities to talk at length with the video stopped. Clearly, one viewing of 30 sec to 1-minute etudes was enough to process a great deal of information, remember it, and talk about it.

Generalists' and specialists' first listening responses also identified what the student was doing incorrectly and go into in-depth explanations of, in particular, air and its relationship to embouchure, tone, and articulation. Teachers briefly complimented aspects of students' performances. This finding differs from previous research in which applied music teachers used a limited number of pedagogical strategies accompanied by unbalanced instructional strategies (Persson, 1984).

During a second viewing, teachers stopped the video at what they perceived to be comment-worthy places and talked. Generalists and specialists' second listening responses tended to address multiple performance issues in a like manner. Responses were extremely specific and usually included at least one prescription for each stoppage of video. They often used adjectives or would sing what they wanted to hear, in which case I asked for further clarification to find out how they would specifically address that issue with the student.

Nested within the many similarities in generalists' and specialists' evaluative responses was one difference, somewhat subtle in nature, but perhaps important. There was a tendency for specialists' to organize their thinking around "big ideas" of music performance technique. A

small detail of performance would be viewed in combination with other related small details leading specialists to “principled” ways of thinking, which were broadly applicable across subject matter and instrument contexts. Specialists’ verbalizations reflected this principled or big idea way of thinking. For example, Henry S. discussed soft playing on brass instruments in his general impressions of the horn lyrical etude:

Soft playing on brass instruments is a difficult thing. People like to say soft playing requires warm air. That’s false. It’s just acoustically false. You have to teach a student how to focus and actually deliver a more focused airstream, which is less air.

In contrast, generalists tended to think in a detail-to-detail way while remaining focused on the instrument at hand. Howard G.’s response to Hannah’s performance was concentrated on three aspects:

First of all, mouthpiece placement is a little odd for the French horn. It’s set a little low. Second of all, she’s probably not manipulating her tongue properly to pop those high notes out. Shaping the tongue ‘eee’ and moving like that and when you get higher. And third with that, I think she probably has not spent a lot of time really focusing in on the details with the small segments, especially with the themes that keep repeating.

Differences Between Teachers and Students

In this section I present the results of the analysis of students’ self-evaluations of musical performance as a precursor to comparing teachers to students in a juxtaposition of PCK contexts and students’ *needs* for pedagogy.

Student Self-Evaluations.

Four themes emerged in an examination of students’ self-evaluations. A Focus on Weaknesses, Knowledge of Cause and Effect Relationships, Effecting Change, and Uncertainty as a Dead End and attendant sub-themes are presented below.

A Focus on Weaknesses.

In the video observation sessions, students were asked to comment on positive and negative aspects (strengths and weaknesses) of their performances. Examination of students' verbalizations revealed a focus on weaknesses and negativity as a theme in student self-evaluation even when there were numerous strengths to be considered. Upon pausing the video, students' initial comments consisted of negative feedback. For example, Tina paused the technical etude video not even one second after it started to say, "The first breath. That was a terrible breath. It was a shallow breath." Sam commented on his low notes, "The dynamics were odd. They weren't that good. I don't know. They were uneven."

Negative feedback also manifested itself when further prompting was needed to ascertain students' diagnoses. Hannah described her note length in the technical etude:

"H: That's where I sound like bullets. I: What do you mean by bullets? H: That was way too short. I just clipped it off so I could take a big breath, but I should have breathed there."

Tina qualified all of her approvals in a negative manner: "I started out a good dynamic, but I kept getting louder and I was like oh my goodness now its mezzo forte and I need to take an even bigger step up and it was too loud." Hannah was noncommittal when it came to a general impression of her lyrical etude performance, "It was all right. It wasn't that good or bad. It wasn't fantastic." In previous research in middle school and high school musicians, Hewitt (2005) asserts: "As students progress through grade levels and achievement levels, they become more critical of their own performance" (p. 159). In a study about middle school students' thinking about musical practice, Oare (2012) found that, when encountering difficult musical passages in practice, students exhibit various levels of frustration by either moving on to a new activity when becoming frustrated, retreating to easier passages, or struggle with maintaining focus..

