User-Generated Tagging and Segmentation of Video Records of Practice: A Tool for Meaning-Marking

by

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Dedication

This dissertation is dedicated to my parents, Sol and Carol Steiner.

Acknowledgements

The process of writing a dissertation is often presented as a lonely and a solo act. My experience has been filled with the inspiration, support, and collaboration of others and I am so thankful for their influence. Many of the ideas and topics in this dissertation are long time interests and passions that have been shaped by those around me. I cannot possible acknowledge everyone who has influenced this work, but I want to recognize many of the people who have contributed to this dissertation.

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This dissertation is centered on two long-term interests: video and user-generated tagging. My passion for video started when I was seven years old and my oldest brother, Erik Steiner, helped me turn a story I had written into a “movie.” I was hooked. I want to thank my brother Erik for sparking that passion and his constant support. My fascination with user-generated tagging originates from conversations with my cousin Nathan Steiner. Nathan first showed me how user-generated tags could allow me to experiment with ways to mark thinking process.

I am very fortunate to have a large, wonderful and very supportive family. They all deserve some recognition, but here I will only mention a few people. I want to recognize both my parents. My mom, Carol, engaged with these ideas as they developed for many years. She has influenced my thinking, supported me when challenges arose, and been a source of inspirations. My dad, Sol, gave me the support, perspective, and confidence I needed to pursue my dreams. My Aunt Donna has encouraged and supported me through every step of this process. My

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CHAPTER 1
INTRODUCTION

Defining the Problem Space

In the last thirty-five years there has been increasing attention on an effort to rethink the importance of effective teaching. Research in the 1990s found that a student's assigned teacher has a much stronger influence on how much he or she learns than other factors like class size and composition (Sanders & Horn, 1994; Sanders & Rivers, 1996; Wright, Horn & Sanders, 1997; Hanushek, Kain, & Rivkin. 1997). Several studies found that differences in teacher qualifications across school districts can account for as much of the variation in student achievement as students' socioeconomic status (Ferguson, 1991; Ferguson & Ladd, 1996). Recognizing the impact of an effective teacher on student learning has focused the field on the area of teacher preparation. During roughly the same thirty-five years, teacher education has been shifting its focus towards a model of *practice-based teacher education*. Practice-based teacher education recognizes that "teaching is an enormously complex human endeavor" (Lampert, 1985; McDonald, 1992; Shulman, 1983) and that teaching and learning is situated in interactions between students, teachers, and the content being taught. It thereby emphasizes offering repeated opportunities for beginning or pre-service teachers to learn through the enactment of teaching, rather than trying to learn how to teach by talking about teaching (Ball & Forani, 2009; Lampert, 2005).

Video has been used to capture and unpack the complexity and inherent "messiness" of teaching practice. It has proven to be a valuable and an increasingly common tool for research on teaching, learning about teaching, and assessing learning about teaching. Video creates a shared artifact or common "text" (Hatch & Grossman, 2009). Recording teaching practice with video affords in-depth study by multiple viewers and, unlike fast-paced "live" classrooms, allows viewers to pause and rewind through the investigation (LeFevre, 2004). Video records of teaching can be used as resources both for investigating specific moments in teaching and drawing generalizations about the nature of and approaches to teaching (Hiebert & Stigler, 2000). Therefore, video records of teaching practice allow many different people to watch the same representation of teaching multiple times and/or with different purposes in mind.

However, Erickson (2007) argues that making sense out of minimally edited video of another teacher's practice is particularly challenging because the viewer lacks context and thereby is prone to speculation ranging far beyond the information presented in the video clip itself. Viewers often become overwhelmed by the variety of aspects they could focus on. Much of the work in practice-based teacher education has been focused on breaking down the complexity of teaching so that novices can understand and learn how to enact it.

One way educators moderate the cognitive demands of watching videos of teaching is through the use of video annotations. For example, a teacher educator might add a series of annotations in the form of text overlaid on the video that point out specific interactions between the teacher and students featured in the video that she wants her students to notice. The teacher educator might also add similar forms of annotations that pose questions for the pre-service teachers watching the video. Educators primarily annotate videos of teaching practice for one of two purposes: 1) to focus viewers' attention on specific elements of instruction (like in the

example above), or 2) to mark their own thinking about the video. In terms of the first use, the audience is not the one making the annotations, but those who will watch the video and see the annotations. For the second purpose, the person making the annotations and the primary audience are the same.

Regardless of the purpose of the educator who creates the annotations, the act of applying an annotation creates a new form of data (the annotation itself) that provides insight into what that educator was paying attention to in the video and how they choose to mark with language. By annotating a video record, a viewer produces a new record that itself represents his or her thinking about the representation of teaching in the video record. The proposed value of annotating a video record of teaching practice rests on an underlying assumption that simply showing a video and having a discussion will not capture a viewer's interpretation of the video. Having a viewer construct a representation of his or her thinking through annotation produces another common text focused on the aspects the viewer identifies as salient.

Tagging is one specific form of annotation; however, it is currently less common in teacher education and in video annotation. Tagging is most commonly used to apply short labels or descriptions to a digital object in order to increase findability. The main affordance of tagging as a form of annotation is that tags can be aggregated to support individual recall and search. The problem is that within the category of teaching there can be many different ways to describe what goes on during the complex act of teaching. When educators watch a video of teaching practice they often have their own purposes in mind. Most of the literature has focused on how educators view videos of teaching with a specific purpose in mind. However, in this study I am interested in better understanding how educators make sense of a video featuring another teacher's practice for their own purposes. For the purposes of this project, that diversity of

viewpoints is not noise in the system to be eradicated or simplified out, but rather a resource to be mined for patterns that can illustrate how the practice of teaching can be improved.

In recent years, there has been a rapid advancement in technology that enables capturing classroom instruction. This has increased the use of videos to support teacher reflection on their own teaching, learning from the teaching of others, using video of teaching practice in professional training, and research on teaching practice. Despite the extensive use of videos of teaching practice, there is very little professional support for their use. There is currently no professional system for searching collections of video records and no common standard for quality or indexing (Ball, 2013). The field of teacher education is recognizing the need to create systems and platforms that would not only provide educators access to videos of teaching practice, but the tools that would support the larger educational community to share valuable resources, learn from each other, and build off the work of others (NCATE, 2010; Ball, 2013). However, there is currently very little research focused on how educators might use an online teaching video platform for their own purposes and collaboratively.

We still have questions about how educators make sense of video and what types of tools and supports are needed to support educators' work with video. As a part of the practice-based teacher education reform movement there has been an increasing emphasis not only on using video effectively to support teaching and learning, but creating new and innovative platforms to support that work.

This study is designed to explore if and how segment and tag data might be linked and tag gardened in a way that would help show educators' collective meaning making about a given video. By examining user-generated segments and tags together with and alongside rich interview data, I explore the potential and limitations of aggregating user-generated segments

and tags as a tool for meaning-marking without the risk of radically decontextualizing the participants' tags from their meaning.

The results from this novel and explorative study, along with substantial further research and collaboration with machine learning experts (also known as data scientists) have the potential to create an analytical tool that would aid the creation of tag gardening techniques and algorithms, specifically designed for the needs and behaviors of educators. These algorithms could then be used, tested, and refined in a widely-used social platform that would provide different types of educators access to the video records of practice and the tools that allow them to apply their own user-generated segments and tags to a given video. With enough users applying their own segments and tags over time there would be enough data to detect and investigate patterns of behavior and meaning-marking. These patterns of salience and language use have the potential to provide insight into how educators make sense of video records of practice. There is potential for such a platform to be used to explore whether and how educators can use and learn from the meaning-marking of others with the aim of improving teaching practice.

Study Overview

This dissertation is an exploratory study that investigates how user-generated tagging and segmentation of a single video marks users' interpretations of that video record of practice. Not only do tags indicate the salience of particular segments, they also mark meaning made by the user (tagger) in relation to those segments. This study shows that what participants segment and tag in the video can provide insight into how people with different roles and experience (pre-service teachers and teacher educators/educational researchers) interpret video records.

I used interviews with participants to learn how each participant made sense of the video and why participants chose to segment and tag as they did. I examine what can be learned about what the participants indicate as salient in the video (through the application of segments) and what language they use to describe what they mark in the video (through the application of tags). I then examine how closely the user-generated segments and tags align with the ways the participants talked about the video in their interviews. In doing so, I have taken the first steps in creating a method or analytical tool that can be used to help aggregate and clarify how educators are making sense of video records of practice. I acknowledge that this method of interpreting meaning-marking will, at best, provide a surface-level understanding of an educator's thinking and that in-depth interviews will always provide a richer understanding. But one of the main affordances of interpreting user-generated segments and tags in this way is that it can be scaled in ways that in-depth interviews cannot. The study explores the following research questions:

1. How did participants annotate one video of another teacher's instruction, and what factors affected their decision-making?
    a. What differences in video segmentation did pre-service teachers and teacher educators/educational researchers exhibit in segmenting one video recording of practice?
    b. What differences in tagging language did pre-service teachers and teacher educators/educational researchers exhibit when tagging one video recording of practice?
2. What potentials and challenges are there for aggregating user-generated segment and tag data to make it useful for individual users while also allowing it to uncover how educators as a larger population make sense of and use video records of practice?

3. What types of tools or contexts would be needed to facilitate such uses in the educational context?

In order to explore these questions, I asked participants to individually engage in an activity where they all viewed the same video record of practice and then applied their own user-generated segments and tags to it. The video featured an authentic example of teaching. After watching the entire video without interruption, participants identified the frame or perspective they were taking as they began to segment and tag the video using their own user-generated tags. Each participant was interviewed while reviewing the segments and tags he or she made. This allowed me to gain insight into how each participant was making meaning of the video and how that meaning making was reflected in the user-generated segments and tags.

Chapter 2 of this dissertation discusses the relevant research literature and articulates a conceptual framework. It describes the research base related to user-generated tags in the context of education and situates this study as a contribution to that base. The chapter provides necessary background information relating to the complex context of practice-based teacher education, and the concept of tagging. In the first section of Chapter 2, I address practice-based teacher education and discuss how video records of practice and tool design can be used to support it. The next section addresses how video is used as a common tool for capturing, studying, and making sense of teaching practice. I then connect the research on video to the research on annotation of video as a way of marking how a user reacts to a video. The concept of tagging is introduced and relevant research discussed. In the conceptual framework section, I address two topics central to the design of this study. The first is the concept of representations and records. In that section I define the term "record of practice" and discuss how the nature of representations of practice affects the meaning that can be made with them. The second is the

unit of my analysis. In discussing this, I define the meaning behind the term, *segment,* and discuss it in terms of Zack and Tversky's (2001) concept of *event*.

Chapter 3 provides a detailed description of the research design, data set, methods of analysis, and standards for quality. I present the results in Chapters 4 and 5. In Chapter 4, I address the study's first research questions while looking at the segment and tag data separately. In Chapter 5, I address the first and second research questions. I examine the segment and tag data together and add further contextualization through the interview data, demonstrating the value of looking at segment and tag data together. In Chapter 6, I address the second and third research questions. I discuss in detail how participants' segments and tags were used to mark meaning and I explore several tensions that emerged. I also discuss several larger design implications and research. Finally, Chapter 7 presents conclusions, implications of this study, and areas for further research.

CHAPTER 2
LITERATUE AND CONCEPTUAL REVIEW

"When everything is connected to everything else, for better or worse, everything matters."

-Bruce Mau

Overview

This conceptual and literature review discusses key literature relating to the dissertation study while also providing necessary background information relating to two key ideas: 1) the complex context of practice-based teacher education, and 2) the concept of tagging.

First, the concept and development of practice-based teacher education is discussed in order to situate this study and further explore challenges posed in the problem statement. The next section addresses some of the challenges of supporting the complex work of practice-based teacher education through the use of multiple records of practice and tool design. The third section introduces video as a common tool for capturing, studying, and making sense of teaching practice; the use of video in teacher education is discussed with an emphasis on what is known about how expert and novice teachers make sense of video. The review of video in teacher education concludes by discussing how annotating videos can mark the reaction of the viewer. Tagging is introduced in the fourth section as a form of annotation that may have important implications for marking viewers' thinking about teaching practice. The fifth section, entitled *The Concept of Tagging*, provides necessary background on what tagging is and how it works.

The final section in this chapter discusses literature on tagging and specifically research on tagging video.

Literature Review

The Context of Practice-Based Teacher Education

A current major reform movement in the field of teacher education is known as *practice-based teacher education.*[1] Practice-based teacher education recognizes that "teaching is an enormously complex human endeavor" (Lampert, 1985; McDonald, 1992; Shulman, 1983) and that teaching and learning are situated in interactions between students, teachers, and the content being taught. It thereby emphasizes repeated opportunities of pre-service teachers to learn through the enactment of teaching, rather than trying to learn how to teach by talking about teaching (Ball & Forzani, 2009; Lampert, 2005). Practice-based teacher education has been developing into a model for reform, building upon scholarly work that focuses on developing approaches that acknowledge teaching as a professional practice that requires not only skill, but also thinking, reasoning, and investigation (e.g., Cochran-Smith & Lytle, 1990; Harrington, 1995; Lampert & Ball, 1998; Zeichner, 1996).

While the concept of practice-based teacher education has been developing for the last three decades, in the last few years, it has taken hold as one of the primary teacher education reform initiatives. According to a 2010 report commissioned by the National Council for Accreditation of Teacher Education (NCATE) on transforming teacher education, the field:

> must move to programs that are fully grounded in clinical practice and interwoven with academic content and professional courses…. Candidates will blend practitioner knowledge with academic knowledge as they learn by doing. They will refine their practice in the light of new knowledge acquired and data gathered about whether their students are learning (NCATE, 2010).

[1] Several different terms are used in the field: 1) clinically-based teacher education (NCATE, 2010), 2)

The NCATE report, drawing on recent research, calls for a kind of teacher education based on practice.

Particularly relevant to this dissertation study is the idea that different kinds of data, specifically video data on teaching practice, must be gathered and synthesized in order for pre-service teachers to refine their practice and assess student learning. The NCATE report offers ten design principles regarding the design of teacher education, numbers three and nine of which relate explicitly to using data to improve teaching and learning:

> 3. *A candidate's progress and the elements of a preparation program are continuously judged on the basis of data:* Candidates' practice must be directly linked to the InTASC core teaching standards for teachers[2] and Common Core Standards,[3] and evaluation of candidates must be based on students' outcome data, including student artifacts, summative and formative assessments; data from structured observations of candidates' classroom skills by supervising teachers and faculty; and data about the preparation program and consequences of revising it.
>
> 9. *A powerful R&D agenda and systematic gathering and use of data support continuous improvement in teacher preparation*: Effective teacher education requires more robust evidence on teaching effectiveness, best practices, and preparation program performance. A powerful research and development infrastructure – jointly defined by preparation programs, school districts, and practitioners – supports knowledge development, innovation, and continuous improvement. While not every clinically based preparation program will contribute new research knowledge or expand development, each must systematically gather and use data, and become part of a national data network on teacher preparation that can increase understanding of what is occurring and evidence of progress in the field (NCATE, 2010).

[2] The InTASC core teaching standards for teachers were designed to outline what all teachers across all content and grade levels should know and be able to do to be effective in today's learning contexts. These standards were created by The Interstate Teacher Assessment and Support Consortium (InTASC), which is a consortium of state education agencies and national educational organizations dedicated to the reform of the preparation, licensing, and on-going professional development of teachers. For more information see: http://ccsso.org/resources/programs/interstate_teacher_assessment_consortium_(intasc).html)

[3] The Common Core Standards were developed in collaboration with teachers, school administrators, and experts, with the aim of defining the knowledge and skills students should gain during their K-12 education so that they will graduate high school able to succeed in entry-level, credit-bearing academic college courses and in workforce training programs. For more information see: http://www.corestandards.org/

While the majority of the NCATE principles focus directly on the design of individual teacher education programs, the two principles cited above address the need for an overarching system for the sharing and innovation of ideas by multiple stakeholders. These two points speak to a goal of the NCATE report as a whole, which is to recommend the creation of a wholly new, extremely ambitious and complex national data network. This ambitious design goal highlights the need for more systematic and integrated ways of looking deeply at specific instances of teaching practice, while being equally able to zoom-out and examine the same elements of teaching practice across the field.

Supporting Practice-Based Teacher Education

In order to achieve the goal of creating more systematic and integrated ways of looking deeply at teaching practice, tools must be designed to support complex problem solving and what Barbara Mirel (2004) refers to as "dynamic knowledge work":

> In dynamic knowledge work, problem solvers need support deliberately shaped to the uncertainty and distinctive traits of complex problems and to the processes of emergent and opportunistic inquiries. They need to adapt the functionality of their applications to their situated patterns of work, patterns defined by idiosyncrasy and changing conditions (Mirel, 2004).

For Mirel, it is significant that complex problems involve a great deal of uncertainty and thus present opportunities to pursue iterative and multiple queries. Dynamic knowledge work refers to the thinking processes that go into the solving of complex problems. Mirel makes the case that complex problems require tools ("applications") that take into account the divergent paths that users might follow and the changing conditions that enable dynamic knowledge work. Though Mirel's terminology may be less well known to teacher educators than to educational researchers, teacher educators are very aware of how complexity plays into the work of teaching

(Lampert, 2005). Clearly, the complex task of teacher education entails dynamic knowledge work. I argue both that making sense out of video records of practice represents an important example of such dynamic knowledge work in teacher education and that editing/annotation tools need to be designed intentionally to support the complex work of studying teaching practice.

Another example of a complex problem intrinsic to practice-based teacher education is the difficulty of collectively assessing student work. Deborah Ball and Magdalene Lampert, who have been pioneering teaching and learning from and with records of practice for the last thirty years, have envisioned how a digital repository of records of practice could enable pre-service teachers, in-service teachers, teacher educators and educational researchers to engage and assess student work together:

> Using suitable records of practice, teachers could study and discuss students' work, comparing what they notice, how they interpret it, and how they evaluate the quality of the work. Discussing such questions with other professionals would create opportunities to encounter differences in attention, interpretation, and judgment—crucial matters that are most often engaged alone and with little or no external referent. Teachers would learn from one another's views and interpretations, thus extending and enhancing their own capabilities. And teachers could develop shared standards for good work, progress, and learning (Ball & Cohen, 1999).

While Ball and Cohen are certainly correct that a repository of records of practice would provide a resource enabling valuable opportunities for the discussion and shared interpretation of student work, it is also true that such interactions between teachers (not to mention teachers and other kinds of stakeholders) present complex problems of interpretation. It is one thing to state, as Ball and Cohen do, that "[t]eachers would learn from one another's views…[and] develop shared standards." How exactly that process of learning and standardizing could come about through interaction, sharing, and discussion is not obvious. Such a process can usefully be called dynamic knowledge work. Here I draw on Mirel's notion that dynamic knowledge work requires intentionally designed tools to suggest that annotation tools can be particularly useful in

facilitating exactly the kind of collaborative interpretation and development of shared language that Ball and Cohen expect records of practice to make possible.

Though annotation tools may be designed and used with a wide variety of different kinds of records, I focus in this study on one particular form of annotation, tagging, as it is used specifically with video records. In the next section, I discuss how video has been used in teacher education research to understand how viewers make sense of teaching practice, before moving on, in the following section, to a review of the research on tagging.

Research on Video in Teacher Education

Video has proven to be a valuable and increasingly common tool for research on teaching, learning about teaching, and assessing learning about teaching. As Bacevich (2010) argues, during the 1980s and 1990s, the field of education began changing its view of the act of teaching to reflect the conception that teaching involves complex cognitive skills (Leinhardt & Greeno, 1986) and that the teacher is a decision maker within the complex and dynamic environment of the classroom (e.g. Lampert, 1985). During those decades, research in teacher education began focusing more on supporting pre-service teachers' understanding and ability to make thoughtful decisions during fast-paced instruction. The use of records of practice, particularly video records of practice,[4] emerged as a powerful way to capture and make accessible the complexity of teaching (Lampert & Ball, 1998).

Working with video records of practice reveals many affordances, such as the creation of a shared or common "text" (Hatch & Grossman, 2009), the capacity for in-depth study by multiple viewers, and study over time (LeFevre, 2004). Video records of teaching practice have

[4] In this dissertation, when I refer to video records of practice, video records of teaching, or videos of teaching, I am referring to video records of practice that document teaching practice. Unless otherwise noted, the records document the teaching of a lesson.

also been used to highlight the "tactical, temporal demands of practice" (Herbst et al., 2010). However, video records of practice still have multiple constraints. Stigler, Hiebert, and colleagues emphasize the inherent limitations of video, in particular the influence of videographers' decisions, including the angles from which to film, when to zoom in or out, and how to edit (Stigler & Hiebert, 1997). These decisions impact what the viewer sees and pays attention to, and ultimately how the viewer makes sense of the video.

One could infer that minimally edited video is superior as an authentic record of teacher practice to video records created with a more cinematic style. However, Erickson (2007) argues that making sense out of minimally edited video of teaching practice is a particularly challenging task, since such videos constitute "an inherently ambiguous and incomplete stimulus that invites reaction and speculation ranging far beyond the information that is potentially available in the video clip itself." Erickson finds this is especially true for novice teachers; novices quickly become overwhelmed by more information than they can process cognitively and tend to "zone out."[5] Furthermore, Erickson finds that when both novice and experienced teachers are asked to watch the same video while taking notes on what they observed, the notes from the novice groups are more fragmented and longer than those of the experienced teachers. In contrast, he finds the experienced teachers' notes to be more "schematic" and "globally descriptive" (Erickson, 2007).

Many studies confirm that there are significant differences in how novice and expert teachers talk about videos of teaching (Berliner et al., 1988; Krull, Oras, & Sisask, 2007; Sabers, Cushing, & Berliner, 1991; Sato, Akita, & Iwakawa, 1993). Sato and colleagues (1993) argue that the differences in expert and novice comments might be the result of several factors not

[5] Some research is exploring alternatives to video (e.g. cartoons and comics) to help teachers see and reflect on teaching specific content and classroom scenarios in a more focused and nuanced way.

limited to professional experience. In their studies (Sato, 2002; Sato, Akita, & Iwakawa, 1993), Japanese researchers asked both expert and novice teachers to watch a video recorded lesson without stopping it and to think aloud about their perceptions and feelings. A comparative analysis of the participants' comments revealed characteristic features of "practical thinking style" that distinguished expert teachers from novice teachers. Their research showed that the majority of novice teachers watched videos as outsiders, while expert teachers observed as insiders and were sensitive to the specific situation. They also showed that the experts, from the beginning to the end of the lesson, changed their viewpoints and standpoints. Sometimes they observed the lesson as a teacher, sometimes as an observer, and sometimes as a student. These multiple viewpoints were not characteristic of the majority of novice teachers, who did not change from their unilateral viewpoint. Sato and colleagues also found that in the novices' comments, more than 70% of the idea units were merely "facts," while "reasoning" counted for 10%. This contrasted with the experts' comments, in which nearly 40% of the idea units represented " reasoning." "Facts" represented less than 15% of the expert teachers' comments. Finally, the novice teachers did not change their opinions from the starting point to the end, but all expert teachers drastically changed their opinions and impressions during the different phases of their observation of the lesson events. They remained flexible and open to reframing concepts they applied to understanding classroom events. The Japanese study highlights that expert teachers' thinking, based on their better professional perceptual and thinking capabilities when compared to novices, is more fluent and coherent; expert teachers are more effectively involved and capable of switching from one perspective to another, and they see the classroom events in the appropriate context and have a more advanced level of hypothetical thinking than do novice teachers (Sato et al., 1993).

In a similarly designed study in the U.S., Krull and colleagues (2007) asked both novice and expert teachers to watch a video of teaching and comment aloud on everything they thought and felt as they watched the lesson. In this study, novice teachers described concrete activities "without relevant generalization." For example: "One pupil reads aloud and explains whether to use capital or lower letters; everybody is checking." This contrasted with the way the expert teachers' comments described the "ongoing events or their nature in much more general but relevant terms." An example of an expert teacher's comment was, "Repeating seems to be fast but this is what typically happens." Krull et al. report similar findings relating to instructional events. Novice teachers made more comments on classroom management in a similarly specific and descriptive manner: "All pupils are standing up in the beginning of the lesson, or the class is a bit noisy." Again, the expert teachers' comments were more general and relevant; for example, "The lesson ended up logically without any exaggerations even though strangers were in the room for record." Krull and colleagues wonder if novice teachers tend to make more descriptive comments than expert teachers because the novices are not yet experienced enough to anticipate the long-term consequences of their instructional decisions (Krull et al., 2007). While Krull and colleagues do not address this point, I wonder if the novice teachers' emphasis on pure description originates from or is connected to any observational training or exercises they may have experienced in teacher education programs. Techniques like Descriptive Review[6] encourage teachers to begin thinking about student work or practice in terms of pure description. While the time-intensive Descriptive Review is not commonly covered in teacher education

[6] The Descriptive Review Process is the method or protocol for looking at student work and teaching practice. The Descriptive Review came out of the work of the Prospect School in Vermont, primarily by Patricia F. Carini. In a descriptive review process, teachers withhold from making judgments about the quality of a child's work, and instead focus on describing the multiple qualities that inhere in every product of human effort (Himley, 2002).

programs, it has influenced many protocols for looking at records of practice. I wonder if novice teachers think they *should* be mainly descriptive while watching a video of practice for the first time. Another possible explanation for the differences between the two groups is that both groups might only focus on elements of the teaching practice they find challenging and relevant to the development of their own practice. Therefore, it would make sense that novice and expert teachers comment on different things (Krull et al., 2007).

Work by Erickson and other research on how novice and expert teachers make sense of video suggest that minimally edited video (sometimes referred to as ethnographic video) limits the potential interference of cinematic choices with the viewer's sense-making process while increasing the potential for the viewer to become overwhelmed with information and lose sight of what to focus on. Recognizing this double-edged nature of video records of practice, practitioners and researchers have begun to create multiple records from the same teaching event for different purposes. Minimally edited video is generally created and then an edited or annotated version is created for the purpose of focusing viewers' attention on a particular element of video. There are many examples of platforms that support users in creating a new record from an already existing minimally edited video record of practice by editing and/or annotating. For examples see *Slate* (Lampert & Ball, 1998), *KNOW* (Fishman, 2007; Lampert & Ball, 1998), *LesonLab's Visibility* (Santagata, Zannoni, & Stigler, 2007), and DIVER (Petko, Reusser, Noetzli, Krammer, & Hugener, 2003). All of these efforts have focused on spotlighting important issues or elements of teaching practice, but what I am trying to understand is how the viewers make sense of minimally edited videos of another's teaching practice for their own purposes, how their annotations might be aggregated to provide insights about a given video, and how educators are making sense of videos of teaching practice.

The Concept of Tagging

Tagging functionality is widely recognized as a tool for locating and organizing information (findabilty), often associated with Web 2.0 (Morville, 2005; Smith, 2008). Essentially, tags are metadata attached to a resource or object. Tags are a particular form of metadata that afford open-ended and user-generated labels via natural language keywords. However, not all forms of tagging involve the application of user-generated tags. A user can tag an object with a set of predefined terms or taxonomy. In this study, I focus user-generated tagging, where a user creates the language (or tags) that he/she wants to apply to any given object. Another affordance of user-generated tags is that a user can attach as many or as few tags to a particular resource or object as desired. This affords the possibility of non-linear associations through tagging. User-generated tagging, often referred to as "social tagging" or "collaborative tagging" could involve any imaginable word and number combination. For example, on the web site Flickr, a community of users tag individual images with words. In this example, the image is the resource and each word the users associate with that image is an individual tag.

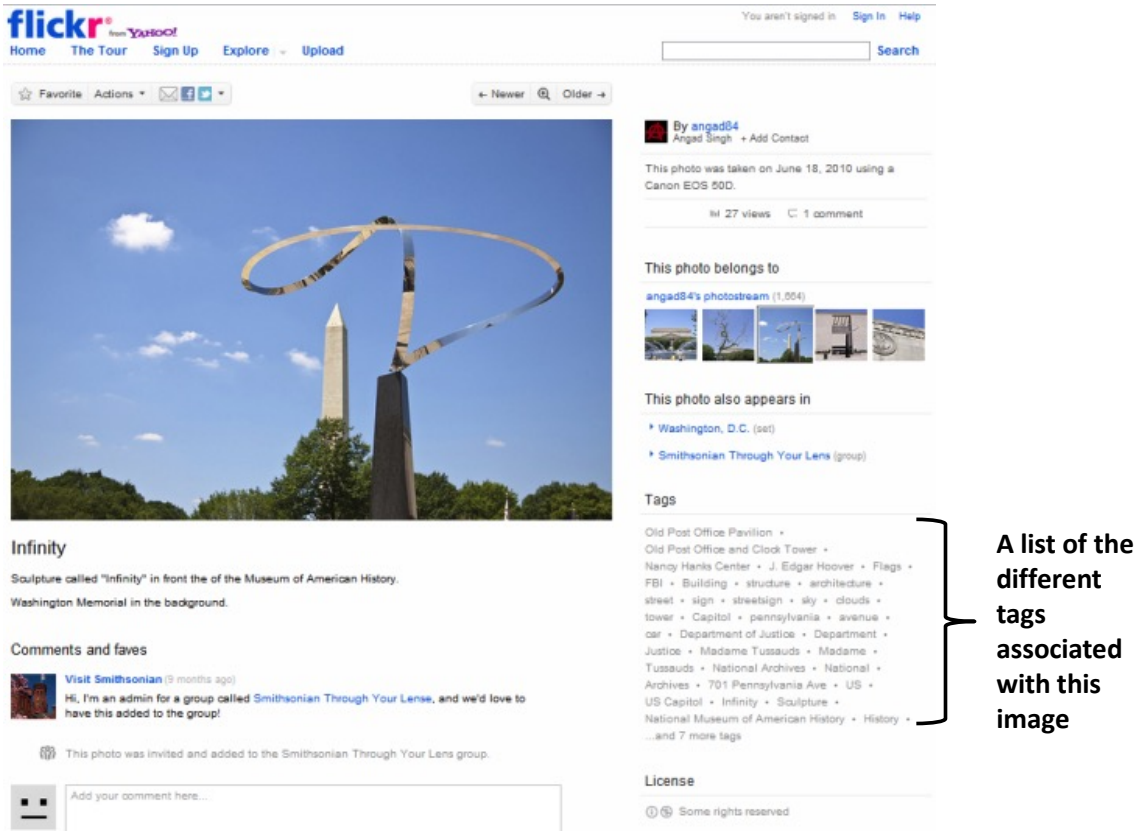


Figure 1: Tags in Flickr

In figure 1, the photograph titled “Infinity” is an object shared through the Flickr web site and tagged by multiple people using multiple tags. Most of the tags applied to this photo are location names and descriptions. These place name tags make it possible for other users interested in photos taken around the Smithsonian Institute to find this photo. The comments section shows that another user found this photo and asked if it could be added to another sub-collection of photos on the Smithsonian. The user who posted the photo must have agreed, because the photo is listed in two collections. Because tagging affords non-linear organization, unlike a physical photograph, this photo can be housed in multiple collections at the same time.

As Gene Smith explains in his book, *Tagging: People-Powered Metadata for the Social Web*, the basic model for tagging simply involves users who apply tags, or keywords, to resources. Tags can be descriptions of the resource's subject matter, its physical location, the resource's intended use, a reminder, or a judgment (for example, "funny"). There is great variation in users' tagging patterns, reflecting individual interests, goals, motivations, and styles of expression (Smith, 2008).

User-generated tagging is a feature that many different platforms or technologies use. The design of a platform determines how users can apply and/or share tags. Some platforms, such as Evernote, support user-generated tagging in order to facilitate individual organization. A user can tag objects in his or her own way in order to find and organize that information later. Flickr and LibraryThing are two examples that offer what is called "social tagging." They enable user-generated tagging for individual organizing, but also aggregate and leverage the tags of the community to aid discovery.

Tagging can organize information on both individual and social levels. On the individual level, tags are private. On the social level, users share tags they have made on commonly available information resources with others. Social tagging allows users to organize their tags and create personalized collections of these resources, just as with tagging on the individual level. However, on the social level, each user's personal collection is made available to every other user of the service. The fact that the same resource has usually been tagged by multiple users allows for drawing connections between various users' collections and mutually tagged resources. When shared with others, or viewed in the context of what others have tagged, these collections of resources begin to take on additional value through network effects. Searching tags can enable the discovery of relevant resources, and the social relationships that develop

among taggers become a means of information discovery in and of themselves (Marlow et al., 2006). Tagging has been proposed as a possible solution to improve searching of networked resources, as well as a means to support personal use. On the social tagging level, tagging also becomes a form of voting, rating or marking. For example, www.librarything.com is a social cataloging web site designed to store and share information on books. In this tagging system, if enough people tag the book *Ficciones* by Jorge Luis Borges with the word "infinity," then users unfamiliar with the book can be confident that the book addresses ideas of infinity on some level, thereby marking some salient element of the book's content.

The Problems of Tagging

User-generated tagging is also associated with several common problems. Tags can be unclear or redundant due to spelling errors and inconsistencies in terms of use of the singular or plural and capitalization. Many tags created are highly personal in nature and thus, unusable or confusing for others. Therefore, tagging systems often become overwhelmed with many tags that are irrelevant to the larger user community. Another constraint of user-generated tagging is that in most user-generated tagging platforms tags are not connected to each other by a reference structure. A reference structure is a formal system used to link related terms and narrower and broader terms. This makes it difficult to show relationships between tags (Kalamatianos, Zervas, & Sampson, 2009).

Tag Gardening and Methods for Linking Tags

Halpin et al. studied the dynamics of collaborative searching, showing that tagging distributions tend to stabilize over time, taking the form of a power law distribution. Wang et al.

and others (Heymann, Ramage & Garcia-Molina, 2008; Sigurbjornsson & van Zwol, 2008; Song et al., 2008) have argued and shown some evidence to support the claim that providing tagging suggestion features could accelerate this stabilization process. Wang et al, have also demonstrated significant performance gains by combining other users' tagging behavior with the user's own tagging vocabulary.

Tagging for Knowledge Discovery and Recommendation

Users tag objects such as video clips on YouTube or Edthena,[7] books on Librarything, URLs on del.icio.us, and images on Flickr. In these instances, the tags apply to the object as a whole. In other situations, individual users do not tag any or all objects in these large public collections, but rather a curated selection from these collections. The fact that users only tag objects that are in some way relevant to them increases the tag's power as a recommendation or marker or descriptor and thereby supports knowledge discovery. Collaborative tagging can be used to support knowledge discovery by making it possible for users to discover 1) resources they are interested in, 2) other users/other users' collections they are interested in, and 3) tags they are interested in (Zauder et al., 2007). Morville (2005) posits that within an environment with an excess of content, findability becomes a critical value. Personal re-discovery, finding the "stuff I've seen," is a major challenge. Dumais et al. (2003) describe a system used before the emergence of tagging applications to support personal re-discovery that recognized that much work with information involves re-visiting materials previously consulted. They note "studies

[7] Edthena is a tool that allows teachers to record video clips of their own teaching practice and then upload those clips to the Edthena platform where coaches, mentors, administrators, or colleagues can offer feedback by annotating specific moments in the video. The platform provides four categories of feedback: questions, suggestions, strengths, and notes.

have shown that 58-81% of Web pages accessed were re-visits to pages previously seen." Improving personal information recall becomes critical in this environment of abundance.

User-generated tagging can enable the formation of social networks around areas of common interest. These networks can reflect the interests, expertise, and tagging patterns of users contributing to the tag development. Furthermore, analyzing user-generated tags can deepen peer interaction and peer awareness around the areas of common interest (Kalamatianos et al., 2009).

The aggregate of tags generated from a user, in the case of tagging on the individual level, or from a community of users in the case of tagging on the social level, is referred to as a *folksonomy.*[8] Folksonomy, originally coined by Vander Wal (2006) is a portmanteau of *folk* and *taxonomy*, but as Saab (2011) points out, this "is a bit of a misnomer as folksonomies lack the one critical characteristic of all taxonomies: hierarchy." Folksonomies create classification structures describing the tagged objects that reflect the language and thinking of the people creating them, as opposed to taxonomies, which are top-down standardized systems of categorization (Smith, 2008). Jennifer Trant (2009) makes the helpful distinction between terms:

> We can think of *tagging* as a process (with a focus on user choice of terminology); of *folksonomy* as the resulting collective vocabulary (with a focus on knowledge organization); and of *social tagging* as a socio-technical context within which tagging takes place (with a focus on social computing and networks) (Trant, 2009).

The vast majority of platforms are designed so that users can either tag a video as a whole or tag a single moment on the video's time code. The application of tags to videos as a whole affords the user the opportunity to mark his or her own judgment, description, etc. of the whole video. The tagging of segments opens up a whole new level of opportunities for analysis and for

[8] Other terms used to describe this phenomenon include: *social classification* (Furner & Tennis, 2006; Landbeck, 2007; Smith, 2004; Trant, 2006), and *ethnoclassification* (Boyd, 2005; Meholz, 2004, 2004b; Walker, 2005).

user meaning-marking. This study focuses on having pre-service teachers and teacher educators/teacher researchers tag a segment of video, as opposed to the whole video or single moments.

Research on Tagging

Technology that enabled social tagging and folksonomy as well as discussions of it emerged on the Internet in late 2004, peaking as hot topic in 2006. These early discussions were mainly in the form of blog posts and papers in the spheres of information architecture and social computing communities (Trant, 2009). A comprehensive review of the literature on social tagging and folksonomy from the years 2004-2007 was written by Jennifer Trant (2009), who groups the literature into three broad approaches:

- Focused on folksonomy itself (and the role of tags in indexing and retrieval)
- Focused on tagging (and the behavior of users)
- Focused on the nature of social tagging systems (as socio-technical frameworks).

Most tagging research considers one of the following three things: 1) the act of tagging in already existing web sites such as del.icio.us and Flickr, 2) emerging folksonomies and communities, and 3) how collaborative tags contribute to information findability. Very little research has been conducted exploring how tagging might serve the field of education (Bateman et al., 2007). However, many people speculate about how social tagging can be applied to education, as I will discuss in the following section.

Research on Tagging in Education

Based on the affordances of tagging proven in other domains, proponents of tagging expect social tagging of digital educational resources to have many benefits. Social tagging should provide individual users (such as P-12 students, pre-service teachers, in-service teachers, and/or teacher educators) the ability to generate and use terms meaningful to them while creating a personal collection of tags. Social tagging should facilitate searching and recalling familiar resources. Theses tags should allow individual users a personal way of organizing and locating learning objects that reflects individual intent and ways of thinking. By sharing tags in an open manner with other users, groups of users with common vocabularies should act as a "human filter." Identifying the most popular tags within a given community of users should produce a community-based folksonomy that reduces redundant and irrelevant tags used within the educational community. Social tagging should enable the formation of social networks around educational tags. These networks should reflect the interests and expertise of users who contribute to the development of the tags. Analyzing user-generated tags should enrich peer interaction and peer awareness around educational content.

The preceding expectations may or may not be borne out by future research. It seems likely that social tagging will benefit educational communities, as it has been shown to benefit other communities. At this point it is not clear which of these expectations will prove true for educational communities that use tagging. There is still very little empirical research showing how tagging can actually function in learning communities and, furthermore, how tagging might impact learning. Research has shown that the aggregation of tags generated by large communities affords the potential to discern contextual information (Shirky, 2008). In this study, I use the aggregation of tags generated by members of a specific education community not only

to gain knowledge of that educational context, but also to shed light on the meaning making made possible by the process of tagging.

Despite tagging's known affordance of marking users' judgment or description of an object, very little research considers how tagging could be used to make visible users' thinking about that object. The work of Bateman and colleagues and Quintana and colleagues constitute two notable exceptions. These two groups of researchers have been conducting a series of design experiments that explore how tagging in the educational context can support reflection, provide evidence of student thinking, and function as a tool to increase peer learning.

Bateman and colleagues, from the human-computer interaction field, examine how tagging could be used in order to encourage reflection and to show evidence of higher order thinking and peer sharing. They examine how students select segments of text, similar to the way a student would highlight text, and tag that selection. They argue that:

> Tagging represents an action of reflection, where the tagger sums up a series of words into one or more summary tags, each of which stands on its own to describe some aspects of the resource based on the tagger's experience and beliefs. Intuitively, when analyzed in terms of the classical Bloom's Taxonomy of Learning, learners who use tags show evidence of moving up the hierarchy from the lower "consumption"-based levels of learning (knowledge and comprehension) to higher levels of applied and metacognitive knowledge (application and analysis). Further, reviewing tags (i.e. comparing tags used by a community of taggers) would potentially facilitate the move to the highest levels of Bloom's Taxonomy of Learning (synthesis and evaluation) (Bateman et al., 2007).

Bateman and colleagues contend that tagging is inherently a reflective practice that affords student-users an opportunity to summarize ideas through the tags themselves. In this instance, tags represent a "concept of interest annotated by the learner." They claim that as students view the tags of their peers, they receive support and insight from the learning community. Furthermore, they state that tags themselves contain useful information that clarifies learners' thinking processes and activities. However, they fail to show any evidence that tagging

improves student learning or teacher assessment. They go on to argue that while tagging has mostly been used to annotate whole objects on a "coarse grained" level (for example, tags on YouTube that apply to whole videos), tagging in education would be more useful on a finer-grained level (Bateman et al., 2007).

Quintana and colleagues have been studying how tagging may be used for educational purposes to support reflection and annotation during elementary students' data collection.[9] Focusing on the area of science inquiry and museum education, Quintana and colleagues have created Zydeco, a mobile system (using iPhones) to scaffold the science inquiry process in the classroom and in museums. Their preliminary results show that tags support "nomadic inquiry" by encouraging students to be reflective and annotate during data collection.

