Archived Video Conference Lessons and the Assessment of Pre-Service Teachers

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Abstract

Introduction. In this study, nine pre-service teachers worked in group (three groups of two and one group of three) to deliver a series of seven lessons via desktop videoconference from a Faculty of Education to elementary students in their classroom.

Method. Each group delivered 2 lessons over a 4-week period. During delivery, the lessons were archived to disk. Each pre-service teacher viewed the performance and submitted reflective advice for improvement to an asymnchronous text thread before planning for the next lesson began. The archived lessons where subsequently examined for evidence of high and low-level teaching practice against performance indicators of a modified version of the Ontario Teacher Performance Appraisal Manual. The modified Manual contains 37 indicators in three teaching domains: professional knowledge, teaching practice, commitment to pupils and pupil learning.

Results. Low scores were found on all seven indicators of professional knowledge and there was a mixed performance in the teaching practice domain (9 low and 5 high). Pre-service teacher performance was high on the majority (12 of 16) of the commitment to pupils and pupil learning indicators. It is argued that high and low results obtained in studies such as this might be used to provide pre-service teachers with guidance between the videoconference lessons that lead them to improvements in their classroom teaching.

Keywords: Videoconference, pre-service teacher performance

Introduction

In Passmore and Goodman (2005), nine pre-service teachers worked in groups (three groups of two and one group of three) to deliver seven desktop video conference lessons to elementary students in remote classrooms during the academic portion of their teacher training. Each group delivered two lessons over a four week period (one lesson was cancelled due to technical problems). Each lesson was archived to disk so that all of the pre-service teachers could watch, and reflect upon, the teaching performance and then submit those reflections to an asynchronous discussion thread. The objective was for each group of pre-service teachers to use their own reflections and the reflections of their peers to develop plans of action for the next lesson by which improvements in their teaching might be realized. The performances were measured along the three domains (professional knowledge, teaching practice, commitment to pupils and pupil learning) of a version of the Canadian Province of Ontario's *Teacher Performance Appraisal Manual* (2000) that Passmore, Fredrickson and Bowen (2006) developed.

Passmore et al adapted the Ontario Teacher's Performance Appraisal Manual (TPAM) in a multi-step process that eschewed indicators of teacher performance that would not manifest in archived videoconference lessons and by rewording the remaining indicators (where necessary) such that they pertained to videoconference lessons. The structure of the TPAM (and the modified version) is such that each of the three domains is comprised of a number of competencies, and each competency is comprised of a number of performance indicators. Table 1 provides examples of competencies and their indicators that illustrate this structure.

Table 1: The structure of the modifed TPAM

Domain	Competency	Performance Indicators
Commitment to Pupils and Pupil Learning	Teachers demonstrate commitment to the well-being and development of all pupils	Shapes instruction appropriately so that it is helpful to students who learn in a variety of ways Effectively motivates students to improve student learning
Professional Knowledge	Teachers know their subject matter, the Ontario curriculum and education-related legislation	uses appropriate diagnostic techniques to assess student difficulties employs formative assessments to check for understanding
Teaching Practice	Teachers communicate effectively with pupils, parents and colleagues	demonstrates a positive, professional attitude when communicating with students communicates clear, challenging and achievable expectations for students

The Passmore et al. modified scale contained 76 indicators of teacher performance; the original TPAM contained 132 indicators. While the TPAM is copyrighted and cannot be duplicated in full in this document, Table 1 presents sufficient examples of the modified TPAM's competencies and indicators that the reader can grasp its nature. Passmore and Goodman selected, through careful review, 37 of the adapted indicators (the indicators that they thought would be most likely to manifest in lessons that concern the material that was to be taught in their study).

Once the lessons were delivered and archived three reviewers gauged the quality of the performances. They rated each indicator along a four-point rubric (unsatisfactory, satisfactory, good and exemplary). That is, they rated the frequency with which the teacher groups exhibited the behaviour of each indicator. Always displaying the behaviour warranted an "excellent" rating. Displaying the behaviour with decreasing frequency warranted lower ratings thus: consistently performing the behaviour (good), generally performing the behaviour (satisfactory), and infrequently performing the behavior (unsatisfactory). In addition to the frequency with which behaviour was exhibited, the Passmore and Goodman (2005) reviewers made judgments as to their quality. On receipt of the reviewers' ratings Passmore and Goodman (2005) generated median scores for each indicator. They converted them from unsatisfactory through exemplary ratings to the numerical values one through four respectively. Summing the values for the indicators enabled the generation of total teaching scores for each lesson. By plotting total scores over time, Passmore and Goodman found that the groups' total scores increased over the course of the study.