Students were predisposed to giving negative commentary. They were not inclined to give positive commentary despite the instructional script specified that they do so. All positive commentary emerged as a result of prompting. Students' comments predominately related to note or rhythmic accuracy. Sam was thankful that a low note responded, "I like this note right here. I like that it came out." Cassie discussed her rhythmic accuracy:

"I: Is there anything about your performance that you are proud of? C: It seemed consistent. I: What does consistent mean? C: The rhythm was correct and the notes were there."

Perhaps students' capacity to approve of their performance was limited by not prioritizing musical elements other than pitch and rhythm. Previous research has shown that high school students tend to most accurately evaluate melody, tempo and rhythm over interpretation, tone, intonation, and technique/articulation (Hewitt, 2005). Just as students have difficulty diagnosing performance issues (Oare, 2012), they may also struggle with identifying, or be reluctant to talk about, positive aspects of their performance.

Knowledge of Cause and Effect Relationships.

The students displayed some knowledge of cause and effect relationships in music performance. Most commonly they referenced relationships between air stream and dynamics and tempo and rhythm. For example, Cassie discussed the relationship between air stream and dynamics:

C: I could have improved that decrescendo. I: How would you do that? C: I would have the same air pressure, but not as much... um... going over the break. The A was loud and I tried to decrescendo going up, but I should have waited till I went over the break to do the decrescendo.

Sam commented on the effect of tempo on rhythm accuracy in his performance of the lyrical etude:

S: I sped up. I: Where did that happen? S: Right here [points to the music]. Through this little area I sped up. I: What do you think caused that? S: I think that maybe I cut this note off and I started this one early. I: What would you do to fix that? S: Use a metronome. I: What would you do with the metronome? S: Keep it the same tempo and tap my foot. I would play this [points to music] with a metronome. Places with a lot of sixteenth-notes.

Students may focus on these areas because melody, rhythm, and tempo are objective in nature more so than tone, intonation, and articulation (Hewitt, 2005).

Effecting Change.

Analysis of student verbalizations revealed effecting change as a third theme. Effecting change was home to two sub-themes—directives and decontextualization.

Directives.

Directives functioned as a self-regulating behavior in the students. Frequently, students talked as if they were giving specific instructions to themselves and expected that the instructions would be the only feedback necessary to improve their performance. For example, Sam described his grace notes in his lyrical etude:

S: I couldn't hear the grace notes at all. I: Why do you think that is? S: I don't know. I wasn't using enough air. I: How would you fix that on your own? S: I would just use more air. I would take a bigger breath right there [points at music].

Tina also gave herself a directive in regards to breathing:

T: Overall, I could have done better with my breathing. Not taking a big enough quality breath, and dynamics need a lot of work. I: You talked about breathing. What would you do differently about your breathing. T: I would just take a bigger quality breath.

Cassie used a self-reflective directive in regards to dynamics: "I could have decrescendoeed more. I would just play it again cause I kinda kept it the same volume instead of just decrescendo."

Directives seemed to be a cue for performance repetition. Participants may feel that these performance issues are minor, achievable in the short term, and fixable by repetition. Previous investigation shows that middle school band directors tell the students what to do and that students are expected to make an in-the-moment adjustment (Millican, 2013), so students may expect that of themselves as well.

Decontextualization.

Students would use decontextualization on a regular basis through various forms of practicing (slow, partial, altered) or related exercises both with and without instruments (Duke, 1994). For example, Hannah recommended buzzing on the mouthpiece to address pitch accuracy: “I would have buzzed that skip right there to make it easier. When you buzz it, you basically make sure that the mouthpiece does all the work and that your horn is like an amplifier.” Tina stated that she would decontextualize both with and without her instrument:

T: Overall I could have done better with my breathing. Not taking a big enough quality breath. I: What do you mean by quality breath? T: Not just breathing from your chest. Breathing from your diaphragm so you can actually get those long notes their full value instead of just chopping them off for a three-count breath. I: How would you practice that on your own? T: Breathing exercises or just seeing how long you can hold a note at this dynamic and at this other dynamic and improving how long you can hold a note.

Oare (2012) found that student musicians tend to break problem areas into smaller parts and chain them together.

Uncertainty as a Dead End.