Using Zydeco, elementary and middle school students collect photos of artifacts in a museum as data relating to a larger class inquiry project. The Zydeco team argues that in education, tags can be used to facilitate organization and annotation. They argue that unlike with typical uses of tagging, the learner may not know in advance what appropriate tag to apply to the photos they have collected due to unfamiliarity with the subject matter. Therefore, the students must reflect on how they plan to use the data to determine what tags are appropriate. The researchers have created a model in which the class discusses inquiry questions generated by the classroom teacher, anticipates the data they would need to collect, and forms a list of tags before going to the museum. Zydeco provides the students with an opportunity to generate tags that they expect to be relevant to their data collection and use them to support the students' data collection. This pre-established list of student tags becomes a shared folksonomy with which to classify the data. Zydeco also provides the opportunity for students to create new tags during

[9] (Cahill, Kuhn, Schmoll, Pompe, & Quintana, 2010) call the process that the students go through while using Zydeco "nomadic inquiry." Nomadic inquiry is inquiry that can occur in a variety of physical contexts, such as a museum or an outdoor environment (Hsi, 2003).

data collection, allowing students to rethink their system of classification and mark other emergent interests (Cahill et al., 2010).

Tagging in Zydeco also increases students' ability to retrieve and recall information that could be used later for synthesis. Research suggests that tagging prompts students to think deeply and learn more as they collect data (Kuhn, Cahill, & Quintana, 2011).

My work builds on research by Bateman, et al, and the Zydeco group. In addition to reflection and learning, I contend that meaning making is also an essential aspect of the user experience in educational tagging. Unlike previous research in education, this dissertation focuses on the tagging of video.

Tagging Video

The temporal nature of video compounds the challenges found in tagging text-based and still image content. Video does not afford keyword searching unless sufficient metadata or transcripts of dialogue are made available. YouTube is the most well-known and largest collection of publically available video. YouTube has shown that tagging video content can effectively annotate videos in order to facilitate findability, sharing and discovery. However, YouTube videos are typically short, usually in the range of 5-10 minutes. Tags annotate the entire video on a coarse-grained level and not smaller segments from the video; however, YouTube continues to improve and add functionality. In 2010, it added an annotating function allowing users to tag specific moments within a video associated with a particular time code. At the time this dissertation was written it was also possible to add a "note." "Notes" are a specific form of video annotation supported by YouTube that enable users to create pop-up boxes containing text. The user can decide what portion or portions of a video contain notes. Therefore,

this function has some similarities to segmenting and tagging video as explored in this study. However, on YouTube, this feature has been used mostly by creators of videos, and there is currently no way for viewers of a video to collaborative annotate. I have not found any published research exploring the use and use cases of this form of video annotation on YouTube. Therefore, it is unclear whether YouTube is currently or might eventually aggregate the user-generated notes, and if so, for what end?

Conceptual Framework

In this section I address two topics central to the design of this study. The first is the concept of representations and records. I define the term "record of practice" and discuss how the nature of representations of practice affects the meaning that can be made with them. Secondly, I discuss the unit of my analysis. In doing so, I define the meaning behind the term *segment,* and discuss it in terms of Zack and Tversky's (2001) concept of *event*.

Representations and Records

Central to the work of practice-based teacher education and this dissertation is the concept of "records of practice." The term "records of practice" originated with the work of Lampert and Ball (1998). Hatch and Grossman define records of practice as:

> "raw" materials (which may include largely unedited video but also curricula, student work, and other materials used in the course of planning, instruction, and assessment) as well as interviews, reflections, notes, and commentaries that relate to the raw materials but were not used in the course of instruction (Hatch & Grossman, 2009).

These materials or artifacts originate directly from teaching and include documentation such as video recordings of lessons, lesson plans, student work, assessment materials, and curricula. This

dissertation focuses on recordings of participants' talk as well as segmenting and tagging behavior around one specific video record of practice.

Records of practice range in terms of "grain size" (Goldman, 1995; Sherin, 2004). Some focus on short segments of classroom interaction (like those used in "microteaching" analyses) and others encompass entire courses or a year or more of teaching (in the form of year-plans) (Lampert & Ball, 1998; Hatch & Grossman, 2009). Records of practice are often used in the context of practice-based teacher education as common texts that serve as the focus of inquiry and be examined and assessed. The quality or presentation of records of practice varies depending on the records' intended purposes and the resources available at the time they are created.

Judith Warren Little (2003) and Grossman and colleagues (2009) both argue "that the nature of representations of practice has consequences for what novices are able to see and learn about practice" (Grossman, Compton, et al., 2009).

> The nature of the representation determines to a large extent the visibility of certain facets of practice. In videos of practitioners at work, the interactive features of practice may be visible, but the professional reasoning underlying the practitioners' actions may be invisible. Narratives of practice may include descriptions of practitioners' thought process…yet novices may have difficulty envisioning the interactions being described (Grossman, Compton, et al., 2009).

Grossman and colleagues remind us that different "representations" (records of practice) necessarily make visible different facets of practice. Video makes the enactment of teaching practice visible, while the thought process behind that enactment can often come from narratives. A comprehensive analysis must account for multiple kinds of representations. This dissertation considers the possibility that the segmenting and tagging of a video of teaching makes visible what is salient to the participants of the study as they watch a specific video record of practice. While the "professional reasoning" of the "practitioner" pictured in the video remains unknown,

segmenting and tagging may uncover patterns in the professional reasoning of a group of viewers. Just as the narratives in Grossman and colleagues' study describe thought processes otherwise invisible in a video record, the interview narratives in this study contrast the perspective of individual participants with patterns gleaned from the tags.

One particular phenomenon relevant to this study is what Grossman and colleagues call *decomposition of practice* – "breaking down complex practice into constituent parts for the purposes of teaching and learning." When designing this study I hypothesized that participants would use the decomposition of practice as a strategy for chunking the complex interactions in the classroom into recognizable components of practice. To that end, tagging simultaneously aids the process of decomposition and makes that process visible. Tags decompose the practice of decomposing practice, in that tagging uncovers for the researcher the participants' efforts to make sense of the teaching practice depicted in the video record. Tagging enables researchers to "see" viewers decompose practice, just as "[d]ecomposing practice enables students to 'see' and enact elements of practice more effectively" (Grossman, Compton, et al., 2009). However, the results of this study show that in the context of a social and educational community of practice participants did not decompose practice simply or straightforwardly.

Unit of Analysis

I made the choice to focus participants' analysis on the level or grain-size of the first half of a single guided reading lesson. A guided reading lesson is an area of confined interaction within the course of the day's teaching focusing on a discrete text and/or skill, as opposed to a complex concept addressed over time. Guided reading lessons are generally familiar and recognizable to educators, as well as being short in duration. I had the participants focus on the first half of a guided reading lesson rather than the whole lesson for two reasons. Firstly,

informal piloting of the study showed that segmenting a 7-9 minute video was seen as a reasonable task, whereas segmenting a 12, 15, or 20-minute video was seen as overly cumbersome and fatiguing by pilot participants.[10] Secondly, the piloting suggested that I could leverage participants' understanding and expectations of how a guided reading lesson unfolds by focusing their attention on just the first half of the lesson without the record resonating as incomplete. (See Chapter 3: Methodology, section "Video to be segmenting and tagged," for selection criteria). The level of the lesson is how pre-service teachers, teacher educators, and educational researchers are generally used to talking about practice and the decomposition of practice. Focusing on the first half of a short guided reading lesson creates a reasonable boundary (for related approaches see (Fishman, 2003; Hatch & Grossman, 2009; Hiebert, Gallimore, & Stigler, 2002).

Here the term *segment* is being used synonymously with Zack and Tversky's (2001) concept of *event*: "a particular selection of time at a given location that is conceived by an observer to have a beginning and an end." As Zack and Tversky make clear, this conception has several important implications. Firstly, events are perceived and defined by the individual and therefore exist in the minds of the beholders, and at the same time are tied to real actions in the world. Secondly, "the temporal dimension of events leads to an inherent asymmetry in event boundaries and organization." Just as at any given moment the special and temporal boundaries of a large protest might be in flux, the boundaries of an event are not fixed given the "asymmetries" of different viewers' perceptions (Zacks & Tversky, 2001).

[10] Informal piloting of the segmenting and tagging activity involved four participants. Two participants were recent graduates of the teacher certification program where the study's pre-service teacher participants were sampled. The third participant was an in-service teacher who graduated from the same teacher certification program three years earlier. The fourth pilot participant was an in-service teacher who had no affiliation with the teacher education program studied in this dissertation.

I chose to use the term “segment” rather than “event” because I felt that asking participants to tag “events” might limit what they mark. For example, it is common within YouTube for users to tag emotional responses, such as “exciting” or “Yeah!” I anticipated that participants would not necessarily equate the term “segment” with an emotional response, regardless of how salient it is to them, and I did not want to discourage any type of use.

CHAPTER 3
METHODOLOGY

Overview

This chapter describes the study context, design, data collected, and methods for analysis. It also describes the ways I have sought to address bias, purposely weigh the evidence, and establish the study's trustworthiness as a way to ensure validity.

Study Context

This study was conducted at the School of Education, University of Michigan, which is known for its particular dedication to the study and improvement of teaching practice, specifically through the use of video-based technologies.

In 2004, the School of Education began a Teacher Education Initiative (TEI), with the goal of redesigning teacher training programs to be more focused on a practice-oriented curriculum for learning and teaching. The period of time between 2004-2010 was focused on conceptualizing, researching, and developing supports for the launch of the "new" program. The hallmarks of the redesign were:

- The curriculum now focuses on specific "high-leverage practices"[11] of teaching that were developed across the program.

[11]High-leverage practices refer to a set of defined practices developed by Teaching Works at the University of Michigan. Teaching Works claims that "carried out skillfully," these practices will "increase the likelihood that teaching will be effective for students' learning. They are useful across a broad range of subject areas, grade levels, and teaching contexts, and are helpful in using and managing differences among pupils… The set of high-leverage practices is intended as a common framework for the practice of teaching that will provide the basis for a core curriculum for the professional training of teachers. Such a core curriculum would make possible collective development of materials and tools for training teachers, common assessments of performance, and agreement about standards for independent practice" (http://www.teachingworks.org/work-of-teaching/high-leverage-practices).

- The program no longer cuts the curriculum into "courses" of equal length and intensity; instead, faculty designed modules and units of duration and intensity based on how hard it is for interns to master particular practices.
- New clinical settings and ways to use them were developed on campus and in local K-12 schools that provide opportunities for interns to observe, study, and practice instruction, and to receive detailed.
- Faculty developed assessments and other tools to measure and provide feedback about teaching interns' developing proficiency.
- Systematic supports were provided for faculty, graduate students, mentor teachers, and staff to develop the capacity to provide practice-focused teacher education (http://www.teachingworks.org/about/history).

Data collection for this study occurred after the "new" program was launched in September 2011. Therefore, the Teacher Education Initiative directly impacted all of the participants in this study. Both pre-service teachers and teacher educators/educational researchers became fluent in the language of "high-leverage practices." Teacher educators and educational researchers had to rethink and redesign the structure and progression of pre-service teachers' learning experiences purposely to support the gradual improvement of the teaching practice and thinking of a novice teacher. The TEI recognized that the way beginning teachers think about, focus on, and parse teaching practice changes over time, becoming increasingly complex, and is greatly influenced by teaching models. Teacher educators had to modify the courses they teach in order to make specific teaching practices more visible and accessible to novices. Teacher educators and educational researchers had to rethink and redesign the structure and progression of pre-service teachers' learning experiences in order to purposely support the gradual improvement of teaching practice and thinking of a novice teacher.

Study Design

This study is designed to explore how the act of segmenting and tagging video may create new data that provides insight into how participants view and make sense of video records

of practice. What is salient to them? What schemas are they using? Are there similarities between participant groups? Is there a large range within the groups? Do they use particular language? The following passages provide details about the participants, the featured video of teaching that participants segmented and tagged, the training video, the tool they segmented and tagged with, the study procedure, the data sources, and the analysis process.

Participants

Two main groups of participants were recruited for this study: pre-service teachers and teacher educators/educational researchers. An effort was made to recruit pre-service teachers and teacher educators/educational researchers who interacted with each other. Two of the teacher educator/educational researcher participants taught courses that all of the pre-service teacher participants took. This allowed me to explore possible similarities between the segmenting strategies and tagging language used within and across various communities of practice (Wenger, 1998).

The pre-service teachers who participated in this study were enrolled in the Elementary-level Masters of Arts with certification (ELMAC) program. This is one of four such programs (along with elementary undergraduate, secondary undergraduate, and secondary masters) at the university and generally attracts passionate and academically well-prepared individuals. Typically, pre-service teachers in the ELMAC program range from 22-55 years of age, with a larger proportion of students in their mid-to-late twenties. The program is a full-time, one-year intensive program, designed to support beginning teachers as they learn over time. The pre-service teachers sampled in this study were in the program 2011-2012, which was the second year of the redesigned teacher education program.

All twenty-two of the pre-service teachers in the ELMAC 2011-2012 cohort were invited to participate. Six pre-service teachers volunteered. The six pre-service teachers sampled are representative of the larger cohort in terms of age as well as range of demonstrated proficiency in the practice of teaching. This sample is not representative in terms of gender. Four pre-service teachers out of the twenty-two-member cohort were men. Two of the men in the cohort volunteered to participate in the study. The data was collected in May 2012, which was at the end of their program. At that point the pre-service teachers were considered "well-launched beginners" and were all in the process of applying for and accepting positions as in-service teachers.

The teacher educator/educational researcher group included both clinical faculty and tenure-track faculty who were educational researchers as well as teacher educators. Educational researchers who did not interact with the sampled pre-service teachers directly, but whose research and/or teaching had a great institutional impact, were also included. More generally, teacher educators were selected based on their experience with practice-based teacher education, their use of video as a tool for learning about practice, and their level of influence on the pre-service teachers' experience.

The category of teacher educator/educational researcher did not exclude graduate students or lecturers who taught the sampled population of pre-service teachers. When making the selection from the larger group of possible teacher educators/educational researchers, I focused less on rank or level of expertise than on 1) consideration of practice-based education, 2) use of video, and 3) interaction and influence over the pre-service teacher group. Participants in the teacher educators/educational researcher group were recruited individually based on the selection criteria.

This study purposely sampled nine teacher educators/educational researchers, resulting in a total sample of fifteen participants. Do to data loss, one of the teacher educators/educational researchers (Participant 10) has been excluded. Participant 10 is not included in counts or statistics.

I purposely over-sampled for participants in the teacher educators/educational researcher group with literacy expertise (See Figure 2 below). I did this so that it might be possible to observe differences in how teacher educators/educational researchers with expertise in literacy (the featured video's content) might segment, tag, and talk about the video as compared to those with different areas of expertise.

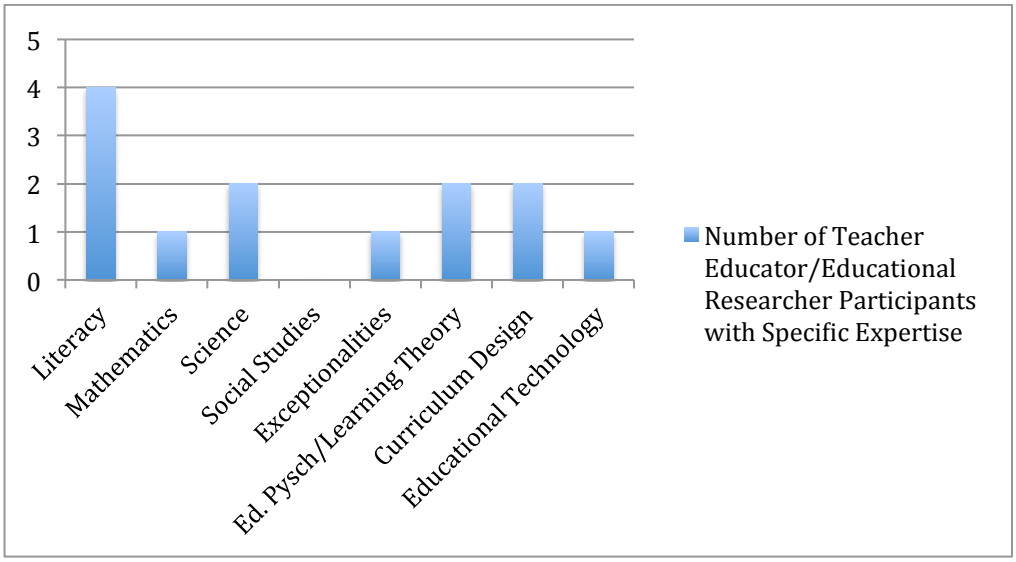


Figure 2: Teacher educator/educational researcher participants' areas of expertise[12]

Some might question the use of studying how a science teacher educator/educational researcher, for example, segments and tags a video representing a selection of literacy practice. However, I argue that this diversity in content expertise is important to take into account. Firstly, by including participants with expertise in areas other than literacy I can better see whether or

[12] This chart includes Participant 10.

not (and how) participants with literacy expertise approach the task differently. Secondly, the video record of practice featured in this study highlights many elements of teaching practice, which cut across subject matter expertise and are potentially interesting to a variety of educators.

Video to be Segmented and Tagged

Each of the participants viewed the first eight minutes of a single video of an elementary-level in-service teacher teaching a literacy lesson to a small group of third-grade students. The video features a short text titled "City Celebrations." The objective of the lesson was not explicitly stated and remained unclear. A narrative description of the video is presented in the following subsection. The video was selected based on the following criteria.

Table 1: Selection Criteria

Selection Criteria	Selection Justification
The video record is novel to all the participants.	This record was collected as a part of a pilot research project examining the teaching of literacy. Videos from this collection have not been shared outside of the research project.
The video does not originate from any of the participants' programs, and participants would not recognize the teacher or school.	The teacher featured in the video does not work directly with any of the participants' teacher education programs. No participants knew this teacher or could identify the school it was filmed in.
The video is continuous and minimally edited.	The original record of the lesson is 21 minutes and 09 seconds. The lesson was recorded using two cameras. One captured a wide shot of the teacher and the students, showing the teacher's face and the back of the students' heads. The other captured a medium shot of the teacher's side and three out of five of the students' faces. The record was constructed by cutting between the two cameras, capturing the entire interaction.
The first 7-9 minutes can be viewed as a short segment of instruction.	In this study, participants were only asked to view, roughly, the first eight minutes of the video lesson. This segment included an introduction to the text, some independent reading, choral reading and the teacher asking

	the students about what they had read.
The video shows a lesson that does not explicitly build on prior sections of the lesson or previous lessons.	The teacher does not explicitly make any connections to prior lessons, texts, or strategies for reading that took place outside of this lesson.
The video captures a dilemma of teaching (Lampert, 2001) and in-the-moment decision making.	One common dilemma of teaching relates to helping students connect their prior experience and knowledge to a text in a way that gives students agency and demonstrates a respect for their ideas and experiences, without losing focus or deviating too far from the goals of the lesson. This tension can be seen in multiple instances in the video clip. While this lesson fits the format of a guided reading lesson, the literacy instruction featured in this video is unfocused and the teacher's use of questions lacks purpose. The reasons behind several of the teacher's decisions are unclear and entice the viewer to speculate about her thought process and/or pose questions. For example, at one point she asks the three students on her left-hand side to read aloud together. Why only three? Why these three? The three students reading are black and the two students to the right are white. What does it mean to have all the black children sitting together and reading together? What is she expecting the other two to focus on while the others read?
The instruction featured in the video is appropriately challenging and engaging for the students.	Given the errors students made as they read, the text appears to be appropriately challenging for each student in the group.

The video representation of practice segmented and tagged in this study features a single classroom teacher and five students. For clarity, I have numbered the students and will use these numbers when referring to these students throughout the dissertation. Students 2 and 3 are twins. The classroom teacher and the students' faces have been covered to protect their identity.

Figure 3: Video that was segmented and tagged

This recording captures an "everyday" instance of teacher-led instruction, meaning that this teacher did not plan something special or specific to be recorded.

Narrative Description of the Featured Video of Practice

The video recording began abruptly with the featured teacher asking, "What does celebration mean?" her body turned towards Students 5 and 4. The teacher and the students were already sitting at the table. She waited one second and then asked Student 5. Student 5 responded, "It is like a birthday party and stuff…you do something fun and there is cake." With her body still turned towards Student 5, the teacher said "O.K." and then asked Student 5 if he had ever had a celebration. Student 5 said yes and the teacher followed up by asking what kind of celebration. "A birthday," Student 5 responded. Then the teacher turned her body, looking and talking directly to Student 3. She asked Student 3 if she had ever had a different celebration. Student 3 told the teacher that she and her sister (Student 2) celebrate Easter. "That's a good one," the teacher responded. The teacher turned toward Student 2, "What about you?" Student 2 quietly said, "ummmm." "A celebration," the teacher repeated. After a brief pause Student 2

said, “Christmas.” “Oh that is definitely a celebration,” the teacher commented. She turned towards Student 1, “How about you?” Student 1 responded quickly with “birthday.” The teacher repeated his response and turned more towards the middle of the group. While the teacher started to pass out copies of the text, Student 3 started to tell a story about how her family set up various games. Student 3 was not explicit, but it appeared that she was describing a family celebration or holiday. The teacher interrupted Student 3’s story in midsentence to say that Student 3 and her sister, Student 2, would have to share a copy “because you’re twins.” Student 3 finished her story. The teacher responded and focused the group by saying, “Well, that would be fun. Our story this week is called ‘City Celebrations.’ How would a city celebrate?” The teacher looked directly at Student 1, but he was not making eye contact. The teacher glanced to the other side of the table and saw that Students 5 and 4 had their hands up. She looked back at Student 1 and asked if he had “ever heard of anything like that?” Student 1 said a “marching band.” The teacher repeated his response, turned towards the middle of the table and said “What else?” She called on Student 4 who said, “The fourth of July.” The teacher called on Student 5, who still had his hand up. Student 5 suggested that the city could be celebrating something exciting like “someone getting a promotion.” The teacher followed up by asking Student 5 if the whole city would celebrate if someone got a promotion? Student 5 did not answer that question and instead said “Christmas,” seemingly changing his example. The teacher nodded her head at him. Then the teacher started to ask the question, “Could a city have a birthday?” but Student 3 interrupted her. Student 3 told her that Student 1 was looking through the text. The teacher looked at Student 1 and finished asking her question. Student 4 said, “Yes” and the teacher asked how. Students 1 and 2 raised their hands. The teacher called on Student 2 and she said, “Parades.” The teacher

nodded and said, “Let’s look,” as she took the books out of Students 2 and 1’s hands and placed them on the table.

The teacher opened the students’ books to the first page. The students looked at the picture, which could not be seen in the video. The teacher said, “I think there are statues like this in downtown Kalamazoo.” Then she pointed to the first part of the text and reminded the group that the twins would be sharing a book. “This book is in the form of a diary,” she told the students. “Who has ever written in the form of a diary before?” Students 5, 4, 2, and the teacher’s hands all went up. “I used to write in a diary,” the teacher told them. “What is a diary?” she asked. Students 4 and 2 raised their hands. The teacher called on Student 2, who said that it was “where you write your personal things.” The teacher repeated Student 2’s response. Then the teacher told the students, “You will notice that this book is in the form of a diary. You’ll notice up in the corner of each new entry is the date and the place.” The teacher asked the group, “On November 9th, where did it take place?” Student 4 responded with “New York.” The teacher repeated Student 4’s response and asked a similar question about the location in the next entry. At that moment, she seemed to notice that Student 5 was looking at his book and holding it out in front of him, blocking her view of his face. The teacher took the book out of his hands and put it down on the table as she repeated the question, directing it at him. Student 5 gave the correct answer and the teacher turned to Student 1 and asked him for the date of the next entry. Student 1 gave the correct answer and the teacher followed up by asking what the location was. Student 1 answered that question correctly as well. The location in that entry was St. Louis and the teacher pointed out the arch in the picture. Student 2 looked excited and the teacher asked her if she had been there before. Student 2 started to tell a story about going to St. Louis and going to see the arch. The teacher interjected, “I was there last summer.” Student 2 continued to talk about how

some people got stuck in the elevator. At that point, the teacher acknowledged the story by referring to the experience of getting stuck in an elevation by saying, "Thanks, but no thanks." The teacher quickly turned the student back to the next entry of the text and asked Student 3 where that entry was. Student 3 told her that it was Washington D.C., and the teacher asked if any of the students had been there before. A few students said yes. Student 5 mumbled, "I've met the president." The teacher turned to the next page and asked Student 3 what the date and location was. She responded correctly and the teacher followed up by asking what time of year it was. Student 3 said it was spring. The teacher said, "Yeah, you can see all the flowers coming out." Then the teacher asked Student 4 about the "last date of entry." As Student 4 was responding, the teacher interrupted by saying, "I think it is the last." The teacher turned the page and realized that there was another entry left. Student 4 pointed out the date and location of that entry. The location was Chicago. The teacher asked how many of the students had been to Chicago. All the hands went up and several students started telling stories at once. The teacher responded to one of them by saying, "Isn't that nice," and turned the page. She asked Student 3 to identify the location and date of the "last place." After Student 3 said that the date was July 23rd, Student 2 started to say that her brother's birthday was July 26th. The teacher turned the page, interrupted Student 2's story and drew the students' attention to "the very last one," meaning the book's actual final entry. Student 1 responded correctly.

At that point the teacher turned back to the beginning of the text. She reminded the students of the location and date of the first entry and then contrasted that with the location and time of the last entry. She pointed out that the book covers "almost a year." As the teacher returned to the beginning of the text she said, "Let's see. I am going to have you [referring to the whole group] read the first two paragraphs in your head and I want you to be able to tell me one

thing." She then handed the copy of the text she had been using back to the twins and told them that they would be sharing. The students read silently for a short period of time. While most of the students were still reading, Student 5 raised his hand high. "Hold on," she told Student 5. A few seconds later, Student 4 also raised her hand. Once all the students appeared to be finished reading, the teacher said, "Tell me one thing," to Student 1. Student 1 struggled to get a coherent response out. "Who is she?" the teacher asked. "Just tell me about the beginning. Where were they? Just give me a short summary," she continued. Student 1 provided a short summary of the entry, though it was hard to understand exactly what he said from the video record. The teacher confirmed that he was right and said, "Good for you." She followed up with another question about a specific detail mentioned in the entry, still directed at Student 1. She repeated his response and the told the students to look at the next page.

At that point the teacher told Students 1, 2, & 3 to all read together aloud. She pointed out exactly where they would start and end reading. The students read aloud together. At one point Student 2 made an error. Student 2 said, "Some runner were wearing weird customers." The teacher stopped them and pointed directly to the word on Student 2's texts. The teacher asked if it said, "Some runner were wearing weird customers." Student 1 said, "costume." The teacher asked Student 1 what a costume is. Student 1 replied and the teacher reread the sentence correctly and prompted the three students to continue reading aloud. It was at this point that the video clip ended.

Study Introduction and Training Video

For this study, I produced an original video designed to introduce the concept of social tagging, to frame the study, and to teach participants how to use the TagMentor tool (see next

section). The video was produced using a "Common Craft Style"[13] of stop motion animation, paper cutouts, and hands on a white background.

I chose to use humor throughout the design of this video. I made this design choice for several reasons. Humor has been shown to "encourage creativity" and change "user perspective" (Mihalcea & Strapparava, 2006). The act of segmenting and tagging a video can be tedious at times. Given the length of the data collection sessions (averaging two hours), I was concerned about mental fatigue. Even more tedious than segmenting and tagging an everyday, authentic video record of teaching practice is watching someone else do it as a part of a training video. Therefore, I wanted to design the data collection sessions to be as enjoyable and interesting as possible for the participants, given the constraints of the task. I hoped that the humor in the video would help mentally refresh the participants and encourage them to think creatively about how they imagine segmenting and tagging videos might be useful or not in education. Informal piloting showed the use of humor to greatly improve participants' experience and perception of the data collection session.

Video Segmenting and Tagging Application: TagMentor

The videos were segmented and tagged by each participant using a very simple application called *TagMentor*. TagMentor is an Apple Script tagging tool that Bob Lougheed, University of Michigan School of Engineering, developed specifically for this dissertation study. TagMentor allows users to play a video in QuickTime format. The user can mark in and out

[13] Common Craft is an industrial video company that focuses on building a collection of online videos covering a variety of topics that are easy for people without technical knowledge to understand. The videos use stop motion animation, paper cutouts and hands on whiteboards (http://www.commoncraft.com/).

points[14] in a video and tag each segment. Figure 4 shows the basic Apple Script program information.

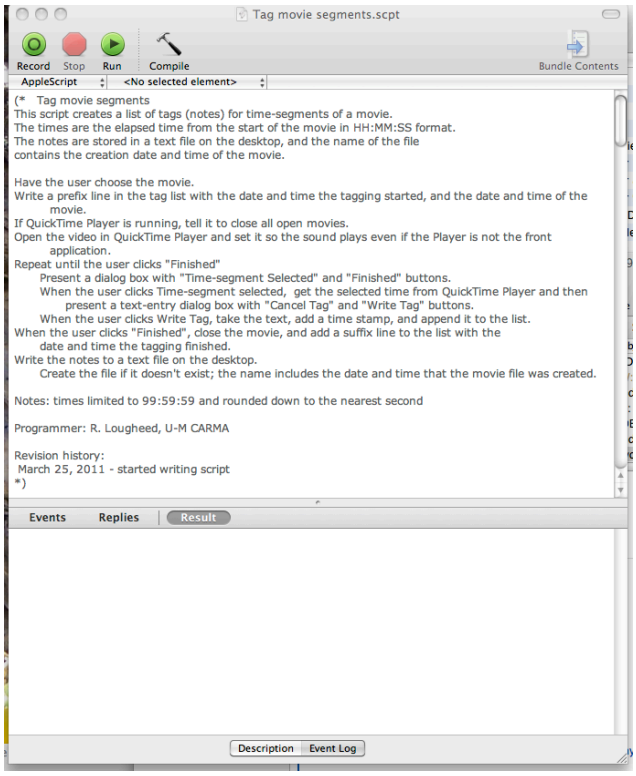


Figure 4: TagMentor code set-up

TagMentor runs on Macs only and can be easily installed. Once in TagMentor, a user can select a video to segment and tag. That video will then appear in a QuickTime video player window. The video player window has basic features, such as play, pause, rewind, and fast forward. The window also allows users to move across the timeline (scrubbing). Unlike typical video players, TagMentor also allows users to easily move in and out points in order to specify the beginning and end of a segment of the video. A small box pops up, allowing users to mark the selected segment and give it a tag. Only one tag can be typed into the box at one time, but if the user wants to apply multiple tags to the same segment that can be done without requiring the

[14] In and out points mark the specific time code and frame where a video clip begins and ends.

user to resegment the video. The user can add as many tags and make as many segments as he or she desires.

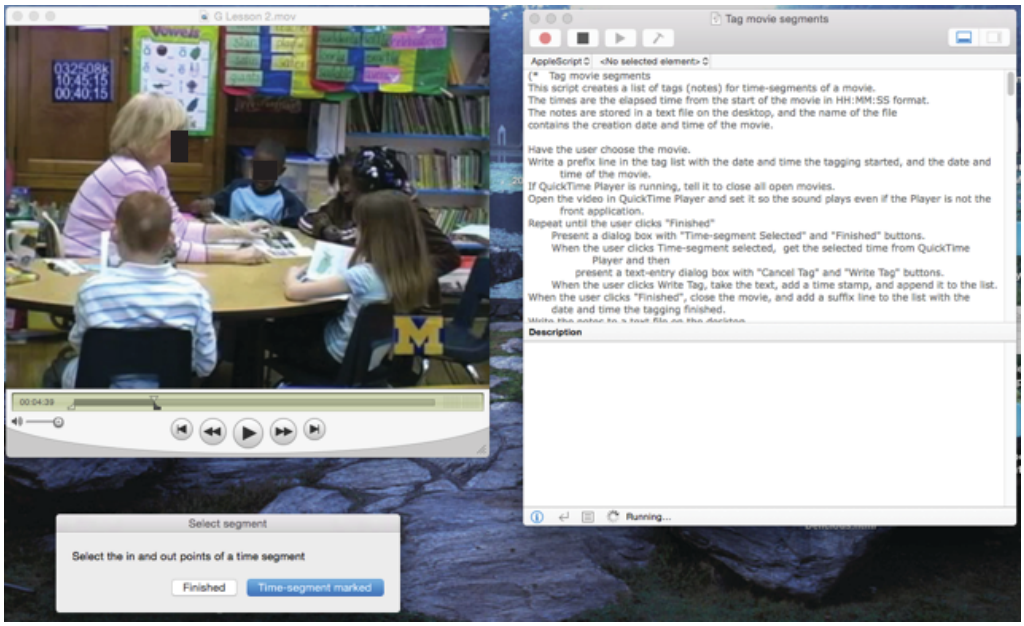


Figure 5: TagMentor interface

TagMentor automatically collects essential data for each user session. It collects the length of the session, the time codes for each segment, the tag(s) associated with each segment, and the date of the user session. It produces a log that a user can refer to after he or she is finished tagging. This log was helpful during the interviews, as it allowed the participants and me to look back at the choices they made and discuss them. However, TagMentor does not provide an easy way for a user to see what tags he or she is applying while completing the task. This affected participants' behavior by making it more challenging for them to use consistent tagging language and to notice patterns in their own tagging and segmenting behavior while they were thinking through what parts of the video to segment and tag and why. The TagMentor interface also did not make it possible for the participants to see how much of the video they had

segmented or tagged. Figure 4 shows a sample output produced with the TagMentor interface. For clarity, I have highlighted the tags in this output.

Tags for movie recorded on Sunday, February 7, 2010 8:05:31 PM
Started tagging Thursday, June 28, 2012 3:45:13 PM
00:00:03 - 00:05:20 -- Pre-reading
00:05:21 - 00:08:03 -- Student reading
00:00:00 - 00:01:06 -- Tapping prior knowledge
00:00:00 - 00:02:05 -- Building background
00:01:00 - 00:02:04 -- Using prior knowledge to predict
00:02:08 - 00:02:26 -- Making connections
00:02:08 - 00:02:26 -- Teaching genre
00:02:13 - 00:02:26 -- Eliciting vocabulary knowledge
00:02:20 - 00:02:34 -- Text features
00:02:20 - 00:02:34 -- Text features- non-fiction
00:02:20 - 00:02:34 -- Text features- non-fiction- diary
00:04:13 - 00:04:23 -- Making connections
00:01:42 - 00:04:23 -- Previewing text
00:00:00 - 00:00:14 -- Eliciting vocabulary knowledge
00:00:14 - 00:00:55 -- Making Connections
00:00:00 - 00:00:16 -- Eliciting vocabulary knowledge- generating examples
00:02:54 - 00:03:19 -- Making connections
00:02:54 - 00:03:19 -- Steering the conversation
00:02:54 - 00:03:19 -- Managing tangential talk
Completed tagging at 4:52:26 PM

Figure 4: Example TagMentor output

In addition to automatically recording key data, TagMentor is very simple to learn and use.[15] Ease of use was critical in this study, because the technology needed to allow me to see how participants were segmenting and tagging the video without getting in the way.

[15] Participants all used the same laptop during their individual sessions using TagMenotor. The laptop's touch pad was unfamiliar to some participants and slightly uncomfortable for one who was having wrist pain at the time of data collection. A few participants voiced that the touch pad was annoying and that they would have preferred an external mouse. While the touch pad might have at times interrupted participants' flow, I have no reason to believe that it skewed the data in any way.

Procedure

I scheduled one-on-one sessions with each of the participants. Sessions took approximately two hours, although some sessions with participants in the teacher educator/educational researcher group were limited to due to their schedules. The sequence of the sessions was identical across user groups. It went as follows: I began each session by reviewing the IRB forms and statement of consent. Then I provided some introductory information about the study and what participants would be asked to do during the session. Next, I showed the training video that I produced that provides users with a basic introduction to the concept of tagging and training in how to segment and tag video using the "TagMentor" application. After the training, the participants watched the video to be segmented and tagged in its entirety, without pausing. Once the participants had watched the video, I asked them to explain how they anticipated segmenting and tagging the video. "What purpose or frame are you thinking about?" I made it clear that participants did not have to stick with this plan, but that I wanted them to articulate their intentions beforehand for two reasons. Firstly, I wanted them to start out with a clear purpose or frame in mind. They could abandon this purpose as they started working, but my having them state their initial intention allowed us to discuss later how and why their thinking changed. Why and how did the purpose they started with not fit?

Then participants immediately began using TagMentor to segment and tag the video. The participants were able to make as many segments and tags as they saw fit. Participants were encouraged to work for as long as they wanted on this part of the task. However, most participants stated at some point that under different circumstances they would continue to segment and tag the video beyond what they felt able to do during the session. In those instances

participants were asked to briefly describe how they might continue segmenting and tagging the video if they had the opportunity.

Most participants chose to think aloud as they segmented and tagged the video. This allowed us to have a conversation about their thinking and choices as they completed the task. After the participants finished segmenting and tagging the video I joined them at the computer. Together we reviewed the segments and tags they had created as I interviewed them on that thinking process (See Appendix B: Interview Protocol). I decided to use the interview as the main source of insight into why each participant segmented and tagged in the way he or she did, rather than asking him or her to think aloud during the activity. One reason I made this choice is that asking the users to think about the teaching in the video and how to segment and tag the video all while they tried to think aloud would put a strain on their cognitive load. Finally, each participant completed a short questionnaire, allowing me to collect some information about each participant's prior experience and knowledge (See Appendix A). Because some of the information I collected asks what types of literacy practice participants had experience with (e.g. running records, guided reading), the questionnaire was placed at the end of the session to prevent bias.

Data Sources

In this section I explain the data sources that were collected. There are four main sources, described briefly in Table 2, and then in more detail below.

Table 2: Data Sources

Data Source	**Description**
Questionnaires	Participants completed a questionnaire that recorded relevant information about participants' experiences and knowledge.

Video screen capture	Video screen capture data with audio was gathered while each participant used TagMentor to segment and tag the video.
Transcription of interviews	Video recordings were produced for each interview. From those recordings, transcriptions of the interview were produced.
TagMentor output	The tool TagMentor produced time code data for each segment created, as well as data on tag(s) applied to that segment, the participant number, and time of data collection session.

Questionnaires

In order to collect relevant information about experiences and the knowledge base for each of my participants, I designed a series of questionnaires (See Appendix A). Each participant completed one questionnaire. All participants were asked standard demographic questions, such as their gender and age, how long they had been working or studying at their current institution, degrees/professional certification already achieved (including where and when), and information on any other past careers. The questionnaire for pre-service teachers differed from the questionnaire designed for the teacher educator/educational researchers. The questionnaires for pre-service teachers focused on gathering information about what related course-work material they had covered up to that point and how much experience they had engaging in teaching guided reading. Some general questions were also included to gauge prior experiences and ambitions. Questionnaires for the teacher educators/educational researchers focused on gathering information on educational background, area(s) of expertise, K-12 teaching experience, experience as a teacher educator, educational research experience, and focus.

Screen Capture Data

While each participant segmented and tagged the video, I used screen capture technology to record how they segmented and tagged, as well as any self-explaining they did through the screen capture software's audio recording function.

Semi-Structured Interview

A semi-structured interview was used to gain information on how each user was thinking about the video and the thinking behind each user's segmenting and tagging choices. On the continuum of interview protocols, on one end of the spectrum are structured interviews, in which the interviewer asks each participant or respondent a series of pre-established questions with a limited set of response categories. On the other end of the continuum are unstructured interviews, a term that refers to open-ended ethnographic interviews. Semi-structured interviews fall in the middle of this continuum between structured interviewing and unstructured interviewing. Semi-structured interviews allow for flexible follow-up questions in order to gain clarification of participants' meaning (Fontana & Frey, 2000).

After the participants finished segmenting and tagging the video on their own, I reviewed the screen capture video with them. If they had not narrated their thinking while making the segments and tags, I asked them to explain their thinking about why they segmented and tagged as they did. When appropriate, we paused, played and, if needed, fast-forwarded through the video so that we could discuss each of the segments and tags created by each participant. This interaction was also captured by the screen capture recording software.

Analysis

This study examines how a group of educators (pre-service teachers and educational researchers/teacher educators) associated with the same university-based teacher education program used a simple tool for creating their own segments and tags of the same video recording of teaching practice and how they talked about that teaching video and segmenting/tagging process. The goal is not to determine which participants "got it right" and analyzed or interpreted

the video in some assumed correct way. Nor was the goal to test TagMentor as a tool. This study seeks to better understand how educators make meaning of the same video of another teacher's practice, how they mark that meaning, and how they would like to be able to mark that meaning, given a specific purpose. The implications of this study speak to the design and development of online platforms that support educators' work using records of practice. Specifically, I am interested in starting to understand if and how a social platform or online community of practice providing access to large and diverse collections of video records of teaching practice might collect data from a crowd of users that could help the field learn about teaching practice. Therefore the analysis needed to focus on the segments and tags the participants created, any notes or sketches produced during the data collection session, and participants' verbal explanations of their thinking process. While it did not include a fully authentic activity, the study design did attempt to simulate a way of studying the complex act of making sense of a video of teaching practice in context.

My analysis process was broken into a series of seven steps: 1) reducing raw data by transcribing video screen capture data and interview data, tabulating segment and tag data for each participant and group, and creating a list of attributes based on the questionnaire data; 2) producing descriptive statistics for each participant and group and analyzing tag frequency based on the tabulated data; 3) grouping similar or related tags and segments together; 4) conducting a nonparametric statistical analysis to examine whether or not significant group differences exist; 5) producing visualizations that show which parts of the video of practice were focused on; 6) engaging in multiple iterations of qualitative conventional content analysis on the sentence and paragraph level in order to uncover emerging themes, tensions, and needs of participants while working with this video of teaching practice (Hsieh & Shannon, 2005); and step 7) adding,

removing, and revising codes in the process of developing a more comprehensive understanding of emerging patterns and themes (Miles, Huberman, & Saldana, 2014).