This study revisits the Passmore and Goodman (2005) data. The goal is to identify performance indicators where the groups' performances were consistently high, consistently low or changed (increased or decreased) over time. The findings we present, while limited by the small size of the Passmore and Goodman (2005) study, are used to illustrate how a Faculty of Education might have used them to gauge the efficacy of the performances of the class (the groups of pre-service teachers) in respect to particular indicators, competences and domains and to provide feedback (between and over the course of multiple videoconference lessons) to realize quantifiable improvements in the class' teaching. It should be said that had the Passmore and Goodman study involved individual pre-service teacher-lead lessons the advisements could have been directed toward individual teachers. That is, numerical ratings for

indicators might be used to provide advisements to individual pre-service teachers such that their teaching improves with time.

Literature review

Known uses for videoconferencing in education include: the delivery of educational courses and programs, the provision of learning opportunities for professionals in regional areas, and pre-service courses for prospective teachers (Passmore, Fredrickson & Bowen, 2006; DeBourgh, 2003; Andrews & Klease, 2002; Jones & Sorenson, 2001; Cifuentes & Murphy, 2000; Hearnshaw, 2000; North, Strain & Abbot, 2000; Boylan & Francis, 1999; Dolhon, 1999a and b). Two research efforts that hold particular relevance to the work of Passmore and Goodman (2005) are Rosen (2003) and Chun, Sharpe, Crawford, Gopinathan, Khine, Moo and Wong (2000). In Chun et al. (2000), pre-service teachers watched video clips of their practicum teaching and commented on their own efforts. The researchers held that the reflective process of watching and commenting facilitated the teachers' growth and development. Rosen (2003) provided her pre-service teachers with virtual field experiences, which became the object of a collaborative reflection. She saw this use of the technology as a way to monitor the professional growth of pre-service teachers.

In Ontario, Canada, pre-service teacher performance in the classroom is assessed during practicum sessions by way of institute-specific measures. Ontario's in-service teachers are subject to assessment by a common measure, the TPAM (2000). The TPAM is structured such that it contains domains of teaching performance. Each domain comprises a number of teacher competences and each competency is made up of a number of indicators of teacher performance. At their core, indicators and competencies pertain to behaviours that teachers ought to exhibit in the classroom. It is important to bear in mind that the issue of competencies in teacher education is an ongoing area of controversy and debate (Korthagen, 2004). We are of the position that for pre-service teachers, competencies can be generalized as an integrated body of knowledge, skills and attitudes (Stoof, Martens, & Van Merriënboer, 2000). Consequently, they represent potential behavior, not the actual expression of the behavior. The expression of a behavior is contextually driven (Korthagen, 2004; Caprara & Cervone, 2003).

Passmore, Fredrickson and Bowen (2006) adapted the Ontario TPAM to video-based assessment of pre-service teacher performance. Their adaptation contained 76 performance indicators in three domains of teacher competency: Professional Knowledge, Teaching Practice and Commitment to Pupils and Pupil Learning. Passmore and Goodman (2005) carefully selected a total of 37 of these adapted indicators, from all three domains to frame their work (the indicators that they felt would be most likely to appear in the lessons that were to be taught). They arranged for three independent reviewers to assess seven archived video conference lessons of the pre-service teachers teaching against each of the indicators using a four point scale: unsatisfactory, satisfactory, good and exemplary (as per the TPAM). For each lesson, the reviewers calculated median scores for each indicator and then summed the median scores to generate total scores for each performance indicator. The total scores were used to monitor improvements (increases in total scores from lesson one to lesson seven) in the pre-service teachers' performance.

This work revisits the data of the Passmore and Goodman (2005) study. It identifies patterns in their median indicator ratings (across domains). The patterns are used to illustrate how a Faculty of Education might use such information to provide advisements between videoconference lessons that aid reflection and target low-scoring indicators, the indicators where improvements in the quality of the pre-service teachers' performance are required.

Method

The Passmore and Goodman (2005) study involved nine pre-service teachers from an undergraduate, elective Educational Technology course in a regional university in Ontario, Canada. They worked in three groups of two and one group of three to teach sequential material in a standard grade 8 history textbook, *Canada: The story of a developing nation* (2000). Each group taught two lessons over a four-week period in the winter 2005 semester to a grade 8 history class via desktop video conferencing (one class was cancelled due to technical problems).