In their video observation sessions, all four students exhibited uncertainty at various points—a type of uncertainty that left them with no options. Hannah was unsure how to improve her tone quality on articulated quarter notes: “I blossomed the first four notes. I don't want to say use more air, cause that would just make me louder. I don't think it would work to fix that

problem. I don't know how to fix that.” Sam was unable to provide a prescription to improve his dynamic contrast: “I guess the dynamics were odd. They weren't that good. I don't know.” Tina was unsure if she played incorrect notes: “I think I missed a couple of partials. I don't know.” Cassie expressed uncertainty concerning rhythm: “I think the rhythm going into the sixteenth notes was phasing. They were a bit too slow to be thirty-seconds. Between a sixteenth note and a thirty-second kind of.” Research has shown that despite having knowledge of practice strategies, students have difficulty diagnosing causes of performance errors (Oare, 2012) and understanding how and when to use practice strategies (Byo & Cassidy, 2008).

Comparison: Teachers to Students

In order for music teachers to improve the way in which they teach their students, it seems apparent that they must first understand the ways in which students self-evaluate their performances as to ascertain students' need for PCK. Unlike the generalists and specialists, students, in both first and second listenings, students made brief, non-specific, and undeveloped statements about single performance issues. They were not inclined to prescribe solutions to perceived problems and had to be prompted by me to think this way. Like the teachers, some students sang during their second listening responses. Overall, teachers commented on more positive aspects of performances than the students.

Comparing student themes to teacher themes, it is not surprising that student commentary organized into fewer themes. To the extent that students *did* develop their thinking through my prompting, it revealed the nature of their self-regulatory thinking. Students focused on performance weakness. They showed some knowledge of cause and effect relationships in instrumental performance technique. In talking about how they would effect change in their

performance, they gave themselves directives and forecasted practice plans involving decontextualization. When they expressed uncertainty about what to do to solve a performance problem, they tended to be at the end of their capacity to effect change.

Knowledge of Cause and Effect Relationships and Effecting Change were common themes in the verbalizations of both teachers and students. Teachers and students alike had an understanding of the results of manipulating various aspects of performances. Teachers exhibited four ways of Effecting Change—decontextualization, sequencing instruction, open-ended questioning, and knowledge of student tendencies. Students demonstrated only two ways of effecting change—directives and decontextualization, both of which students experience frequently in the large ensemble rehearsal setting. Teachers and students verbalized as if the directives would be the only feedback necessary to improve performances. Both groups used decontextualization in the same manner.

Uncertainty had contradictory effects on the verbalizations of teachers and students. Even though there were times that teachers were uncertain about a diagnosis, they always chose to experiment and discover a solution that would work. Students did not have this “can do” attitude. In facing uncertainty as to how to proceed, students would say, “I don’t know,” and move on to something different. This difference in uncertainty may be the result of both groups’ length of experience in music.

Conspicuous by its absence in students’ self-evaluations was any reference to intonation. All teachers, on the other hand, addressed intonation frequently. This is consistent with Hewitt (2005), who found that high school students were rarely accurate in evaluating intonation and that there is little agreement between students and experts in evaluating intonation. Research has

shown that students have difficulty understanding melodic intonation since they commonly focus on it within a harmonic context in the large ensemble setting (Hewitt 2002; Hewitt & Smith, 2004). Oare (2012) found that students primarily focus on melody and rhythm, so they rarely view intonation as a priority.

Discussion

Evidence of PCK: A Rich Trove

The first research question focused on evidence of PCK in the verbalizations of music teacher generalists and specialists. The evidence was ample and situated within four emergent themes—aural concept, conveying information, effecting change, and uncertainty.

Aural Concept functioned as a starting point for all teachers. They seemed to form judgments always in relation to a clear aural sound image. This was true whether evaluating the performance of their primary instrument or the same-family non-primary instrument. Generalists and specialists knew precisely what they expected to hear from the students, which suggests that this aural concept allows them to detect even the smallest deviations from what they have in mind.

The sub-themes of directives, metaphor and analogy, modeling, and knowledge of cause and effect relationships in instrumental music performance were collapsed into Conveying Information. Teachers' responses focused primarily on air stream, tone, articulation, and musical expression. The absence of commentary about note and rhythm accuracy may indicate that the videos functioned as intended; student performances were flawed in ways that elicited serious talk about substantive issues of instrumental music technique and expression. Generalists and specialists possessed specific language and pedagogical techniques for presenting musical concepts. The multiple ways of communicating with students (directives, metaphor/analogy, and modeling), all informed by knowledge of cause and effect, may in and of itself be evidence of PCK.