Data Reduction

For each participant, I listened to the screen capture recordings in order to mark relevant talk that was transcribed. Most of the transcripts focus on conversations that took place while 1) participants segmented and tagged the video of teaching practice, and 2) participants were interviewed about their experience segmenting and tagging. Some transcripts also include questions that participants asked during the introduction video. I produced a set of transcription guidelines (See Appendix C, which outlines the format and procedure used by me and the three other people who completed the transcription work). Transcripts were formatted for readability as documents so they could be imported and coded in NVivo10.

Using the questionnaire data and some of the interview data, I created a matrix of attributes that represents characteristics of my participants. Certain attributes, such as gender (male/female) and current institution, were straightforward to assign. However, specifying other attributes that emerged from more open-ended questionnaire data on topics such as current professional role required some content analysis. I then used NVivo10 to assign attributes to each of the participants' representations.

I created a series of spreadsheets to organize the segment and tag data. Regarding tag data, I maintained any spelling errors and inconsistencies introduced by the participants. For each participant I tabulated:

- Each segment made (including the in and out points, and segment length)
- All the tags created by each participant and associated with each segment

Producing Descriptive Statistics

Descriptive statistics were calculated based on the tabulated data. For each participant I calculated:

- Total number of segments created
- Mean segment length
- Frequency of tags applied
- Frequency of discrete tags[16] applied

For each participant group I tabulated:

- Total number of segments created
- The mean, median, and range of segment length
- Frequency of tags applied
- Frequency of discrete tags applied

Grouping Tags

Through this study I show that discrete tag frequencies shed light on only a fraction of the meaning making that participants made evident through their user-generated segmenting and tagging. In order to illuminate this, I started to apply tag gardening techniques, such as grouping tags that are not phrased exactly the same way, but are likely to refer to the same phenomena, based on the similarity of the words participants used in the tags and/or the proximity of the tags' segments to other related segments.

[16] Details on how I defined "discrete tag" are explained in Chapter 4.

Grouping on the Basis of Base Word Similarity

My primary criterion for grouping two or more tags together on the basis of similarity was that the tags must share the same base term or lemma. For example, the words "connect," "connection," and "connecting" were all grouped under the base term of "connect." The terms "teach" and "teacher" were treated as separate base words and each had separate groups of tags because the terms associated with "teach" imply an action, while the terms associated with "teacher" imply an object. Three participants each introduced a discrete abbreviation into their tagging language. Since interview data was able to confirm the meaning of each abbreviation, I was able to group those tags with their appropriate base-term group. For example, the tag PK referred to "prior knowledge." PK was grouped with the rest of the tags that contained the term knowledge, as well as the sub-group for "prior knowledge." A single discrete tag could be a part of more than one group. Below is an example of all the tags grouped by the similar word-base "knowledge."

Table 3: Tag Groups, Second Cut, Knowledge

Participant #	In Point	Out Point	Segment Length	User Tag
1	0:00	1:06	1:06	Tapping prior knowledge
1	1:00	2:04	1:04	Using prior knowledge to predict
1	2:13	2:26	0:13	Eliciting vocabulary knowledge
1	0:00	0:14	0:14	Eliciting vocabulary knowledge
1	0:00	0:16	0:16	Eliciting vocabulary knowledge- generating examples
2	0:00	1:08	1:08	Prior Knowledge
2	2:10	2:33	0:23	PK
2	1:08	1:45	0:37	Tying PK to the book
3	0:00	1:08	1:08	Activating prior knowledge
3	0:00	1:08	1:08	Activating background knowledge
4	0:19	1:13	0:54	tapping into students' background knowledge
7	2:13	2:23	0:10	Question - How many of you have written in a Diary Before? To include student in text by activting prior knowledge
8	0:00	1:10	1:10	Elicit prior knowledge
9	0:00	1:21	1:21	GRF- Activating prior knowledge of topic in general
11	0:00	1:12	1:12	activating background knowledge - celebrations
11	1:12	1:52	0:40	city celebration – finer background knowledge
14	0:00	1:08	1:08	Activating Prior Knowledge
15	0:00	1:08	1:08	activate prior knowledge

15	0:00	1:08	1:08	knowledge of celebrations
15	0:09	1:47	0:38	connects prior knowledge to text

This method of tag gardening could be produced by an algorithm. Due to the exploratory nature of this study, I wanted to code at least part of the data in a way that could be replicated by an algorithm so that the study could have implications for natural language processing. However, I did not want to use an algorithm to conduct the coding. I wanted to process through the coding myself in order to explore if and how an algorithm might be useful when applied to educators' segment and tag data.

Grouping on the Basis of Hierarchy or Groups within Participants' Tags

The second method of tag gardening was to group certain tags that participants articulated as being related to each other. Some of these groups were described by the participants as a form of a hierarchy, while others functioned more like a qualitative coding scheme created by the same participant. For example, Participant 9 created five segments that all focus on some aspect of the guided reading format. All of these tags started with "GRF," which the participant confirmed stands for "guided reading format."

Table 4: Example of Group Based on Hierarchy or Groups Created by a Participant

Participant #	In Point	End Point	Segment Length	User Tag
9	0:00	1:21	1:21	GRF-Activating prior knowledge of topic in general
9	0:00	1:21	1:21	GRF-Predicting in relation to the title of the book
9	1:48	2:44	0:56	GRF-Text Preview-Genre
9	2:45	4:32	1:47	GRF-Familiarizing students wit the format of the text
9	2:53	3:21	0:28	GRF-Does the question accomplish an important purpose? Is time loss in an unnecessary opportunity to share personal stories or are the stories important to the understanding of the story or the motivation of the students?

She confirmed her tagging strategy was supposed to help her group or cluster the tags. These groups are examined more closely in Chapter 5.

Conducting Nonparametric Statistical Analysis

The data in these spreadsheets were also used to perform a nonparametric statistical analysis in collaboration with Gwynne Morrissey, Senior Evaluation & Research Specialist at Collaborative for Educational Services. Nonparametric statistics are appropriate given the very small sample size in this study. As noted in the limitation section, these statistics are helpful for developing an understanding, but are by no means conclusive, especially due to the small sample size. These analyses can help inform the discussion of this data and guide further research.

Creating Data Visualizations

From the spreadsheets and in collaboration with Justin Joque, the University of Michigan Visualization Librarian, I was able to create a series of descriptive visualizations using the programming language R. These visualizations were used to identify hot spots of interaction between the participants and the video clip. These hot spots were then used to focus further qualitative analysis.

Engaging in Iterative Coding

In this section, I describe the specific methods used to analyze the interview data, which is then used to contextualize and analyze the meanings of the tags. In order to analyze the meaning participants attributed to the video of practice and how they were thinking about the use of a social segmenting and tagging tool through the interview data, I used the verbal analysis

methods described by Michelene Chi (1997). For the interview data, the unit of analysis was the reasoning chain, which corresponded with the goal of the study: to understand participants' meaning-making, and possibly a common language. Focusing on the reasoning chain as the unit of analysis also made it possible to account for participants' changes in thinking or for their questioning of earlier statements and strategies. Accounting for change in participants' thinking, statements and strategies was critical because I wanted to account for a learning curve in terms of segmenting and tagging strategies. Furthermore, I wanted to account for the possibility that participants would have some interpretations or make assertions about what they saw in the teaching video, but on closer inspection would find evidence in the video counter to what they had first noticed.

Chi's method has commonalities with a grounded theory approach, in that the analysis occurs during the process of moving between two levels: the actual words used by participants and my understandings of these. While the stage of iterative coding is presented here as the 6th and 7th step of the analysis process, in reality it happened alongside the other forms of data analysis. This back and forth process of examining interview data in tandem with the segment and tag data enabled me to think carefully about the role of context in this study. In this way, similar to what Chi describes, the development of the coding scheme was a combined top down/bottom up process. Some codes emerged as I became familiar with the data, and others were based on my knowledge of how educators use and watch video and of teacher education in general, and my specific knowledge of how the participants had previously engaged with similar ideas and activities.

Matching Interview Data with Hot Spots

One set of qualitative codes focused on participant talk around the video's hot spots, providing insight into one of the research sub questions: *What differences in video segmentation do pre-service teachers and teacher educators/educational researchers exhibit in segmenting one video recording of practice?* First I marked off the portions of each interview where the participants were creating segments and tags by grain-size. The data produced groups of segments by grain-size and one outlier segment. The grain-sizes were: 1) largest, 2) large, 3) medium, 4) small, and 5) very fine. From there I created boundaries around similar grain-sized groups of segments in order to delineate hot spots. A hot spot is an area of the video where multiple participants appear to be focusing on the same part of the video, as seen by overlapping segments. These hot spots are visible in Figure 7.

I identified a total of six hot spots. I then returned to the featured video of teaching practice in order to see what was happening in the video during these hot spots. After identifying what parts of the featured video record of practice each hot spot refers to, I coded the interview data so that I could pull out the parts of the interview where participants were talking about those actions and ideas. Focusing on these portions allowed me to examine not only how different participants segmented and tagged those hot spots (described in Chapter 4), but how they each talked about their thinking process while creating segments and tags in that hot spot and how they were making sense of that portion of video more generally (discussed in Chapter 6).

Matching Interview Data with Tag Clusters

A second set of codes focused on participant talk regarding the specific clusters of tags that were grouped by base term similarity. For example, many tags were created that contained

the term “prior knowledge.” There were also tags that contained the terms “background knowledge” and “vocabulary knowledge.” Some of these tags were applied to the same segments. I coded the interview data in order to pull out any talk regarding the terms or concepts in the tag clusters. This provided insight into how participants were talking about these tags and the parts of the video to which they were referring, contributing to a more nuanced understanding of my second research sub question: *What differences in tagging language do pre-service teachers and teacher educators/educational researchers exhibit when tagging one video recording of practice?* Once I had developed a complex understanding of how participants were using tag language to describe the meaning they were making from the video, I used a combination of interview data and tagged segment data to question which terms are synonymous and what the implications might be for designing an algorithm that linked user-generated tags of video segments in the context of educational videos of practice. I paid close attention to how closely aligned time codes of seemingly related segments were and how strongly I could warrant their relation.

Thematic Coding

The interview data proved richer than expected during the design phase. Coherent themes and tensions emerged that clearly affected the ways participants segmented and tagged the video. Therefore, I also engaged in some thematic coding focused on diving deeper into the tensions that became evident through my previous analysis. I first coded with an eye for themes that seemed to be salient to more than one participant. After examining the emerging themes I focused in on those that shed further light on the research questions.

In sum, using primarily the interview data combined with the segment and tag data, I used content analysis to uncover themes across the data. The interview data was used to interpret participants' meaning so that I could accurately categorize the tags. Using tag gardening strategies (see literature review) to semantically disambiguate the collection of tags, making it more productive and effective, I was able to diagram hierarchal and networked tagging language (see discussion sections).

Standards for Quality

"Qualitative analyses can be evocative, illuminating, masterful---and wrong. The story, well told as it is, does not fit the data" (Miles & Huberman, 1994).

Using the guidelines outlined by Mile and Huberman (1994), I carefully attended to issues of validity and reliability in a manner appropriate for a qualitative study. In this section, I describe the strategies and research practices (Corbin & Strauss, 2008; Patton, 2002) used to become aware of the biases that could affect the analysis process and to manage them accordingly.

Bias and Triangulation

Corbin and Strauss summarize the nature of bias while analyzing qualitative data:

> Though some analysts claim to be able to "bracket" their beliefs and perspectives when analyzing data, we have found this impossible. Bias and assumptions are often so deeply ingrained and cultural in nature that analysts often are unaware of their influence during analysis. We find it more helpful to acknowledge our biases and experiences and consciously use experience to enhance the analytic process (2008).

Bias and prior experiences, as Corbin and Strauss point out, are a both a threat to validity and a tool to enhance the process of uncovering and interpreting meaning. Taking their approach, I tried to acknowledge my bias and hypotheses during the analysis process in order to ensure that I was critically and as subjectively as possible examining the data. However, during the semi-structured interview process I used my prior experiences and hypotheses to inform follow-up questions. In that way, I was purposely testing my bias and hypotheses, often learning that the participants were not following my predictions.

While analyzing the data, I focused on practicing *reflexivity*, which entails keeping in mind the historical, cultural, and personal ways the study is situated. Patton (2002) describes reflexivity as the "ongoing examination of what I know and how I know it." In an effort to manage my bias, I wrote memos focused on my prior experience talking with educators about how they think about video and how they want to work with video. I included all my hypotheses regarding what I expected to see in the data before analysis so I would be able to diligently check my analysis carefully against my assumptions and expectations. I also sought accountability to others by sharing my interpretations, questions, and thought processes with committee members and a small group of educational researcher/teacher educator peers. These colleagues, who were not involved in the study directly, brought their "critical perspectives" to our conversations and served as "critical friends" (Costa & Kallick, 1993).

The Hawthorne effect[17] could be one potential threat to this study's internal validity. As the researcher, I did know all my participants professionally. The pre-service teachers sampled in this study were never my students, but throughout their time completing the ELMAC program, I at times, provided technical support. Some of the support involved me sitting in on their classes.

[17] The Hawthorne effect (also referred to as the observer effect) is when individuals modify or improve an aspect of their behavior in response to their awareness of being observed.

Therefore, I had knowledge of their particular contexts and learning experiences that most likely affected what experiences pre-service teachers chose to reference during their interview and how they chose to reference ideas or experiences. The teacher educators/educational researchers sampled are also all professional colleagues whom I have collaborated with in varying capacities over the course of my time at the university. With all my participants I had a friendly rapport, and they all seemed to want to give "good data." While I tried to emphasize that for me and for this study "good data" would just be what they found interesting and why, it is possible that an interview with a stranger might have produced interview data with a slightly different emphasis. However, I have no reason to believe that my relationship with the participants skewed the results of the data in any specific way.

Weighting the Evidence

In order to make sure my results are valid, I have paid careful attention to how the data is weighted. Weighting of evidence suggests that some data are better than other data, based on how the data were collected, when they were collected, or whom they were collected from and why. For example, some participants were better at articulating how they could imagine using segmenting and tagging technologies outside of their own experiences than others. Therefore, I may cite well-articulated examples of how participants imagined the design of a platform that would afford or enable particular uses of segmenting and tagging that they saw as potentially valuable, but I recognize that not all the participants imagined the potential use of segmenting and tagging in the same ways. Therefore, the search for disconfirming evidence could be inaccurate or incomplete. I tried not to quote the same participants repeatedly so I could capture the range of responses in order to make my assertions. I also stress the exploratory nature of the

study in the discussion sections. While many of the participants' insights and ideas regarding tool design can be used to make a series of design recommendations, the insights, and ideas themselves are still only musings. It is very possible that participants would behave quite differently than they imagined when using a feature or tool that they themselves suggested. Therefore, I continually emphasize the importance of further research in order to understand how educators work with video for different purposes and in different contexts, as well as research focusing on their behavior using tools or features designed to support their processes.

CHAPTER 4
RESULTS: SEGMENTING AND TAGGING AS DISCRETE BEHAVIORS

Overview

In this chapter I address the study's first research question and two sub questions: *How did participants annotate one video of another teacher's instruction and what factors affected their decision-making? What differences in video segmentation did pre-service teachers and teacher educators/educational researchers exhibit in segmenting one video recording of practice? What differences in tagging language did pre-service teachers and teacher educators/educational researchers exhibit when tagging one video recording of practice?* In the literature review, I describe how segmenting and tagging a video are often examined as discrete acts removed from their authentic context. This has in part to do with the ways platforms are designed that enable video annotation and user-generated tagging, and the data they produce. My two research sub questions reflect this common way of breaking down the behavior.

I first examine how the participants segmented the featured video of practice by looking at 1) how many segments were made, and 2) segment length. This analysis provides insight into the first research sub question. Then I examine the tags that participants created by focusing on how many tags were made, how many discrete tags were made, and how I calculated tagging frequency. I then focus in on the groups of tags that were used more than once. From there I look at some of the most common words used in the tags as a way to represent a gestalt of the tagging language participants demonstrated. I also use the most common words used in the tags in order

to pull out clusters of possibly related tags. This analysis provides insight into the second research sub question.

I discuss participants' segmenting and tagging as discrete behaviors. The results introduced in this chapter are further complicated in Chapter 5, where I reexamine many of the "hotspots" of segments on the video timeline and the common clusters of tags featured in this chapter in the contexts of the larger corpus of data. Chapter 5 emphasizes how through the synthesis of user-generated segmenting and tagging behavior we can start to better understand the complex meaning-marking demonstrated by the study's participants.

Segmenting Behavior

Participants were instructed to make as many segments as they wanted. As explained in the methods section, they were told that the focus of the study was to better understand what parts of the video were interesting to them and what language they chose to tag the segments with. Participants were told that they should continue the segmenting and tagging activity until either they had completed the goal that they set for themselves after watching the video once through or they felt they had reached the maximum amount of time that they would focus on such a goal in one sitting.

Number of Segments

The 14 participants (excluding the data from Participant 10[18]) sampled in this study created a total of 122 segments. The pre-service teacher group, which has two fewer people than

[18] Interview data was lost for Participant 10; therefore, I am excluding Participant 10's tag data from the results.

the teacher educator/educational researcher group, created close to half of those segments (total of 58).

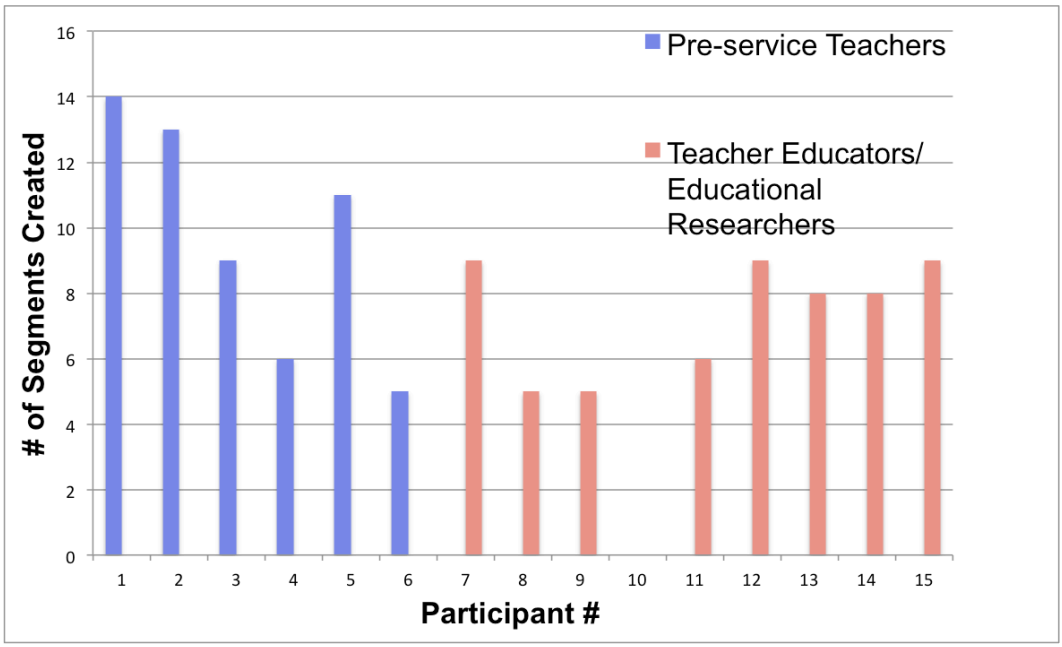


Figure 6: Number of segments created by each participant

Pre-service teachers (participants 1-6) had a wider range of frequency of segments created (9), than the larger teacher educator/educational researcher group who had a range of 4. The teacher educator/educational researcher group demonstrated less variability in the number of segments created as a group. The pre-service teachers on the other hand, represented both the smallest number of segments created (Participant 6) and the largest (Participant 1). The mean number of segments created[19] for the pre-service group was 10, and it was 7 for the teacher educators/educational researchers. A Wilcoxon-Mann-Whitney test found no difference between pre-service teacher and teacher educators/educational researcher groups in the number of distinct segments they identified ($z = 1.314$, $p = 0.1887$).

[19] Rounded to the nearest whole number.

Segment Length

Participants each created multiple segments of different lengths. Figure 7 shows the segment lengths for each participant. Each pre-service teacher is represented by a shade of blue and each member of the teacher educator/educational researcher group is represented by a shade of pink or red. The horizontal axis is the video clip timeline in minutes, thereby contextualizing the segments in the video clip.

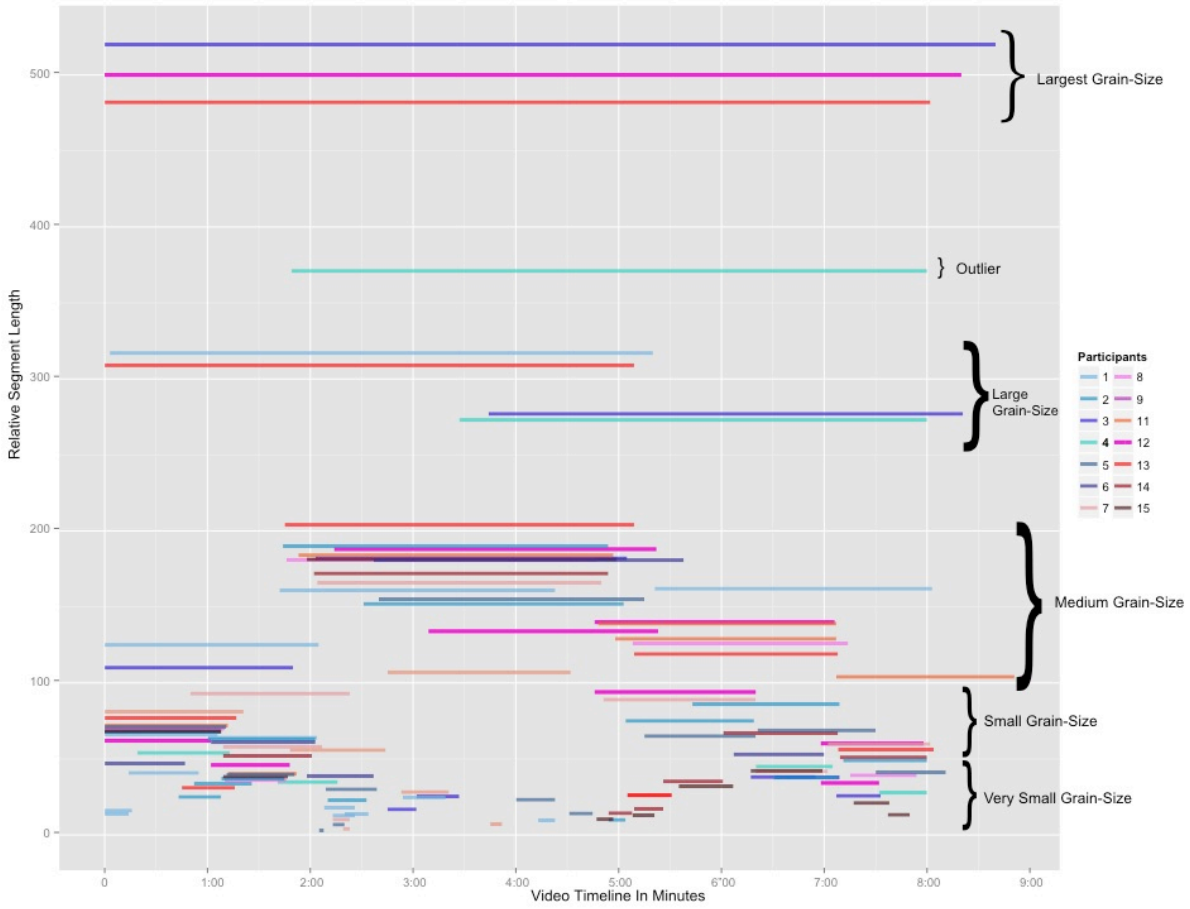


Figure 7: Segment length: Grain-sizes

Just by looking at Figure 7, one can see that participants from both groups created segments of various lengths throughout the video clip. This mirrors the way the segmenting and

tagging activity was introduced and modeled in the tutorial video. In that video, the video clip was segmented at multiple grain-levels. Figure 7 shows five clusters of segment length:

1. Largest grain-size: roughly 8 minutes
2. Large grain-size: 4 and half to 5 and half minutes
3. Middle grain-size: 2-3 minute range
4. Small grain-size: 1 to 1 and a half (including up to 2 minutes)
5. Very fine grain-size: less than 1 minute

Figure 7 also highlights one segment that does not fit into any of the other clusters. This 6:11 segment was created by Participant 4 (pre-service teacher), and appears to be an outlier.

The mean segment length for the sample population was 1:28. The participant group means were both very similar: pre-service teachers had a mean of 1:23 and the teacher educators/educational researchers had a mean of 1:32. Both groups had participants who created long segments spanning the entire clip: Participant 3 (pre-service teacher), Participant 12 (teacher educator/educational researcher), and Participant 13 (teacher educator/educational researcher). These participants increased the means and range for both groups. A Wilcoxon-Mann-Whitney test found no difference between the pre-service teacher and teacher educators/educational researcher groups in the average length of segments ($z = 0.194$, $p = 0.8463$).

Largest Grain-Size

The three longest segments were all created (by different participants) to represent the entire video clip they watched for this exercise. This is clearly visible in Figure 7. Participants were instructed to focus roughly on the first eight minutes of the lesson and were given some

choice in what moment they chose to stop the video clip. Therefore, the three segments were not identical.

Table 5: Segments Created at the Largest Grain-Size (Hotspot 1)

Participant #	Participant Group	Segment Length
Participant 3	Pre-service teacher	8:40
Participant 12	Teacher educator/educational Researcher	8:20
Participant 13	Teacher educator/educational researcher	8:02

These three segments at the largest grain-size represent Hotspot 1, which is analyzed in light of its larger context in the next chapter.

Large Grain-Size

A few participants each created a single segment in the four-five minute range. While these segments are similar in length, they do not all represent the same part of the video clip. Instead, in Figure 7, we see two focal points emerging, one in the first five and half minutes of the video clip (as demonstrated by participants 1 and 13), and a second spanning the second half of the video clip (as demonstrated by participants 3 and 4).

Table 6: Segments Created at the Largest Grain-Size

Participant #	Participant Group	Segment Length	Segment Time Code
Participant 1	Pre-service teacher	5:17	0:03 – 5:20
Participant 13	Teacher educator/educational researcher	5:09	0:00 – 5:09
Participant 3	Pre-service teacher	4:37	3:44 – 8:21
Participant 4	Pre-service teacher	4:33	3:27 – 8:00

The pair of segments spanning roughly the first five minutes are Hotspot 2 and the pair focusing in the second half of the video are Hotspot 3. Both of these hotspots are examined in Chapter 5.

Middle Grain-Size

Some participants created segments that were about two to three minutes in length. Like the large grain-size group, these middle grain-size segments were not all focused on the same part of the video, but there were some overlaps. When the segments with similar start and end points were grouped together, a few clear groups emerged, as well as some groups that were not as strongly associated. The segments with the most overlap and the tightest association were focused roughly on 1:45 – 5:00 of the video clip.

Table 7: Middle Grain-Size Segments Focused 1:42-5:09

Participant #	Participant Group	Segment Length	Segment Time Code
Participant 1	Pre-service teacher	2:41	1:42 – 4:23
Participant 2	Pre-service teacher	3:10	1:44 – 4:54
Participant 8	Teacher educator/educational researcher	3:01	1:46 – 4:47
Participant 11	Teacher educator/educational researcher	3:04	1:53 – 4:57
Participant 13	Teacher educator/educational researcher	3:24	1:45 – 5:09
Participant 15	Teacher educator/educational researcher	3:01	1:58 – 4:59

This popular point of attention can be clearly seen in Figure 7. Figure 8, below, highlights just these segments.

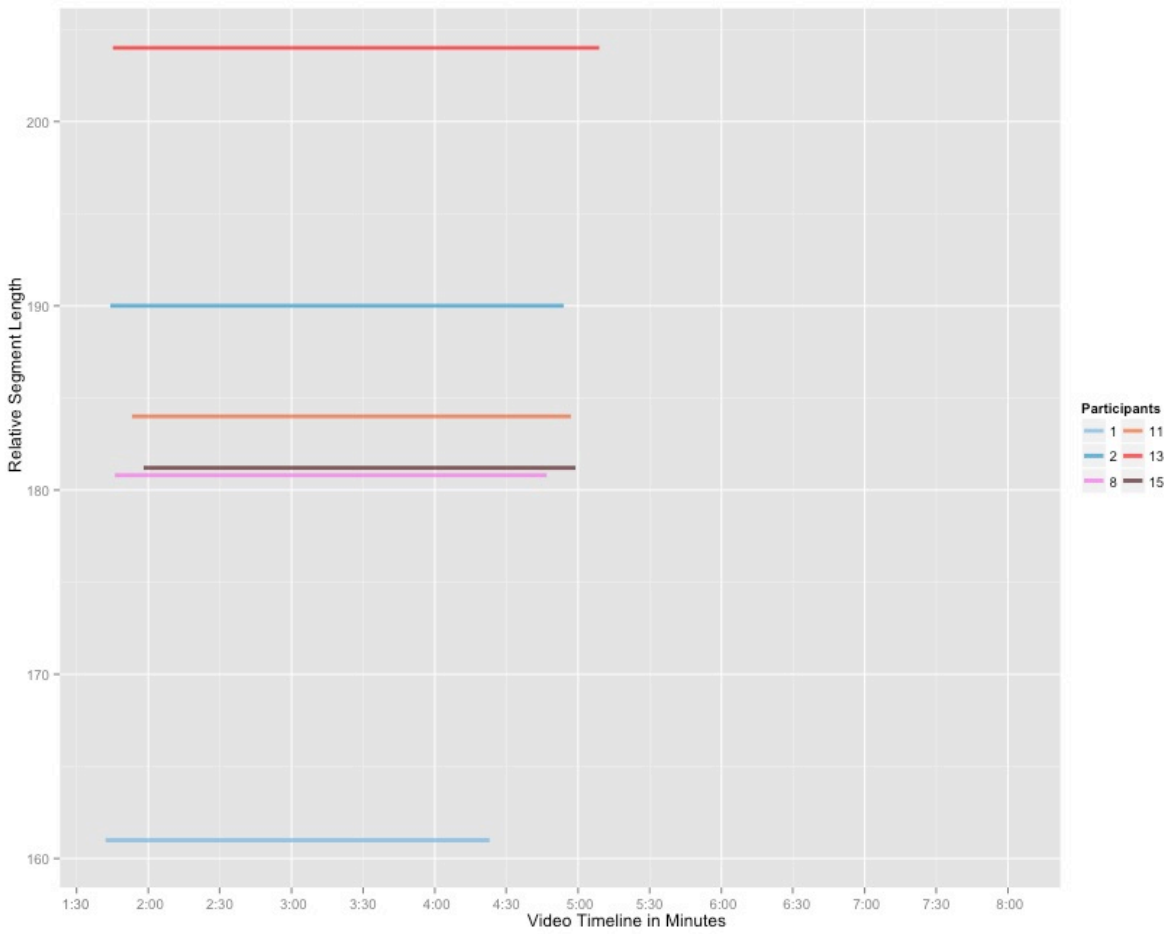


Figure 8: Medium grain-size Segments focused 1:42 – 5:09

Both pre-service teacher and teacher educators/educational researchers segmented this part of the video. The segment length for this first cluster of segments ranged from 2:41 – 3:24.

A second cluster of middle grain-size segments spanned the two to five minute period of the video clip. These segments are visualized in Table 8 and Figure 9. Here we see an equal number of pre-service teachers and teacher educator/educational researchers making similar segments.

Table 8: Middle Grain-Size Segments Focused 2:03-5:38

Participant #	Participant Group	Segment	Segment

		Length	Time Code
Participant 2	Pre-service teacher	2:32	2:31 – 5:03
Participant 3	Pre-service teacher	3:02	2:03 – 5:05
Participant 6	Pre-service teacher	3:01	2:37 – 5:38
Participant 7	Teacher educator/educational researcher	2:46	2:04 – 4:50
Participant 12	Teacher educator/educational researcher	3:08	2:14 – 5:22
Participant 14	Teacher educator/educational researcher	2:52	2:02 – 4:55

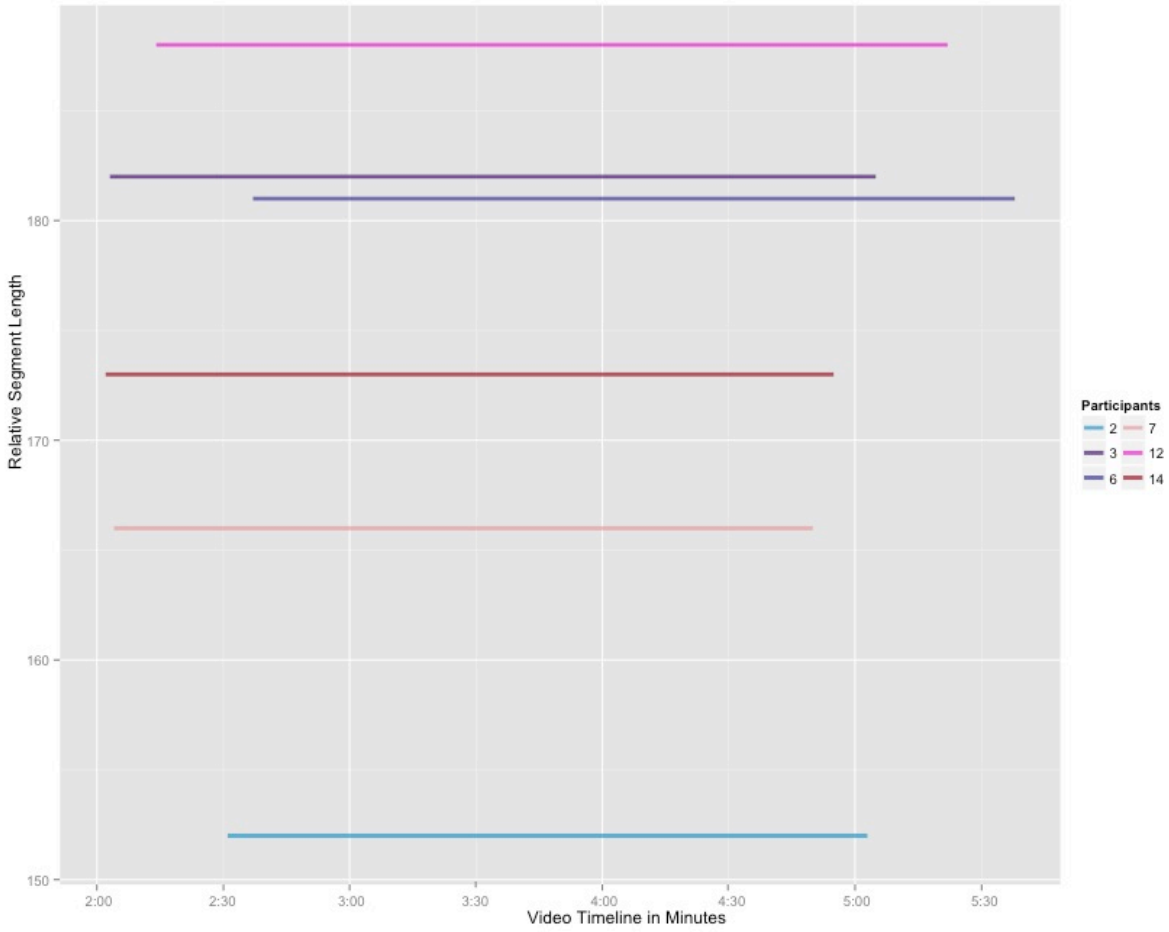


Figure 9: Medium grain-size segments focused 2:03 – 5:38

In Chapter 5, I examine both of these clusters of segments as a part of Hotspot 5.

Small Grain-Size

Many participants made segments at the small grain-size. Participants created a total of 25 segments at that grain-size. There was almost an equal split between the participant groups: 12 segments were created by the pre-service teachers and 13 were created by the teacher educators/educational researchers. The tightest collections of associated segments were made at this grain-size. Table 9 shows a band of segments that all start at the 0:00 mark and all end within a 19 second range. 1:08 was the most common end point created, with four participants' segments aligning exactly. The modal end point for the segments if rounded down would be 1:08.

Table 9: Small Grain-Size Segments Focused 0:00-1:21

Participant #	Participant Group	Segment Length	Segment Time Code
Participant 1	Pre-service teacher	1:06	0:00 – 1:06
Participant 2	Pre-service teacher	1:08	0:00 – 1:08
Participant 3	Pre-service teacher	1:08	0:00 – 1:08
Participant 5	Pre-service teacher	1:11	0:00 – 1:11
Participant 7	Teacher educator/educational researcher	1:09	0:00 – 1:09
Participant 8	Teacher educator/educational researcher	1:10	0:00 – 1:10
Participant 9	Teacher educator/educational researcher	1:21	0:00 – 1:21
Participant 11	Teacher educator/educational researcher	1:12	0:00 – 1:12
Participant 12	Teacher educator/educational researcher	1:02	0:00 – 1:02
Participant 13	Teacher educator/educational researcher	1:17	0:00 – 1:17
Participant 14	Teacher educator/educational researcher	1:08	0:00 – 1:08
Participant 15	Teacher educator/educational researcher	1:08	0:00 – 1:08

This collection of segments was created by a higher proportion of teacher educators/educational researcher than pre-service teachers (4 pre-service teachers as compared to 8 teacher educators/educational researchers).

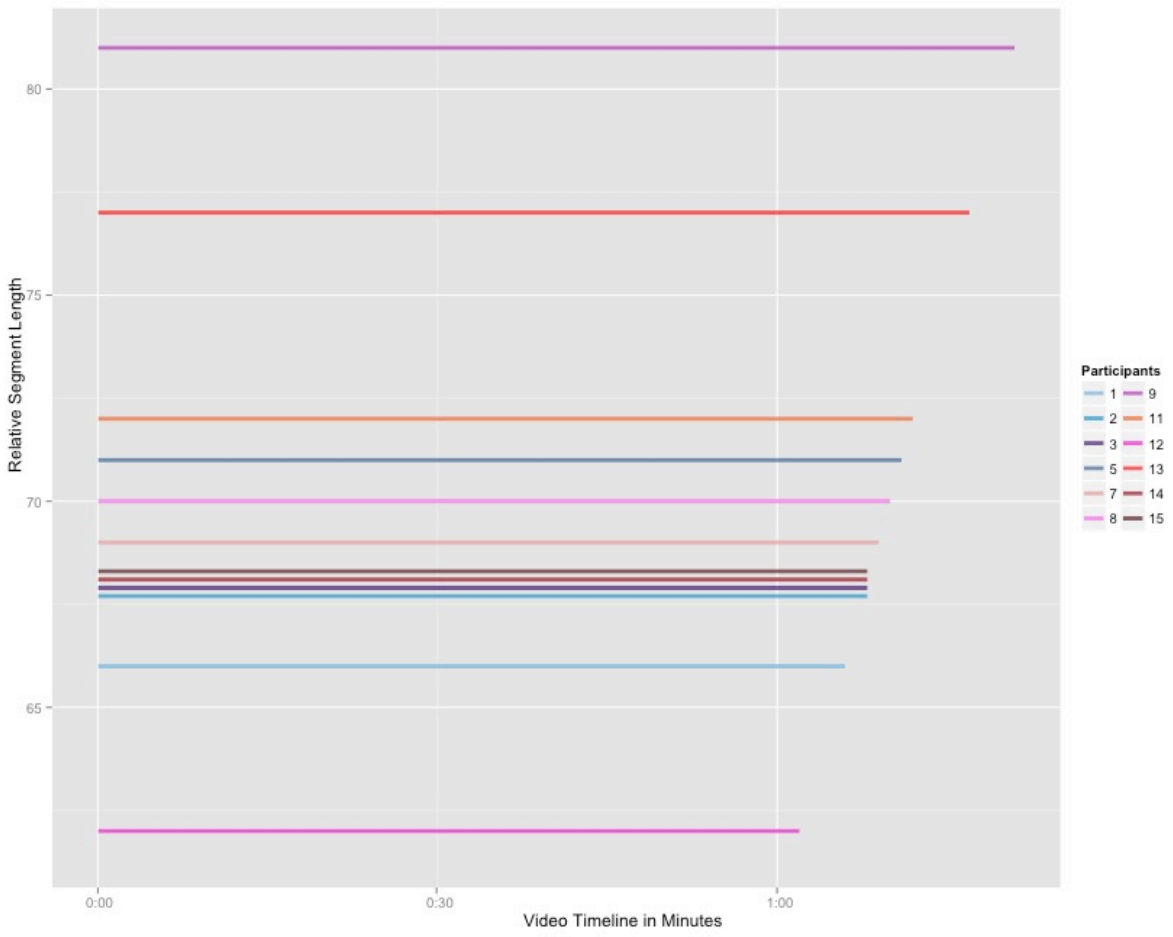


Figure 10: Small grain-size segments focused 0:00 - 1:21

This selection of segments and tags are examined as a part of Hotspot 4. Hotspot 4 examines all the segments in the first two minutes and forty seconds of the video clip.

Very Fine Grain-Size

Participants from both groups also created many short segments that were less than a minute long. By far, participants created more segments on this very fine grain-size, with a total of 61 segments created. (See Appendix D for the complete list.) This disproportionately high number of segments lasting under one minute is reflected clearly in the group median values.