Three independent reviewers (an in-service teacher, a retired Principal and an Education Professor) were provided with seven DVD's of the pre-service teachers' lessons and asked to award scores of unsatisfactory through exemplary for each of the 37 performance indicators for each archived video conference session. Their ratings were based on the fre-

quency of the performance of a behavior and their subjective judgment as to the quality of those performances. They awarded "not applicable scores" if an indicator was not exemplified in an archived lesson. An example of a performance indicator and its assessment criteria is shown in Table 2.

Table 2. The TPAM 4-point scale for one competency

Domain: Commitment to pupils and Pupil Learning					
Competency	**Performance Indicator**	**Exemplary (4)**	**Good (3)**	**Satisfactory (2)**	**Unsatisfactory (1)**
Teachers demonstrate commitment to the well-being and development of all students	Assists learners in practicing new skills by providing opportunities for guided practice	The teacher always demonstrates commitment to the well-being and development of all students	The teacher consistently demonstrates commitment to the well-being and development of all students	The teacher generally demonstrates commitment to the well-being and development of all students	The teacher infrequently demonstrates commitment to the well-being and development of all students

Passmore and Goodman (2005) used the reviewers' ratings to generate median ratings for each indicator for each lesson. They converted these median unsatisfactory to exemplary scores to numerical values of one through four respectively and summed them to calculate total scores for each lesson. In this article, the median scores for each indicator are used to determine where pre-service teacher performance was weak or strong. That is total median scores (median of the median scores) were calculated for each indicator for all seven lessons to reveal where the pre-service teachers performed at:

- low levels: total median score of zero, one or two; or,
- high levels: total median of three or four.

In addition, median scores for each performance indicator were tracked across the lessons to reveal the indicators that improved over time (performance indicators whose median scores increased or demonstrated growth). It is proposed that low, high and growth scores may be used to provide pre-service teachers with advice that targets low scoring and non-growth indicators and improves classroom teaching over the course of multiple videoconference lessons.

Results

Two types of performance score that were identified from our analysis of the data were: low-scores (total median ratings of 0, 1 or 2) and high-scores (total rating of 3 or 4). Indicators that improved over the course of the lessons (growth scores) were identified too as

were those that did not (static scores). Table 3 presents example scores for a few competencies. As noted above, the TPAM is a government owned and copyrighted scale that cannot be printed in full. Only a few specific competencies are provided in Table 3 but they do allow us to illustrate high and low scores and subsequently to discuss the provision of advice that targets weaknesses in pre-service teachers teaching performances.

Table 3: Summary of Performance Scores and Growth/Static scores

Domain	Competency	Performance Indicators	Score	Performance Score	Growth/Static Score
Commitment to Pupils and Pupil Learning	Teachers deomonstrate commitment to the well-being and development of all pupils	Shapes instruction appropriately so that it is helpful to students who learn in a variety of ways	3	High	Growth
		Effectively motivates students to improve student learning	2	Low	Growth
Professional Knowledge	Teachers know their subject matter, the Ontario curriculum and education-related legislation	uses appropriate diagnostic techniques to assess student difficulties	0	Low	Same
		employs formative assessments to check for understanding	1	Low	Growth
Teaching Practice	Teachers communicate effectively with pupils, parents and colleagues	demonstrates a positive, professional attitude when communicating with students	4	High	Same
		communicates clear, challenging and achievable expectations for students	2	Low	Same

Before we consider the results for each domain and consider how they may be used to provide targeted advice for pre-service teachers it should be noted that across the data set, not one of the performance indicator scores decreased over the course of the 7 lessons. Professional knowledge scores increased in only 42% of the performance indicators, while in the domain Teaching Practice scores increased in only 35% of the performance indicators. Commitment to pupils and pupil learning performance scores increased in 75% of the performance indicators.

It should be noted too that the above results are consistent with the literature on pre-service teacher learning which maintains that the professional learning of pre-service teachers is a complex undertaking that involves a wide variety of, at times, contradictory interests: personal and relational, the forms and construction of knowledge, knowledge transmission, and the purposes of education. These interests develop through pre-service teachers engaging in ongoing discourse on their own and by "interaction with others involved in the same process" (Mule, 2006, p. 208) The relatively high numbers of static scores ("Same" scores in Table 2) in our results is a reflection of the pre-service teachers' inexperience with classroom teaching: professional knowledge and teaching practice require pre-service teachers "to put theory into practice in settings that model and encourage both state-of-the art practice and inquiry ethic that sustains continued professional growth" (Darling Hammond, 1994, p. 9). It is with the above perspective in mind that we address an analysis of our results for each the teaching domains.