Likewise, generalists and specialists articulated a variety of ways by which to effect change in student performance.. The sub-themes of decontextualization, sequencing instruction, open-ended questions, and knowledge of student tendencies were collapsed into Effecting Change. Generalists and specialists seemed well equipped to meet students “where they were” or “at their needs.” A variety of out-of-context activities would be employed presumably if the performance target were deemed inaccessible through more direct means. Decontextualization was presented both with instrument (e.g. altering tempi, altering articulations, octave studies) and without instrument (e.g., counting rhythms, mouthpiece buzzing, singing, conducting). Sequencing instruction was another means by which both generalists and specialists would reach students at their needs. Frequently, teachers situated specific performance problems in larger, fundamental issues, predominately air speed and tone quality. They prioritized air stream and tone quality over other musical aspects and based their decision-making on a hierarchy of what elements they would address first, second, third, etc. Both teacher groups used open-ended questions as a means to foster critical, evaluative thinking about tone quality and dynamics. Knowledge of student tendencies informed teachers’ decision-making about whether to and how to employ decontextualization, sequenced instruction, or open-ended questions to effect change in students’ performances. Previous research shows that expert band directors are tenacious in correcting performance errors, have a willingness to work with the problem until it is either corrected or shows improvement, use multiple correct repetitions of target passages, frequently utilize modeling, and have students practice errors in a variety of contexts (Cavitt, 2003). Brittin (2005) found that experienced middle school band directors’ lesson plans include decontextualization, repetition, and modeling. Again, the variety of techniques or options

available to the teachers of the present study relative to effecting change may in and of itself be evidence of PCK.

There was significant overlap between Millican's (2013) common elements of PCK findings involving middle school band directors and the themes of the present study involving high school band directors and university applied music teachers. Generally speaking, when considered from the pedagogical point of view, the differences of age and experience in the labels middle school, high school, and university melt away. Perhaps it is the *likeness* of the "subject matters" (music and pedagogy) across the different age and experience labels that explains the similarity of responses in PCK. Taking into account Millican's findings, all three teacher "groups" compare student performances to an aural concept to determine what action to take next. Other shared findings between Millican and the present study include: imagery, modeling, cause and effect relationships, sequencing instruction, questioning, and knowledge of student tendencies.

Few studies of pedagogical content knowledge in music exist. Although PCK has been shown to be a valued skill across a wide demographic of music teachers in the United States (Millican, 2008), only one study (Millican, 2013) has investigated and described PCK within a single subject pool, middle school band directors. The present study, both individually and comparatively, investigated and described PCK within two subject pools, high school band directors and university applied music teachers. Results of this study further confirm the applicability of Shulman's (1986, 1987) PCK model to music education.

There were also important differences between Millican's common elements of PCK and the finding of the present study. The use of directives in Conveying Information and

decontextualization in *Effecting Change* were not present in Millican's findings. This may be the result of teaching environment. Perhaps in some cases the perceived or actual needs of students are different between the middle school and high school/applied lesson environments, thus warranting different approaches. For example, the use of directives may be more conducive to the needs of high school musicians, who are typically more advanced in their resourcefulness and skill level than are middle school musicians. Blocher, Greenwood, and Shellahamer (1997) equated the differences between middle and high school band directors as, "The need to develop basic instrumental technique may account for more time spent by middle school directors in 'listening' to students run through drill-type material [...] this may reflect the nature purpose, and level of the material being rehearsed" (p. 466).

Unique in the present study of PCK in music is the theme of Uncertainty. Differences existed in how teachers and students coped with uncertainty. Students expressed uncertainty once they were out of practice techniques, and made no further attempts to discover solutions to performance problems. This "dead end" uncertainty may be remedied by helping students to take fuller advantage of practice techniques. With only one exception (noted in Results and Discussion), teachers chose to address uncertainty head on by experimenting with techniques to address performance problems. The tendency among teachers to unabashedly "dive in" to figure out a performance problem showed them to be confident in their abilities and unafraid of vulnerability, both perhaps byproducts of their experience.