Pre-service teachers had a median segment length of 0:43 and the teacher educator/educational research group had a median slightly higher of 1:02. Together, the sample population median was 0:56. Even though the pre-service teacher group had two fewer participants, it produced at total of 34 segments less than one minute, compared to the teacher educators/educational researcher group, which created 27 segments.

Segmenting Behavior Summary

Participants in this study all segmented the video at multiple grain-sizes and focused on common portions of the video timeline. No significant difference was found regarding the number of segments created or the mean number of segments created between the two sets of participants. Some segments created by two or more participants overlap exactly or within a tight range of seconds of each other. This suggests the possibility that different participants are finding the same aspects of the teaching represented in the video salient. A question that will be addressed in the next chapter is: can and does the tag data show that these similar segments are reflective of the participants' similar or shared meaning making about the video of teaching practice?

Tagging Behavior

After participants created a segment with the TagMentor tool, they were prompted to add a tag to that segment. They did not have the option to create a segment that was not tagged. As explained in Chapter 3, they could apply as many tags as they wanted to each segment. The video tutorial that showed them how to use the TagMentor tool and modeled tagging a segment with more than one tag. In that model, multiple tags were presented as a way to mark the same

event with more than one term or way of describing the same thing. For example, for a segment where the Muppet characters, Statler and Waldorf were present, the user in the video first applied the tag "Statler and Waldorf," but then narrated aloud that she doesn't always remember the names of the characters, but instead thinks of them as those "Old Guys." She applied a second tag, reflecting how she thinks about that segment. In this way, the video modeled using more than one tag as 1) a method to increase findabilty of the segment from the perspective of the user creating the tags, as well as that of others on a social platform, and 2) as a form of equivalence.

Tag Frequency

The 14 participants sampled in this study produced a total of 218 tags and 209 discrete tags. A "discrete tag" refers to an original or single instance of a tag. Examples of discrete tags include: "Pre-reading," "Diary Style," "Activating prior knowledge," "checking for clarity/understanding." When calculating the frequency of discrete tags, I allowed for inconsistencies in capitalization and use of single versus plural forms. For example "Making connections" and "making connections" were counted as the *same* discrete tag. This decision was made based on the increasing use of autocorrect and other features that allow users to catch their own inconsistencies and create more regular tagging schemes across a disparate group.

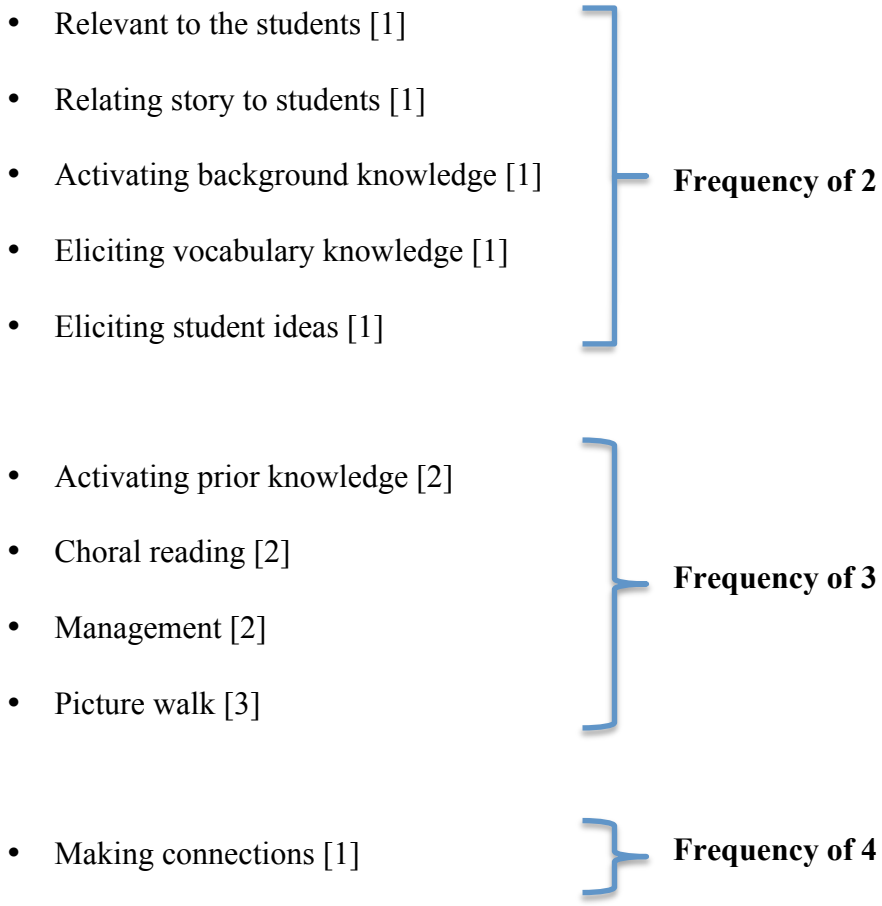
However, "Choral Reading" and "choral oral reading" were each counted as *different* discrete tags. I made this choice because those tags did *not* use the exact same terminology, and I wanted to capture the chunk of meaning that participants created within the unit of the tag, as opposed to just the common root words.[20]

[20] At times, for the purpose of comparison, I present tag word clouds that represent the common words across the collection of tags, as opposed to the common discrete tags.

195 of those 209 discrete tags were used only once and by a single participant. Pre-service teachers as a group created 124 tags, whereas the teacher educator/educational researcher group created a total of 94 tags. A Wilcoxon-Mann-Whitney test found that the number of tags pre-service teachers created was marginally significantly greater than the number of tags created by teacher educators ($z = 1.686$, $p = 0.0918$). Pre-service teachers as a group *did* tag differently than the teacher educator/educational researcher group. There were no members of the teacher educator/educational researcher group who used the same tag more than once, whereas four out of the six pre-service teachers purposely used the same tag more than once. In Chapter 5, I will explore the pattern of behavior I uncovered through the participants' interviews and how the pre-service teachers' recent experiences in their coursework might have primed them to tag in this way.

Discrete Tags with a Frequency of More Than One

In this section, I discuss the ten discrete tags that have a frequency of more than one. The following discrete tags were used more than one time. The bracketed number indicates how many participants used that tag:



The very high proportion of discrete or unique tags means that on the surface level, there was an extremely high level of variability in tagging language, hardly producing enough frequency to see any common language use or patterns between users. Looking at the discrete tag frequency is important, as it reflects the potential usefulness of user-generated tags as a method of marking shared language across users and user-groups through the simple and commonly used method of aggregating tags. However, as this dissertation will show, through linking and "gardening" tags, a much more interesting and useful understanding emerges.

Tags Used More Than Once but by Only One Participant

Five tags, “Relevant to the students,” “Relating story to the students,” “Activating background knowledge,” “Eliciting vocabulary knowledge,” and “Making connections,” were all applied to more than one segment by the same person. All of the participants who administered at least one of these tags to more than one segment were pre-service teachers. Participant 2 applied the tag “Relevant to the students” to two different segments. Participant 6 applied the tag “Relating story to the students” to two different segments. Participant 3 applied both the tags “Activating background knowledge,” and “Eliciting vocabulary knowledge” to two different segments. Participant 1 applied the tag “Making connections” to three different segments. This tagging behavior suggests that they were chunking the instruction into groups of moves based around the teachers’ assumed purpose. One such instructional purpose appears to be to make the story or the lesson relevant to the students, as illustrated by the tags “relevant to the students” and “Relating story to the students.” The other instructional purpose appears to be eliciting background (or prior) knowledge, specifically vocabulary knowledge. Interestingly, the term “Making Connections” could be seen as an even larger chunk of instruction containing both the ideas of making the story relevant and eliciting background knowledge. In Chapter 5, these tags are revisited in the context of the segments they were applied to and of other tags that might be referring to similar ideas. At that point, the connection between “Making Connections” and other tags featured in this section will become clearer.

The Same Tags Used by More Than One Participant

Four tags were used by more than one participant: “Activating Prior Knowledge,” “Choral Reading,” “Management,” and “Picture Walk.” All of these terms describe chunks, not too dissimilar from the other discrete tags described above.

"Activating Prior Knowledge" can be interpreted as an instructional purpose, similar to "Eliciting Background Knowledge." This association between the tags "Eliciting Background Knowledge," "Eliciting Vocabulary Knowledge," and "Activating Background Knowledge" becomes stronger when one sees that these tags were all created by the same participant (3) and applied to the same segments. The discrete tag "Activating Prior Knowledge" was also used by Participant 14, a member of the teacher educator/educational researcher group. The relationship between the three discrete tags that Participant 3 applied to the same two segments poses questions that will be further explored in Chapter 5: Can we deduce equivalence of discrete tags when participants use the same tags on multiple segments?

The term "Choral Reading" is a descriptive term used when a group of students read aloud in unison. Choral reading is used to help build readers' fluency, self-confidence, and motivation. One of the rationales for using this strategy is that when students read aloud together, students who may ordinarily feel self-conscious or nervous about reading aloud have built-in support. Participant 3 marked two separate instances of this kind of reading. Participant 15 also used the tag "Choral Reading," but used it only once. Examining this tag data alone, one could make the assumption that the tags refer to the same point or points in the video and thereby serve as a way to identify parts of the video where the students were engaged in choral reading. However, as Chapter 5 reveals, when put into context along with the segment data and the other tag data that contain the term "choral reading," a different and less straightforward picture emerges.

The tag "Management" was applied to three segments. Participant 2 created one of those segments; Participant 3 created two of them. In the field of education, the term "management" is shorthand for "classroom management." This is a general term to describe the process of

ensuring that classroom activates run smoothly despite disruptive behavior by students. Classroom management is known to be one of the most common and highest concerns of pre-service teachers. Therefore, it is not surprising that both participants who tagged with the term "Management" are pre-service teachers.

"Picture Walk" is the most commonly used tag. Participants 2, 3, and 15 each use that discrete tag once. A picture walk is the simple act of reviewing the pictures in a book prior to reading it. A picture walk is often used to spark interest in the book and help connect the visual cues to the story. Teachers generally ask students specific questions about the pictures. It is a very well known strategy and easy to identify. The use of this single term by three different participants suggests that it is a common term in the language of teaching. The fact that participants in both groups used this term suggests that this term might be a part of the University of Michigan School of Education Discourse Community. This possibility is discussed further in the discussions and implications chapters.

Common Words Across the Tag Corpus

As explained earlier, I first and primarily focused on tags as unit of analysis, rather than words contained in the tags. I did this in order to stay true to the ways the participants chose to express their thoughts. However, pulling out the common words across the study's entire folksonomy, as well as the participant group folksonomies, does help highlight some clusters of tags that are made up of the same words. It can also create a form of gestalt overview of the folksonomy. Tag clouds made up of common words contained in individual tags are another common way that tags are counted and clustered using algorithms. In this section, I use that form of visualization to highlight common clusters of words represented in the tag data.

These clusters of common terms suggest the possibility that some participants were in fact using the segments and tags to mark similar phenomena. Below is a tag cloud that highlights the most popular single words in the study's folksonomy.[21]

Figure 11: Folksonomy created by participants

This tag cloud provides a gestalt of language that participants used to mark this video of teaching practice. Many of the words represented in this tag cloud can be used to accurately summarize the video of instruction featured in this study. This video featured a selection of *reading* instruction that fits into the framework of a *guided reading lesson*. It featured a *teacher* and

[21] The tag clouds presented here were created using https://www.jasondavies.com/wordcloud/#. In these tag clouds, every word included in the participants' tags was treated as its own "tag" and therefore counted individually. However, I chose to exclude the following words from this version to increase clarity: *a*, *an*, *the*, *and*, *or*, *to*, *for*, *with*, *by*, *in*, *on*, *at*, *as*, *of*, *is*, *was*, *have*, *about*, *that*, *through*, and *while*. Also in order to increase clarity, I did not include the following forms of punctuation: commas, colons, quotation signs, dashes, backslash, and parentheses. More details describing how this tag cloud generator works can be found here: https://www.jasondavies.com/wordcloud/about/.

three students. During this lesson, the teacher focused on a *book* with the *title* of *City Celebrations*. The section of the video that the participants watched involved *introducing* the *text* in the form of a *picture walk* and trying to *hook* the students' *interest* by asking questions that *prompt* the students to *make connections* to their *prior experience* and *knowledge*. The students respond by *telling* personal *stories*. The teacher also *asks* a series of *questions* about the meaning of the *word* "celebrations." The teacher points out that this *text* is in the *genre* of a *diary*. She highlights the text-*features*: *dates* and *place* names. During the video clip, students read *independently*, *chorally*, and *silently*.

Some of the words in the tag cloud can also be used to summarize the interpretation or meaning making of the participants when watching this video; however, the participants' questions and critique are not transparent from the data represented in the tag cloud alone. Many participants questioned the teacher's *goal* for the lesson, as well, as the *specific questions* she chose to ask and her language choices more generally. This tag cloud does not highlight the way participants expressed the pervasive tension observed across participants regarding being critical of the teacher featured in the video. This important tension that directly influenced participants' segmenting and tagging choices is discussed in depth in Chapter 5, contextualizing much of the segment and tag data.

The above tag cloud highlights a different selection of words from the list of discrete tags with a frequency of more than one. The top five common words were: "student," "reading," "text," "knowledge," and "teacher." Here the most common single word is "student," which was used a total of 63 times by the participants. The word "teacher" was the fifth most common word. "Student" and "teacher" are likely subjects of tags given that they are the actors in the video. "Text" also represents a likely subject of tag given that this video features literacy

instruction centered around a single text, or book, entitled "City Celebrations." The presence of these words in the tags does not necessarily provide any insight into how participants were using these words to mark meaning.

The second most common single word is "reading," which was used a total of 32 times by the participants. The only instance of a discrete tag including the word "reading" that was used more than once was "choral reading." The tag "choral reading" was applied a total of three times by two different participants. Clearly, the participants created many more and different tags all with the term "reading" than a simple discrete tag frequency or a single word frequency make visible. The fact that the tem "reading" is the most common term is hardly surprising given that the featured video is a small group reading lesson. What is potentially interesting is uncovering what ways and for what purposes participants used the term "reading."

The figure below presents two tag clouds, side by side, representing the single words used across the tags by each participant group. The cloud on the left represents the pre-service teacher group and the one on the right represents the teacher educators/educational researcher group.

Figure 12: PST folksonomy compared to TE/ER folksonomy

The two clouds reveal similarities between the words used by the participant groups.

Table 10: Frequency of Common Words in Tag Data

Common Words in Tag Data	Pre-Service Teachers (n = 6)	Teacher Educators/Educational Researchers (n = 8)	Total
student	25	13	63
reading	13	19	32
text	7	24	31
knowledge	11	9	20
teacher	10	7	17
celebrations	5	10	15
features	3	4	7

The most common word across both participant groups and the most common word among the pre-service teacher tags was "student." Out of the total instances of the word "student," pre-service teachers created forty percent[22] of those instances. This is interesting and surprising given that pre-service teachers as a group are known for paying more attention to the teacher than to students. As explained in the literature review, pre-service teachers often demonstrate a focus on the moves of the teacher, and specifically management moves. More experienced teachers and teacher educators/educational researchers tend to focus on student thinking more than pre-service teachers do. The presence of the word "student" in a tag does not necessarily mean that the participant who created that tag was focusing on student thinking or even that the student was the focus of the tag – simply that the word "student" was included in the tag. The presence of the word "student" does not provide enough information to understand what participants were actually paying attention to. What is potentially interesting is discovering how participants used the term "student" in the tags and if this group of pre-service teachers did in fact demonstrate an uncharacteristic focus on student thinking.

[22] Rounded to the nearest whole number.

CHAPTER 5
RESULTS: REEXAMINING TAG CLUSTERS AND HOTSPOTS IN CONTEXT

Overview

In Chapter 4, I address the study's first research question (How did participants annotate one video of another teacher's instruction and what factors affected their decision-making?) and two sub questions (What differences in video segmentation do pre-service teachers and teacher educators/educational researchers exhibit in segmenting one video recording of practice? And, What differences in tagging language do pre-service teachers and teacher educators/educational researchers exhibit when tagging one video recording of practice?) in terms of segmenting and tagging as discrete acts removed from their authentic context. I first examine the segment data and then I focus on the tag data. In this chapter, I explore the segment and tag data together and add further contextualization through the interview data. The first half of this chapter begins with certain clusters of tags, as opposed to segments. In the second half of this chapter, I revisit the hotspots (segment clusters) introduced in Chapter 4 in order to illustrate that by combining the segment and tag data, a richer and more useful understanding emerges regarding what participants found salient and how they chose to mark their meaning making. This chapter starts to examine what factors appeared to affect participants' decision-making when segmenting and tagging. It brings to light the ways participants experienced a trade-off between marking the complexity of teaching practice through nuanced language and marking practice so that it could be understandable, findable, and useful to others. This tension is more thoroughly discussed in Chapter 6. This chapter also addresses the second research question: *What potential and*

challenges are their for the aggregation of user-generated segment and tag data so that it would be both useful for individual users and uncovering how educators as a larger population are making sense of and using video records of practice?

I begin chapter 4 by first examining how many segments each participant group made, and mean segments lengths. No significant differences were found. Then I illustrate how participants segment at multiple grain-sizes and across the video timeline. I highlight several interesting clusters and hotspots of interaction. The first type of hotspot (representing clusters 1-3) is where more than one participant made segments that are similar in length and in placement on the timeline. This similarity implies the possibility that they refer to the same aspect of the video. The second type of hotspot (representing clusters 4-6) is where there are many segments of different lengths focused around a specific span of the video. This presence of multiple segments implies that participants found this part of the video particularly salient. In this chapter, I return to the hotspots and explore 1) what tags participants applied to those parts of the video, and 2) whether the tags in relation to the segments can be used to warrant claims about to what extent participants are making *similar meaning* from *similar segments.* Then I look for differences between the participant groups.

This chapter takes a more complex and integrated approach to shed further light on this study's research questions. As explained in Chapter 4, I made the choice to first look at segment and tag data separately in order to reflect the way that segmenting and tagging are often treated as separate acts. The results from this chapter illustrate that by combining these two forms of annotation (user-generated segmenting and tagging), a more complex and valid picture emerges of the participants' meaning making. The rich interview data provides an opportunity for insight into participants' thinking, which is used to warrant emerging claims, and dig deeper into the

tensions participants experienced while marking what they found salient in an imagined social context. The results also highlight the limitations of simply applying many tag gardening techniques to the specific context of marking meaning in video records of practice. Many platforms that enable video annotation and user-generated data currently do not utilize combined user-generated segment and tag data, producing disconnected data. In the next chapters, I argue that by designing platforms and interfaces that utilize both segment and tag data together and in a way specifically tailored to the specialized needs and behaviors of educators, we can not only produce tools that aid different types of educators in their work with video records of teaching practice, but also collect data that can provide important insights into the ways educators are making meaning of videos of practice.

However, it is true that considering tags and segments together introduces another level of complexity to this study's results. Examining the segmenting and tagging behavior of multiple participants necessarily involves a three-variable binary distinction between sameness and difference. That is to say, in identifying clusters of tags/segments, sameness and difference are equally salient between participants, between segments, and between tags. The "hotspot" clusters of segments, for example, share a chronological slice of the video but have necessarily been created by different participants and may not share the same tag. A single participant, meanwhile, may use the exact same tag for multiple segments.

A set of binary distinctions along three axes results in a set of eight permutations. The following constitutes a list of the phenomena we can observe among the results of this study. For the purposes of comparison, and in keeping with the analysis of segment clusters as discussed to this point, "sameness" of segments created by different participants refers to segments that significantly overlap on the timescale of the video.

Tag-Segment Distinctions

1. Same tag, same participant, same segment (null distinction category).
2. Same tag applied to multiple segments by the same participant.
3. Same tag applied to the same (overlapping) segments by different participants.
4. Same tag applied to different (non-overlapping) segments by different participants.
5. Different tags applied to the same segment by the same participant.
6. Different tags applied to different (non-overlapping) segments by the same participant.
7. Different tags applied to the same (overlapping) segments by different participants.
8. Different tags applied to different (non-overlapping) segments by different participants.

Categories 1-4 in this list have ostensibly been addressed previously, in the discussion of tag frequency. In the second half of chapter 4, I examine the tags participants created. I compare the number of total tags created and discrete tags between participant groups. There was a marginally significant difference in the number of tags created by the different participant groups. I then examine the ten discrete tags that were used more than once, again only using the tag data to warrant equivalence of meaning. In this chapter, I further explore categories 2-4 of tag-segment distinctions, which further complicate the results presented in Chapter 4.

Then in this chapter, I examine series of tags that appear semantically similar (both those that are applied to clusters of segments and those that are used throughout the video) in an attempt to decide at what point, or under what conditions, we might consider non-identical tags to be nevertheless related. The particular problem of semantic similarity has implications for techniques of tag gardening (to be discussed in a later chapter). For the moment, suffice it to say that the semantic similarity of tags cannot be ignored, nor can we make facile assumptions about synonymity between similar-sounding tags. Rather, considering different tags (categories 5-8 above) as *potentially related* allows for the possibility of tag clusters. In the same way that the visualizations in chapter 4 show the chronological clustering of segments, here I investigate the semantic clustering of tags.

Tag and Segment Clusters

It is one thing to count all of the instances of discrete tags and look at whether the segments tagged with the same terms are clustered together in time. That process potentially provides insight into the discrete tags or specific language educators use to describe the same parts of the video of practice (see the discussion of tag frequencies in chapter 4). If the primary goal is to develop collaborative platforms that track the use of specific and already-defined educational terms, then that analysis, along with a relatively simple set of corresponding machine learning algorithms and interface design, would be all that is necessary. Perhaps more interesting, but also potentially more problematic, are the series of tags that seem to be indicating the same thing but use different words to describe it. Can we reasonably expect all of the tags that include the word "knowledge," for example, to reflect the same observation or meaning making?

In this section, I explore the results related to the six clusters of tags first introduced in Chapter 4. Those clusters are *prior knowledge*, *making connections*, *picture walk*, *read (including choral reading)*, and *management*. The clustering of segments (by similarity in length and overlapping placement on the video timeline) alone can be seen to signify that participants refer to the same phenomena. The addition of the tag data to the segment data simultaneously adds weight to the assertion that participants are noticing and marking the same phenomena, while complicating our understanding of what meaning exactly they are making.

Tag Cluster: Prior Knowledge

In this section, I unpack the cluster of segments and tags that contain the word "knowledge." I specifically examine the tags that contain the phrases "prior knowledge, " "background knowledge," and "prior experience." The results show that in the first two and a half minutes of the featured video, multiple participants appear to be marking the same phenomena using segments and tags. The clustering of segments and tags relating to prior knowledge presents the best series of examples for establishing what exactly it means for semantically similar tags to be treated as equivalent.

Counting abbreviations, which I discuss further in this section, the term "knowledge" appeared a total of twenty times in the tag data[23] and was used by ten out of the fourteen participants. The term "knowledge" was also included in three out of the ten discrete tags used more than once. Those discrete tags included: "activating prior knowledge," "activating background knowledge," and "eliciting vocabulary knowledge." Figure 13 illustrates all the segments that are associated with the term "knowledge." This figure shows that participants' focus on knowledge is contained in the first two and half minutes of the video and that many of the segments have a similar length and placement on the timeline. This type of segmenting pattern suggests that participants are noticing and marking the same things.

[23] See Table 3: Frequency of common words in tag data (Chapter 4).

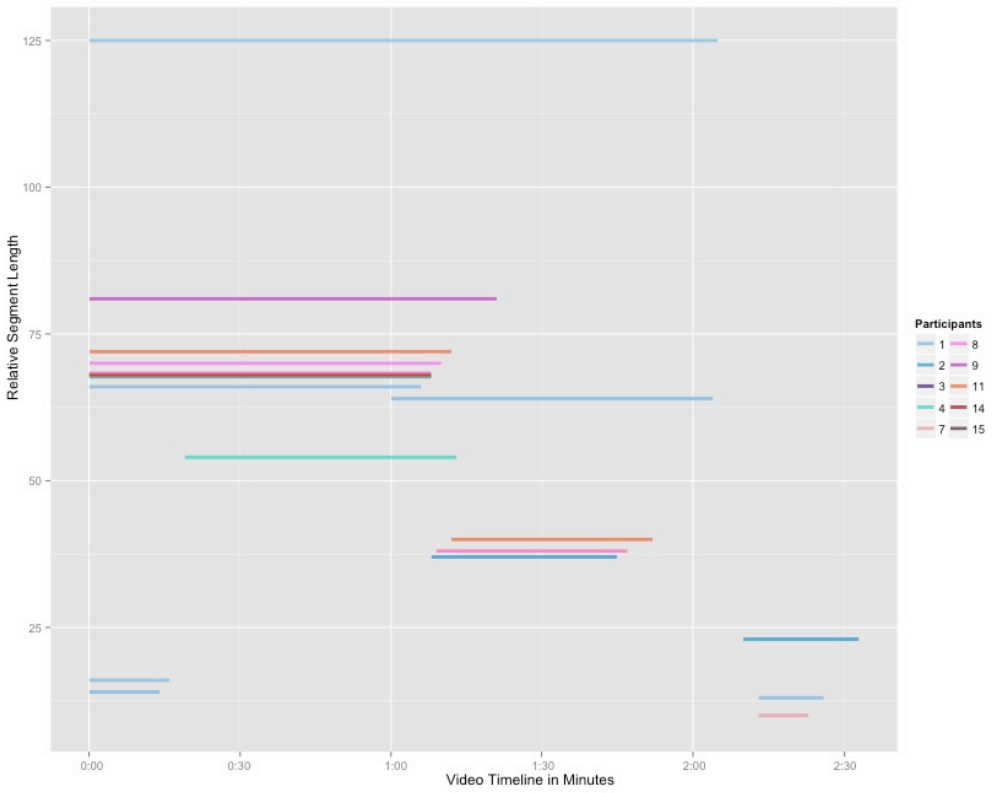


Figure 13: Segments tagged with the term "knowledge"

Figure 14 contains the same segment data from Figure 13, but it also represents all the tags applied to each segment.[24] The segment and tag data together do add further weight to the suggestion that the participants are focusing on and marking the same phenomena in the video and using similar, if not exactly the same, phrases.

[24] To make Figure 14: Segments tagged with the term "knowledge" and associated tags readable I had to modify the segments' placement on the horizontal plane. Therefore, this figure is not accurately scaled in terms of relative segment length, but it does still reflect the accurate location on the video timeline.

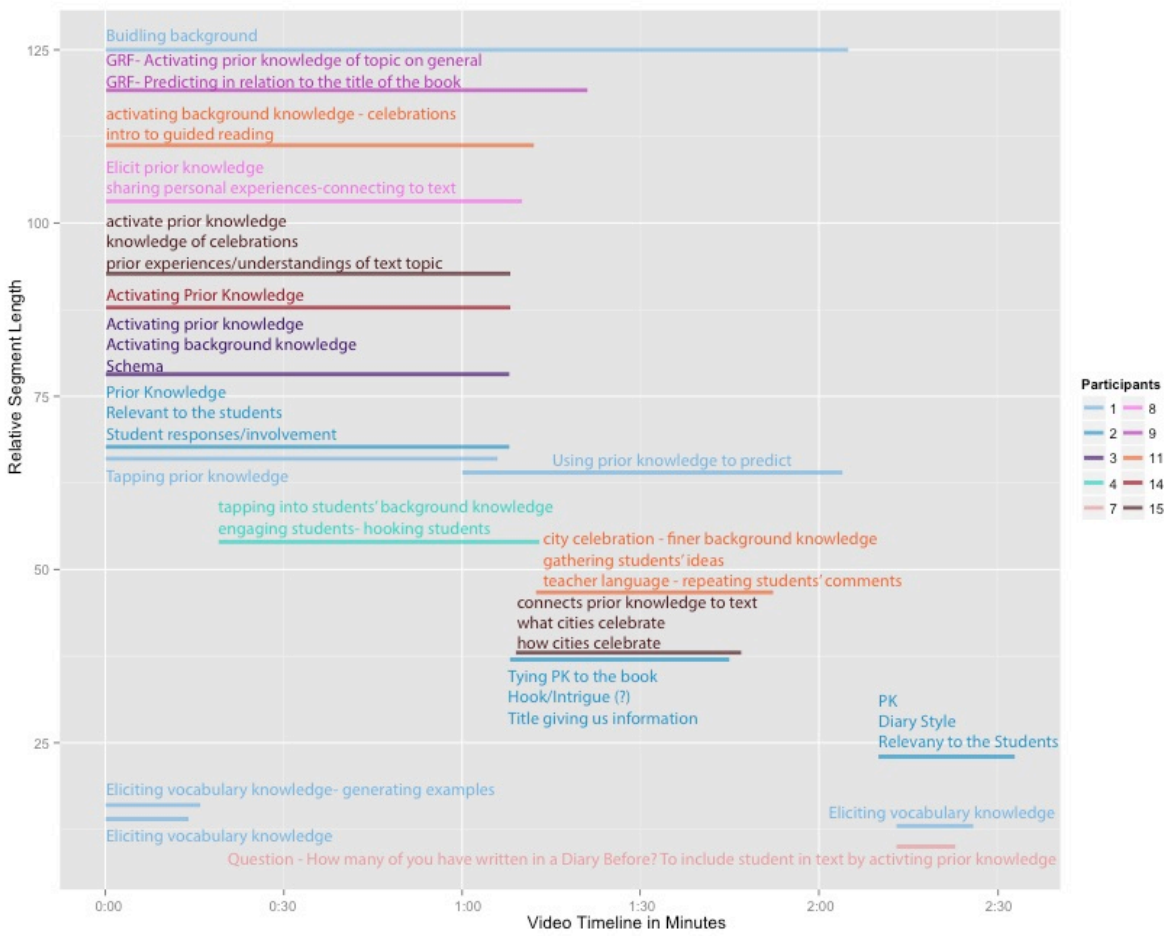


Figure 14: Segments tagged with the term "knowledge" and associated tags

Many of the tags contained the term "prior knowledge." In terms of reading instruction, prior knowledge is regarded as an important factor in determining how deeply readers will comprehend a text (Pressley et al., 1992). When a reader already knows something about a topic, there is less new content to synthesize and the reader is more able to give attention to the new topic, as well as to the bigger ideas and related themes (Duke, Strachan, & Billman, 2011). "Activating prior knowledge," a phrase included in six tags, refers to the practice of beginning a lesson by bringing up topics with which students can then assimilate the new information. This

discussion can also be used to gauge the level of prior knowledge of the students, which can inform how to proceed with instruction.

This section makes a claim that the tag "prior knowledge," can be linked to a series of discrete tags. At the same time, the Tag Cluster: Prior Knowledge, shows how the use of the conventional term, "prior knowledge," affords findability, but perhaps at the expense of marking the nuance and complexity of what participants find salient. The phrase "prior knowledge" was used in ten different tags. The only participants who did not use the term "prior knowledge" in any of the tags were Participants 4 and 11. Those participants used the phrase "background knowledge."

Table 11: Participants Use "Knowledge"

Participant #	Participant Group	Tag(s) contained "prior knowledge"	Tag(s) contained "background knowledge"
1		Tapping prior knowledge	
1		Using prior knowledge to predict	
2		Prior Knowledge	
3		Activating prior knowledge	Activating background knowledge
4			tapping into students' background knowledge
7		Question - How many of you have written in a Diary Before? To include student in text by activting prior knowledge	
8		Elicit prior knowledge	
9		GRF- Activating prior knowledge of topic in general	
11			activating background knowledge - celebrations
11			city celebrations - finer background knowledge
14		Activating Prior Knowledge	
15		activate prior knowledge	
15		connects prior knowledge to text	

Participant 3 created one segment that she applied three tags to. One tag contained the phrase "prior knowledge" and the second tag contained the phrase "background knowledge." Both tags started with the same verb: "Activating." Participant 3 may have been applying more than one

tag to the same segment to signify the same phenomena in order to increase findability, as was modeled in the study's tutorial video. Participant 3's interview data did not provide any direct insight into whether she sees these two terms as equivalent. However, her interview showed that she was very conscious of how her tags could be used by a hypothetical online educational community of practice, as is shown in the discussion of the term "read" later in this chapter.

So far, the segment and tag data alone suggest that the terms "prior knowledge" and "background knowledge" were being used synonymously. This assertion is further warranted and simultaneously complicated by the interview data.

> **Participant 2**
> I am going to label it prior knowledge.
> [Types: Prior Knowledge]
> But I would honestly label it PK. Or BK for background knowledge. Um… in my own notes if this is just for me that is how I would do it.

Here Participant 2 used and explained two abbreviations: "PK" for "prior knowledge" and "BK" for "background knowledge." She also seems to confirm that for her, at least, the terms "prior knowledge" and "background knowledge" were equivalent. She announced her intention to tag the segment with the words "prior knowledge." When she made the comment, "But I would honestly label it PK. Or BK for background knowledge," at that point she could not add any other tags to the same segment. It is unclear if she would have edited or added these extra terms if she were able. Saying that she would label the segment as "PK" or "BK" suggests that she considered the terms to be equivalent. Later in the session she used PK to stand for "prior knowledge" in the tags: "Tying PK to the book" and "PK."

While not in the tag data, another participant, Participant 12, brought up another similar term in her interview. Commenting generally on the featured video, Participant 12 says: "Some of her [referring to the featured teacher] moves are about soliciting prior experience, I think some

would say prior knowledge, but she's soliciting *prior experience* [emphasis added] by asking, particularly, if they've [referring to the students] been to the cities." Here Participant 12 makes an interesting distinction between "prior knowledge" and "prior experience." She implies at least a strong relationship between the terms "prior knowledge" and "prior experience" by using the term "prior experience" to describe what she is noticing. But by commenting, "some would say [meaning she or others could tag with the term] prior knowledge," it seems that Participant 12 was categorizing prior experience as a form of prior knowledge.[25] When Participant 12 says, "I think some would say prior knowledge," she is acknowledging or perhaps defaulting to a conventional term. The distinction between "prior knowledge" and "prior experience" was not represented by the segment or the tag data; therefore, without the interview data this relationship would not be visible.

Participant 13 also made a distinction between "prior knowledge" and "prior experience" during her interview. Participants 13 and 12 are the only teacher educators/educational researchers in the study who did not include "knowledge" in any of their tags; therefore, the interview provides the only window into their thinking about the term. Towards the end of the interview, the researcher asks Participant 13 if she would be surprised to learn that most of the pre-service teachers used the term "prior knowledge" in their tags.

> **Participant 13**
> I wouldn't be surprised at all… Because she was doing such a nice job of connecting to the kids. I mean I was calling it their *experiences* [emphasis added] but it is also obviously about their *prior knowledge* [emphasis added]. …. So it doesn't surprise me that people did that, because it surprised me that I didn't do that.

Participant 13 narrated that while she was using the term "experiences," the phenomena that she

[25] The relationship between knowledge and experience depends on approach. Generally speaking, prior experience is a form of potential knowledge. Access to prior experience through memory means that the experience in the past has necessarily been processed in some way, allowing for a making sense of that prior experience in terms of one's sense of self. The sense-making of the experience results in knowledge.

was describing was “also obviously about their prior knowledge.” Here Participant 13, very much like Participant 12, made a distinction in her interview between “prior knowledge” and “prior experiences,” but defaulted to the conventional term when connecting it to the behavior of the pre-service teachers. Participant 13’s commentary further supports the assertion that the following terms are related (or synonymous) and could be linked together using tag gardening techniques: “prior knowledge,” “PK,” “background knowledge,” “BK,” “prior experience,” and “experiences.” The fact that she defaulted to the conventional term when talking about how others have tagged the video with that term could be seen as a reason to make the term “prior knowledge” the umbrella, catchall, or overarching tag.

Multiple participants noted this distinction between “prior experience,” “prior experiences,” and “prior knowledge,” but it is only understandable through the interview data. The segment and tag data does show an effort to describe more specifically what participants are noticing rather than simply labeling it with a conventional term. By describing what they are noticing in their own words, participants are adding more variability to the tag data; thereby creating “messier data.” While this messy data makes it more challenging for a common language of teaching practice to emerge, it affords the participants an increased level of nuance which potentially adds more insight into how educators are actually making sense of the video, as opposed to tagging the video using an already determined educational taxonomy or framework.

Despite the participants’ nuanced and descriptive tagging language, there were several instances where participants defaulted to the conventional term, “prior knowledge,” in their tagging and/or in their commentary. This observed behavior brings up the question: what might it mean if educators in the context of socially tagging video records of practice default to the

conventional term rather then using their own more specific descriptions or terms?

Participant 15's interview highlights how this behavior, while "not at all" surprising, has the potential to misrepresent the practice being demonstrated through the video, particularly in instances where the featured teaching practice is not exemplary of the practice or phenomenon that is being marked. Towards the end of the interview Participant 15 explained why she was not surprised to learn that many pre-service teachers used the term "prior knowledge":

> Well, part of it is - it's a really commonly used thing by teachers; they all think, "at the beginning of the lesson I have to activate prior knowledge." Which it is probably pretty good practice to somehow activate prior knowledge. It was probably the vague description, again, of what was going on there [referring to the lesson's instructional goals]. If you had asked me, "how would you go about activating prior knowledge," I don't think--it's always like asking kids, have you ever had a celebration? I think, sometimes, I can actually start talking about celebrations and prime your background knowledge in ways that are more supportive, that might not take you off on a tangent about all of the Easter eggs you dyed and that sort of thing. I think it's something that, just in general, teachers talk about a lot and so we see a lot of it in practice.

Participant 15 explained that it made sense to her that pre-service teachers would tag using the term "prior knowledge" because they are taught to begin a lesson by "activating prior knowledge." She acknowledged that this habit of mind is "probably a pretty good practice." Participant 15 implied that the pre-service teachers' thinking process might involve recognizing the chunk of instruction as a guided reading lesson and then connecting it to the framework or schema they have about structuring a guided reading lesson, which generally involves beginning with "activating prior knowledge" and a "picture walk."

Participant 15 then went on to explain how in the featured video of teaching practice the teacher's use of questions is not particularly effective for the goal of activating prior knowledge. The featured teacher's questions elicit stories about celebrations, the topic of the text, but not in a way that effectively supports the students' understanding of what kinds of celebrations would be

celebrated by an entire city and why. Participant 15 used that critique by way of explaining why simply and only using the term "activating prior knowledge" might not offer a helpful descriptor in this instance. However, there is nothing in Participant 15's interview data to suggest that she was being critical of the pre-service teachers' use of prior knowledge tags. She was just noting that the teacher in the featured in the video is doing something specific that is not fully described by the term "activating prior knowledge."

Participant 15's above interview data does match her segmenting and tagging behavior quite closely. She created two segments that were tagged with the term "knowledge" (See Figure 12). These two segments aligned closely in terms of segment length and placement on the video timeline, as well as in terms of similar words contained in the tags. Her tags were "activate prior knowledge," "knowledge of celebrations," and "prior experiences/understandings of text topic" for her first segment (1:00-1:08). For her second segment (1:09-1:47), she uses the tags, "connects prior knowledge to text," "what cities celebrate," and "how cities celebrate." Despite Participant 15's insightful explanation regarding why pre-service teachers might use the conventional term "activating prior knowledge" even if it is not the most accurate way to describe the featured practice, she also defaulted to the conventional term in her own tags (i.e. "activate prior knowledge"). The question remains, why might she continue to use or default to the conventional term? While this intention cannot be verified through the interview data, Participant 15 did appear to use the addition of more than one tag per segment to add more details about the nature of the phenomena that she was marking. Perhaps this was a strategy for balancing findability (through the use of the conventional term) and nuance (through the use of more descriptive tags).

Participant 1, a pre-service teacher, also noticed and discussed how the practice the

featured teacher actually demonstrated did not align exactly with the conventional terms he knew. Participant 1 expressed uncertainty regarding what terms he should tag with and how his choices would impact both the findability of the segment (for himself and other hypothetical users) and the accuracy of the representation.

> **Participant 1**
> Alright so here's what I want to do [scrolling] so it's basically one minute from zero to two minutes I think all this I'd call all this building background. [Types: Building background] And then the first part I saw is more tapping prior knowledge and in the second…part was more having to do with um…[seven second pause] maybe um…[five second pause] maybe um…using background…using prior knowledge to predict or something like that? [Types: Using prior knowledge to predict] Is that okay?
>
> **Researcher**
> It's whatever you want.
>
> **Participant 1**
> I'm just thinking I just see those as a little bit different but I don't know if that's the right…I don't know if that's the right tag to be able to find it again but….
>
> **Researcher**
> So when you say that do you mean like for *you* to find it again?
>
> **Participant 1**
> Um…yeah I guess it would depend on if I was trying to share with like I guess its social tagging right? So, it seems….it doesn't that's not a….that's not language that really um….it's kind of clunky I guess. The phrase is kind of clunky. Whereas building background that's something more that people…it's kind of a catchy phrase or a catchall.

Here Participant 1 narrated a similar tension between describing the representation of teaching in the video using conventional or "catchy" phrases that others were more likely to use and recognize, verses using more descriptive and "clunky" descriptions that may be more accurate, but less findable. He also expressed uncertainty in his choices by asking me (the researcher) if his tags were "okay" and then by talking through how he saw the descriptions "Building background" and "Using prior knowledge to predict" as "a little bit different." Participant 1 expressed that he saw these two terms as being "a little bit different" but he did not clearly

articulate how these two terms were different or how they connected directly to the featured video. It is unclear from the tag, segment, and interview data whether Participant 1 was noticing the difference between prior knowledge and prior experiences, as Participants 12, 13, and 15 were.

A little later in the interview Participant 1 elaborated on the relationship he saw between the two terms: "activating prior knowledge" and "building background."