1. Professional Knowledge

This domain consists of three competencies and seven performance indicators. All seven performance indicators received low performance scores. Four of the performance indicators received median scores of zero, and three received median scores of two (satisfactory). Examples of the performance indicators that scored at zero were:

- Organizes instructional time by providing for the needs of all students
- Uses different motivational strategies to encourage students in developing competence in all areas.

Examples of the performance indicators that scored at performance level two were:

- Teaches scheduled class/subject for allocated time periods with effective student engagement
- Differentiates instruction to meet diverse student needs

Zero scores for indicators such as "organizes instructional time by providing for the needs of all students" and "employs formative and summative assessment to check for understanding" suggest that the teaching event failed to stimulate activity in these areas or that the pre-service

teachers were not aware of the importance of the teaching skills that they represent. The fact that all seven scores in this domain were static (Same) indicates that the latter may be the case. Mule (2006, p. 208) found a similar result in her study, in which pre-service teachers demonstrated "a preoccupation with certain skills and principles prescribed in competency based manuals or in prior theory or practice." Indicators with low-level performance scores such as "differentiates instruction to meet diverse student needs" improved in lesson 4 when the pre-service teachers decided to use PowerPoint to accompany their presentation. The classroom teacher was cued to change the slides as the pre-service teachers presented their material and student engagement increased as a result. This tactic was subsequently adopted by the groups that taught the fifth, sixth and seventh lessons. It is possible that the growth in these performance indicators was a byproduct of the technology use and not a result of the actions of the pre-service teachers. It is also possible that delivering just three lessons after the introduction of PowerPoint was not enough to realize additional and continued improvement We believe that additional investigations would be justified to clarify these matters.

The performance indicators with zero scores represent aspects of teaching that require considerable knowledge of the students: "Organizes instructional time by providing for the needs of all students," or are more suited to face-to-face instruction: "Uses appropriate diagnostic techniques to assess student difficulties, employs formative assessment to check for understanding." It seems possible (and probable) that short-term video conference instruction, divorced from the subtle (and not so subtle) nuances of the classroom does not readily promote these teaching behaviors. It is also possible that the pre-service teachers are more concerned to invest their efforts on more basic matters of instruction (Mule, 2006). A pressing concern for many pre-service teachers is the recognition that 'this is the information I need to get across and this is how I intend to do it.' These findings suggest that additional research that focuses upon these matters would be required to determine if and how advice may be provided between videoconference lessons to guide pre-service teachers.

The theoretical performance indicators of professional knowledge are covered in pre-service teacher courses. The connection between theory and practice is often missing however until pre-service teachers are on their practicum. The practicum component of the program provides pre-service teachers with opportunities to implement their theoretical professional knowledge and resolve the "problems of professional action" (Wallace & Louden, 2000, p. 104). Our results indicate that any one wishing to advise pre-service teachers in these areas

may need to investigate how pre-service teachers attempt to integrate their developing professional knowledge into the unpredictable context of the classroom.

Apparent anomalies exist in our findings. For example, the low performance score of the performance indicator "Differentiates instruction to meet diverse student needs" conflicts with the high performance scores in the commitment domain for "Utilizes a variety of teaching strategies suited to the individual needs of students." Alternatively, the low performance score in professional knowledge for "Uses different motivational strategies to encourage students in developing competence in all areas" conforms to the low performance score in the commitment domain for "Effectively motivates students to improve student learning." Again, these anomalies point to a need for those using instruments such as the TPAM to develop a common situated understanding of the performance indicators.

In summary, the performance indicators of this domain require pre-service teachers to quickly develop an intimate knowledge of their students and such knowledge requires frequent contact with students. It is possible that short-term video conference instruction restricts pre-service teachers' ability to engage in the level of relationship required by these performance indicators. It is also possible that pre-service teachers are simple unaware of the importance that the indicators of this domain hold for successful classroom teaching. Additional research is required to clear up our understanding of these matters. If this research indicates that introductory videoconference sessions reduce or eliminate barriers to pre-service teachers' acquisition of requisite knowledge in this domain it should be possible to provide advise between subsequent videoconference lessons that assists the reflections of groups of pre-service teachers (or individuals) in regard to low-scoring indicators such that their performance improves with time.