PCK of Generalists and Specialists: A False Dichotomy

The second research question focused on how music teacher generalists and specialists might differ in their dealings with PCK. At the outset, I hypothesized that I was studying two

disparate teacher groups, that is, band directors as generalists and applied teachers as specialists, and that differences might appear in their dealings with PCK. Results, however, indicated that the two teacher groups were remarkably the same in their verbalizations about student performance relative to PCK. Apparent differences in educational and performance background did not result in actual differences in the way that teachers responded to the same evaluative tasks and the ways they thought relative to PCK. If these results were to hold up through further investigation, this would be a positive outcome given that experienced generalists, who have education-focused backgrounds, seemed to respond to music performance evaluation tasks on par with specialists, who have performance-focused backgrounds. Just as positive is that the converse may also apply—that specialists seemed to respond on par with experienced generalists in the context of PCK. In the present study, the “education” perspective required in PCK was not lost on the specialists. The “performance” perspective required in musicianship was not lost on the education-minded generalists. Is the generalist/specialist dichotomy as applied in the context of PCK in music a false dichotomy? Based on the results of the present study, it seems so. Consider, however, that the music teacher generalists and specialists in this study were all experienced, successful teachers. Previous research has shown that amount of teaching experience promotes higher interjudge reliability (Bergee, 1997). Perhaps the assumed differences among generalists and specialists are real when teachers are novices, but lessen as teachers accumulate experience and success. Shulman (1987) and Millican (2013) were in agreement that PCK separated the pedagogue from the content specialist. To the contrary, results of the present study suggest that PCK in music is a common trait of experienced and successful generalists and specialists and that they contextualize PCK in like manner.

In many school music programs, high school band directors formally evaluate performances of all instruments. In many university schools of music, applied teachers formally evaluate of the family of instruments to which their primary instrument belongs (the woodwind family, brass family, percussion family, string family). There is an underlying belief that both groups of teachers are qualified to evaluate performances of instruments that extend beyond their primary instrument, regardless of the context. In the analysis of teachers' responses, I did not detect a difference by instrument in teachers' evaluations of student performances, despite the differences in technical challenges between clarinet and alto saxophone, and horn and trombone. It is possible that teachers learn how to evaluate performances of other instruments, and are eventually on par with teachers of those other instruments. In fact, previous research has shown that over time, judges' reliability improves through teaching experience, particularly with instruments other than those of one's specialty (Fiske, 1977).

The subtle difference characterized by specialists who tended to organize their thinking around details as components of big ideas of music performance technique and generalists who tended to work detail to detail while focused on the instrument at hand may be a result of the contrasting teaching/learning settings of the two teacher groups. University applied teachers most often teach in one-on-one settings that match the observation activity of this study. Band directors most often teach in large ensemble settings with many students, varying types of students, varying levels of skill development, and many different instruments. This does not at all match the observation activity of this study. The challenge of the highly varied, large ensemble setting may induce band directors into a conceptualization of rehearsal as being dominated by separate details, separate instruments, separate students. On the other hand, the

one-on-one applied environment may afford specialists the opportunity to view things from a distance, through a bigger picture lens, leading to broader conceptualizations of pedagogy.

Teachers' PCK and Students' Pedagogical Needs: The Gap

The third research question focused on the differences between teachers' PCK and students' pedagogical needs. The difference in verbalizations between teachers and students is, not surprisingly, wide. The magnitude of the gap is striking. Unlike teachers, who reference aural concept as a foundation for all teacher responses, students exhibited little to no aural concept in their verbalizations. Teachers were able to compare student performances to their aural concept, which may have been the catalyst for myriad of diagnoses and prescriptions. Students' lack of an aural concept may have made it difficult to diagnose underlying performance problems and provide prescriptions to remedy them.

Teachers provided great detail and expounded upon their ideas, completely opposite of the students. Students provided very short, generic statements with little depth. Students tended to identify performance issues, but were not inclined to prescribe solutions (Oare, 2012). More often than not, student prescriptions resulted from prompts from me. The gap between the students and teachers in evaluative skills was so wide that one might predict that actually following through on PCK may be more difficult than initially expected. It is important to note that none of the students identified intonation as a performance concern. This gap was the most evident in teachers' and students' evaluations of intonation. Intonation was frequently addressed by teachers, but was absent in all student responses. Previous research has shown that students

are able to identify performance issues but have difficulties diagnosing their causes and prescribing solutions (Oare, 2012), and that students struggle with evaluating tone and intonation (Hewitt, 2004).