> **Participant 1**
> The thing is that I'm getting confused about it. It really could be both. Okay so like say *activating prior knowledge* and *building background information*….those are synonymous in a lot of ways. But at the same time *building background* also can be providing background information. ….You know what I mean? Giving kids information they don't already know so that they can access a new concept during the text. So in a way they are… they're doing the same thing, but in a way…this is what I am kind of talking about the nuance…

Here Participant 1 was making a distinction between the conventional use of "Activating prior knowledge" and what he called "Building background." He described "Building background" as *providing* students with background information needed to understand a text that they do not already have. Both of these terms focus on improving comprehension of a text. The key difference between these two terms for Participant 1 was that "building background" involved providing information to aid comprehension, whereas "activating prior knowledge" involved asking questions to facilitate students connecting what they already knew to a new concept.

"Building background" was a discrete tag that Participant 1 used, but he did not actually tag a segment with the term "activating prior knowledge." He did use the term "Tapping prior knowledge." It is unclear if the substitution of "activating prior knowledge" for "Tapping prior knowledge" in his commentary means that he sees the two terms as synonymous. Given the fact that, at this point in the interview Participant 1 and I were discussing what counts as a synonymous term when describing teaching practice, and that Participant 1 did not use the

example of "tapping prior knowledge" and "activating prior knowledge" as his example, I suspect that Participant 1 forgot that he had applied the tag "tapping prior knowledge" and thought that he had used the term "activating prior knowledge." In other words, I suspect that Participant 1 thought that he was being consistent in his terminology, but since he could not see the tags that he had already applied he made an error. The question still remains, does Participant 1's likely substitution of "activating" for "tapping" mean that the terms are synonymous?

Participant 4 also used the verb "tapping" in his tag "tapping into students' background knowledge." In Participant 4's interview data he emphasized repeatedly that he noticed the ways the teacher was "tapping into the students' background knowledge" in order to "hook" and "make it [the text] relevant" to the students. This connection between "tapping into students' background" and relevance is discussed as a part of Hotspot 4.

Participant 1 talked about the affordances of using the more "catchy" or conventional terms in terms of findability. He and the other pre-service teachers did *not* talk about whether or not they felt a desire or possibly even pressure to tag using conventional terms because those were the terms that they learned in the context of the teacher education program. Might they have seen this activity as a way of demonstrating their ability to accurately describe or decompose a lesson using what they learned? Some participants brought up the possibility of using a segmenting and tagging tool as an assessment tool or as part of an activity specifically designed for pre-service teachers to decompose a lesson.

The results regarding how the participants used the word "knowledge" to mark meaning have been heavily influenced and possibly skewed by a single participant. Participant 1 made six tags all containing the word "knowledge." That means that Participant 1 made over half of all the tags relating to knowledge. His interview data made it clear that he was deliberately focusing on

prior knowledge and moments when the students had opportunities to "make connections." This highlights a theme that is further explored in the Chapter 6: how frame and purpose affected what participants noticed, how they chose to mark what they noticed, and other behavior.

Participant Group Differences Regarding the Use of "Knowledge"

The use of the term "prior knowledge" is not associated with one participant group over the other, though pre-service teachers used the term "knowledge" eleven times compared to the slightly lower frequency of nine, demonstrated by the teacher educators/educational researchers. One member from each group did *not* use the term "prior knowledge" and instead used the term "background knowledge." Furthermore, participants 5, 6, 12, and 13 are not represented in Figures 11 and 12, since they did not create any tags containing the word "knowledge." An equal number of the participants from each group did *not* create any tags with the term "knowledge." This suggests that "prior knowledge" is a commonly used term that members of both participant groups were familiar with. Recognizing that "prior knowledge," "background knowledge," "PK," "BK," and "prior experiences" can be seen as linkable, if not equatable, terms we see a strong case emerging that these participants were in fact marking common points of salience and using, a not exact but common language to do so.

Tag Cluster: Making Connections

"Making connections" was another discrete tag used more than once. It had the highest frequency, being applied four times. However, Participant 1 applied all four of those tags. Figure 15 shows that multiple participants used the term "connection," but there is not a high degree of clustering on the video timeline.

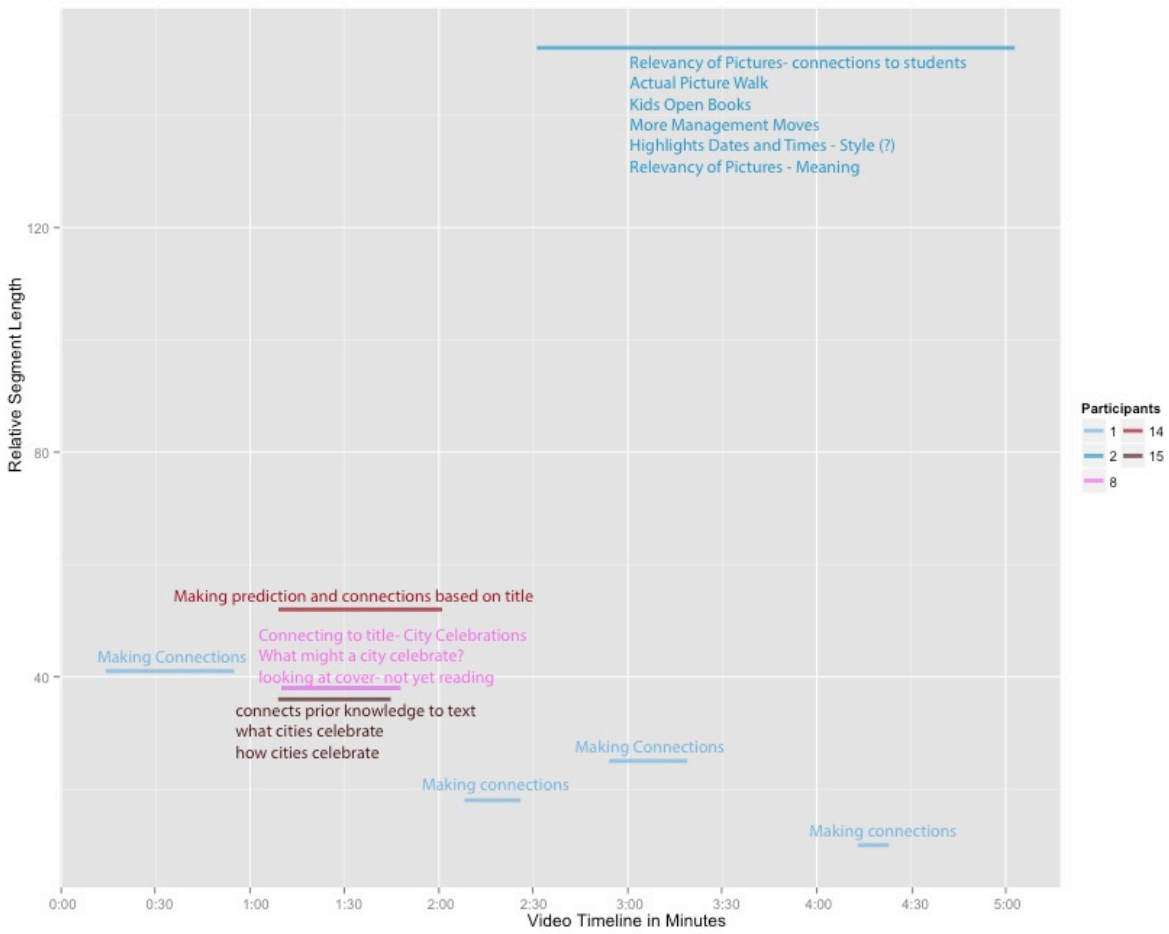


Figure 15: Segments tagged with the term "connection"

None of Participant 1's segments aligned directly with those of the other participants. Participant 1's interview showed that he was essentially coding the featured video for examples of the teacher supporting the students in order to make connections. The transcript selection below shows that he was thinking about two types of connections. However, his tags did not make those distinctions clear.

> **Participant 1**
> There's a lot of work with making connections and there seem to be two types. One was primarily tapping into prior knowledge; asking you know what their ideas about celebrations and then when they're pre-viewing the book…um…kind of building background and giving them some access into the text by pre-viewing it. So I might tag those things as well.

In the interview, Participant 1 explained that he saw two types of connections. The first he categorized as "tapping into prior knowledge," specifically the teachers' use of questions "about their ideas about celebrations." He described the second type of connection as the moves the featured teacher made to provide the students "access into the text by pre-viewing it." The tag data alone does not provide any insight into the distinctions that Participant 1 was making. He chose to tag all the terms with the same and general discrete tag, "Making Connections." He did end the above explanation by saying that, "I might tag those things [referring to the distinctions he just made] as well. While he was not explicit, this suggests that after coding the video for general instances that he considered to be "making connections," in an authentic setting he could or would return to these segments and add tags reflecting the more specific distinctions he was making.

In Participant 1's description of these two different types of "making connections," he was not specific about the moves the teacher made in order to support or make those connections. Participant 1 did not provide an explicit explanation regarding why he chose to code for making connections in the first place. Later in the interview, he did acknowledge that he and all of the participants were familiar with the process of qualitative coding and that he saw the segmenting and tagging activity as being very similar to that process. At the time of the data collection, all of the pre-service teachers were taking a course focusing on research for teachers. The concept of qualitative coding and especially the terms "open coding" and "closed coding" were fresh in their minds. I explore how the pre-service teachers' recent experience with open and closed tagging might have influenced the ways they segmented and tagged in the discussion chapter.

Participant 2 made one medium grain-size segment that encompassed two of the four segments Participant 1 made at the very small grain-size. However, by looking at just the segment and tag data, it is still unclear if they were trying to mark the same phenomena. Participant 2 applied six tags to this one segment. Only one of those tags contains any reference to connections. That tag is "Relevancy of Pictures- connection to students." This example highlights how in some instances where participants tagged a single segment with multiple tags, knowing the order in which the tags were applied can impact the ability to interpret participants' meaning-marking. Participant 2 applied the following six tags to one segment in this order: "Actual Picture Walk," "Kids Open Books," "More Management Moves," "Highlights Dates and Times – Style (?)," "Relevancy of Pictures – Meaning," and "Relevancy of Pictures – connections to students." The first tag, "Actual Picture Walk" appeared to be the tag that was most descriptive of the segment itself. This case is made explicitly in the next section, Tag Clusters: Picture Walk. Participant 2's interview data suggests that she created the segment for the purposes of clarifying the bounds of the picture walk, as a chunk of the instruction, and then applied five other tags describing other things she noticed *within* this segment of the video. Whereas most segments contain a start (in) and an end (out) point specific to the phenomena being marked through the use of tags, in this case that happened only for the first of the six tags. The other five tags Participant 2 applied, including the one tag using the term "connection," were generally descriptive of this portion of the featured video, but not specifically tied to the segments' in and out points.

Participant 2's interview provided some insight into what she meant here by "connection to students,"

Participant 2

> She [the teacher] also does a nice move of pointing out the relevancy of pictures for meaning.
> [Types: "Relevancy of Pictures – Meaning"]
> So I am going to write a tag that says "Relevancy of Pictures – Meaning" and then another tag that says for relevancy of pictures – what is it? Connection to students.
> [Types: "Relevancy of Pictures – connections to students"]
> Cause that is the other whole thing. That is something that needs to be done in a lot of books because otherwise students don't care. It also helps keep their interests. Then… Kind of a little summary at the end, but I don't know if she gave them their assignment first… I don't think so.

Participant 2 was explaining that her use of the term "connection" was really more about making the pictures and the text relevant to the students. Her comment could also have been rephrased as "supporting the students so they can make a connection between the pictures and text." Similar to Participant 1, she was not specific in her interview about what moves the teacher made in order to make the pictures relevant to the students. In fact, as explained in the next section, Tag Cluster: Picture Walk and Hotspot 5, the tag "Relevancy of Pictures – connections to students," and her comments were misleading. Participant 1 and 2 both appeared to be marking a portion of the video where the teacher provided opportunities for the students to make connections to the text. However, it is still unclear whether they were marking the same phenomena. Participant 1 appeared to be focused on opportunities to connect prior knowledge to the text and opportunities to make connections through previewing the text, both of which were rather vague. Participant 2 appeared to be focusing on the opportunities students have to connect the pictures, as she says. However, the featured video actually represents the teacher creating opportunities for the students to connect the date and location features of the text to the students' prior experiences. This example illustrates how challenging it can be to deduce equivalence of segments and tags when there is a difference in grain-size. A case could be made that both Participants 1 and 2 were generally marking opportunities for the students to make connections to the text. In that way they were marking the same phenomena. However, both of them appear to have been focused on

different and possibly related opportunities for connections. In Chapter 6, Discussion of Design Implications section, I discuss how specific interface designs can be used to clarify the relationship between these types of segments and tags.

Figure 15 also shows that there are three segments that align closely that all contain a tag with the word "connection." These segments were made by Participants 8,14, and 15 (all teacher educators/educational researchers). The tags applied to these three segments focus on a connection being made to the text, or specifically the text's title and main topic – city celebrations. Participant 15 narrated what she was noticing, while being explicit about what the featured teacher was connecting (i.e. students' prior knowledge to text).

> **Participant 15**
> So in that segment there she's just connected--she's moved to talking about celebrations specific to city celebrations. She's taking from this general kid experience and now she's moving it towards whatever the point of the text is. So it's like this middle ground where ideas are meeting and she's trying to move kids toward the text. So that's why I'm tagging that segment that way.
> [Types: "connects prior knowledge to text," "what cities celebrate," and "how cities celebrate".]

Participant 15's comment showed how the concept of prior knowledge, investigated in a previous tag cluster, could be related to this more general idea of making connections. Participant 15 was explicitly marking the part of the lesson where the featured teacher connected the students' prior knowledge to the text, or more specifically to the text's title and content (i.e. city celebrations). The other segments, similar in length and placement on the video timeline, also associated the term "connect" or "connection" with the topic and title of the text, "City Celebrations." Here we see a clear difference in the ways the teacher educator/educational researchers noticed and marked the ways the teacher is making connections. The teacher educators/educational researchers were more specific in marking what kind of connection was being made, as opposed to generally marking moments where she was making connections.

Tag Cluster: Picture Walk

Figure 16 shows that five participants created segments and used the word "picture" in their tags. Most of those segments are medium grain-size segments and five of them contain the phrase "picture walk." As pointed out in Chapter 4, "Picture Walk" is the most commonly used tag. Three different participants used that discrete tag three times. However, the words "picture walk" appeared in a total of five tags: "Picture walk," "Picture Walk," "picture walk," "picture walk through text," and "Actual Picture Walk." A picture walk is the simple act of reviewing the pictures in a book prior to reading it and is often used to spark interest in the book and help connect the visual cues to the story. Teachers generally ask student specific questions about the pictures. It is a very common strategy and considered easy to identify. The five segments that have the term "picture walk" in the tag ranged in length from 1:44 – 5:03. The end point for the five segments ranged by only six seconds.

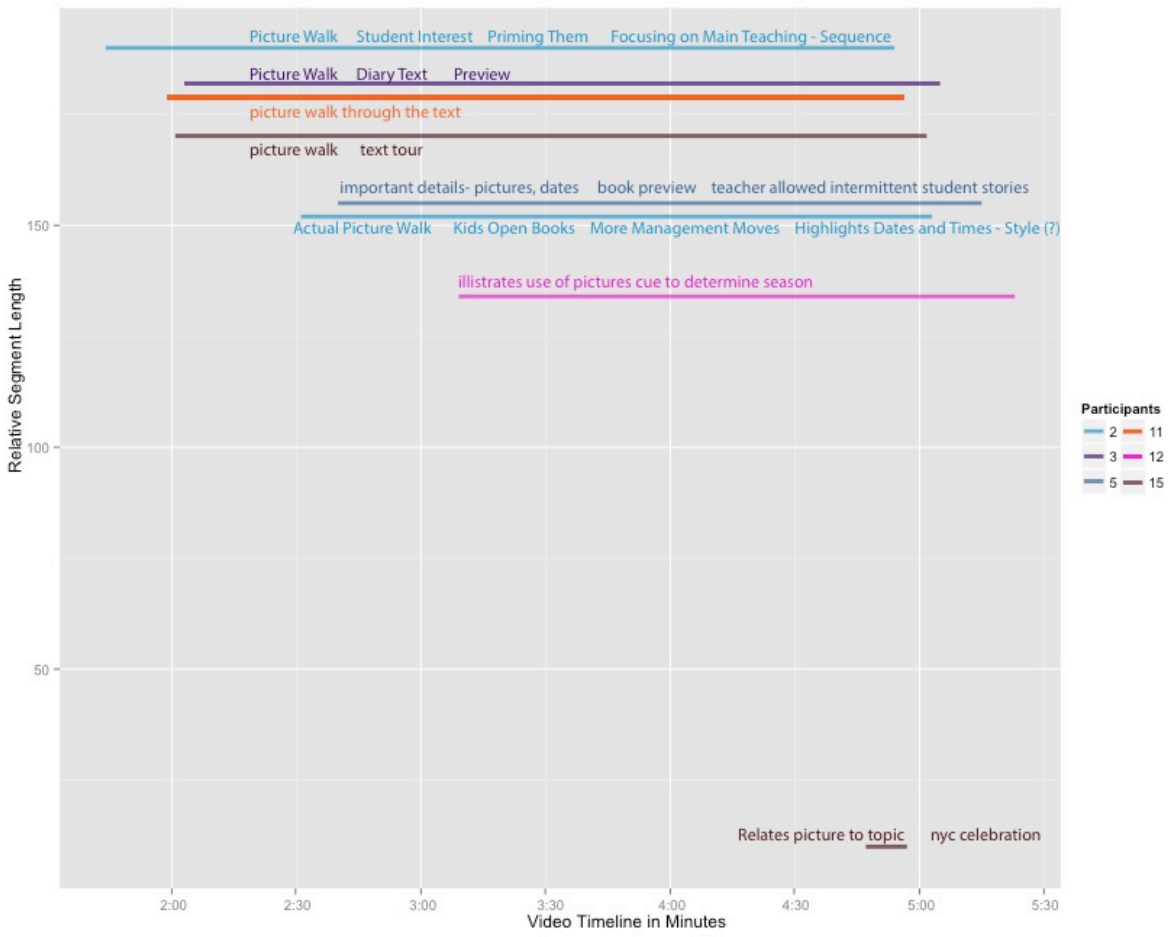


Figure 16: Segments tagged with the term "picture"

This combined segment and tag data suggest that Participants 2, 3, 11, and 15 all noticed and marked the same pedagogical act using similar, if not the same words. The small range of segment end-points suggests general agreement among the group regarding when the teacher concluded the "picture walk." The larger range of segment in-points suggests that there is possibly some disagreement or lack of clarity regarding when the teacher began the picture walk. The fact that Participant 2 created two segments, first the longer segment "Picture Walk" and then the shorter segment "Actual Picture Walk," suggests that after creating a segment that she

tagged as "Picture Walk" she realized that a smaller and different segment was more accurate.[26] The interpretation that the start of the picture walk was unclear in the video is supported by the interview data.

> **Participant 2:**
> [T]his is where she does a picture walk. Until about… [Setting in and out-points.]… This is a pretty long picture walk. [Listens to the video.] Yeah. They are still doing the picture walk… So this segment would be the picture walk segment, which is pretty common.

Eight minutes later, and after adding more several more segments and tags, Participant 2 commented generally about the length of the lesson introduction and then created a new segment that she articulated was a more accurate representation of the lesson's picture walk.

> **Participant 2**
> I guess this is the *actual* [emphasis added] picture walk. Although she did turn to [or reference] the pictures another time.
> [Types: "Actual Picture Walk"]

Participant 2's second segment with the tag "Actual Picture Walk" combined with her interview data shed light on why there appears to be agreement among these participants on the term being marked and the end point of the segment, while at the same time, there is inconsistent data regarding the where this segment starts. Later in this section, the other tags applied to this segment by Participant 2 are further examined to show some limitations of using in and outpoints to mark the duration of a tag phenomenon.

Like Participant 2, other participants also expressed uncertainty regarding when the picture walk portion of the lesson started. Teacher educator/educational researcher Participants 11 and 15 also expressed uncertainty regarding how well the term "picture walk" fit the teaching practice represented in this video. Participant 11's narration provided a little more insight into

[26] Participants were not able to edit their segment tags. Participant 2 implied, but did not explicitly say that if she had the ability to edit segments and tags that she would delete the first instance of "Picture Walk" and replace it with the segment she calls "Actual Picture Walk."

how this part of the video might not clearly fit with the definition of a picture walk that the other participants had in mind.

> **Participant 11**
> So what I'm thinking that she's doing here is um, as they do this picture walk, not exactly reading everything but yet providing enough information through their discussion that when they come to an unfamiliar word or something they'll have something they can problem solve with. I'm assuming, I mean not being able to see the book. But that's certainly a good thing to do when you're doing a guided reading lesson.

Here Participant 11 was narrating that the featured teacher was highlighting some important information in the book that would aid the readers. This act of "not reading everything," but focusing the students' attention on information that will help them make sense of the text is one feature of a picture walk. However, Participant 11 pointed out that without being able to see the "book" or text that the students were reading from, it was not entirely clear exactly how the featured teacher was using the text to support the students. Participant 15 also referred to this same chunk of instruction as a "picture walk," both in her tag language and in her interview. Participant 15 pointed out other specific things that the featured teacher did that fit her definition of a picture walk.

> **Participant 15**
> So, that segment where she takes them to the text, what I would really say that she's doing more than anything is she's doing a picture walk, because she is drawing their attention to the pictures and saying like, 'Have you been here?' and all that. So I'm going to label that that or tag that as 'picture walk' [Types: picture walk] also because she goes page by page by page. She's not intentionally stopping on one page and then skipping forward to others.

Participant 15 pointed out that the featured teacher was "drawing" the students' "attention to the pictures and saying like, 'have you been here?" In this way, the featured teacher was focusing the students' attention on specific parts of the text, as Participant 11 pointed out. Participant 15's commentary adds that the featured teacher was focusing on the pictures and connecting them to the students' prior experiences through her questioning, "Have you been here?" After the

commentary above, Participant 15 added another tag and continued to discuss how this did and did not fit her definition of a picture walk.

> **Participant 15**
> And then I might also call that a 'text tour' [Types: text tour].
>
> **Researcher**
> Is that different? Does that mean something different than a picture walk?
>
> **Participant 15**
> I think I might have just made it up in the moment. But I am trying to think about what she is doing because it is not just a picture walk, right, because she is drawing attention to the date and the place and some of those features of the genre. But I feel like it's not in-depth enough to say she's really digging in to, what does it mean to have something written in a diary; how us this person's diary, if it is a diary, how is this person's diary going to help us understand celebrations more. Does that make sense?

In this selection, Participant 15 pointed out that the featured teacher was actually drawing the students' attention to the date and place information on each page (as opposed to the pictures). The date and place information are features of the genre of the text, which is a diary. In this way, the representation of practice captured in the featured video did not fit with one of the key criteria of the term, "picture walk," in that the teacher did not point to the pictures (instead she pointed to text features on each page). In the passage above, Participant 15 also discussed how the featured teacher did not go into enough depth about those diary features and how they connected to the topic of celebrations. Participants 11 and 15 emphasized the complexity of teaching through nuanced language and description. Perhaps Participant 11's choice to use both the conventional term, "picture walk," in one tag and some more specific and descriptive information in another tag was a way of balancing the emerging tension between using segments and tags to be useful and "findable" versus using them to authentically represent the teaching and participants' meaning making.

Participant 3 made no comments regarding the tag picture walk. Her commentary emphasized that the text was in the form of a diary, which was reflective of the three tags she

applied to the segment: “Picture walk,” “Diary text,” and “Preview.” Could she also be using the conventional term “Picture walk” to increase findability, but primarily be noticing and focusing on a different aspect of the instruction (i.e. the genre of the text)?

How do multiple tags associated with the same segment relate to participants’ meaning making? As suggested above, multiple tags on the same segment could signify a method for marking the conventional term (increasing findability) while still marking more descriptive and nuanced distinctions. In these examples, the multiple tags mark the same phenomena and the segments mark the beginning and end of the phenomena. Participant 2’s segment with the tag “Actual Picture Walk” illustrates a different way that participants use multiple tags applied to the same segment to mark meaning. After noticing that the first segment Participant 2 had created and tagged as “Picture Walk” was not “actual picture walk,” she created a new segment and first tagged it with “Actual Picture Walk.” Then she continued to add tags to the same segment. She added a total of five more tags: “Kids Open Books,” “More management,” “Highlights Dates and Times - Style (?),” “Relevancy of Pictures - Meaning,” and “Relevancy of Picture - Connection to students.” She narrated her thinking as she applied these tags.

Participant 2
Then we are going to say that this is ….pointing out… this is where the kids open books… compared to her.
[Types: “Kids Open Books”]
She also has to do more management, so I think I will put that in.
[Types: “More management”]
That just occurred to me so I think I will do it. Um… and then she highlights dates and times. Style. Then I am going to put in a “?” because she does not tie it back to the diary which initially set it up.
[Types: “Highlights Dates and Times - Style (?)”
And then [2 second pause] she also does a nice move of pointing out the relevancy of pictures for meaning.
[Types: “Relevancy of Pictures - Meaning”]
So I am going to write a tag that says “Relevancy of Pictures - Meaning” and then another tag that says for relevancy of pictures - what is it? Connection to students.
[Types: “Relevancy of Pictures - connections to students”]

> Cause that is the other whole thing. That is something that needs to be done in a lot of books because otherwise students don't care. It also helps keep their interests.

Participant 2's narration indicated that the segment's in and out-points reflected the term "picture walk," or to use her words, the "Actual Picture Walk." The other tags reflected phenomena that occurred within the segment. Therefore, the segment itself did not specifically mark any five out of the six tags. This use of multiple tags on one segment was very different from the way Participants 11 and possibly 3 illustrated using multiple tags to the same segment in order to balance findability and nuance.

This particular segment by Participant 2 illustrates very well not only the potential complications of user-generated segments and tags to mark meaning, but also how tags themselves can be misleading. Two of the tags applied to this segment begin with "Relevancy of Pictures" (e.g. "Relevancy of Pictures - Meaning," and "Relevancy of Picture - Connection to students"). Participant 2's comment that the teacher "does a nice move of pointing out the relevancy of pictures for meaning" and the tag itself, was actually misleading. During this portion of the featured video the teacher was not actually referencing the pictures in the book at all. As noted earlier, Participant 2 was not the only one to make this error. Such an error is understandable considering the fact that the participants had only watched the video once before and that they could not see the text featured in the video.[27] However, the featured video actually showed that the teacher was marking the place and date information on the page that accompanied each picture.

Participant 12 also misinterpreted the featured video in a similar way. She too created a misleading segment and tag. Her tag, "illustrates use of picture cue to determine season," was not too far from the cluster of "picture walk" segments in terms of placement on the video timeline.

[27] As explained in Chapter 3, a big effort was made to find a copy of this text for the participants to reference as apart of the study activity. Unfortunately, this was not possible.

However, it was misleading in terms of how it reflected on the featured video of practice. Participant 12's segment was an example where the interview data did not explain why she chose to mark this segment and use this language to describe it. It is noteworthy that the featured video involved very little emphasis on season. Most likely, with more data segments and tags, tags like this one, which appears to mark a phenomenon that either was not actually a part of the featured video or an element that most participants did not find salient, would be seen as outliers or noise in the data.

This discussion of the Tag Cluster: Picture Walk and the various ways that participants used multiple tags applied to the same segment to mark meaning concludes by examining the segment and tags made by Participant 5. Participant 5 made one segment and applied three tags to it. Those tags included: "important details- pictures, dates," "book preview," and "teacher allowed intermittent student stories." The interview data did not provide direct insight into her thinking behind this segment. However, examining the tag data in the context of what has already been deduced about how participants were understanding this selection of the video, it appears that Participant 5 was probably noticing the same phenomena as many of the participants who used the term "picture walk." Her first tag, "book preview" could be interpreted as an alternative way of describing the same portion of practice that others were calling a "picture walk." A picture walk is in fact a common and conventional form of previewing a book. Participant 3's second tag was "Preview." Participant 5's second tag was "important details- pictures, dates." It has already been pointed out that the featured teacher was drawing the students' attention to important information or "details" such as dates and locations. Here, Participant 5's tag references "pictures" and locations or place names, but as already noted, several participants made the same incorrect assumption that the teacher was pointing to pictures

when they watched this video. Participant 5's last tag associated with this segment was "teacher allowed intermittent student stories." This tag was descriptive of action taking place during the segment, rather than a similar term for a specific chunk of instruction, such as a picture walk. This analysis of Participant 5's segment and tags was only possible in light of what had already been put together through the segment, tag, and interview data of the other participants. Hotspot 5 shows how other participants may also be marking this same phenomenon in the video and using similar tagging language to that of Participant 5.

Tag Cluster: Read

Many tags contained some form of the word "read" or "reading." This is not surprising, given that the featured video captured small group reading instruction. Figure 17 shows that there are segments associated with tags containing the word "read" at multiple grain-sizes and throughout the video timeline. Figure 17 contains a cluster of very fine grain-size segments towards the end of the video that are not labeled with their tag information. These segments and their associated tags are presented in Figure 18. The distribution and variety of segments associated with tags that contain the word "read" suggests that "read" or "reading" happens throughout the featured video, which is also not surprising.

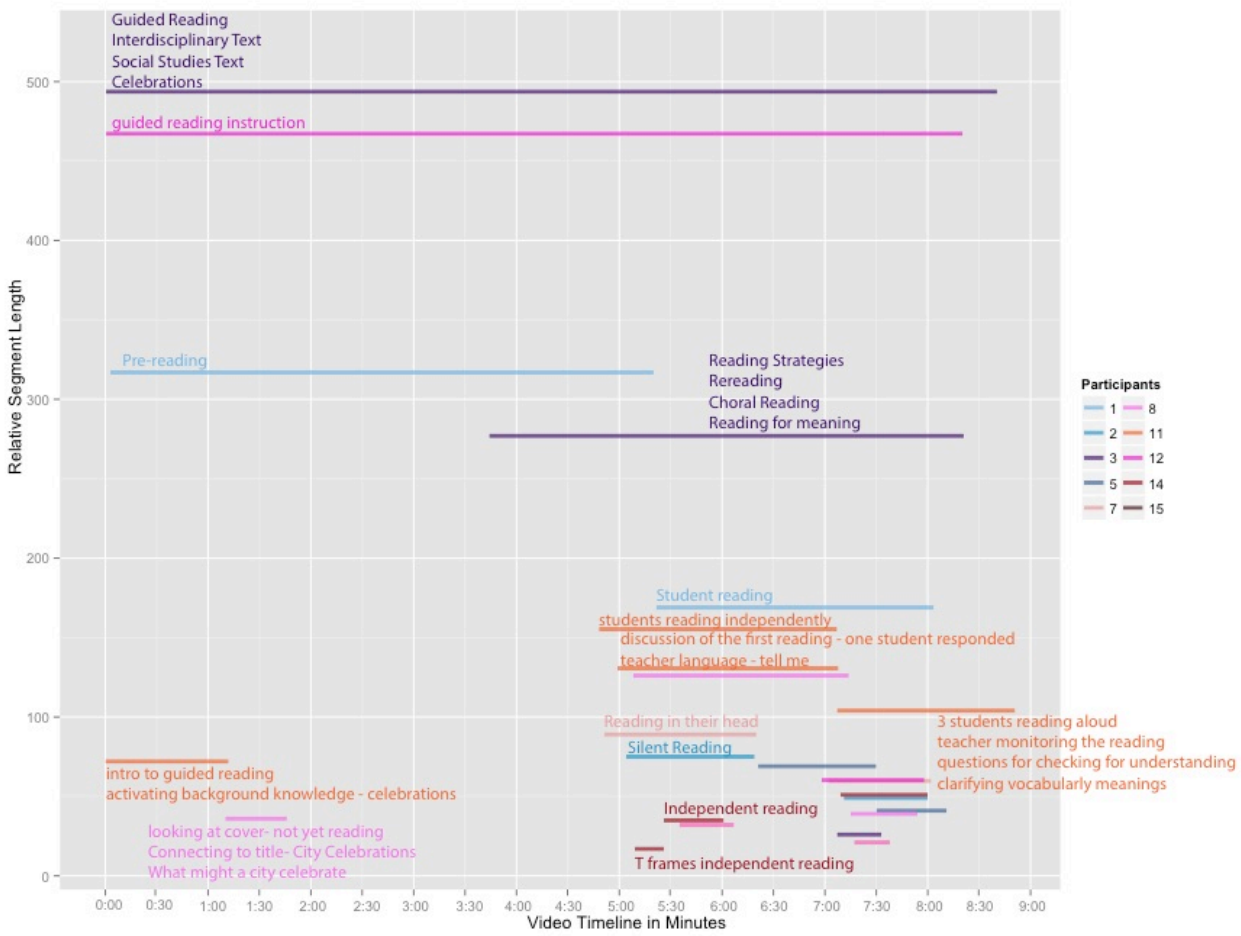


Figure 17: Segments tagged with the term "read"

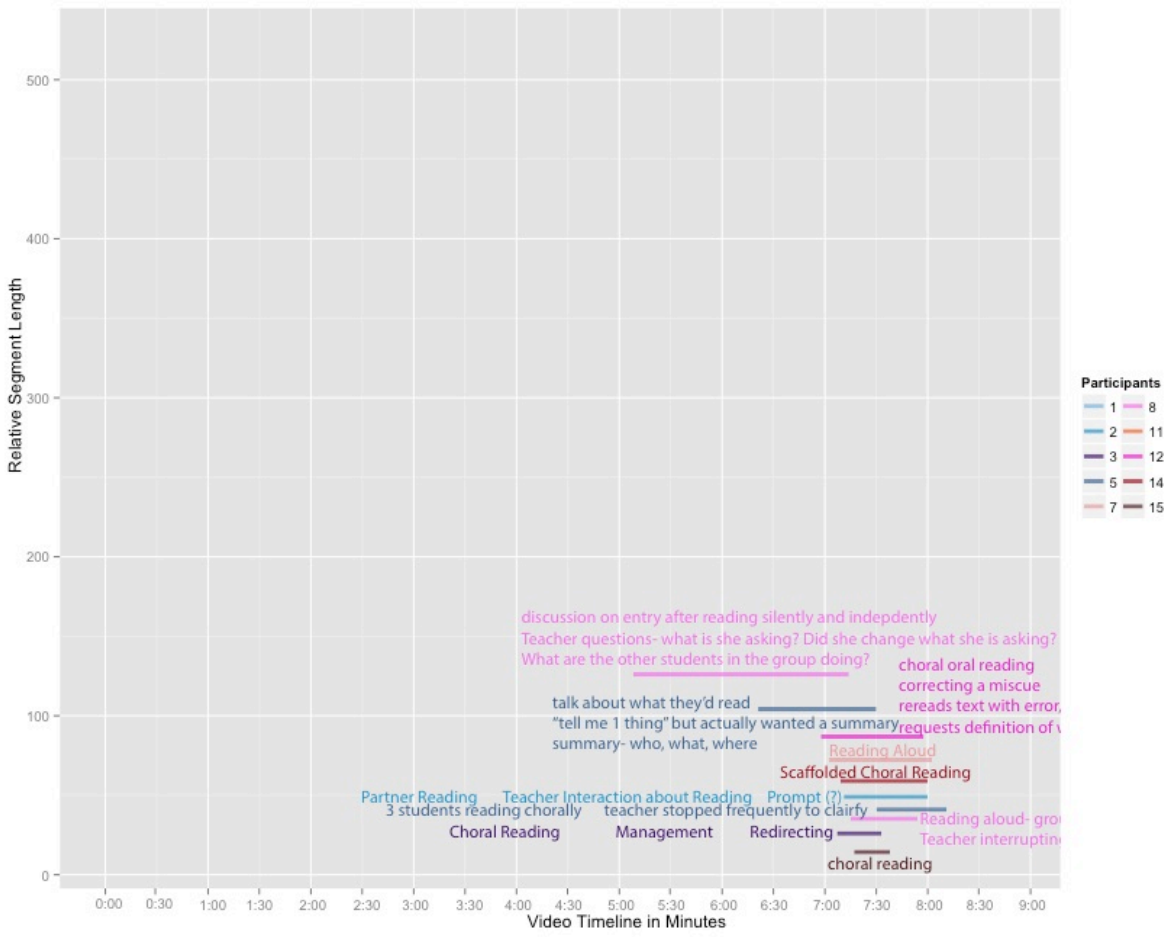


Figure 18: Small and very small segments tagged with the term "read"

Figure 18 shows a few different areas on the video timeline where similar segments and tags may be present. Looking generally across the data presented in Figures 17 and 18, segments and tags appear to be focused on marking three groups of phenomena. In this section, I will examine the segments and tags related to each of these three groups. The first form of phenomena appears to be a general description about the featured practice. The second appears to be what is happening *before* the students start reading the text. The third appears to be marking the different ways student read the text, for example, silently or all together.

The general description of the featured video appears to be marked by two large grain-size segments towards the top of Figure 17. Both of these segments are associated with tags containing the term "guided reading." Guided reading is a very common practice in elementary-level literature instruction. It is characterized by small-group reading instruction designed to provide focused supports to students' specific needs. In guided readings the teacher selects students who have similar needs, read at same level, or who are working on similar learning goals. The presence of these similar segments both associated with the term "guided reading" suggests that they are both marking generally that this video represents "guided reading instruction." The two large grain-size segments associated with "guided reading" and one other similar segment are explored in detail in the section on Hotspot 1, later in this chapter.

There are three other segments focused on the first three minutes of the featured video that appear to be focused on the action before the students start reading the text. Those segments were created by Participants 1, 11, and 8. Participant 1 applied a single tag, "Pre-reading," to his segment. Participant 11 applied two tags to her segment: "intro to guided reading" and "activating background knowledge – celebrations." Participant 8 applied three tags to her segment: "looking at the cover– not yet reading," "Connecting to title- City Celebrations," and "What might a city celebrate." Both Participant 1's and Participant 11's segments start at the beginning of the video (0:00). Here the participants seem to be marking a similar chunk of instruction—the instruction that happens before the students start reading—but Participants 8 and 11, at least, appear to be focusing on different parts and more specific parts of that chunk.

The third phenomenon that seemingly marks the different ways that the students read the text is represented by a large selection of segments and tags. This segment and data is represented in the Table 12.

Table 12: Segments Tagged with Forms of Student Reading

Participant #	Segment Time Code	Segment Length	Tag Containing a Form of Student Reading	Other Tags Applied to the Same Segment
1	5:21-8:03	2:42	Student reading	
2	5:04-6:19	1:15	Silent Reading	
2	7:11-8:00	0:49	Partner Reading	-Teacher Interaction about Reading -Prompt (?)
3	7:07-7:33	0:26	Choral Reading	-Management -Redirecting
7	4:51-6:20	1:29	Reading in their head	
7	7:02-8:02	1:00	Reading Aloud	
8	5:08-7:14	2:06	discussion on entry after reading silently and independently	-Teacher questions- what is she asking? Did she change what she is asking? -What are the other students in the group doing?
8	7:15-7:54	0:39	Reading aloud- group of 3	Teacher interrupting-comprehension
11	4:48-7:07	2:19	Students reading independently	
11	7:07-8:51	1:44	3 students reading aloud	-teacher monitoring the reading -questions for checking for understanding -clarifying vocabulary meanings
12	6:58-7:58	1:00	choral oral reading	-correcting a miscue -rereads text with error, one child corrects -requests definition of word “costume”
14	5:26-601	0:35	Independent reading	
15	5:35-6:07	0:32	reading silently	
15	7:17-7:38	0:21	choral reading	

Many participants marked when the students were reading and how they were reading. While several of the participants used similar language, such as the term “choral reading,” the segment data does not clearly line up. In fact, much of this segment and tag data conflict. For example, one form of reading is known as “independent reading” or “silent reading.” A third common descriptor for this way that students can read a text is “reading in their head,” as Participant 7 tagged. Looking at just those segments and tags in Table 14, a general part of the video is highlighted but there is quite a bit of discrepancy regarding interpretations of how long the students were reading independently and exactly when that happened.

Table 13: Segments and Tags Representing Independent Reading

2	5:04-6:19	1:15	Silent Reading	

7	4:51-6:20	1:29	Reading in their head	
11	4:48-7:07	2:19	Students reading	
14	5:26-601	0:35	Independent reading	
15	5:35-6:07	0:32	reading silently	
8	5:08-7:14	2:06	discussion on entry after reading silently and independently	-Teacher questions- what is she asking? Did she change what she is asking? -What are the other students in the group doing?

Two of the participants, 14 and 15, made similar short segments. However, Participants 2, 7, 8, and 11 all made longer segments roughly spanning the same part of the video. A general principle in crowdsourcing and big data is that with enough data the signal will clearly come through all the noise, to reference Nate Silver (2012). While this study represents a very small sample size, should the fact that more participants created a longer segment to represent this assumed same phenomenon give more weight to their segments as being more representative? Perhaps, that would hold true if this data set was larger and more complete. However, digging deeper into this example, it suggests that here specifically, the crowd is not smarter than the few. All the tags but Participant 8's appear to be marking the specific part of the video where the students were reading independently. Participant 8's tag suggests that she was marking the part of the featured video just *after* the students read independently. However Participant 8's segment overlapped with most of the other segments supposedly just marking the reading. The one thing that is clear here is that the segments and tags themselves were not clearly marking the action of students' reading silently.