2. Teaching Practice

This domain consists of two competencies and fourteen indicators. There was a mixture of nine low and five high performance scores. The high performance scores, along with the growth scores, pertained almost exclusively to the communication capacities of pre-service teachers. Examples of these performance indicators include:

- Communicates effectively information from a bias-free multicultural perspective

- Uses a clear and consistent format to present instruction
- Integrates curriculum expectations effectively into teaching practice

It is unlikely, given the specialized nature of these performance indicators that they all pertain to innate talents and knowledge that pre-service teachers possess on entering their course. We believe that the results indicate that the Faculty is being explicit in modeling the *how* of communicating with students.

While communication appears to be strength of the pre-service teachers, instruction appears to be a potential area of weakness. Low performance scores, along with static growth scores, in this domain pertained to 'the what' of instruction, as exemplified by the following performance indicators:

- Develops clear and achievable classroom expectations with the students
- Demonstrates flexibility in teaching strategies by addressing the needs of all students.

The results, taken with our analysis of the other domains, indicate that pre-service teachers were capable of communicating with students in a professional manner and appear to be cognizant of the sensibilities of multicultural classes. While communication skills are developed, the information that is conveyed appears to lack focus and fails to inform students as to what they were expected to know at the end of a period of instruction. The extent to which the pre-service students understand, and have an opportunity to practice, 'the what' of communication remains an open question.

Some of the low performance scores in this domain support findings from the others. For example, the low performance scores for teaching in ways that "demonstrate flexibility in teaching strategies by addressing the needs of all students" conforms to findings for professional knowledge "Organizes instructional time by providing for the needs of all students" and "Differentiates instruction to meet diverse student needs." Low performance scores for instruction lend weight to the supposition that short-term video conference lessons do not make it easy to attend to the higher-level aspects of teaching practice. In order to confirm this supposition, it would seem reasonable for further research to centre on the relationship be-

tween video conference instruction and the development of pre-service teachers' explicit teaching practice.

In summary, the performance scores obtained for this domain lend weight to the findings from the other domains. The pre-service teachers possessed admirable qualities and attitudes in regard to the sensibilities of diverse classroom populations, but they lacked the knowledge and skills to deliver instruction in a timely and effective manner. The latter finding indicates that the careful planning that pre-service teachers need to engage in to cater to the needs of multiple students was not addressed. Although additional research into the capabilities of videoconference lessons is recommended, advisements could be provided between lessons to aid pre-service teachers reflections such that improvement in the low-scoring indicators are targeted for improvement (our results suggest that targeting the area of face to face instructional experience would be particularly beneficial).

3. Commitment to pupils and pupil learning

The Passmore and Goodman (2005) version of this domain consists of three competencies and 16 performance indicators. The majority of the performance indicators (12) received high performance scores. The high performance scores may be the result of the Faculty's program. They could also occur if students who chose to, and were selected to enter, teaching were those that possess high levels of commitment toward children and learning. Either way, it is important that pre-service teachers develop this commitment. All but one of the indicators of this domain, (models and promotes the joy of learning), presented as growth scores which suggests that commitment develops as the videoconference sessions (and the program) unfold. Despite the struggles involved, teacher identity is closely bound up with "a sense of purpose for teaching and being a teacher" (Rex & Nelson, 2004, p. 1317). Feiman–Nemser (2001, p. 1029), stresses the importance of teacher preparation that involves "combining parts of their past, including their own experience in school and in teacher preparation, with pieces of their present." Targeted advisements in this area would be wise to consider Feiman-Nemser's counsel.

An interesting result is the clustering of three of the low performance scores associated with the competency:

- Teachers demonstrate commitment to the well-being and development of all pupils.

A difficulty in working with this competency is that pre-service teachers may be challenged, even under ideal conditions, to make progress in this area. Dinkelman (2000, p. 196), in a review of research, has claimed that growth in this ethical area "is an aim that rests beyond the pale of typical pre-service teachers' development, and is best thought of as a trait that is acquired by teachers who have several years of classroom experience." It should be said though that other researchers have argued to the contrary (Cochran-Smith, 1991). Additional research is recommended. If improvements can in deed be made in this area in a short series of videoconference lessons then a clustering of low scores such as was found in this study would provide strong indication that advisements for pre-service teachers (groups or individuals) ought to focus energies toward improvement for this competency.