Implications

Confirming and Extending Previous Research

Research in pedagogical content knowledge in music has been focused on middle school band directors or survey data. The present basic interpretive qualitative study is the first to provide evidence of pedagogical content knowledge (PCK) in the thinking of generalists and specialists. That thinking shows knowledge of students, knowledge of content, understanding of curriculum and sequencing, and general teaching skills (Millican, 2013, p. 51). Previous PCK research in music has not been comparative; instead, studies have focused on single subject pools (i.e., middle school band directors and pre-service teachers). The present study is comparative; it focuses collectively on generalists' and specialists' PCK in the context of student performers' pedagogical needs.

Results showed ample evidence of PCK in the verbalizations of teachers. Four themes of PCK emerged—Aural Concept, Conveying Information, Effecting Change, and Uncertainty. There were ten sub-themes. Directives, metaphors/analogies, modeling, and knowledge of cause and effect relationships in instrumental music performance formed Conveying Information. Contextualization, sequencing instruction, questioning, and knowledge of student tendencies formed Effecting Change. Aural Concept, Convey Information, and Effecting Change overlap considerably with Millican's (2013) common elements categories of PCK.

Two findings appear to be unique to this study of PCK in music and quite in keeping with Shulman's (1987) definition of PCK: "how particular topics, problems, or issues are organized, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction" (p. 8). (a) The sheer variety of ways in which teachers would communicate with

students and initiate change in performance may in and of itself be an indicator of PCK, and (b) uncertainty emerged in two forms as a theme indicative of PCK. In some cases, teacher uncertainty about how to approach a performance problem was cause for experimentation. In this context, the teacher seemed to be highly adaptive, resourceful, in-the-moment, and very connected with the student. Even the other form of teacher uncertainty—dead end uncertainty—ultimately led the teacher to seek outside help, which ultimately would benefit the student.

Refuting a Generalist/Specialist Dichotomy

According to Millican (2008), PCK is what separates music educators from professional musicians who teach, as music educators have to combine their musical knowledge with teaching skills. Results of the present study, however, indicate that the generalists and specialists were remarkably the same in their verbalizations about student performance relative to PCK. Apparent differences in educational and performance background did not result in actual differences in the way that teachers responded to the same evaluative tasks and the ways they thought relative to PCK. If these results were to hold up through further investigation, this would be a positive outcome given that experienced generalists, who have education-focused backgrounds, seemed to respond to music performance evaluation tasks on par with specialists, who have performance-focused backgrounds. Just as positive is that the converse may also apply—that specialists seemed to respond on par with experienced generalists in the context of PCK. Is the generalist/specialist dichotomy as applied in the context of PCK in music a false dichotomy? Based on the results of the present study, it seems so. Consider, however, that the music teacher generalists and specialists in this study were all experienced, successful teachers. Previous research has shown that amount of teaching experience promotes higher interjudge reliability

(Bergee, 1997). Perhaps the assumed differences among generalists and specialists are real when teachers are novices, but lessen as teachers accumulate experience and success.

The Teacher/Student Difference

The difference in verbalizations between teachers and students is, not surprisingly, wide. The magnitude of the gap is striking. Teachers provided great detail and expounded upon their ideas, completely opposite of the students. Students provided very short, generic statements with little depth. Students tended to identify performance issues, but were not inclined to prescribe solutions (Oare, 2012). More often than not, student prescriptions resulted from prompts from me. The gap between the students and teachers in evaluative skills was so wide that actually following through on PCK might be a more daunting challenge than casual observation might indicate. It is important to note that none of the students identified intonation as a performance concern. The gap was the most evident in teachers' and students' evaluations of intonation. Intonation was frequently addressed by teachers, but was absent in all student responses. Previous research has shown that students are able to identify performance issues but have difficulties diagnosing their causes and prescribing solutions (Oare, 2012), and that students struggle with evaluating tone and intonation (Hewitt & Smith, 2004).

Music Teacher Preparation

Research indicates that preservice teachers lack technique and language for presenting musical concepts (Ballantyne & Packer, 2004; Millican, 2014). The findings of this study may provide "food for thought" about how preservice and less experienced music educators might implement PCK in their classroom instruction. Reading the specific verbalizations of teachers, even without the context of the videos being evaluated, would seem to be an opportunity to see

the clarities and complexities of teachers' evaluative thinking. The more the music education community understands the nature of PCK among expert teachers, the better they can tailor teacher preparation programs to better develop PCK in preservice teachers.