The interview data shows that while Participant 11's tag was "silent reading," implying that the segment was referring to the time the that students were reading silently, she was actually marking both the time the students were reading and the discussion afterwards. After I confirmed that Participant 11 was purposely tagging both the portion of the featured video where the students were reading independently and the discussion afterwards with the one tag, "silent

reading," I asked Participant 11 to explain her choice. Participant 11 explained, "Because that's usually what happens. You read a little section, or you can, I mean you can read a longer section and discuss that section." Participant 11 then confirmed that she was chunking the instruction in terms of the portions of text the students read and their discussion of it. This chunking is different than simply segmenting off only the part of the video where the students were reading. In this way, Participant 11 was marking very much like Participant 8. However, Participant 8's tagging language made her intention more clear. It seems quite possible, though it cannot be confirmed by the data, that Participants 2 and 7 were also chunking the video in this manner and thereby creating longer segments. This small group of segments and tags shows that the participants were chunking the video to reflect their own mental model of how teaching practice unfolds. These chunks or segments do not always match-up directly with tagging language in expected ways, adding yet another complication to using segments and tags to mark meaning making. This pattern of behavior contrasts with that of Participant 6, who chose not to mark any forms of reading at all. While segmenting and tagging the video she purposely "skipped" over all of those sections: "Okay, okay I ah…[Scrolls through video] So I'm skipping all that part where they [referring to the students] are reading by themselves."

Another similar group of segments and tags are those that relate to "choral reading." As explained in Chapter 4, choral reading is a common and convention term used to describe the activity where a group of students read aloud in unison. Choral reading was a discrete tag used more than once. That discrete tag was applied three times, by three different participants.

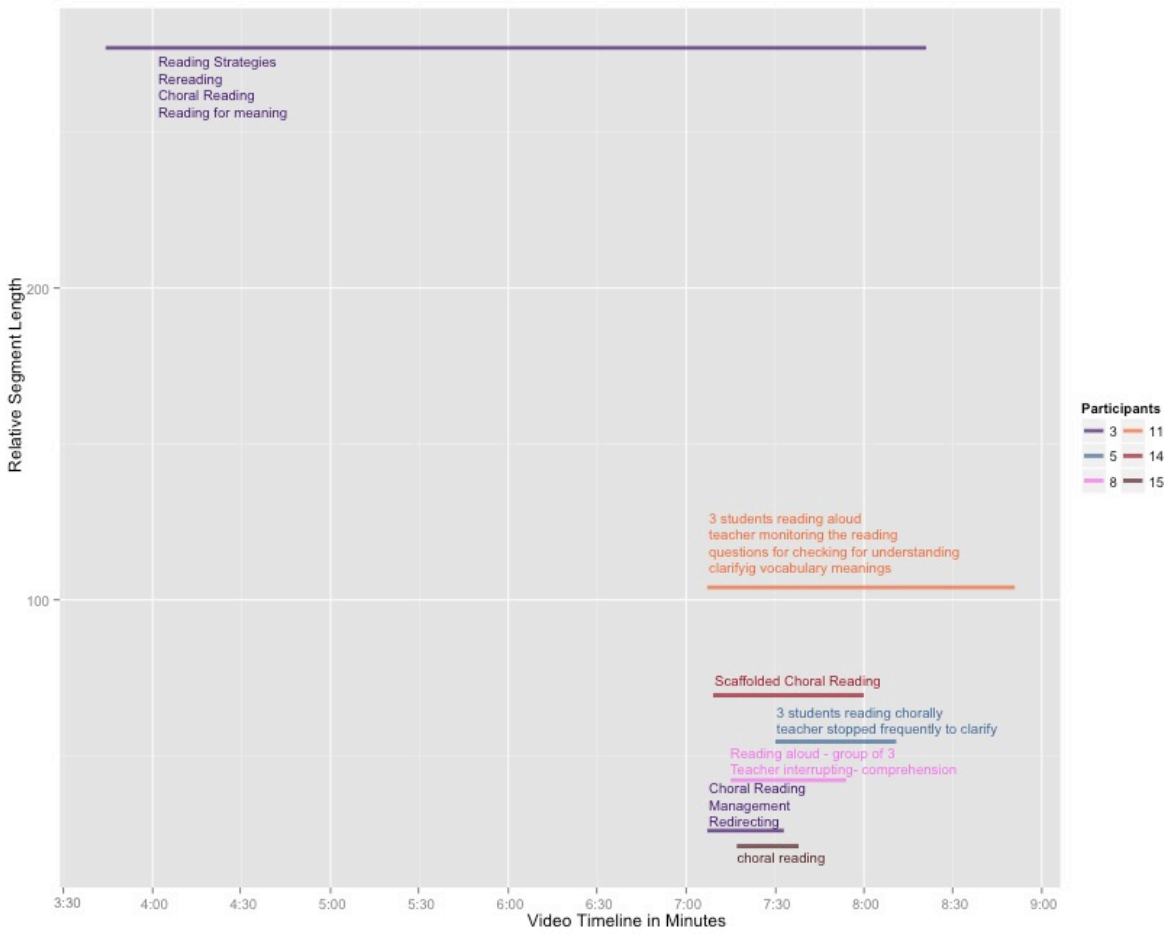


Figure 19: Segments tagged with the phrase "choral reading"

Two participants also created tags containing similar phrasing. These tags include “Scaffolded Choral Reading” and “3 students reading aloud- chorally.” Figure 19 also includes two more segments that have tags indicating that three students were reading aloud “3 students reading aloud” and “Reading aloud - group of 3.” These two tags describing three students readings aloud are very likely to be referring to the same phenomenon, given the similar tagging language and location on the video timeline. They are probably also referring to the same phenomenon as the conventional term, “choral reading,” based on its definition and the similar segment and tag data. The majority of these segments are clustered around the same part of the featured video.

Similar to segments tagged with independent or silent reading, the boundaries of the choral reading are not clearly marked across the participants. The interview data does not provide much insight into how participants were thinking about the boundaries of choral reading. During the interviews participants were generally more focused on the choice that the featured teacher made to have all of the students read chorally at this time. Most participants questioned this choice. Therefore, it seems that here, as with the silent reading example, participants were less interested in marking specifically when the students were reading and how they were reading. Instead participants appeared to be more focused on marking moments in the video where a specific action or interaction occurred that they found interesting, or more often questionable.

Tag Cluster: Management

The discrete tag "management" was used a total of three times. Participant 3 applied two of those instances. Participant 2 applied the other instance. Figure 20 shows that there were a total of five tags containing the term "management. " All of those tags were applied by pre-service teachers. The term "management" is generally used in education as shorthand for "classroom management." Classroom management is a very commonly used term to categorize and describe a wide variety of skills and techniques teachers use to keep students organized, orderly, focused, and productive during class time. When classroom management strategies are used effectively, teachers minimize the behaviors that impede learning for both individual students and groups of students, while maximizing the behaviors that facilitate or enhance learning. Effective classroom management is essential for high quality teaching.

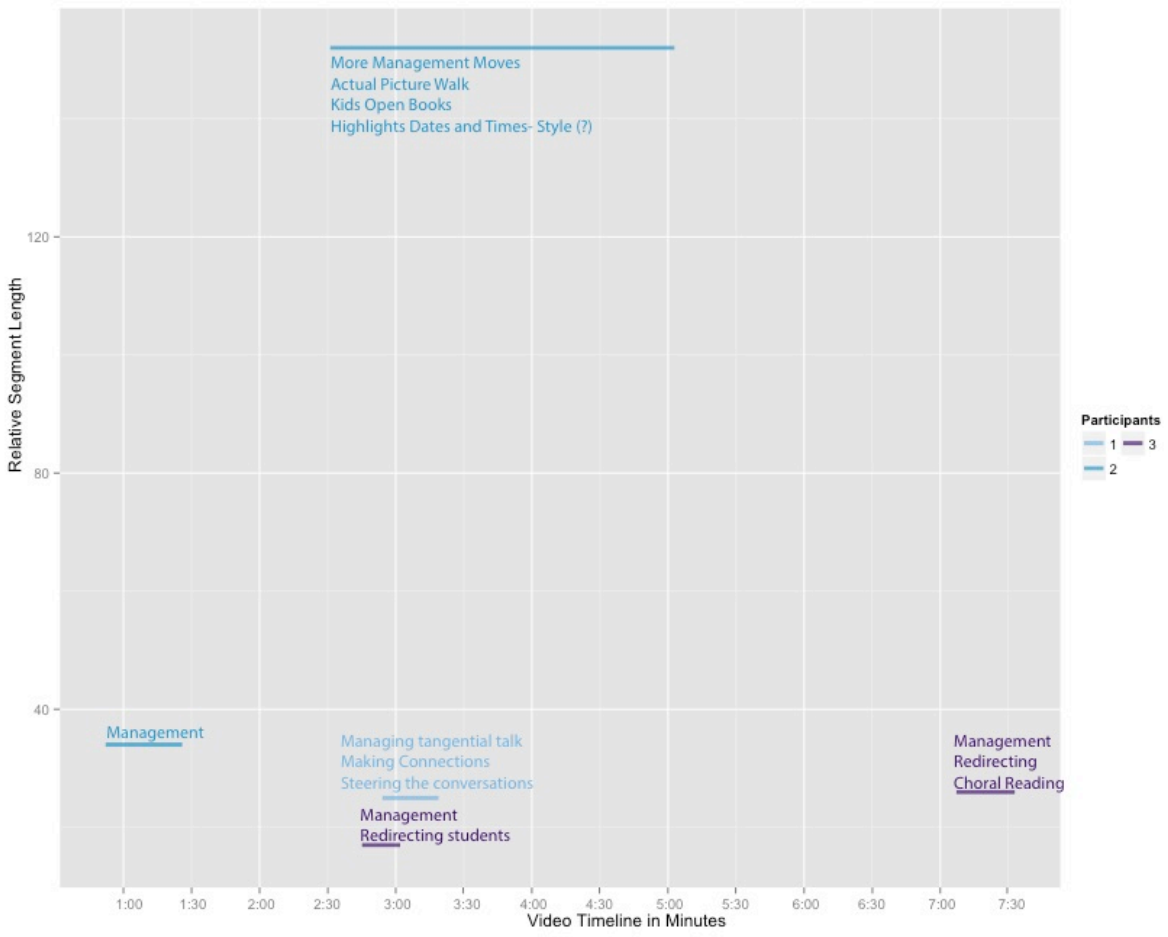


Figure 20: Segments tagged with the term "manage"

Similar to the tag cluster "making connections," there was not a lot of overlap between the segments containing the term "management." Most of the segments were on a very fine grain-size. The only segment that was not on the very fine grain-size level was Participant 2's segment that contained the tag, "More *Management* Moves." The previous section on the tag cluster "Picture Walk" shows that the boundaries of this segment only apply to the second tag she applied, "Actual Picture Walk." There other tags, including "More Management Moves" were descriptive of phenomena that Participant 2 noticed during this segment. Therefore, her larger grain-size segment could be considered an outlier or even noise in the data.

Participant 1 and Participant 3 each created a short segment, and these overlapped for a few seconds. Just looking at the two tags that both contain the word "manage" does not make it clear whether or not they are marking the same phenomenon. Both of these participants applied multiple tags to the same segment. In this instance, the application of multiple tags aids the understanding of what each participant was noticing in this part of the featured video.

When Participant 3 looked back on the segments and tags she created I asked her to explain why she chose to create two segments that both contained the tag, "Management," as well as other tags, including "redirecting." Participant 3 explained that, "At the time I was thinking, 'let me look for management or management moves.'" She continued to say that she specifically wanted to mark "examples of redirection in action" and make sure that someone searching could find this example with either search term. Here Participant 3 was demonstrating a high attunement to how her segments and tags would be used in the imagined social platform. She used multiple terms to increase the findability of her segment.

Participant 1's use of similar multiple tags applied to the same segment suggested that he intended to mark the same phenomena as Participant 3. Participant 1's segment had three tags. He applied them in the following order: "Making Connections," "Steering the conversation," and "Managing tangential talk." The commentary Participant 1 made while he was creating these segments and tags shows that, as with Participant's 2 segment, the first tag represented the action within this segment, while the subsequent tags represented phenomena that Participant 1 noticed during the segment.

> **Participant 1**
> I wonder if I can find that moment where I was talking about the way she kind of did the response to the girl's [referring to Student 3] comment.
> [Scrolling through the video until he finds the spot.] … So maybe making connections… [Types: "Making Connections"] is one but then also, maybe [Types: "Re-directing"]. Um…what's a good word for it? It's like steering the conversation [Deletes and the

types: “Steering the Conversation”]. I am also going to call it um… managing tangential talk. [Types: “Managing tangential talk”].

Participant 1’s commentary above shows that he had originally entered the tag language of “Re-directing,” which was the same language that Participant 3 used to tag her overlapping segment. Participant 3’s tag was “Redirecting students,” so by my criteria they would be considered discrete tags, but their similar language and proximity would have connected them. This parallel between Participant 1’s and Participant 3’s segments and tags brings to light several questions. If “re-directing” and “Redirecting students” can be considered functionally equivalent, is the term “Managing tangential talk” also equivalent? Or are these tags reflecting a hierarchy of terms where “management” is the overarching conventional term and all the other terms are more specific types of management, including some that might be functionally equivalent? Is there a direct connection to the act of “making connections” and “management”?

After Participant 1 finished the commentary above I asked him why he applied these three tags to the same segment. Participant 1 elaborated further on what he was thinking. Even though he had just applied the tags to the segment, he could not remember what terms he tagged with and at one point he got confused about his intentions.

Participant 1
One of the main things she [the featured teacher] is doing is having the kids making connections between ideas in the book and their own life so… I missed a lot of them sure, but I am tagging a lot of those moments… just as examples of that. And then I tagged it as um…can’t remember. [Participant 1 and the researcher talk for a minute in order to correctly identify the other tags Participant 1 had just applied to the segment.] …I don’t know exactly why I put those tags to it, but it sticks out to me because it seems like something that’s a part of the art of teaching and it was a moment at least that could be looked at, talked about the strengths or the move she made and then maybe even critique of how you could… you don’t just want to cut a student off in those moments but you don’t want it to go too far in term of getting off task. But I don’t know it’s almost maybe even that the second tag, I can’t even remember what it was but the second tag maybe helped me get to the third one.

This commentary from Participant 1 highlights several key things. Firstly, he was making it clear that one of his main purposes was to mark these moments of "making connections." Secondly, as Participant 1 reflected back on the tags he applied he could not remember exactly what his purpose was or why he applied some of them. He then pointed out that what he had marked with this segment was more of what he called the "art of teaching," or a moment that could be looked at in order to think about how to acknowledge a student's contribution without getting the conversation off track. Participant 1 was describing what Magdalene Lampert and colleagues refer to as a "dilemma of teaching" (Lampert, 2001) and in-the-moment decision making. Participant 1 appeared to be suggesting that he approached the segmenting and tagging activity with the intention of marking specific moments where the students were making connections, but what was actually more salient was the dilemma of teaching, that perhaps was marked inadvertently.

The remaining segment and tag to discuss is Participant 2's very fine grain-size segment "Management." With just the segment and tag data there is little that can be said about it. There are no other overlapping segments to examine it with and the tag itself is a very general term with no referent. However, through her interview data it becomes clear that Participant 2 was noticing a specific interaction between the teacher and one student that was also noticed by other participants. During her interview, Participant 2 talked about a specific interaction between the featured teacher and Student 1. First she narrated how the teacher distributed the books and while the teacher was talking, Student 1 was "doing his own thing." Student 1 had already opened the book and was turning through the pages.

> **Participant 2**
> He wants to participate so badly and then she puts his book down.
> [Plays video.]

> That might be a good thing to segment. O.K. I am going to mark that whole segments as "management" because both where she is kinda ignoring him or doesn't see him, but she does bring him back in. I had missed that earlier.
> [Types: "Management"]
> She asks him a question so that he would put the book down.

Here Participant 2 also appeared to be marking a dilemma of practice with her tag "Management." She is not articulating that in the same way that Participant 1 did, but her interview showed that her segment reflected not only the management move the teacher made, but also the whole interaction that Participant 2 was being critical of.

Summary of Tag Cluster Results

The tag clusters show both how the combination of segments and tags can be used to assess the likelihood that one or more segments are marking the same phenomena, and the complexity that would be involved in reliably determining what segments and tags are equivalent. The tag clusters "Prior Knowledge" and "Picture Walk" highlight what appears to be a tension participants feel when marking in a way that affords findability versus marking in a way that captures the nuance and complexity that they are noticing. The results from the tag clusters "silent reading," "choral reading" and "management" suggest that in some instances, the segment was used to mark the bounds of the given phenomenon in unexpected ways. While the terms "silent reading" and "choral reading" imply that participants were marking when and how the students read the text, the results show that many of those segments were actually marking the time that the students read and the discussion about that section of the text. Similarly, the tag "management" could be interpreted to signify the management moves that the teacher made. However, for at least two of the three pre-service teachers who tagged with the term

"management," it appears that they were actually marking a larger moment that could be considered a dilemma of teaching.

Revisiting Hotspots

In this section, I return to the same hotspots that were shown to be salient to the participants in Chapter 4, but explore them with more context and depth. In Chapter 4, Figure 6 is used to show the segment data plotted along the video timeline (the horizontal axis). It spreads out the segments along the vertical axis to show cluster segments of similar lengths. This visualization illustrates where participants created similar segments. Participants in shades of blue and purple are pre-service teachers, while teacher educator/educational researcher participants are represented by shades of pink and red. Below is Figure 21, which is a version of Figure 6 labeled to show the six hotspots that are examined in this chapter. While revisiting these hotspots, I explore them in the context of the relevant tag and interview data. Hotspot 1 provides insight into how the three participants think about the featured video clip as a whole and what high-level information embedded in that clip they see as important to call attention to. Hotspot 2 highlights the important limitations of many semantically based tag gardening techniques. Hotspot 3 highlights how similar segments' lengths and placement on the video timeline do not necessarily imply equivalence or relationship. Hotspot 4 shows how participants appeared to be marking meaning, not just through specific instances of segments and tags, but in relation to the other segments and tags that had been applied. Hotspot 5 shows that by looking at the segment and tag data together in the context of the other similar segments and tags, a different interpretation can emerge. Hotspot 6 illustrates a tension that participants felt while segmenting and tagging the video. Finally, the outlier segment, pointed out in Chapter 4, is discussed in its

larger context. The outlier segment highlights how this participant made certain discourse moves and employed a specific segmenting strategy in order to mark a problem of practice without appearing to be too critical.

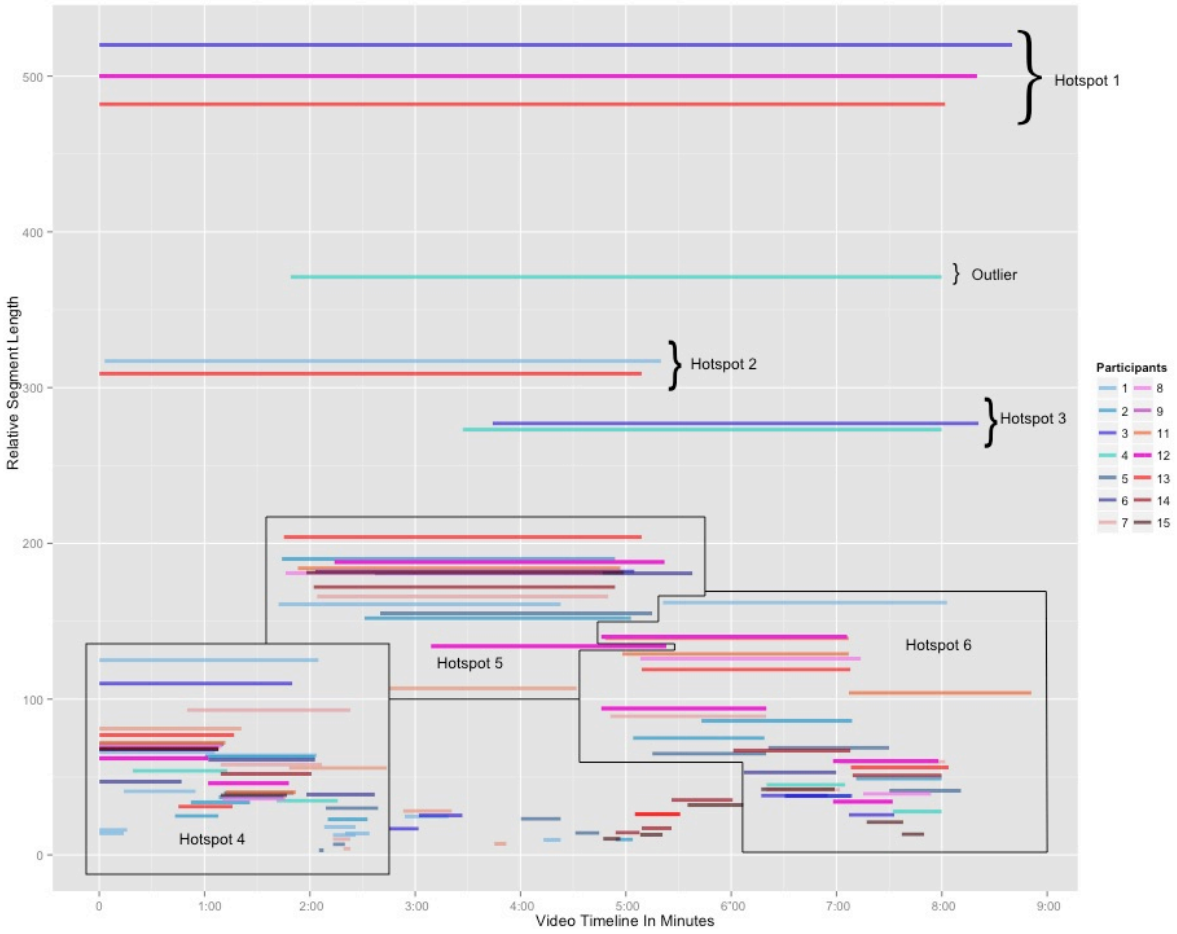


Figure 21: Segment length: Hotspots

Hotspot 1: Largest Grain-Size Segments

As explained in Chapter 4, three participants made a segment representing the entire video clip they watched for this exercise. Participants were instructed to focus roughly on the first eight minutes of the lesson and were given some choice in what moment they chose to stop the video clip. Therefore, the three segments were not identical. Table 14 shows segment data

along with the tag data. Segments on this grain-size are similar. They all serve to bracket and provide some information about the video clip they watched as a whole. However, it is interesting to note the different emphasis, language, and motivation each user demonstrates through his or her choice of tags.

Table 14: Hotspot 1 Segment and Tag Data

Participant #	Participant Group	Time of Segment	User Tags
Participant 3	Pre-service teacher	8:40	Guided Reading Interdisciplinary Text Social Studies Text Celebrations
Participant 12	Teacher Educator/Educational Researcher	8:20	guided reading instruction
Participant 13	Teacher Educator/Educational Researcher	8:02	Whole clip

Participant 13's tag "Whole clip" was descriptive of the segment rather then the instruction or content represented in the segment. This was the first segment and tag she created. Participant 13 narrated her thinking as she went through the process: "I'm going to write 'Whole clip.' This is just me practicing." Her comment suggested that she did not have an authentic purpose behind segmenting off the entire clip she watched, but that it seemed like a manageable way to start the activity.

Participant 12 used the tag "guided reading instruction" to broadly categorize the instruction represented in the clip. She said, "So this is a guided reading lesson, I would tag the whole experience as an example of a guided reading lesson." Both Participants 12 and 3 tagged with the term "guided reading"[28] to provide general information on the instruction represented in the featured video. However, Participant 3 applied three tags to this segment, whereas the other two participants only used one tag. After watching the entire video clip all the way through, but

[28] "Guided Reading" and "guided reading instruction" are considered discrete tags.

before beginning the segmenting and tagging activity, Participant 3 explained that because the lesson featured was interdisciplinary she wanted both subject matter categories, literacy and social studies, to be reflected in the segments and tags.

> **Participant 3:**
> [The lesson is] interdisciplinary, so I can see social studies and literacy being meshed together, that's something that I would definitely want to tag the entire video for. Also looking at, um…just in terms of content, the idea of celebration and the different celebrations clearly related to our society, our country, so again with social studies…

Here Participant 3 also made a connection to the "idea of celebration" as reflective of the lesson's content, but specifically of the content related to social studies. While she did not explicitly state that she used the tag "Celebrations" to refer to the lesson's content, her commentary above, taken together with her comments after completing the activity while reflecting back on her choices, supports that interpretation. After completing the activity and reviewing her segments and tags, Participant 3 pointed out how some of the tags she applied to short segments toward the beginning of the clip could have been applied to the whole clip:

> **Participant 3:**
> I tagged the first little bit as *city celebrations* or *national celebrations* and honestly I could have really called the whole chunk also about something related to celebrations, because technically the entire clip is about reading from a text; it refers to celebrations.

Participant 3's comments suggest that important information regarding a specific video record of practice includes type(s) of instruction featured (e.g. guided reading), subject matter domain(s) (i.e. mathematics, social studies, science, etc. and including a designation for "interdisciplinary"), and perhaps specific thematic content such as "celebrations" and "city celebrations," or related thematic content such as "national celebrations."

While only these three participants created segments and tags marking that the featured video was a "guided reading" lesson, every single participant noticed and referred to the featured

video as an example of "guided reading." Hotspot 1 provides insight into how these three participants thought about the featured video clip as a whole and what high-level information embedded in that clip they saw as important to call attention to.

Hotspot 2: Large Grain-Size Segments

Hotspots 2 and 3 both feature large grain-size segments. Hotspot 2 has only two segments, but they are similar in length and closely overlap on the video timeline.

Table 15: Hotspot 2

Participant #	Participant Group	Segment Length	Segment Time Code	User Tags
Participant 1	Pre-service teacher	5:17	0:03 – 5:20	Pre-reading
Participant 13	Teacher educator/educational researcher	5:09	0:00 – 5:09	Intro and previewing the text

The tag data reveals that both of these segments refer to the introduction of the text or the instruction that precedes the students reading the text. The two participants, who are each from different participant groups, are describing the same phenomenon. However, they use different words and phrases to describe this stage of the lesson. These two tags do not have any common words. They do both share the same prefix *pre*, but these two tags are so different in terms of the language they contain that they would not be linked together by any of the strictly semantically based tag gardening techniques discussed previously. The fact that they created segments that are so similar in length supports the claim that they are in fact noting the same thing.

This example highlights an important limitation of many semantically-based tag gardening techniques. There are many different ways to describe the same phenomenon. If the tags are linked purely on the basis of like words then they are likely to miss many terms that are also in fact related. The addition of the segment data calls attention to the possible connection

and equivalence. In a larger social platform (or larger study) where many users watch, segment, and tag the same videos, enough data can be collected and aggregated to warrant a claim, for example, that roughly the first 5 minutes and 15 seconds of the video is spent introducing the text.

Hotspot 3: Large Grain-Size Segments

Similar to Hotspot 2, Hotspot 3 is also made of two large grain-size segments. The two segments are also similar in duration and overlap on the video timeline. Both of these segments were created by pre-service teachers. The tag data shows that Participant 3 applied six discrete tags to this single segment, while Participant 4 applied one. Just as in Hotspot 2, Hotspot 3 has no common words represented by these tags.

Table 16: Hotspot 3

Participant #	Participant Group	Segment Length	Segment Time Code	User Tags
Participant 3	Pre-service teacher	4:37	3:44 – 8:21	Reading Strategies Rereading Choral Reading Reading for meaning Decoding Sounding out words
Participant 4	Pre-service teacher	4:33	3:27 – 8:00	inadequate inclusion

When Participant 3 started to add tags to this segment she began with "Reading Strategies." She then paused and added in the other tags, which are all more specific examples of reading strategies. In the interview she articulated her thinking behind these choices.

> **Participant 3:**
> I feel like there are lots of different terms that have come to mind when I viewed this chunk. There are lots of different reading strategies that are within that chunk. For this part, I just went with the bigger chunk instead of moving it to more finer grain size as you said. And I felt that this period captured things like *choral reading, repeated reading, sounding words out, reading for meaning*... so those reading strategies--they're all kind of similar reading strategies and I thought that would be helpful as a tag for the entire

chunk. Do you think...I wonder if I should go in and make it…actually highlight the exact couple of seconds where that particular...

Researcher:
What are you thinking…?

Participant 3:
Um…if it gets to have way too many tags, for one, and remembering if I wrote that consistently. But I think being able to watch this in a chunk will make more sense than individually seeing a thirty-second clip that shows just that particular video. I mean, it's a fairly short chunk, less than five minutes, and it just captures a range of strategies, so yeah, that would be more helpful, personally.

Participant 3 explained that this roughly five-minute chunk of instruction contained examples of reading strategies. She first tagged the segment with the overarching category of "Reading Strategies" and then she also applied a series of tags to the same segment that described the specific reading strategies she noticed. She explained and also questioned this strategy. She wanted to highlight the whole chunk of instruction because it contained examples of reading strategies, which implied a hierarchy. She questioned whether or not it would be more useful to segment off the specific examples of those reading strategies, but articulated that her thinking behind her decision was that she believed it would be more useful to see the larger chunk of instruction (which is still only about five minutes long, so not a big investment of time on the part of the viewer) rather than the shorter segments completely removed from their context.

The interview data suggests that Participant 3 would like to have a way of linking or nesting her tags in a way that would show relationships and/or hierarchy. That would enable her to clearly show that the whole segment refers to "Reading Strategies" and imply that it also features the nested or linked examples "Rereading," "Choral Reading," "Reading for meaning," "Decoding, and "Sounding out words." This would help her or someone viewing her tags find

and see specific examples of these reading strategies contextualized within the larger segment of instruction that she chose to segment.

Participant 4 approached this same chunk of the video in a very different way. He applied the single tag, "inadequate inclusion." He was not referring to the reading strategies that the teacher employed. Instead, he was making a general comment about how in his mind the teacher's moves in this section did not adequately include the students' thinking about the text. For him this segment was used to highlight a missed opportunity or area "that the teacher could focus on to learn from."

Hotspot 3 highlights two segments that closely overlap on the video timeline, but unlike those in Hotspot 2, are *not* referring to the same element of instruction. This points out how segments' similar length and placement on the video timeline do not necessarily imply equivalence or relation. The question of how we can accurately link together segments and tags that are related, while separating out what appear to be similar segments and tags but are not, is addressed in the discussion and implications sections.

Hotspot 4: All Segments 0:00 – 2:40

Hotspot 4 examines a chunk of the video where participants made many segments and tags at the medium, small, and very fine-grain sizes. Within this hotspot one can see what appear to be a few specific areas where similar segments are present. This raises a series of questions. Are these similar segments tagged with terms that reflect the same elements of practice? Or in other words, are the participants focusing on the same things in this part of the video? Are there any differences in the ways the participant groups segment and tag this hotspot?

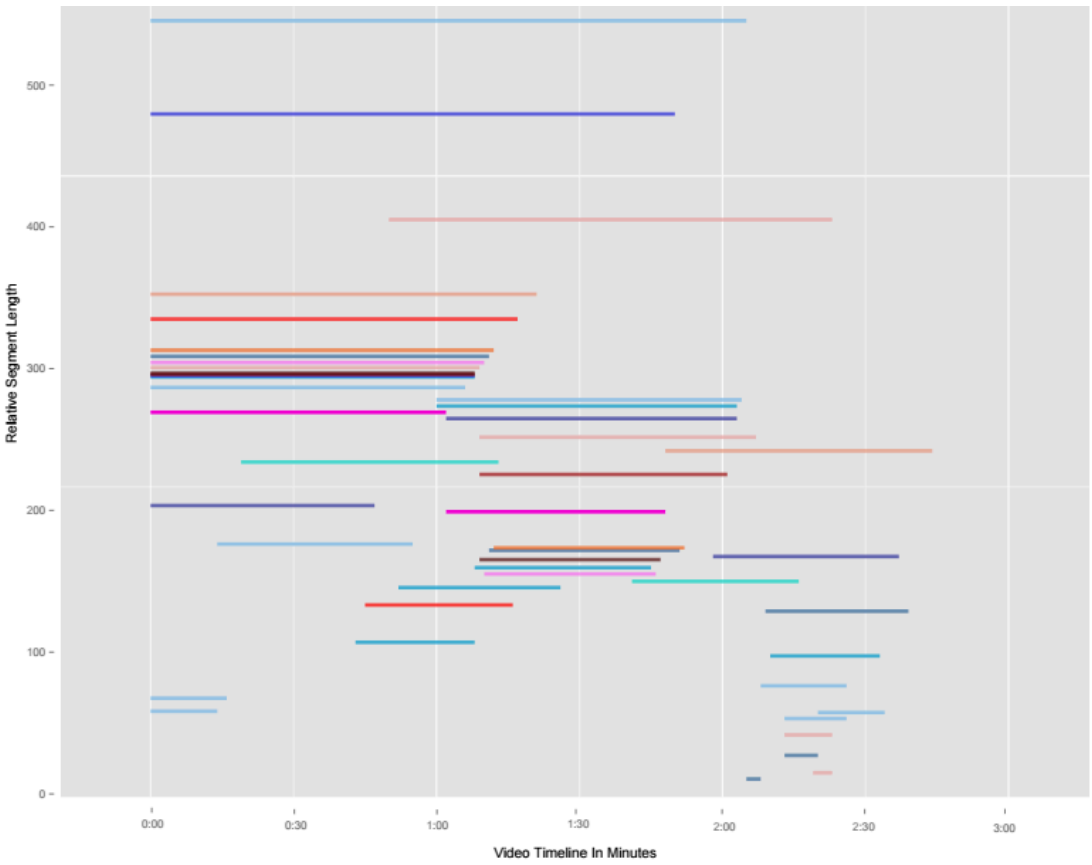


Figure 22: Hotspot 4 segments

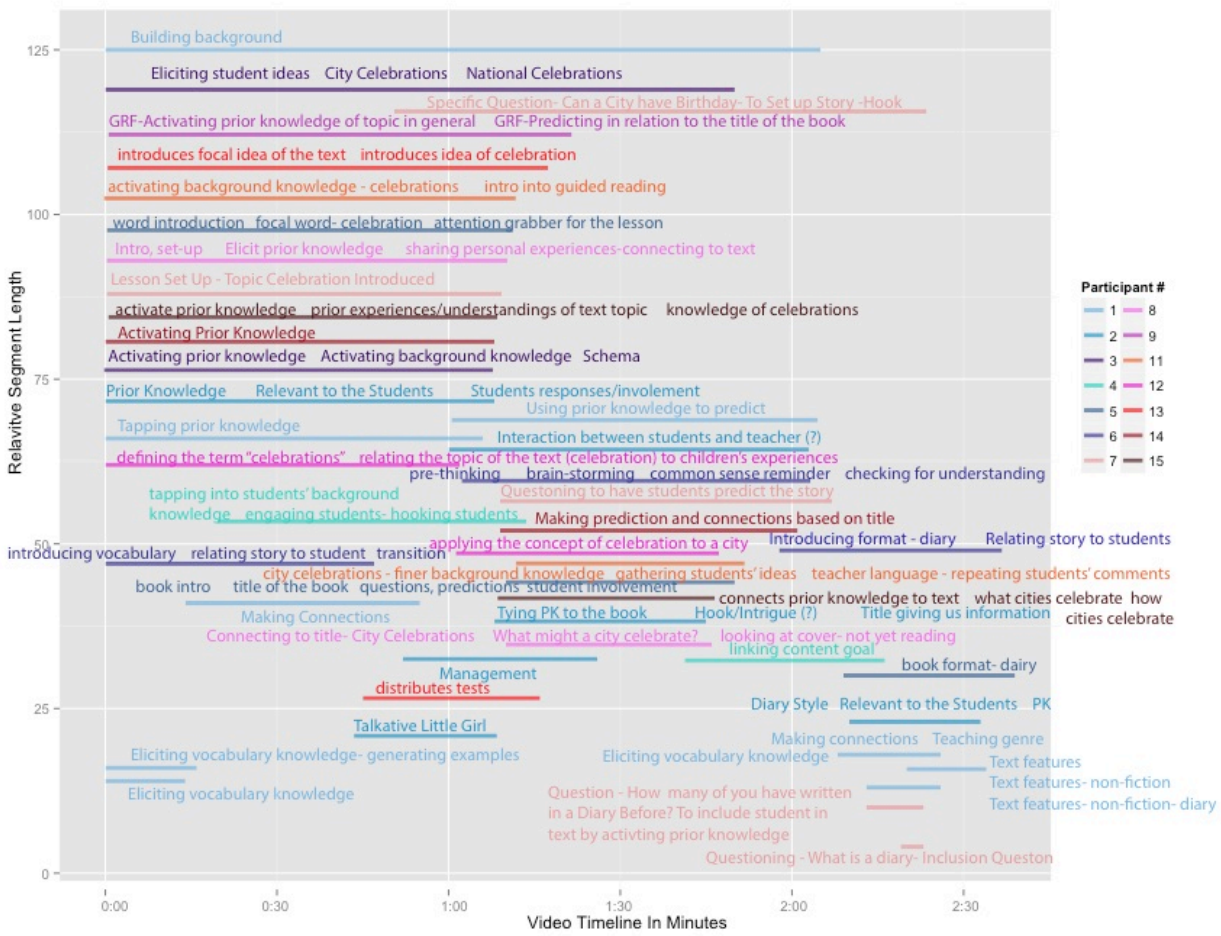


Figure 23: Hotspot 4 segments and tags

The segments and tags displayed in Figure 23 include many of the segments and tags addressed in the discussions of the tag clusters focused on "prior knowledge," "making connections," and "management." Hotspot 4 allows these segments and tags to be examined alongside the other segments and tags applied to this portion of the video. The results from Hotspot 4 help show how other segments that do not share common terms may be in fact marking the same phenomena and how by looking across the tagging language a more complex picture of this portion of the featured video emerges.

Table 17 shows the segment and tag data for just the segments that start at the 0:00 mark. This selection encompasses many of the tags that include the word "knowledge" or specifically "prior knowledge." The results from the prior knowledge tag cluster show that some participants used the conventional term "prior knowledge" in their tags, but they talked about what they were noticing in the video in terms of "prior experiences" in order to capture a salient nuance. In Table 17, all of the tags that do not contain "knowledge" are highlighted in yellow to point out the other types of meaning-marking related to this portion of the video.

Table 17: Hotspot 4 Segments Starting at 0:00

Participant #	Segment Length	Tag
1	0:00 – 1:06	Tapping prior knowledge
2	0:00 – 1:08	Prior Knowledge
2	0:00 – 1:08	Relevant to the students
2	0:00 – 1:08	Student responses/involvement
3	0:00 – 1:08	Activating prior knowledge
3	0:00 – 1:08	Activating background knowledge
3	0:00 – 1:08	Schema
5	0:00 – 1:11	word introduction
5	0:00 – 1:11	focal word- celebration
5	0:00 – 1:11	attention grabber for the lesson
7	0:00 – 1:09	Lesson Set Up – Topic Celebrations Introduced
8	0:00 – 1:10	Intro, set-up
8	0:00 – 1:10	Elicit prior knowledge
8	0:00 – 1:10	Sharing personal experiences-connecting to text
9	0:00 – 1:21	GRF-Activating prior knowledge of topic in general
9	0:00 – 1:21	GRF-Predicting in relation to the title of the book
11	0:00 – 1:12	activating background knowledge - celebrations
11	0:00 – 1:12	intro to guided reading
12	0:00 – 1:02	define the term "celebration"
12	0:00 – 1:02	Relating the topic of the text (celebration) to children's experiences
13	0:00 – 1:17	introduces focal idea of text
13	0:00 – 1:17	Introduces idea of celebration
14	0:00 – 1:08	Activating Prior Knowledge
15	0:00 – 1:08	activate prior knowledge
15	0:00 – 1:08	prior experiences/understandings of text topic
15	0:00 – 1:08	knowledge of celebrations

These tags collectively emphasize three things: 1) "celebration," 2) "introduction" and its abbreviation "intro," and 3) "relating" to students and/or their experiences. Pre-service teachers created ten of these segments while the teacher educator/educational researcher group created

sixteen. The higher frequency of segments suggests that teacher educators/educational researchers found this part of the video particularly salient. There does not appear to be a clear difference between participant groups in terms of what was emphasized.

Besides "prior knowledge," this portion of the video was generally marked as having something to do with 1) celebrations, 2) introduction, and 3) relating to the students and/or their experiences. These descriptors fit with the understanding of what participants were noticing in the discussion of Tag Cluster: Prior Knowledge. The examination of "prior knowledge" showed that some participants were making a distinction between prior knowledge and prior experience(s). These participants wanted to mark that the featured teacher asked questions that elicited stories from the students about their prior experiences with celebrations. The only descriptor in this section of segments and tags that does not fit neatly into the previous discussion of Tag Cluster: Prior Knowledge is "introductions."

The interview data sheds light on how participants marked and thought about this portion of the video in terms of both introductions and the other descriptors. Participant 2 narrated what she was noticing in this chunk of the featured video:

> **Participant 2**
> It did kinda follow the guided reading theme that we learned where you know you start with the (Pause 2 seconds) prepping background knowledge and then you go into the intro for the book and try to hook the readers in. Then she kinda veered off a little bit.

Participant 2 first identified the instruction as following the general outline of a guided reading lesson. She commented that she learned that a guided reading lesson starts with "prepping background knowledge" and then provides an introduction to the book. Participant 2 explained that a part of that guided reading structure is "hooking" the readers or making it relevant to them in some way. Participant 2's narration illustrated how different elements of tagging language found in this part of the hotspot relate to each other. It also provides insight into how she has

chunked this portion of the video. Interestingly, Participant 2's narration of her thinking process matches almost exactly the way Participant 15 imagined a pre-service teacher might think about and chunk this portion of the video (See Tag Cluster: Prior Knowledge).

Participant 11 also narrated what she noticed about the same portion of the video. Participant 11's narration also illustrates how aspects of the tagging language in Table 18 relate to each other. However, Participant 11's narration is less focused on how the featured video fits her structure for what a guided reading lesson is, and instead is more focused on what the teacher actually did.