A need for additional research is made evident by a number of apparent anomalies in the ratings for this domain. For example, the performance indicator "Assists learners in practicing new skills by providing opportunities for guided practice" had a low performance score rating while the performance indicators "Provides learners with appropriate opportunities for independent practice of new skills" and "Provides guidance and appropriate feedback to learners on attainment of new concepts/skills" had high performance score ratings. Similarly, "Encourages students to excel to the best of their ability" had a high performance score while a low performance score was recorded for "Effectively motivates students to improve student learning." Different levels of rating for such similar performance indicators leave open the question of interpretation and the understanding of the teaching context. These anomalies point to a need for those using the instrument to develop a common, situated understanding of the performance indicators.

In summary, high scores for the majority of the indicators in this domain suggest that this would not be an area that anyone wishing to advise pre-service teachers need initially focus upon. Additional discourse and research would be prudent to determine whether the pre-service teachers have sufficient understanding of this domain and to determine how that understanding might be acquired. The alternative to understanding how pre-service teachers can learn in this area is to hope that osmosis and perhaps an admissions policy that selects for committed pre-service teachers shape the attitudes, and identities of teachers at the beginning

of their careers. As Britzman (2003, p. 230) notes, the "self made" teacher is a "cultural myth."

Discussion

This work has described a scenario in which pre-service teachers delivered multiple videoconference lessons from a Faculty of Education to students in the classroom. It was proposed that pre-service teachers' performance in the lessons can be rated against the indicators of a modified scale (the Ontario Teacher Performance Appraisal Manual). It was suggested too that advisements can be provided between lessons to aid pre-service teachers' reflections such that they are directed, in a targeted manner toward improvements in those indicators where they score at a low level.

Low and high scoring indicators where in fact identified in the archived videoconference lessons suggesting that our proposal holds merit. However, our analysis of the data point to a number of considerations that ought to be accommodated before faculties of education forge ahead with this technique. These considerations are discussed in the text that follows. First, the pre-service teachers generally performed at a low level when it came to the domain of Professional knowledge. It was suggested that the implications to be drawn from this finding were that the pre-service teachers appear to be focused on basic aspects of teaching such as the method of presentation. Higher-level aspects of teaching such as formative tests and the needs of individual students were said to require an intimate knowledge of students and frequent contact with them. It was proposed that those wishing to provide advisements to improve the prospective teachers' performance should provide introductory sessions wherein teachers and students get to know one another and that sufficient opportunities to practice the higher-level skills are provided. However, it was also proposed that short-term video conference instruction might simply require too much of pre-service teachers in regard to the development and/or exhibition of high-level performance in this domain. Additional research was therefore recommended as a means of examining the role of video conference instruction and the development of pre-service teachers' professional knowledge.

The second domain of teaching practice produced a range of performance levels. The high communication scores were interpreted to mean that pre-service teachers are aware of the *how* of communicating with students. The low scores concerning matters of instruction

were said to lend weight to the supposition that the pre-service teachers were challenged to address higher-level aspects of teaching when engaged in short-term video conference instruction.

High-level performance in the domain Commitment to pupils and pupil learning requires that pre-service teachers:

- Demonstrate commitment to the well-being and development of all pupils
- Are dedicated in their efforts to teach and support pupil learning and achievement
- Provide an environment for learning that encourages pupils to be problem-solvers, decision-makers, life-long learners and contributing members of a changing society

That the pre-service teachers attained high scores on the majority of the indicators of this domain was interpreted to mean that the Faculty was particularly good at providing appropriate instruction in this domain and/or that the pre-service teachers in this study possess traits that ensure successful performance in this area. Again, additional and clarifying research is required. It is encouraging that the pre-service teachers exhibited growth in several indicators of this domain. The finding suggests that advisements could be provided to enhance the improvements that pre-service teachers realize in videoconference lessons.

In closing, a few general comments about this research are required. While the work of Passmore and Goodman (2005) was limited by its scope; we believe that this re-interpretation of the performance indicator scores highlights a number of means by which faculty could gauge and subsequently critique the performances that pre-service teachers exhibit in archived videoconference lessons. The critique would be directed (as we have indicated) toward improving performance on the indicators were low scores were exhibited.

While the Passmore and Goodman (2005) data concerned the performance of groups of students there is little reason to suppose that high and low scoring indicators could not be identified if videoconference lessons were delivered by individual teachers. Regardless of whether pre-service teachers deliver the lessons individually or in groups, there is a need to research ways to develop pre-service teachers' professional knowledge through explicit con-

nection of theory and practice, and to investigate the challenges of providing opportunities video conference instruction in ways that develop higher order teacher practices.

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