It is interesting to note that preservice teachers in previous studies appeared to behave like the high school students of the present study, specifically with the themes of conveying information and effecting change. Both the students of this study and preservice teachers of previous research (Millican, 2014) gave non-specific diagnoses and often failed to provide prescriptions. High school students and preservice teachers may struggle with understanding cause and effect relationships because they are still developing connections between musical knowledge and specific strategies. Despite these shortcomings, high school students and preservice teachers show some understanding of decontextualization. Both groups utilize slow, partial, and altered practicing strategies.

Limitations

The results of this basic interpretive qualitative study are not generalizable. Complete objectivity in qualitative research is not possible. Although these data provide important and useful information about PCK in music, the process of coding is inherently subjective in its basis on the investigator's choices about themes and sub-themes. Time did not permit member-checking, which had I employed it, would have added objectivity.

The self-report nature of data-gathering can be unreliable in its sole focus on participant perception. While participants' verbalizations in response to the video stimuli and my prompts represent authentic evidences of meaning-making, there was no opportunity for participants to demonstrate the extent to which they would have followed through behaviorally on their intentions.

Participants were two high school band directors, two university applied music teachers, and four high school musicians. Not only is this a small sample, it is the only sample. One cannot rule out the possibility that results are idiosyncratic to these participants. The study represents 4 hours of teacher verbalizations about evaluation and 4 hours of student verbalizations about self-evaluation. These hours may or may not provide a valid snapshot of PCK in juxtaposition with students' pedagogical needs. In the course of the study, I found no reason to believe that the data collected relative to PCK did not represent a valid snapshot.

PCK is most certainly a factor in large ensemble settings, but this study focused on PCK in the context of solo performance evaluation only, which is more consistent with what university applied music teachers do frequently than what high school band directors do frequently. High school band directors may have responded differently had the task been about the application of PCK in the ensemble setting. Likewise, university applied music teachers may

have responded differently if the task were ensemble-oriented. Despite these limitations, the research does provide important and useful information about PCK in music.

Directions for Future Research

On the simple fact that there are only a few studies that examine PCK in music education, more research is needed. Further, one study (the present one) does not prove. More research should apply methods similar to those of this study. A replication could enlist teachers and students from different educational settings and with different instrument specialties. Findings could possibly reinforce and extend the findings of this study. The perception of an across the board generalist/specialist dichotomy is quite robust. The contrasting results of the present study need verification.

Another potentially revealing approach might be to replicate with student musicians whose performance quality is less refined than that of the present study in order to investigate the point at which teachers offer PCK versus dismiss PCK on the basis of performers' lack of basic preparation. Further study is necessary in order to validate the unique evidences of PCK—variety of method and teacher uncertainty. Finally, to compensate for the limitations of self-report data, future research might investigate PCK strictly on the basis of what teachers do while in the teaching act, or this might entail comparing music teachers' self-report of PCK to how it manifests in actual teaching.

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Appendix A
Louisiana State University IRB Exemption Approval and Form

ACTION ON EXEMPTION APPROVAL REQUEST



Institutional Review Board
Dr. Dennis Landin, Chair
130 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.5983
irb@lsu.edu | lsu.edu/irb

TO: Danielle Emerich
Music

FROM: Dennis Landin
Chair, Institutional Review Board

DATE: November 24, 2014

RE: **IRB#** E9101

TITLE: Pedagogical Content Knowledge: Its Use Among High School Band Directors and University Applied Music Teachers in the Context of Student Self-Evaluation

New Protocol/Modification/Continuation: New Protocol

Review Date: 11/22/2014

Approved **Disapproved**

Approval Date: 11/22/2014 **Approval Expiration Date:** 11/21/2017

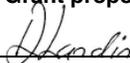
Exemption Category/Paragraph: 2a

Signed Consent Waived?: No

Re-review frequency: (three years unless otherwise stated)

LSU Proposal Number (if applicable): _____

Protocol Matches Scope of Work in Grant proposal: (if applicable) _____

By: Dennis Landin, Chairman 

PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –

Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.

8. SPECIAL NOTE:

**All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at <http://www.lsu.edu/irb>*

Appendix B
Consent Form for Non-Clinical Music Study

Title of Study: Pedagogical Content Knowledge: Its Use Among High School Band Directors and University Applied Music Teachers in the Context of Student Self-Evaluation

Researcher: The following investigator is available for questions,
M-F, 8:00 a.m. – 6:00 p.m.
Danielle Emerich
Graduate Teaching Assistant, LSU
(404) 502-8008

Purpose of Of Study: The purpose of this study is to describe and compare the use of pedagogical content knowledge among high school band directors and university applied music teachers in the context of student self-evaluation of music performance.