> **Participant 11**
> Well this is obviously a guided reading lesson going on here, so I mean there, one thing you know like similar to what you were thinking about with the other video [referring to the TagMentor tutorial video] you could segment in terms of "Here's the introduction of the book to the children," "Here's the part where the kids are reading and she's supporting." And I assume there will be something else at the end so you could do it that way. Um, but I was also thinking about other things like um, well you could get into each of those sections and talk about like what did she, like what specific things was she doing in her introduction that sort of activated their background knowledge or got them thinking about what was going to be in the text. So, and when she read the title she furthered that by "How could a city have celebrations." So she's asking them again and maybe going a little deeper into making connections into their own lives to what was going to be in this story. And then she also gave them some more support by um, telling them what the genre text structures of that could be.

Participant 11 started by identifying that this instruction was an example of "guided reading," just as Participant 2 did. Participant 11 then talked about how she could and actually did segment and tag the video by first marking off the main structural elements (i.e. "Here's the introduction of the book to the children" and "Here's the part where the kids are reading and she's supporting"). She continued to explain that she could then dig deeper into each of those sections and mark what the featured teacher did, "what specific things she was doing in her introduction that sort of activated their [referring to the students] background knowledge or got them thinking about what was going to be in the text."

Participant 2's and Participant 11's interview data provides insight into how some participants were thinking about the ideas related to activating prior knowledge or prior experiences as a part of the lesson's introduction. These results speak to the ways participants appear to have been marking meaning, not just through specific instances of segments and tags, but in relation to other segments and tags that had been applied.

Hotspot 5: 1:45 - 5:09

Hotspot 5 represents a series of overlapping medium grain-size segments focusing around the 1:45-5:09 portion of the featured video. This hotspot contains many of the same segments and tags explored as a part of Tag Cluster: Picture Walk.

Figure 24: Hotspot 5 segments with tags

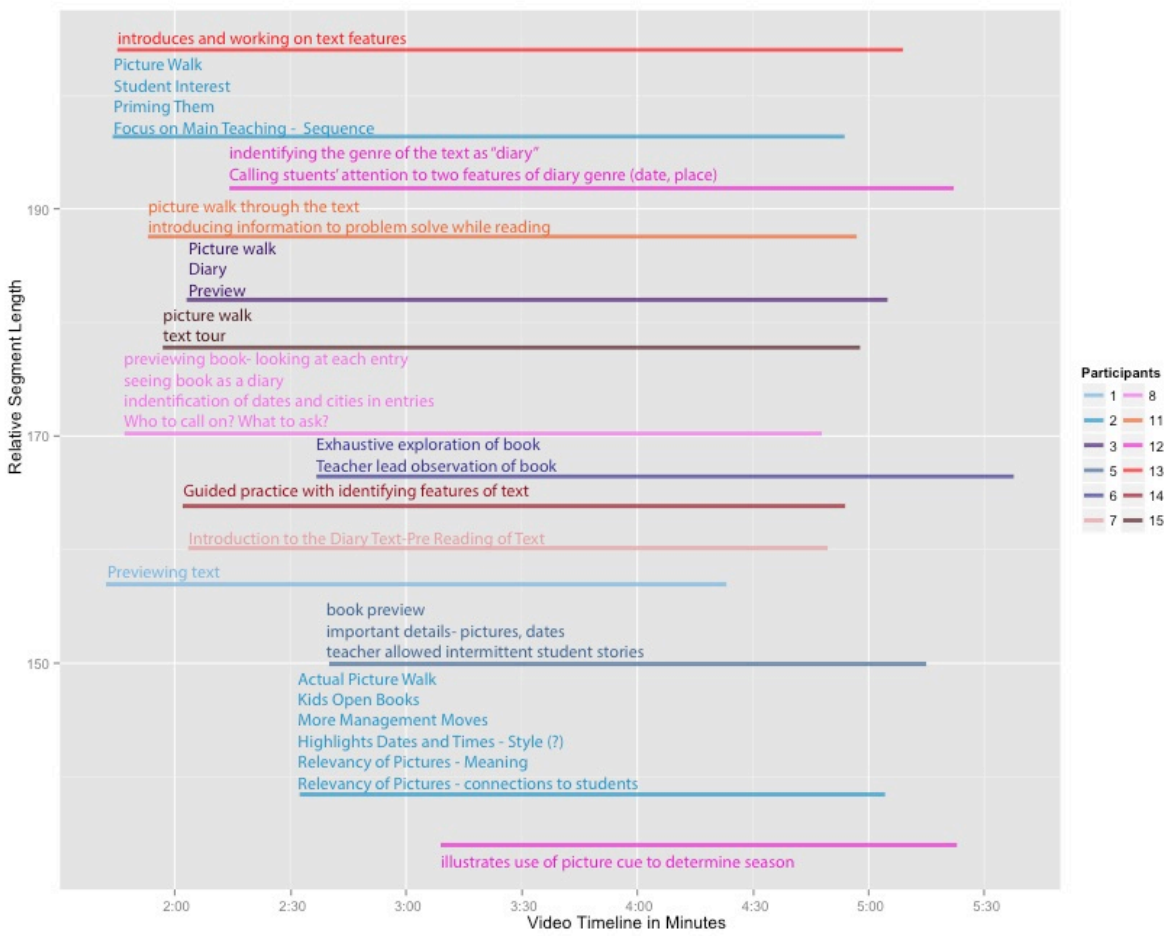


Figure 25: Hotspot 5 segments with tags

The Tag Cluster: Picture Walk shows that some of the segments and tags containing the term "picture walk" do not reflect the bounds of that phenomenon in the video. In those instances, the first tag applied to the segment represented the bounds of the phenomenon the participant was trying to mark, and the subsequent tags applied marked other phenomena that took place within that same segment. This, combined with a lack of clarity regarding when the "picture walk" or "Exhaustive exploration of the book" (as represented by Participant 6's tag) begins, helps explain why these segments that seemingly mark the same phenomenon do not align closely.

Examining the tagging language in this hotspot that does not use the term "picture walk" shows emphasis on "previewing" and "text features." Table 18 shows the segment and tag data that illustrate this emphasis.

Table 18: Segments and Tags Emphasizing "Preview" and "Text Features"

Participant #	Participant Group	Segment Length	Segment Time Code	User Tags Emphasizing "Preview" and "Text Features"	Other Tags Applied to the Same Segment
Participant 1	Pre-service teacher	2:41	1:42-4:23	Previewing text	
Participant 2	Pre-service teacher	2:32	2:31-5:03	Highlights Dates and Times - Style (?)	-Actual Picture Walk -Kids Open Books -More Management Moves -Relevancy of Pictures - Meaning -Relevancy of Pictures - connections to students
Participant 3	Pre-service teacher	3:02	2:03-5:05	-Diary Text -Preview	Picture walk
Participant 5	Pre-service teacher	2:35	2:40-5:15	-book preview -important details-picture, dates	teacher allowed intermitted student stories
Participant 6	Pre-service teacher	3:01	2:37-5:38	-Exhaustive exploration of book -Teacher lead observation of book	
Participant 7	Teacher educator/educational researcher	2:46	2:04-4:50	Introduction to the Diary Text-Pre Reading of Text	
Participant 8	Teacher educator/educational researcher	3:01	1:46-4:47	-previewing book-looking at each entry -seeing book as a dairy -identification of dates and cities in entries	Who to call on? What to ask?
Participant 12	Teacher educator/educational researcher	3:08	2:14-5:22	-identifying the genre of the text as "diary" -Calling students' attention to two features of diary genre (date, place)	creates the possibility of children developing a situation model for the text
Participant 13	Teacher educator/educational researcher	3:24	1:45-5:09	-introduces and working on text features -diary features	
Participant 14	Teacher educator/educational researcher	2:52	2:02-4:54	Guided practice with identifying features of text	

Table 18 shows that an equal number of pre-service teachers and teacher educators/educational researchers marked this portion of the video in terms of previewing and text features.

By looking at the segment and tag data together in the context of the larger hotspot of instruction it becomes evident that what had first appeared to be a collective meaning-marking of the featured teacher's use of a "picture walk" is actually more focused on the ways the featured teacher addresses (or does not adequately address) how the text features support the students' understanding of the text they are about to read. This, again, highlights the tension between marking a segment of instruction with the more conventional and more findable term "picture walk, " versus using more descriptive language.

Hotspot 6: 4:46 – 8:40

The final hotspot, Hotspot 6, focuses on the segments and tags that appear towards the end of the featured video clip. This hotspot contains many of the segments and tags examined in Tag Cluster: Read, specifically referring to silent reading and choral reading. Those tag clusters reveal that some of the participants were not actually using segments to mark when and how the students read the text, but rather to mark moments in the video where a specific action or interaction occurred that they found interesting, or more often questionable. If that interpretation is accurate and common among the participants then Hotspot 6 should reveal more segments and tags that suggest a dilemma of practice.

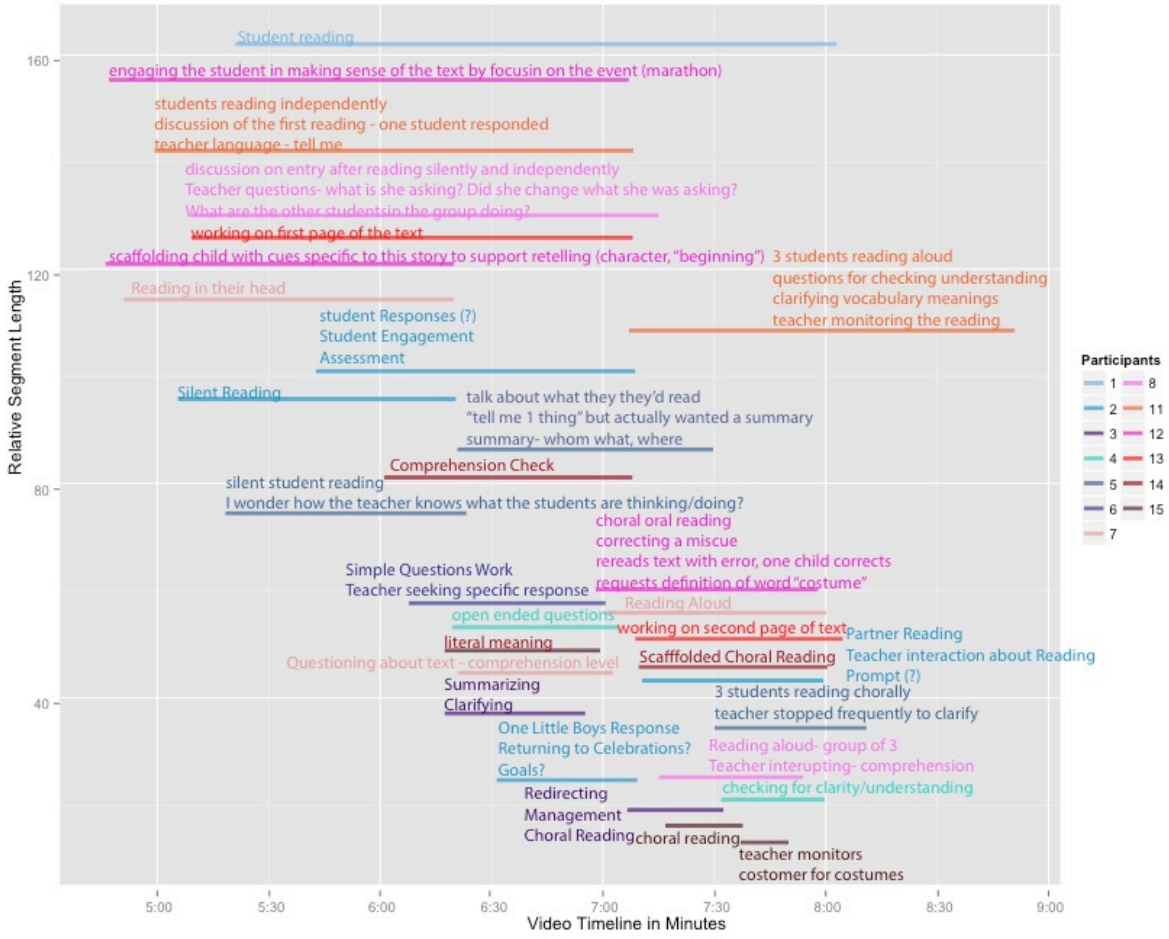


Figure 26: Hotspot 6

The tag data by itself does not clearly mark a dilemma of practice. Some tags could be interpreted to mark questions or criticisms by the participants. However, through the interview data we see that participants were in fact noticing a dilemma of practice, but they were reluctant to mark it and unsure as to how they would mark it using segments and tags.

In this portion of the video the featured teacher told the students to read a portion of the text "in their heads." The featured teacher told Students 3 and 4 (black twin girls) that they have to share the same book. The students then all read silently for a few minutes. During the period of silent reading Student 5 raised his hand high. The featured teacher said, "Hold on" and went

back to her notes. Student 5, with his hand still raised, quietly made a comment to the teacher that was hard to understand. The featured teacher responded by saying, "Yeah. Yeah, really." By this point the other students had finished reading and the featured teacher quickly shifted her focus and her body in the opposite direction. She looked directly at Student 1 and said, "Tell me one thing." Student 1 started to say that "she [referring to a character in the text] got dizzy" but he does not appear confident. Meanwhile Student 5 had his hand raised high again. The featured teacher, still just looking at Student 1 said, "Who is she? Just tell me about the beginning? Where were they and … just give me a short summary." Student 1 started to summarize what he read. The teacher interrupted him a few times to repeat some of the details he pointed out and then asked Student 1, "Who was in the marathon?" Student 1 answered and the featured teacher repeated his response while turning her attention back to her copy of the text. Then the featured teacher told Students 5, 4 and 3 to all read the next section aloud (i.e. reading chorally). These three students were all siting next to each other. Many participants pointed out that these three students were the African-American students.

All participants expressed some degree of tension in wanting to mark these aspects of the lesson that they were noticing, but at the same time *not* wanting to assume too much. After Participant 14 voiced some critique, concerns, and questions, she said that she would focus her segmenting and tagging on the literacy practice rather than the "racial piece" because she would feel "hesitant" to focus on that element of the video without more information.

> **Participant 14**
> I don't even know this woman. I would not want to critique her without fully understanding a little bit more. And in that particular dimension of teaching I think people are *especially*, I don't know, both sensitive and really trying to do their very best most of the time. So if I am going to critique someone I want to have a better sense of what kind of practice they engage in. But with the literacy structure I feel a little more, like I have enough here to be able to see very clearly how she's segmented it. So that would be… something I'd feel ready to do.

Participant 14 made it clear that the "racial piece," or the specific interactions between the teacher and the African-American students, was very salient, but was not something she felt comfortable marking using segments and tags. Participant 4, a pre-service teacher (and also a participant of color) also talked about how the interactions between the featured teacher and the two twin girls were puzzling. However, his commentary emphasized that he was trying to withhold judgment based on his limited information.

> **Participant 4:**
> …like the two girls in the brown [Students 2 & 3], there may be a good reason that she's giving them more attention and I don't know…I don't know her or the students…um…maybe they have high needs and they need to be seated together. It seemed like they were…something I just thought of too, I mean I thought of it, but I didn't tag it. They were seated together and they um…they seemed to be very connected in what they were doing like…almost like I wonder if they could do this independently…

Participant 4 explicitly stated, "I thought of it, but I didn't tag it." Here, participants were showing that when they noticed something that appeared to be problematic or that raised a flag for them in terms of ethical and equitable teaching practice, they also experienced a strong tension regarding whether to mark the instance and if so, how to mark what they are noticed.

Outlier

Focusing on the large and middle grain-size segments, Figure 21 illustrates what appears to an outlier. This segment, created by pre-service teacher Participant 4, spanned 1:49 – 8:00 (total length = 6:11). Participant 4 applied the tag, "increased support to specific students." When creating the segment and tag, he alluded to his intention to mark off the portion of the video that he talked about in the beginning of the interview as being a little "confusing" and "curious." After watching the chunk of instruction for the first time, Participant 4 started by expressing curiosity regarding Student 1. He quickly turned his focus to pointing out "good stuff" that he

saw in the lesson and then returned to his observation that the teacher in the video was not really engaging him.

> **Participant 4:**
> I am curious about one thing… One thing I… This little guy here [indicating to Student 1], it seemed like a lot of good stuff was happening there. Like a lot of open ended questions and tapping into children's background knowledge and making it relevant. And obviously she is gonna do a lesson about, ya know things like celebrations of our country or something… I wasn't sure where it was going, But it seemed like… I think this is human nature and I do it too… I might not be very aware of it, but when there's a group in front of you and you have students on your left and right you have to really make an effort to engage them and she really… I wanted to see if she'd engage him [returning to Student 1] more and she just turned to him right at the eight-minute mark. That was one of the things that I had wanted to see.
>
> I mean in nine-minutes it seemed like… he may have received like sixty seconds max of instruction like… I would have liked to see more like… and I know it's hard, you know, I've been there too.., and so I wonder… Was most of the attention going to these girls up front [indicting to Students 2 & 3, the twins] because they needed more? I am assuming that all of these students are at the same reading level. That's why they are at the same table, but it seemed like the two girls in brown were getting most of the attention and most of the questions and they were seeming like the most outspoken as well. You know a lot of times as teachers it's easy to go there you know instead of extracting or pulling information out of you know, the more quiet kids.

In the second part of the transcript, Participant 4 related the lack of attention or interaction with Student 1 by comparing it to amount of attention Students 2 & 3 received. While he was expressing some criticism of the teacher for not engaging all the students, he was quick to empathize with the featured teacher through discourse moves, such as "I know it's hard, you know, I've been there too." He also posed questions and suggested that there were probably reasons for the choices the teacher was making that an outsider view of the video would not know.

What is so interesting about this segment is that based on segment and data alone it appears to be an outlier. The segment, both in terms of length and location on the timeline, is unlike the others. The tag itself does not clearly fit with any of the other tag clusters. However,

examining this segment and tag in the context of the interview data, it becomes clear that Participant 4 is bracketing off the dilemma of teaching that most participants brought up during their interview and explained in Hotspot 6. So while the segment and tag do not fit with the rest of the corpus, Participant 4 is in fact highlighting the same problematic moment of teaching that was brought up again and again throughout the interview data.

Participant 4's interview commentary also illustrates how he made certain discourse moves in order to downplay his criticism. The results revealed in Hotspot 6 and this outlier show that the participants found many of the interactions between the featured teacher and the students to be "puzzling" or "problematic," but they were very hesitant to mark what they were noticing because of lack of information and context. What does it mean for the design of a social platform for educators to segment and tag teaching practice if educators are uncomfortable and sometimes unwilling to mark these types of observations?

Other Relevant Observed Behaviors

The study data also highlights some participant behavior that 1) helps further contextualize the results already presented and that are discussed further in the next chapters; and 2) future research and design work can build on and test more rigorously.

Participants were not able to remember exactly or confidently what tags they had created. This led to inconsistency in the tagging language and what the participants expressed as a lack of "clarity" and "focus." Most participants questioned at one time or another what parts of the video they had already segmented. Some wondered if there was a section of video that they had not already segmented and if so, what was happening during that part of the video. Almost all the participants demonstrated some inconsistencies regarding the tags they created. Most of the

inconsistencies were in terms of capitalization, plurals, and formatting choices. However, some participants used the same term or word inconsistently as well. Many participants expressed frustration regarding their own lack of consistency. Many participants also questioned their formatting choices (i.e. capitalization, punctuation, and plurals). They wondered what would be most useful to other users on the imagined social platform.

Many participants used paper notes to mark the time codes and things they found salient while they watched the featured video for the first time. For some participants, this act almost appeared to be a pre-segmenting and tagging activity. Participants commented that they wanted to use the paper notes to help them "jot down" their reactions and what they were noticing the first time they watched the video.

CHAPTER 6
DISCUSSION

Overview

This dissertation is an exploratory study that investigates how user-generated tagging and segmentation of a single video record of practice marks participants' interpretation or meaning making of that video. When I first conceptualized this study, I hypothesized that what participants segmented and tagged in the video would provide insight into how different participant groups (pre-service teachers and teacher educators/educational researchers) interpret the video record. The results show that tagging and segmentation do yield information as to the participants' interpretations of the video record, and these findings are further discussed in this chapter. These results add to the educational literature on what educators notice when watching video of another teacher's practice, and specifically how segmenting and tagging, as a specific from of annotation, can be used to mark that meaning making.

This study is designed to explore if and how segment and tag data might be linked and tag gardened in a way that would help surface educators' collective meaning making about a given video. The results from this novel and explorative study, along with substantial further research and collaboration with machine learning experts (also known as data scientists) has the potential to create an analytical tool that would aid in the creation of tag gardening techniques and algorithms specifically designed for the needs and behaviors of educators. These algorithms could then be used, tested, and refined in a widely used social platform that would provide different types of educators access to the video records of practice and tools that would allow

them to apply their own user-generated segments and tags to a given video. With enough users applying their own segments and tags over time, there would be enough data to detect and investigate patterns of behavior and meaning-marking. These patterns of salience and language use have the potential to provide insight into whether and/or how the field of education is developing a common language of practice. There is potential for such a platform to be used to explore whether and how educators are using such a language, such as the language of High-Leverage Practices, for example. Potentially, such a platform may help shed light on how specific communities, such as a school district, graduates of a specific teacher education program, or educators in Montessori schools use language. Such a platform may be able to track changes in what users are focusing on and what language they use to mark that meaning making over time.

The answers to the big questions posed above regarding the potential usefulness of segments and tags as a way to collectively mark meaning in the aggregate are *far* beyond the scope of this dissertation. This study shows that while segments and tags *do* mark participants' meaning making, interpreting that meaning making accurately is very challenging. In this chapter, I first further discuss the meaning the participants marked, or what participants noticed and how they used language to describe what they found salient. Here, I dig deeper into three things that participants noticed, but either found particularly challenging to mark or did not mark at all: 1) dilemmas of teaching, 2) salient phenomena that did not fit participants' frame or purpose, and 3) phenomena, in particular teacher moves, that were not represented by the video. I refer to this third category as "absent tagging." In the next section, I discuss the difference between the participant groups in terms of what they noticed and how they used segmenting and tagging to mark their meaning making. The following section explores three tensions that

participants experienced while applying user-generated segments and tags to the video. These tensions that emerged from the data are 1) findability versus nuance of language, 2) concerns about being critical, and 3) sharing in the social context and a community of practice. From there, I discuss some of the limitations of user-generated segmenting and tagging as a form of meaning-marking. I specifically look at one participant's individual strategy for segmenting and discuss how that strategy is problematic, or perhaps incompatible with the forms of tag gardening techniques discussed in this study. I also discuss some instances where segmenting and tagging may not be the best method to mark that specific meaning making. Then I discuss the limitations of the study's activity in terms of authenticity. From there, I discuss how a more authentic use of the user-generated segmenting and tagging might produce different findings, and the generalizability of these results. In the last main section of this chapter, I return to the idea of supporting practice-based teacher education through the creation of more systematic and integrated ways of looking deeply at teaching practice. I discuss some larger design implications and areas of further research regarding the development of tools and social platforms in order to support the complex work of making sense of teaching practice.

The Meaning Not Marked

There is already a significant body of literature examining what novice (pre-service) teachers and more experienced teachers (teacher educators/educational researchers) notice when watching video records of practice (van Es, 2011). Many of the behaviors demonstrated by the participants, such as the pre-service teachers forming general impressions of what occurred as compared to the teacher educator/educational researchers highlighting noteworthy events, supports that existing body of literature. While this study explores what participants noticed in

one short video of another teacher's practice, the focus is less on *what* they noticed, but the *relationship* between what they noticed and how they chose to mark it through the application of user-generated segments and tags. In this section I discuss a series of observed participant behaviors that point out some of the ways participants were *not* marking their meaning through user-generated segments and tags. First, I dig deeper into how some participants marked dilemmas of practice using a misleading tag language as shown in the sections, Tag Cluster: Read, Hotspot 6, and the outlier (See Chapter 5). I then discuss two other related segmenting and tagging behaviors demonstrated when marking a dilemma of practice: purposely obscuring tagging language and absent tagging. In the second part of this section, I discuss how the frame and purpose a participant may use influences what they choose to mark, but not necessarily what they actually notice as salient. Both of these sections highlight some of the limitations of segmenting and tagging as a form of meaning-marking. While there is discussion of these behaviors in light of participant group differences, group differences are the focus of the next section.

Marking Dilemmas of Teaching

The interview data indicated that many of the participants found some of the interactions between the featured teacher and the students to be "puzzling" or "problematic," but they were either hesitant to mark what they were noticing or they were unsure how they would mark such an interaction. In chapter 5, the results related to Tag Cluster: Read, Hotspot 6 and the outlier segment all illustrate examples of how participants wanted to mark the interactions between the featured teacher and the students in a way that captured a dilemma of teaching or in-the-moment decision making. For example, the results showed that some of the tags with the term "read,"

were not actually marking when the students were reading, as the tag suggested. They instead marked the interaction around the action of reading that the participant found interesting. Participants expressed uneasiness about marking any kind of interaction that could in any way come across as being overly critical of the featured teacher's practice. (This tension is discussed further in a later section of this chapter.) Some participants appeared to be purposely obscuring their tagging language so they could mark the salient event while not appearing to be critical of the featured teacher.

Participant 2, for example, applied the tag "Prompts(?)." Based on her narration, her tag at first sounds straightforward, but as she continued to explain her thinking regarding her use of the question mark, it becomes apparent that she was purposely obscuring her meaning-marking from anyone else looking at her tag.

> **Participant 2**
> This is where she pauses and checks for meaning. Or prompts for meaning. Really more prompts for meaning. I'm going to say, 'prompts.'
> [Types: Prompts (?)]
> I am also going to put a question mark and a parentheses around it because I am not entirely sure she… well, a) she didn't do it in the Fountas and Pinnell style and b) I am not entirely sure that is what she was actually trying to prompt for. …So yeah all my little parentheses question marks show more simple/judgmental thoughts. [Laughs] But they are hidden so it's fine.

Here Participant 2 explained how she used a question mark in parentheses throughout her tags to indicate a question or criticism. She pointed out that because her "judgment thoughts" were hidden, they were "fine." Participant 2's commentary reflects more complex thinking about the teaching than the word "prompts" by itself suggests. Without the interview data, Participant 2's method of obscuring her tags and the thinking behind it would not be visible.

Participant 8, a teacher educator/educational researcher, explained that she used the tag, "Who to call on? What to ask?" to mark the portion of the video where the featured teacher was only paying attention to the three African-American children. Participant 8 said, "I remember

thinking the 'What to ask?' [portion of her tag] had something to do with who was reading [the text aloud]." She went on to explain that this first question in her tag marked what she truly found salient: "I feel like she's only calling on certain kids." Participant 8 went on to explain that for her the second question in her tag, "What to ask?" marked, "I don't know what they're doing!" She continued, giving quite a lot of detail regarding what she was thinking about this particular interaction.

> **Participant 8**
> It's something to think about. Like she's spending two minutes solid with what feels just part of the group. What are the other kids supposed to be doing? What are they doing? What might they be doing? What does she want them to be doing?

Clearly, there is a lot more meaning making happening around dilemmas of practice than what the segmentation and tagging show. Participant 8, like Participant 2 was purposely *not* marking her assessment of this segment of the lesson.

Related to this observed behavior of purposely obscuring tags when noticing a dilemma of practice or forming a criticism is a behavior I refer to as "absent tagging. "All of the participants, at one point or another, commented on moves that the featured teacher did not make. Participants' discussions of these absent moves were always in the context of some form of questioning about the instruction, a dilemma of practice or a form of criticism.

In some of the pre-service teacher participant interviews a question emerged regarding how they could *tag* a specific phenomena in the video that was not there. Tagging, as several participants pointed out, marks what exists, is evident, or can be seen. Tagging is specifically a way of applying metadata to a given object. In the case of this study, the participants were adding metadata to segments of the video. However, if a specific teacher move was not in the video, several participants questioned where would they add the segment and how they would

tag it in a way that would indicate that the participants were marking what was *absent* from the record.

While all participants commented on moves that the featured teacher did not make in the video, pre-service teachers were more concerned with how to appropriately mark using tags than teacher educators/educational researchers. Five out of the six pre-service teachers initially said that they did not know how to tag a teacher move that was not there.

Members of the teacher educator/educational researcher group also commented on moves that they did not see the featured teacher making. However, as a group, they came at the problem differently. They focused less on the affordances of the technology and more on how they could frame their observation in terms of a question. Many of the teacher educator/educational researchers talked about how they were seeing these missing teacher moves as "missed opportunities." Participant 8 narrated that if she wanted to mark a specific teacher move that the featured teacher did not make she would have used a question such as: "What else might have she done here? What is she trying to accomplish, what might be some other ways to accomplish this?"

Most participants who tried to tag a phenomenon that was *not* represented in the video expressed that they were uncomfortable using the same blunt and critical language that they used when talking with me about the segment. They brought up issues of "not wanting to be too critical" and how they didn't feel it was "their place to be critical." Pre-service teachers kept coming back to an idea that tagging is about "what is there" and not well suited to marking what is not.

Interestingly, one out of the six pre-service teachers (Participant 4), did not have the preconception that tagging should be used only to mark what is there. Participant 4 also appeared

to be the least tech savvy of the group. He commented on the moves he did not see the teacher making and tagged one of those segments of the video as "missed opportunities." Interestingly, Participant 4 also demonstrated that he was less concerned with being seen as "critical" than his colleagues. He and all the pre-service teacher participants acknowledged that naming areas of strength in a video of a lesson, as well as areas needing improvement, was a big part of how video was used throughout his teacher preparation program. However, only Participant 4 expressed total comfort using segments and tags to provide that kind of feedback in a social tagging environment when giving feedback to peers.

The interview data reveals that when it came to marking dilemmas of practice, criticism, or moves that the teacher did not make, segments and tags did not adequately mark participants' meaning making. In fact, in some instances participants purposely obscured their tags so their authentic reaction to the video would be hidden from others. This could be seen as a reason why segments and tags do not accurately mark meaning making. I argue that even segment and tag data combined do not adequately mark this type of meaning making. However, that does not exclude the possibility (though even I am skeptical) that machine-learning algorithms could one day understand this type of educator behavior. Along with sophisticated algorithms, this would likely require other relevant information about the content of this video and possibly suggest something like: 1) this tag is likely marking a dilemma of practice, and 2) the dilemma likely represents where the teacher is only focusing on a portion of the students. Therefore, I think these very complex behaviors deserve further investigation.

In the short-term, however, educators, researchers, designers, data scientists, and anyone trying to apply segmenting and tagging as form of meaning-marking need to be fully aware of the current limits of this particular form of annotation. One important take away from this study

is: if the goal is to mark how educators are reacting to dilemmas of practice, segmentation and tagging is probably not the best choice. On the other hand, if the goal is to mark individual responses, the structural elements of a lesson, the moves a teacher makes using conventional terms, or to decompose teaching practice, then segmenting and tagging might be a good choice mainly because it has the affordance of scale. However, as discussed later in this chapter, in order for user-generated segmenting and tagging to effectively mark these types of meaning-making, perhaps specifically the decomposition of practice, well-designed user supports and scaffolding will be needed.

The Influence of Frame and Purpose on Meaning-Marking

Interview data shows that many participants noticed particular phenomena marked as salient by other participants' segments and tags, but did not mark those phenomena with segments or tags themselves. What should be obvious but could be easily overlooked by someone extrapolating from meaning-marking is that the lack of a marking does not necessarily mean that a participant did not notice something. Participant 13, for example, did *not* use the term "connection" in any of her tags. However, in her interview she talked about some of the same teacher moves that Participants 1 and 2 did (See Tag Cluster: Making Connections). Participant 13 noticed the same phenomena, but she had a different purpose in mind. Whereas the two pre-service teachers (Participants 1 and 2) marked the moments they saw the teacher making moves to help the students make connections to their "prior experiences," "prior knowledge," or "the text," Participant 13 focused on marking the teacher's questioning techniques. In the beginning of the interview, Participant 13 described how she was intending to segment and tag from that position:

Participant 13

> Then other times, she [referring to the featured teacher] would ask a question "Have you ever blah" and the kid like does the natural thing of starting to answer and she's kind of like, "Yeah, whatever." Right, so you might want to look at this from the standpoint of how is she um, how is she asking for those connections to kid's lives, and sort of what's the character tone of those and the interactions around them. Like does it do productive work instructionally? Or is it she asks but she doesn't really care and she doesn't really want you to answer and she like, it's not moving you, it's not moving you forward, right?

Participant 13's interview shows that she was in fact noticing how the teacher provided opportunities for the students to make connections to their lives, just as Participants 1 and 2 marked. However, since her purpose was to mark the teacher's questioning techniques, this particular phenomenon, which was clearly salient to all three participants, was not represented in Participant 13's segment and tag data. This excerpt illustrates how the frame and purpose a participant brings to the task affects what they choose to mark, but not necessarily what they notice. This is important to keep in mind when thinking about possible applications of user-generated segmenting and tagging of a video.

Several participants suggested that a teacher educator or educational researcher could look at the segments and tags that pre-service teachers made as evidence of what they noticed. If in this scenario the pre-service teachers were applying user-generated segments and tags for their own purposes, as in the study activity, then the person examining the segments and tags might make an incorrect assessment regarding what a pre-service teacher was actually noticing.

The fact that the frame and purpose that participants chose affected how and what they segmented and tagged, in itself, is not surprising. The purpose one has for looking at a video undoubtedly influences what one attends to. Educators have very different purposes for looking at a video record of teaching practice than, for example, a Muppet enthusiast, watching a Swedish Chef short video. The main reason for asking participants to articulate their frame and purpose even before they started the activity was to aid the interpretation of their segments and

tags. Participants were asked to imagine an authentic frame or purpose while they were engaged in the activity. They were also asked to imagine the activity in the context of a social community of educators. The results of this study show that participants found this challenging and that the activity felt inauthentic. This perceived lack of authenticity is discussed in depth later in this chapter. Some participants did not clearly articulate a single frame or purpose that they were using to tag the video with. Some participants claimed to be using one frame and purpose, but demonstrated a fluid movement between multiple purposes.

The fact that participants did not simply articulate a single frame and purpose and segment and tag the video accordingly brings up some important questions. 1) Was this behavior a result of the study design and different from the way participants would behave in an authentic online educational community of practice? 2) Does this behavior reflect the ways educators are especially attuned to and skilled at thinking about teaching practice with multiple purposes and frames in mind (Sato, 2002)? In that case, we would expect to see similar behavior in an authentic online educational community of practice. 3) Is it truly necessary to know an educator's purpose or frame in order interpret or verify marked meaning through the use of segments and tag data? 4) If so, is there a way to collect that data from users participating in an online educational community of practice in a way that would not be perceived as overly cumbersome?

Starting with the first two of the above questions, from this data set alone it is unclear whether this observed behavior of not sticking with a single purpose and frame was the result of the study design or reflective of how educators think about video records of practice. Later in this chapter I discuss specifically how Participant 15 talked about the segmenting and tagging activity as feeling inauthentic. However, this observed behavior required further and more

focused investigation. This data generally suggests three possible explanations as to why participants used multiple frames and purposes, often at the same time and/or moving between multiple frames and purposes with fluidity.

1. Asking the participants to determine their own purpose or frame for the activity felt inauthentic and contributed to a lack of focus.
2. This was the first time that participants had segmented and tagged a video in this way. Participants might have been unconsciously thinking about multiple purposes as they tried to figure out this new form of annotation. In other words, with more practice and experience segmenting and tagging video they might exhibit different behavior.
3. The educators in this study were experienced and attuned to thinking about how a video could be used for multiple teaching and learning purposes. Therefore, they found it natural to think about more than one purpose and frame at the same time.

Whether it is necessary to know a participants' frame and purpose in order to accurately interpret meaning-marking, at this point depends on if other data can be used to contextualize the segment and tag data (and if so, what other data). In this study, rich interview data was used to aid the interpretation of participants' meaning-marking. Since the interview data was so rich, I was able to interpret much of the participants' behavior even when their frame and purpose was not clear. However, I strongly suspect that purpose and frame play a greater role in educators' segmenting and tagging behavior than I was able to uncover through this study and that more focused research is necessary.

In theory, a body of research that uses rich interview data or some other form of triangulating participants' meaning-marking can eventually be used to create a set of algorithms that garden user-generated data in a way that marks meaning without relying on interview data.

In the section addressing the wider design implications of the study, I suggest a possible method for gathering information about a user's thinking process while segmenting and tagging that has the potential to be integrated into a user's authentic workflow.

In summary, when participants noticed a specific phenomenon but chose not to mark it because it was outside of their scope, their segment and tag data alone made that meaning-making invisible. This relates to an emergent pattern of behavior where some participants expressed a desire to mark phenomena, specifically teacher moves, which were not represented in the video. Many participants voiced an internal struggle regarding how they might "tag" something that that is not there.

Differences Between Participant Groups

This study highlights several differences between the ways participants in the pre-service teacher group and participants in the teacher educator/educational researcher group segmented and tagged this same video of teaching practice. From this exploratory study's data it is not clear whether these observed participant differences are merely a consequence of happenstance or whether they relate to genuine differences in the ways pre-service teachers and teacher educators/educational researchers segment and tag videos of another teacher's practice.

Pre-Service Teachers' Focus on Management

Pre-service teachers were the only participants to tag segments with the term "manage" or "management." This supports the general consensus in the literature that pre-service teachers focus on management (Eliam & Poyas, 2006; Gore & Zeichner, 1991; Wodlinger, 1990). However, the interview data shows that the teacher educators/educational researchers also paid

close attention to the teacher's management moves. The teacher educator/educational researcher form of marking of the same phenomena was very different than that of the pre-service teachers. As presented in the Tag Cluster: "Management" section (Chapter 5), the pre-service teachers marked small or very small segments of the video where the featured teacher made management moves. Most of those segments were marked very generally (i.e. Participants 3's tag "Management.") By contrast, the teacher educator/educational researcher group made many segments reacting to the featured teacher's management moves (or lack sometimes lack of management moves), but most of these tags were framed as either what participant would say to the featured teacher in the context of a coaching session or how the participant would present this chunk of instruction to a group of pre-service teachers.

Pre-Service Teachers' Coding-like Behavior

Pre-service teachers as a group *did* tag differently than the teacher educator/educational researcher group. No members of the teacher educator/educational researcher group used the same tag more than once, whereas four of the six pre-service teachers purposely used the same tag more than once. Those pre-service teachers were Participants 1, 2, 3, and 6. In Chapter 4, I point out the five tags that were applied to more than one segment by the same participant. These tags include "Relevant to the students," "Relating story to the students," "Activating background knowledge," "Eliciting vocabulary knowledge," and "Making connections." All of the participants who tagged in this manner were pre-service teachers. Participant 6 applied the tag "Relating story to the students" to two different segments. Participant 3 applied both the tags "Activating background knowledge," and "Eliciting vocabulary knowledge" to two different segments. Participant 1 applied the tag "Making connections" to three different segments.

Only members of the pre-service teacher group applied the same tag to more than one segment. In the section, Tag Cluster: Making Connections, I suggest that one possible explanation for this observed participant group difference might be related to the pre-service teachers' recent experience with open and closed coding. All of the pre-service teachers made a connection between the study activity and their recent course activity they had just completed that involved open and closed coding. Participant 2, one of the pre-service teachers who segmented and tagged in this way actually referred to her tagging as "coding" throughout her interview. When she was asked about the connection between the study activity and the process of open and closed coding she said that her tagging process was like open coding.

> **Participant 2**
> Because I got to make up the coding. So I came at this with my ELMAC teacher education slant, whereas I could completely see coming at this video with the interactions for one of those students or just to see does this student interact with any other kids? How often are they interrupting? When are they interrupting? So if I knew the students. So if this was my lesson I probably would have come in and used this for individual students. Trying to figure out what is making them click? What is not making them click? So that could be another use that I would actually do it for those problem kids. I won't do it for every kid. Cause that is a lot of time.

Participant 2's commentary is interesting. She said that the activity was like open coding because she "made up the coding," or in other words, she applied user-generated tags. Then she went on to explain how the frame and purpose she chose (i.e. her "ELMAC teacher education slant") directly impacted what she focused on, but she also narrated other frames and purposes she could have used to approach this video. In the first example that she narrated her frame was unclear, but her purpose was to mark and better understand how and with whom a particular student interacted. A second purpose she proposed was to mark when and how often students were interrupting the lesson. In this example, again, her frame was not clear. Was she focusing on student interruptions that take place in an instance of another teacher's practice because she was critical of that instance of practice? Or was she thinking that she might learn something new and

useful about interruptions, thereby, taking more of an educational researcher frame? For all of these purposes, Participant 2 implied that the reason she looked at this video record of practice in these ways was ultimately to better understand and improve teaching practice, though she did not explicitly say that, nor did she make it clear how her "coding" or tagging could aid that process. After that example, Participant 2 pivoted slightly and imagined a scenario where she was segmenting and tagging a similar lesson of *her own* instruction, thereby taking the frame of the featured teacher. Participant 2 made the point that if she knew the students she would use the video and TagMentor to focus on specific students, most likely "problem students." With this example, Participant 2 was being much more clear about the frame and purpose she would take when segmenting and tagging video. However, the connections she was making to open and closed coding was obscured. It is unclear if she was suggesting that the various purposes she had just listed were meant to be illustrations of when she would use open or closed coding.

Participant 4, a pre-service teacher who did not apply the same tag to more than one segment, articulated the similarities he saw between this study's activity and open and closed coding. He said that the activity was "definitely" more like open coding.