Participants: Three – four experienced high school band directors and 3 -4 university applied music teachers whose primary instrument is either woodwind or brass.

Description of Study: Three – four experienced high school band directors and 3 -4 university applied music teachers watch two videos of student performances and pause it when they hear comment-worthy strengths or weaknesses. There will be one viewing session that will last no longer than 45 minutes. The investigator will employ interview protocols designed to stimulate participants’ comments as necessary.

Risks: There are no known risks.

Right to Refuse: Participation is voluntary. Participants will become part of the study only if they agree to participate. At any time, participants may withdraw from the study without penalty or loss of any benefit to which they might otherwise be entitled.

Privacy: Results of the study may be published, but no names or identifying information will be included in the publication. Participants’ identity will remain confidential unless disclosure is required by law. Audio recordings will be kept in a secure location.

Signature: The study has been described to me and all my questions have been answered. I may direct additional questions regarding study specifics to Danielle Emerich, Graduate Teaching Assistant, LSU, at (404) 502-8008 or at demerich@lsu.edu. I agree to participate in the study described above and acknowledge her obligation to provide me with a signed copy of the consent form.

Signature: _____ Date: _____

Appendix C
Parental Permission Form for Non-Clinical Music Study

Title of Study: Pedagogical Content Knowledge: Its Use Among High School Band Directors and University Applied Music Teachers in the Context of Student Self-Evaluation

Researcher: The following investigator is available for questions,
M-F, 8:00 a.m. – 6:00 p.m.
Danielle Emerich
Graduate Teaching Assistant, LSU
(404) 502-8008

Purpose [Of Study: The purpose of this study is to describe and compare the use of pedagogical content knowledge among high school band directors and university applied music teachers in the context of student self-evaluation of music performance.

Students Who Can Participate: Students 14-18 years of age who are auditioning for the Louisiana Music Educators Association District IV Honor Band.

Description of Study: 10-12 student musicians will be video recorded performing audition music. There will be one recording session, per student, lasting a maximum of 15 minutes that will occur in band class during the school day. Students will watch the video of their performance and pause it when they hear comment-worthy strengths or weaknesses. The investigator will employ interview protocols designed to stimulate student comments as necessary. Three high school band directors and 3 university applied music teachers will watch the same videos and, following the same protocols, provide evaluative commentary on student performances.

Benefits: This experience may serve to reduce performance anxiety that typically occurs within the audition setting.

Risks: There are no known risks.

Right to Refuse: Participation is voluntary, and a student will become part of the study only if both student and parent agree to the student's participation. At any time, either the student may withdraw from the study or the student's parent may withdraw the student from the study without penalty.

Privacy: Results of the study may be published, but no names or identifying information will be included in the publication. Student identity will remain confidential unless disclosure is required by law. Video recordings will be stored in a secure location and may be destroyed upon parent's request.

Signature:

The study has been described to me and all my questions have been answered. I may direct additional questions regarding study specifics to Danielle Emerich Graduate Teaching Assistant at LSU, at (404) 502-8008 or at demerich@lsu.edu. I am allowing my student to participate in the study described above and acknowledge the researcher's obligation to provide me with a signed copy of the consent form.

Parental Signature: _____ Date: _____

Appendix D
Student Assent Form

I, _____, agree to be in a study that examines how music teachers teach music. A female graduate student will video record me playing my audition music and I will watch the video and evaluate my performance.

Signature

Date

Vita

Originally from Magnolia, Texas, Danielle Emerich is a candidate for the degree of Master Of Music Education from Louisiana State University. She obtained a Bachelor of Science degree in Music Education from the University of Alabama in 2008. From 2008-2011 she taught secondary instrumental music at Apalachee High School in Winder, Georgia, and from 2011-2013 taught instrumental music at River Oaks Middle School in North Charleston, South Carolina. Her bands at both schools consistently received excellent and superior ratings at the district level. She served as a clinician at the 2010 Georgia Music Educators Association Conference. In the fall of 2013 she was awarded graduate assistantships with the Louisiana State University Band and Music Education Programs. She is currently searching for a secondary instrumental music position in the Houston area.