> **Participant 4**
> [I]t wasn't okay, [Participant 4] you are gonna watch this video and you are specifically looking for…I wasn't told…what to look for…um so this is open coding where I think anything is up for grabs and anything is…you know anything can be looked at or looked for and to me that's a better way to approach this just because things aren't missed it's not, it's not a narrow, not a narrow way to look at it, I think um…I think well it depends on the purpose, let me re-track what I am saying cause it…it kind of depends um…for my own purposes at this point…having a classroom for the first time I would probably approach it the first few open codes like "What's going on?" you know and maybe when I start seeing connect patterns, connecting those and maybe having a more closed approach then a more narrow and specific approach to…to…handle certain things that I've noticed. So…

Participant 4 expressed that in open coding the focus was broad so that the researcher could start to uncover patterns. He expressed that using open coding was how he would want to approach a

video of his *own* practice. Rather than choosing a specific purpose, like Participant 2, Participant 4 was suggesting that given the purpose of better understanding his own teaching practice he would want to start by open coding in order to get a clear understanding of "What's going on [in his classroom]?" Participant 4 then pointed out that when he was ready to connect patterns he might take "more of a closed approach" to investigate certain things that he noticed.

At this point in the interview, I asked him whether the experience of engaging in open and closed coding in class consciously informed the way he segmented and tagged. Participant 4 said that he was not consciously thinking about open and closed coding while he was doing the activity, but afterwards the connection became very apparent to him. I followed up by asking, "Did that connection change anything about your thinking about this or how you could do it or what you might do?"

> **Participant 4**
> It does. Since I approached it with the open-coding, I think had I approached it with the closed coding like…you know "How do…you know what's the difference between females and males in guided reading groups?" I would have really paid more attention to how many times the boys spoke versus the girls or…or what they were saying or so um….and some of the things would have over-lapped just like I pointed out like the one little guy who sat there for like three and a half minutes…so….but yeah it wasn't what I was looking for…so.

Here Participant 4 talked more concretely about the difference he saw between open and closed coding. He pointed out that if he were using closed coding he would pay greater attention to frequency. Assuming that all the pre-service teachers shared this general understanding of open and closed coding, could it be that Participants 1, 2, 3, and 6, who all demonstrated this coding-like tagging behavior, were trying to take a more closed coding approach? Participant 1 did say that his purpose was to mark instances where the students were "making connections."

While the interview data suggests that experience in coding data influenced the ways the pre-service teachers thought about the activity, it is unclear how it actually affected their

behavior. It is interesting that all of the teacher educators/educational researchers have ample prior experience coding data, but not one of them demonstrated this same behavior. When remarking on a similarity between segmenting and tagging the video and coding data, the teacher educators/educational researchers all acknowledged a similarity, but did not have much else to say about it. Participants 7 and 9 referenced how in some ways TagMentor was like Studiocode, a program for coding video, but did not express that their experience or knowledge of Studiocode impacted the ways they segmented and tagged the video. Participant 8 was the only participant to report that she had never engaged in open coding and that all her prior experiences involved closed coding. Participant 8 talked about an "ongoing tension" she felt when coding. Interestingly, in this selection she was referring to prior experience coding a video, but instead of using the verb "coding" she said, "tagging." Participant 8 explained that when she was applying codes that had already been developed there was some clarity on what the codes meant and referred to, even if someone disagreed with a particular application of a code.

> **Participant 8**
> I guess, I think it's an ongoing tension in tagging or identifying these kind of like…especially if you're using somebody else's tags like…you know….if they mean *this thing* by that, than I really only can….should tag when that thing happens like *that*. Verses [laughter] in this case somebody else might come along and say "Oh I don't agree that that's the intro or the set-up or whatever." So maybe that…this feels a little harder to me maybe [laughter] because…..when I know what the codes are; especially when you're really familiar with them……it's…….not always it depends on the code; like how…how much um…um…sort of [three second pause] implicit assumptions you need or combinations you need to sort of make a decision. Some things are just very obvious and they're easy to see you know "The teacher is talking from here to here", verses you know….a kid is you know…are they making a hypothesis or are they playing with an idea or are they actually that's what they really think or just that they're putting it out there for other people…you know. I mean….in some ways this is more open-ended…it's definitely more open-ended and some ways it feels….it's a different kind of work. I don't know actually that I would say it's harder. In some ways it's a little harder cause it's like "What am I gonna call that thing….like I've noticed something, but what is it that I have noticed and how am I going to name it?"

Participant 8 pointed out that in some ways closed coding was easier than the more "open" activity she was engaging in creating segments and tags. "It's a different kind of work, " she said. She articulated that she was not sure whether it was actually harder, but the challenge for her was captured in the sentence, "I've noticed something, but what is it that I have noticed and how am I going to name it?"

It remains unclear as to exactly why the pre-service teachers demonstrated this coding-like tagging behavior, while none of the teacher educators/educational researchers, despite prior experience with coding, tagged the video in this way. The interview data suggests that the pre-service teachers' recent experience learning about and engaging in open coding may have primed them to approach the segmenting and tagging activity in this way. Further research needs to be conducted to determine whether this observed participant difference is merely a consequence of happenstance or whether it relates to a genuine difference in the ways pre-service teachers and teacher educators/educational researchers segment and tag.

Pre-service teachers and teacher educators/educational researchers in this study demonstrated typical patterns of noticing, consistent with the literature (van Es, 2011). Pre-service teachers demonstrated a greater emphasis on how practice fit a mental model, whereas teacher educators placed more emphasis on what was actually happening in the practice, with specific attention to interactions. When talking about how they would segment and tag videos of practice, pre-service teachers as a group were much more likely to talk about how they would use segment and tag video of their own practice. Not surprisingly, teacher educators were more focused on how they could use segmenting and tagging or portions of the featured video in the context of teaching teachers.

Emergent Tensions

This exploratory study uncovers some emergent tensions that seem to have affected how the participants marked their meaning making through the use of segments and tags. These tensions include: 1) findability versus nuance, 2) concerns with being critical, and 3) a social context and community of practice. Data from this study alone, which was not designed to explore these tensions explicitly, can only provide a preliminary understanding of exactly how and why these tensions affected participants. It remains unclear as to whether these tensions are specific to participants sampled or if these tensions would be observed more generally.

Tension: Findability Versus Nuance

The results in Chapter 5 highlight that some participants seemed to be trying to balance findability, one of the main affordances of tagging, with nuanced and descriptive language that would mark the complexity of what they found salient. In the interview data, multiple participants noted a specific distinction between "prior experience," "prior experiences," and "prior knowledge." The segment and tag data does show an effort to describe more specifically what participants were noticing rather than simply labeling it with a conventional term. By describing what they were noticing in their own words, participants were adding more variability to the tag data; thereby, creating "messier data."

This tension between findability and nuance is discussed in the results in terms of participants defaulting to a more conventional term. Participant 15 said, "If you had asked me, 'how would you go about activating prior knowledge,' I don't think--it's always like asking kids, have you ever had a celebration?" Participant 15 highlighted that while the featured teacher is activating prior knowledge, the question she chose elicited prior experiences in the form of

stories from the students in a way that did not support their reading of the text. This comment calls into question the potential usefulness of marking a segment of instruction where a teacher demonstrates a "vague" or unfocused application of a particular teaching practice with just the conventional term.

In the context of a social platform for segmenting and tagging video records of practice, if users default to the conventional term when choosing what language to tag a segment with in order to increase findability, collections associated with that term will have a higher frequency of common tags and common words used in tagging language. However, this collection may very well also represent a diverse collection of segments that do not clearly reflect the conventional term. For example, a user could search for segments tagged with "activating prior knowledge" and receive a large collection of segments containing many examples that might not fit the definition of the term, "activating prior knowledge."

For some users' purposes this could be appropriate. Educational researchers might want to study the range of ways a specific and common practice is enacted. Administrators and those planning professional development might want to see which communities (e.g. particular schools in a district or teachers in one school teaching at the same grade-level) are focusing on specific types of practice as a way to get insight into what professional development to offer. This also might not be a problem if the user's goal was find examples of approximations of practice relating to "activating prior knowledge." However, this points out that in the case marking a decomposition of practice, it would be helpful to users and those trying to make sense out of the collective meaning-marking if there was a way to add metadata to the segments and tags that in some way indicated how well the practice contained in the segment fit criteria of the term.

The above discussion points out that when the goal is to mark nuance and complexity, tagging is the wrong form of annotation. More open and comment-like annotation is better suited to marking nuance and complexity. Participant 7, and to some degree, Participant 9, both created tags that were very comment-like. They were not labeling specific chunks of instruction with conventional terms. Most of Participant 7's tags summarized chunks of instruction or marked a question that the teacher had asked. For example, "Specific Question- Can a City have Birthday- To Set up Story - Hook" and "Questioning - What is a diary- Inclusion Queston."[29] Two of Participant 9's tags were actual questions that she would pose to her students if she were showing the video segment in the context of a course. These tags were: "GRF-Does the question accomplish an important purpose? Is time loss in an unnecessary opportunity to share personal stories or are the stories important to the understanding of the story or the motivation of the students?" and "Questioning Techniques-How might the teacher coached the student to correct the date without being directive (Is that March?)"

Does Participant 7's and Participant 9's tagging language reflect a lack of interest in findability over marking nuance? Given the ways other participants segmented and tagged, it is possible that Participants 7 and 9 were purposely obscuring their tags. In that case, they may have been truly marking more complex and critical meaning, which was not elicited through the interview. Or perhaps their tagging language reflected the purpose of thinking about how this video clip could be used to spark discussion in the context of one of the courses they were teaching. At the time of data collection, both of these participants were actively teaching pre-service teachers with video. Much of their commentary focused on how they used video to support pre-service teachers to reflect on and improve their own teaching practice. However,

[29] This spelling error is reflected in the data.

Participant 14 was also currently teaching pre-service teachers and using video to do so, and her tags were much shorter and more descriptive.

Tension: Concerns About Being Critical

Existing literature on how pre-service teacher make sense of videos records of practice and what they pay attention to shows an emphasis on classroom management, teacher interactions with students, and a tendency to be evaluative. The results from this study do not contradict that line of research, but they do paint a more complicated picture. As has already been pointed out, many of the participants used tags to obscure their criticism of the featured teacher, like Participants 8's use of the tag, "Who to call on? What to ask?" She used this tag to stand in for a complex series of questions and observations relating to the way the featured teacher interacted with the students. Pre-service teacher Participant 6 was less subtle. As she was segmenting and tagging the video she narrated her thinking: "I've been so frustrated watching… like 'okay, we gonna get there?' This is was so exhaustive [laughing]." Then Participant 6 entered the tag, "Exhaustive Introduction of Book." However, the interview data shows that while Participant 6 was engaging in the segmenting and tagging activity she was less focused on her tags being a part of a social platform. She and Participants 4 and 14 commented during their interview that after marking their user-generated segments and tags they would want to "revisit" and "revise" them so they reflect a balance of positive and constructive annotations.

Teacher educators/educational researchers, in particular, expressed the importance of demonstrating respect for the featured teacher and her practice. Participant 14 explained this tension.

> **Participant 14**
> And over time I felt uncomfortable about it, because there was lots of things you could compliment, but I was uncomfortable. It is a tension that always comes up. I want them [referring to the pre-service teachers] to be able to critique, but it's very difficult to

> critique people that we rely on as collaborators. …It's easier to critique one's own teaching.

At this point, Participant 14 talked about how she used video records of her own teaching with the pre-service teachers. This allowed her to model "self-critique" and as she said, "nothing's off-limits if it's me." Participant 14 expressed being "hopeful" that modeling for the pre-service teachers how to critique one's own teaching would help them to develop those skills, which they could use when looking at their own teaching. Then she turned back to critiquing another teacher's practice.

> **Participant 14**
> But any time I would talk about *another* teacher's practice I would always try to um, you know to kind of temper judgments and to always say, "This is one of the things I'm wondering… But of course I don't know…" I would be sure to say those things aloud. I guess because of two reasons. Out of respect for the teacher whether she is or is not present, and respect for collegial relationship.

Here, Participant 14 was explaining that she would position her judgments or critiques of another teacher's practice by acknowledging out loud what she did not know and phrase her observation in the form of a question. This behavior was connected with the ways participants, and in particular teacher educator/educational researchers, often tagged those segments that marked a dilemma of teaching using the form of a question.

As explained in the previous section, in at least part of the segmenting and tagging activity (and/or musing about it), Participant 1 was taking the role of professional colleague providing feedback on another teacher's practice within the school community. Interestingly, Participant 1 was the only participant *not* to voice directly criticism of the teaching practice featured in the video. In fact, he praised one of the same interactions between the teacher and Student 1 that most participants either directly criticized or called into question. The difference in interpretation of the featured teaching practice was surprising, given how well respected Participant 1 was as novice teacher. He was generally considered one of the strongest pre-service

teachers in the cohort. Why might he be interpreting the interactions captured in this video record of practice so differently than the other participants? One possible explanation is that he was consciously or unconsciously situating himself in the position as the colleague of the teacher featured in the video and confining his thinking to the social norms of not critiquing the practice of your colleagues (especially not those who are more experienced). This relates to the tension that Participant 14 articulated regarding critiquing the teachers they partner with.

This behavior is very interesting to think about in relation to the design of a social platform where educators would make their teaching public and available for others to apply their own user-generated segments and tags. Might we find that respectful norms of commenting on another educator's practice directly limit the way segments and tags can be aggregated to mark collective meaning making? If so, perhaps this tension can be moderated through the platform's design and features. A design consideration might be to provide educators with the ability to keep some segments and tags private, while making others public.

Tension: A Social Context and Community of Practice

Participant 2 was quite critical of the featured teacher's instruction. Throughout the interview, Participant 2 made multiple references to Katherine,[30] a literacy instructor whom she and the rest of the participants worked with in the beginning of their program, specifically on guided reading practice. For example, when Participant 2 created the segment that she tagged with "Summary Statement," Participant 2 said in a hushed tone, "I don't think she [referring to the featured teacher] did the best job summarizing." Participant 2 continued narrating her thought process in her normal voice: "At least in my head I was thinking – maybe I'll tag this too – go back to the initial purpose for reading the book. And in my head I was hearing Katherine say,

[30] Katherine is a pseudonym for the literacy instructor mentioned by the participants.

'O.K. now you have to give them your two reasons for reading." Here, Participant 2 was describing how her meaning-making process was directly influenced by her prior experiences learning about and practicing teaching a guided reading instruction. Participant 2's commentary suggests that she had so completely internalized these features and the specific moves necessary for an effective guided reading lesson that she could "hear" the feedback that Katherine would have given the featured teacher.

After completing the study activity, Participant 2 reflected on her segments and tags. At that point, I narrated back to Participant 2 some of the critical comments and connections to her experience with Katherine that Participant 2 had made in her interview, and asked her why her segments and tags did not reflect that meaning making. First, Participant 2 acknowledged that she was being "rather haphazard" about what she chose to segment and tag. She then talked through how her segments and tags did and did not reflect the connections she was making between the featured video and her thoughts about what makes an effective guided reading lesson.

> **Participant 2**
> I did tag a "hook." And I did tag "background knowledge," which we talked about with Katherine. And "picture walk" too, we did with Katherine. I guess [4 second pause] I am not entirely sure why I didn't. I guess it did not seem relevant at the time maybe because…such …maybe because people would only get that if they knew Katherine. It is not something that even other people would teach about guided reading or know about guided reading. It was literally just because guided reading is tied to Katherine.

Participant 2 was pointing out that marking more conventional and common parts of the featured instruction made sense in the context of a community of practice because those are the features that others are likely to understand. The specific meaning making she mentioned that related directly to her experiences with Katherine, such as "give them your two reasons for reading," would not be seen as relevant or meaningful to a wider audience.

Participant 5 also talked in her interview about how her segmenting and tagging strategies were tailored to communicate important information to her imagined audience.

> **Participant 5**
> So I …wanted the tags to be understandable for me and for *you* [emphasis added], so I figured if I just wrote 'celebration' I would know that that meant it was heavily emphasized during that first minute of the video, but I wanted you to know that I was picturing celebrations as the focal word for that chunk of the lesson. And when I said 'book format – diary,' same thing. I wanted it to be known that I was focusing on both the fact that they were talking about the format of the book and that the format of the book that they were talking [about] was the diary. And when I talking about the important details and have a dash to pictures and dates, those where the details that I was picking up as important during that time.

Participant 5's use of the word "you" in her commentary is interesting. By "you" she appeared to be referring directly to me (the researcher whom she was talking with). It is unclear if the audience she had in mind was me or others in the imagined online community of practice that the study was situated in.

These examples show a strong awareness of the audience who would be interpreting their segments and meaning. Generally, it appears that when making decisions about what and how to segment and tag, participants weighed multiple factors. They asked themselves: Who is the audience for this meaning-marking? How comfortable am I making my meaning making accessible to that audience? How likely is it that the audience would find my meaning-making useful or interesting? What tagging language can I use to mark my meaning while taking all of these factors into account?

Thinking about user-generated segment and tagging decision making in this way helps understand why Participant 8 would describe this type of meaning-marking as "hard" (See section on Pre-Service Teachers' Coding-Like Behavior). One question is whether this process is too hard. Is it too hard for participants to weigh all these factors while trying to keep in their

mind the phenomena they found salient in the first place? Could the process be so challenging that educators would not want to use this form of annotation? Further research into these tensions and how educators use segmenting and tools for video in a truly authentic context is needed to answer these questions. A better understanding of these tensions and educator behavior would allow scaffolds to be developed and designed into these tools so that users could more easily mark their meaning.

A Common Language for Describing Teaching Practice

In 1975, Dan C. Lortie published *Schoolteacher: a Sociological Study*, in which he observed that the field of education lacks a "framework for teaching, with well-defined common terms for describing and analyzing teaching." Pamela Grossman and Morva McDonald (2008) argue that this absence of a common and careful way of parsing the work of teaching to identify an "underlying grammar of practice" negatively impacts the work and learning of novice teachers, teacher educators, and educational researchers. Many notable educational researchers and teacher educators have been working across multiple institutions in order to investigate what it would mean to develop such a framework for teaching. With this emphasis on constructing a common language about teaching stretching across the shared space of teacher education and educational research, one might expect and hope to see evidence of a coalescence of domain-specific language used by pre-service teachers, teacher educators and educational researchers, especially within institutions where members have explicitly identified the decomposition of practice as a goal, such as the University of Michigan. Furthermore, given the particular education community in which this study is situated, with its strong emphasis on high-leverage practices and attunement to the field's lack of a common language, one might expect that

participants would segment and tag High-Leverage Practices. Or perhaps, the participants who work closely with High-Leverage Practices might tag specifically with related terms.

While the results from this study showed a very low frequency of common discrete tags, the tag data revealed that many participants used the same words or word-bases in their tags. While there were a few notable differences observed in terms of word choice between the participant groups, on the whole, this study observed little difference in the words applied by each participants group. This suggests that the participants featured in this study *may be,* in fact, demonstrating a shared and common language for describing and analyzing video records of practice in the context of the guided reading structure. However, the participants' whole tags (as opposed to just the common clusters of tags) illustrate the ways pre-service teachers and teacher educators/educational researchers as groups mark meaning making about the video differently. Many of these differences appear to be related to the tensions discussed in the previous section.

While many participants, especially those in the teacher educator/educational researcher group, brought up High-Leverage Practices during the interview, no one segmented and tagged the video with specific High-Leverage Practices language. Many of the tags and much of the conversation about the featured video of practice relate directly to the High-Leverage Practices; however, the High-Leverage Practices generally occur at a larger grain-size than participants were focusing on in this activity.

Out of the nineteen High-Leverage Practices, eight are relevant to the video of teaching practice used in this study. Table 19 pulls out those eight High-Leverage Practices and descriptions, taken from the Teaching Works website (www.teachingworks.org).

Table 19: HLP Relevant to the Featured Video of Teaching

1	**Making content explicit through explanation, modeling, representations, and examples** Making content explicit is essential to providing all students with access to fundamental ideas

	and practices in a given subject. Effective efforts to do this attend both to the integrity of the subject and to students' likely interpretation of it. They include strategically choosing and using representations and examples to build understanding and remediate misconceptions, using language carefully, highlighting core ideas while sidelining potential distracting ones, and making one's own thinking visible while modeling and demonstrating.
3	**Eliciting and interpreting individual students' thinking** Teachers pose questions or tasks that provoke or allow students to share their thinking about specific academic content in order to evaluate student understanding, guide instructional decisions, and surface ideas that will benefit other students. To do this effectively, a teacher draws out a student's thinking through carefully-chosen questions and tasks and considers and checks alternative interpretations of the student's ideas and methods.
5	**Recognizing participant common patterns of student thinking in a subject-matter domain** Although there are important individual and cultural differences among students, there are also common patterns in the ways in which students think about and develop understanding and skill in relation to particular topics and problems. Teachers who are familiar with common patterns of student thinking and development and who are fluent in anticipating or identifying them are able to work more effectively and efficiently as they plan and implement instruction and evaluate student learning.
6	**Identifying and implementing an instructional response to common patterns of student thinking** Specific instructional strategies are known to be effective in response to particular common patterns of student thinking. Teachers who are familiar with them can choose among them appropriately and use them to support, extend, or begin to change student thinking.
7	**Teaching a lesson or segment of instruction** During a lesson or segment of instruction, the teacher sequences instructional opportunities toward specific goals and represents academic content in ways that connect to students' prior knowledge and extends their learning. In a skillfully enacted lesson, the teacher fosters student engagement, provides access to new material and opportunities for student practice, adapts instruction in response to what students do or say, and assesses what students know and can do as a result of instruction.
10	**Engaging in strategic relationship-building conversations with students** Teachers increase the likelihood that students will engage and persist in school when they establish positive, individual relationships with them. Brief, one-on-one conversations with students are a fundamental way of doing this, as they help teachers learn about students and demonstrate care and interest. They are most effective when teachers are strategic about when to have them and what to talk about and use what they learn to address academic and social needs.
12	**Appraising, choosing, and modifying tasks and texts for a specific learning goal** Teachers appraise and modify curriculum materials to determine their appropriateness for helping particular students work towards specific learning goals. This involves considering students' needs and assessing what questions and ideas particular materials will raise and the ways in which they are likely to challenge students. Teachers choose and modify material accordingly, sometimes deciding to use parts of a text or activity and not others, for example, or to combine material from more than one source.
14	**Selecting and using particular methods to check understanding and monitor student learning** Teachers use a variety of informal but deliberate methods to assess what students are learning during and between lessons. These frequent checks provide information about students' current level of competence and help the teacher adjust instruction during a single lesson or from one lesson to the next. They may include, for example, simple questioning, short performance tasks, or journal or notebook entries.

It is not clear as to why participants focused their segmenting and tagging on a smaller grain-size than the High Leverage Practices. Does this behavior reflect the length of the featured video? If participants were tasked with segmenting and tagging an hour-long lesson, would they have made some segments and tags that align more closely with the High Leverage Practices? Are the participants in this study just more interested in examining teaching practice on a fine grain-size than the high leverage practices? Perhaps user-generated segmenting and annotation are not well suited to the task of decomposing teaching practice. Perhaps, with a different set of annotation tools and scaffolds, participants might demonstrate more decomposition of practice.

Another factor that might explain the lack of High Leverage Practices language might be the perceived audience. Participant 9's interview data speaks directly to this question. Towards the end of her interview, Participant 9 explained how she would use her own segments and tags to support a class of pre-service teachers. She commented that if she were teaching at the University of Michigan she would use High Leverage Practice language because she "would expect that my students would have already an established criteria for what would constitute high leverage practice." In contrast, she said that if she was teaching in a professional development setting outside of the University of Michigan she would probably say: "Is this effective practice? How could it be more effective?" While audience was not addressed through the interview, perhaps participants were imagining the social community of practice as being specifically outside of the University of Michigan, in venues where talk of High Leverage Practices is not commonplace.

Authenticity of the Study's Activity and Data

Many researchers have pointed out that studying teaching practice through video "affords the luxury of time" (Sherin, 2004) and that this slowing down the fast pace of teaching practice allows for explicit noticing and further analysis (van Es & Sherin, 2002). Video records of practice afford multiple viewings with different foci and can foster professional discussion among educators (Borko, Jacobs, Eiteljorg, & Pittman, 2008). In the context of this study, participants voiced how they *imagined* possibly returning to the same video, watching it multiple times with different foci, and the larger discussions they could have with others based on those segments and tags. But the segments and tags created in the study capture only what participants were able to do within the bounds approximately half an hour. Participants were able to watch the featured video as many times as they desired, but not a single participant watched the entire video all the way through more than once. This calls into question the authenticity of the study's segmenting and tagging activity and the data it produced.

Generalizability

This study is exploratory, small, and highly situated. Therefore, the results are not generalizable to larger populations, such as pre-service teachers or teacher educator/educational researchers, as collectives. Furthermore, the pre-service teachers in this study were considered "well launched beginners," demonstrating an attention to student thinking and specific moves teachers make to support student thinking, uncharacteristic of pre-service teachers as a general population. Developing this type of attention was an explicit emphasis throughout the pre-service teachers' preparation program. The research literature generally shows that pre-service teachers and novice teachers are less attuned to students' thinking and more focused on the teacher and

technical aspects of the classroom, such as classroom procedures and management (Eliam & Poyas, 2006; Gore & Zeichner, 1991; Wodlinger, 1990). This highlights one of the challenges of comparing what pre-service teachers focus on at different stages of their development. Not all cohorts or pre-services and their learning environments are comparable. Furthermore, the definition of a novice teacher is not easily standardized. While decades of research have shown a general trajectory regarding what educators focus on at different stages of their development, many of these studies are also highly contextual. Perhaps, with the development of a large and commonly used social platform that supports educators at different levels of their expertise and over time to annotate videos of teaching practice, we will be able to gain further and more specific insight into what different groups of educators find salient and the language they use to describe what they are focusing on. This dissertation suggests that a well-designed platform might also function as a tool for collecting valuable data that would aid in making comparisons across different cohorts of pre-service teachers, teacher education programs, institutions, and discourse communities.

In terms of generalizing the segments and tags participants produced to similar contexts, one of the major limitations of this study is the design choice to have the participants create their own purpose and frame, in lieu of conducting the study in an authentic context. Because this was an exploratory study with the aim of informing the future design of social platforms for video records of practice as opposed to testing an already existing platform, it made sense to ask participants to articulate their own frame and purpose rather than provide them with a standard and completely inauthentic one. However, through the rich interview data, it became clear that participants still felt that this was not authentic enough. They questioned whether or not the

segments and tags they created during the study were actually representative of their thinking and their likely behavior in the imagined social platform context.

If the study's goal was to understand how educators would segment and tag with a particular purpose or frame in mind in the context of an imagined social platform, then the choice to give participants a frame and collect data on how they behaved in that context might have resulted in narrower, but more authentic results. However, this explorative study, with its broader focus, produced insights into the ways many educators use videos of practice for multiple purposes and employ multiple frames at the same time. Clearly, further research is needed to unpack how segmenting and tagging video might be useful for educators, what design supports they would need, and if the user-generated data they created might provide another form of useful data to help researchers learn about teaching and learning.

Discussion of Possible Larger Design Implications

In this section, I use the findings of this exploratory study to discuss and ask more questions about the greater implications of designing tools to support practice-based teacher education. I first discuss how some of the observed participant behavior suggests specific design implications for segmenting and tagging tools. Next I discuss several possible applications of segmenting and tagging in the context of an online community of practice platform that could support new and potentially powerful ways of working with videos of teaching practice that emerged from the interview data. I discuss these ideas presented by the participants and the larger design and research implications. This discussion highlights both the potential value of further exploring and developing video annotation tools for meaning-marking and the limitations.

Implications for Design of Segmenting and Tagging Tools

While not the focus of this dissertation, the interview data did provide insights that inform design recommendations for video segmenting and tagging tools. The very small sample size and the fact this study was not designed to collect usability data reduces the generalizable validity of these recommendations. I present them here so that future research can build on these initial findings and test them more rigorously.

Avoiding Unnecessary Inconsistencies

Based on the fact that participants were not able to remember exactly or confidently what tags they had already used, segmenting and tagging tools should include a clear and constantly updating list of tags applied. Most participants at times questioned what parts of the video they had already segmented. They wondered if there was a section of the video that they had not already created a segment for, and if so, what was happening at that part of the video. Therefore, interfaces should include some clear indication of what parts of the video timeline have been segmented. Ideally, it should be clear where and when there are overlapping and multiple segments. These features described by the participants are a part of the inventive video segmenting and tagging tool interface, VideoTater, developed by Nicholas Diakopoulos and Irfan Essa (2006). A video showing how VideoTater works can be accessed at this web address: http://www.cc.gatech.edu/~nad/Projects/Videotater/index.html. Designers should consider and reference VideoTater's graphical user interface (GUI) design and usability research.

When creating tags, almost all participants demonstrated some inconsistencies in regard to the specific terms they used, capitalization, plurals, and formatting. Many participants

expressed frustration regarding their own lack of consistency. Tools and interfaces should support easy editing of tags as well as segments. Many participants also questioned their formatting choices (i.e. capitalization, punctuation, and plurals). They wondered what would be most useful to another user on the imagined social platform. One possible design solution is for the platform to create a common or suggested format for tags that includes the use of capitalization, punctuation, and plurals. As users enter tags they could be given suggestions in the form of auto-complete options that if selected would keep their tags consistent with the formatting choices of the majority of users.

Supporting Quick Marking

The study also revealed that many participants used paper notes to mark the time codes of things they found interesting so they would remember to watch it again. A segmenting and tagging tool could have some sort of feature affording users the ability to quickly mark a moment or a segment to return to later when they are being more deliberate about their creation of segments and tags.

Representing Hierarchy

As shown in Hotspot 3 (Chapter 5), Participant 3 created one segment to which she added the tag "Reading Strategies." Then she added a series of other tags to the same segment. Her interview data supports the interpretation that she was using the tag "Reading Strategies" to communicate to herself and imaginary users in a social environment that the specific chunk of instruction featured *reading strategies*. Her interview data confirms that the five other tags she applied to the same segment were examples of the specific reading strategies she noticed in the

segment: “Rereading,” “Choral Reading,” “Reading for meaning,” “Decoding,” and “Sounding out.”

She explained and also questioned this strategy. She wanted to highlight the whole chunk of instruction because it contained examples of reading strategies. She also wanted to highlight the specific reading strategies demonstrated in this segment. She questioned whether or not it would be more useful to segment off the specific examples of those reading strategies, but articulated that her thinking behind her decision was that she believed it would be more useful to see the larger chunk of instruction (which was still only about five minutes long, so not a big investment of time on the part of the viewer) rather than the shorter segments completely removed from their context.

Her discussion of the segments and their relationship to the tags she applied implies a hierarchy. Tags and tag representations are generally non-hierarchical.[31] However, her meaning-marking would have been more clear if there were a way for her to classify her tags in order to show the implied hierarchy. The interview data suggests that Participant 3 would have liked to have a way of linking or nesting her tags in a way to show relationships and/or hierarchy. Such a functionality would have enabled her to clearly show that the whole segment referred to “Reading Strategies” and imply that it featured the nested or linked examples “Rereading,” “Choral Reading,” “Reading for meaning,” “Decoding, and “Sounding out words.” This would help her or someone viewing her tags find and see specific examples of these reading strategies contextualized within the larger segment of instruction that she chose to segment. Other participants (Participant 1, 2, 7, 9, and 13) also demonstrated that their meaning-marking of the featured video involved a hierarchy that could be represented through segments and tags.

[31] While most tags and representation of tags, such as tag clouds, are non-hierarchal, some algorithms such as the work by Song, Qiu, and Farooq (2011) are designed represent hierarchy and specifically “1) the similarity between different tags, and 2) the abstractness of tags.”

Autocomplete Function

Towards the end of his interview, Participant 1 mused about how an autocomplete or suggested term function might work in an authentic context. In this section of the interview, Participant 1 and I had established the assumption that the imagined platform was built with an accurate machine learning representation of teacher language, linking many common educational terms that are related and synonymous. We posed an example where a user enters the tag "Small-Group Discussion" and the interface communicates in some way that the term "Guided Reading" is used more often for this segment and segments like it than "Small-Group Discussion." At this point, Participant 1 brought the discussion back to the importance of purpose. He explained that if the purpose of segmenting and tagging the video was for the user's or teacher's own reflection, or to give a colleague feedback, then that sort of interface feedback or push[32] would be less useful and potentially annoying. However, he continued to say: "but if you're trying to make your tags available [or understandable] to others then that might be really useful." Then Participant 1 tied in the idea of nesting or linking to related tags. He suggested that a user could enter a tag that is:

> Connected to or linked to another commonly used tag that is a little broader, but to you [referring to the user] are kind of making a connection between … what is meaningful to you and what was meaningful to all the other people in different contexts [referring to the learning community at large]. It could be a learning tool in that way. …It might help you gain awareness of the way that you're using terminology and the way that others might be understanding [it] … It might help me sort of learn and become more aware of the nuance between terms maybe? … it seems like there is a difference between a tool that could help you say 'you know what? What you're really trying to say is this, this is a better term or more widely used term,' …verses 'these are ideas or related concepts that might help you or expand what you're seeing…'

[32] "Push" or "server-push" technology is the delivery of information on the Web that is initiated by the information server (the publisher or application) rather than the information user (or client), as it usually is (http://whatis.techtarget.com/definition/push-or-server-push).

Here, Participant 1 constructed a scenario where he would enter user-generated tags and then be presented with relevant information about how the community had been segmenting and tagging. Depending on his purpose, he could then decide to dismiss the tagging information and suggestions or adopt them. Seeing this information could potentially allow him to make a connection or have an insight into how language is used in teaching practice. This scenario is particularly interesting in the context of education's famed lack of a common language. Could a tool or platform like this eventually be designed? Might it over time contribute to a gelling of common terms? Could and should it be designed to encourage the use of some terms over others? In that way, the platform would function less as a way of collecting data on teacher language use and more as a tool for influencing it.

Segments and Comments That Can Be Tagged

One of the main affordances of tags is that they can label and categorize objects. Given that the field of education is in the midst of creating a formal language of teaching, as opposed to already having one in place, tags may not be the most appropriate form of annotation to mark teaching practice, if the goal is to 1) enable users to mark their own meaning making of videos for their own purposes and 2) understand if and how a common language is developing. Perhaps platforms should be developed that encourage educators to mark and describe teaching practice using segments of video and free-form comments. In this scenario, the comments would afford users the ability to describe what they noticed in the video in more depth and with less concern as to how their observations would be findable. A user could then tag these comments and related segments. This would modify the user's workflow. First the user would be focused on identifying what is salient and interesting and then create a segment to mark that portion of the

video. The second step would be to use the comment annotation to describe the salient aspect, practice, or interaction represented in the video. The third step would require adding a tag to that segment and comment. This should change the purpose of the tag itself. As opposed to standing in for a description or marker of the user's meaning (as tags do in this study), the tag would not attempt to mark the complex practice or user's noticing. It could instead be a way of marking what topics or conversations or even uses the segment and topic were applicable to.

For example, think of Participant 8's segment (1:46-4:47) and series of tags: "previewing book," "seeing book as diary," "identification of dates and cities in entries," and "Who to call on? What to Ask." Her segment represented an interaction that she found interesting and problematic as opposed to a specific move the teacher made. However, just by looking at the tagging language, some of her tags appear to be marking specific moves (i.e. "previewing the book," and "identification of dates and cities in entries") and therefore, without taking into account the segment data and the other tags associated with that segment, the tag data is misleading.

An interface could be designed to allow Participant 8 to mark off that interaction and add one or more comments responding to the practice represented in the video segment. Given this example, Participant 8 could have created something along the lines of the following five comments:

1. The teacher previews the book. She has the students look at each entry.
2. The teacher identifies the book as a diary.
3. The teacher asks the students to identify the date and city in each entry.

4. The teacher told three out of the five students to read aloud together. These three students are all African-American and all sitting together on one side of the classroom.
5. The teacher spent two minutes with what feels just part of the group. What are the other kids supposed to be doing? What are they doing? What might they be doing? What does she want them to be doing?

These hypothetical example comments capture the observations and the questions Participant 8 expressed regarding this segment of video. In the imagined scenario, Participant 8 could apply user-generated tags to these comments (along with the associated segment). These tags could be used to provide information about how and for whom the comments and the segment may be useful in the context of an online community of practice.

Table 20: Segment, Comments, and User-Generated Tags Example

Comment #	Comment	Applied Tags
1	The teacher previews the book. She has the students look at each entry.	"Previewing text"
2	The teacher identifies the book as a diary.	"Genre: Diary"
3	The teacher asks the students to identify the date and city in each entry.	"Questioning techniques" "Missed opportunities"
4	The teacher told three out of the five students to read aloud together. These three students are all African-American and all sitting together on one side of the classroom.	"Ethical obligations" "Questions about featured teacher's choices"
5	The teacher spent two minutes with what feels just part of the group. What are the other kids supposed to be doing? What are they doing? What might they be doing? What does she want them to be doing?	"Questions about featured teacher's choices" "Dilemma of teaching" "Questions for pre-service teachers"

The interface could also afford users the opportunity to apply tags from a formal ontology along with their user-generated tags. This formal ontology could allow users to connect their thinking directly with more standardized ways of talking about and parsing practice, such as High-Leverage Practices.

Table 21: Segment, Comments, User-generated Tags, and Ontology Tags Example

Comment #	Comment	Applied User-Generated Tags	Applied Tags from Ontology
1	The teacher previews the book. She has the students look at each entry.	"Previewing text"	"Teaching a lesson or segment of instruction"
2	The teacher identifies the book as a diary.	"Genre: Diary"	"Making content explicit through explanation, modeling, representations, and examples"
3	The teacher asks the students to identify the date and city in each entry.	"Questioning techniques" "Missed opportunities"	"Eliciting and interpreting individual students' thinking" "Engaging in strategic relationship-building conversations with students"
4	The teacher told three out of the five students to read aloud together. These three students are all African-American and all sitting together on one side of the classroom.	"Ethical obligations" "Questions about featured teacher's choices"	
5	The teacher spent two minutes with what feels just part of the group. What are the other kids supposed to be doing? What are they doing? What might they be doing? What does she want them to be doing?	"Questions about featured teacher's choices" "Dilemma of teaching" "Questions for pre-service teachers"	"Setting up and managing small group work"

This feature would create more metadata associated with each segment, thereby potentially increasing the power of any algorithms. This would also allow users to connect what they are seeing and thinking about in their own terms to the aspects of teaching and the specific language that teaching is developing.

Annotating or Rating User-Generated Segments and Tags

Relating to the idea presented above of tagging comments associated with segments of video, rather then tagging the segments themselves, is the idea of further annotating or rating user-generated segments and tags. This idea relates to the way participants identified specific practices, such as "Picture Walk," but wanted to mark the ways that the instance of instruction featured in the video did not fit their definition of a "picture walk."

As discussed in the Picture Walk tag cluster in Chapter 5, the term "picture walk" was used as a tag more then once and by more then one participant. However, those participants expressed uncertainty about if and how exactly this part of the lesson fit the criteria of a picture walk. This example highlights that even if multiple users create very similar segments all using the same tags (or tags that contain the same terms) this provides no information about the quality being represented by the segment, or the confidence the user has in that tag's representative ability.

With this in mind, the segmenting and tagging tool could provide a way for the user to mark or rate segments and tags. In this scenario, Participant 15 could mark off the segment that she saw as a "picture walk." At any point in her workflow, she could decide to rate or evaluate that tagged segment. Determining exactly what the interface design to support this type of interaction would need to be would require its own focused design and research cycle. But for the moment, imagine one possible design, where the user could select one of a few choices:

- Excellent Example of Practice
- Clear Example of Practice
- Unclear Example of Practice
- Poor Example of Practice

The interface could also make it possible to link this video segment (along with the tag data) to some sort of forum regarding what counts as that specific form of practice. This would enable users to collect, share, and debate what should count as specific forms of teaching practice and how to evaluate or rate quality. These conversations are already happening through research literature, but this interface design has the potential to make that conversation more concrete and inclusive.

Linking User Folksonomy to a Flexible Ontology

User-generated data is messy! The inherent messiness of the data limits what can be done with it. I embrace the mess because it affords a more authentic representation of the differences in a population and the complexity of the subject matter. However, I do advocate finding ways to manage the mess. I believe that through user-centered research and design we can, over time, learn how educators mark their meaning-making of videos of teaching, and how they want to use the annotations of others, in order to design tailored supports that help users and viewers decode and link their own user-generated data. I believe that it is possible to design these features in a way that helps individual users make their own meanings, complicate their meaning through seeing how others mark the same things, and add to the larger body of knowledge. I also believe that we can and must design these features so they first and foremost appear to aid the individual user creating the annotations. This type of design will not work if the users feel burdened by steps or features that make their annotations into something else.

New Uses for User-Generated Segments and Tags

During the interviews, many participants suggested and/or mused about how segmenting and tagging tools might support educators' work with video records of practice. Here I present and discuss some of the applications that emerged from the data, as well as a few possible applications that were not suggested directly by the participants. The table below outlines a series of tools enabling segmenting and tagging of videos of teaching practice and the different types of educators who might use such tools. Each of these possible tools is discussed in this section.

Table 22: New Uses for User-Generated Segments and Tags

Tool	Possible User Groups

Tool for facilitating reflection on one's own practice	-Pre-service teachers -Practicing teachers -Teacher educators
Tool for sharing video of one's own teaching with peers and soliciting feedback	-Pre-service teachers -Practicing teachers -Teacher educators
Tool for marking off segments of a video that demonstrate problems of practice that can be used in discussions/training with teachers	-Teacher educators -Practicing teachers (less common) -Educational Researchers (less common)
Tool for teaching teacher educators how to effectively work with video records of practice	-Teacher Educators
Tool for modeling and teaching self-critique using video records of one's own practice	-Teacher educators -Practicing teachers -Pre-service teachers -Novice teachers
Tool for marking questions that a teacher educator would want pre-service teachers (or practicing teachers in the context of PD) to respond to	-Teacher educators
Tool for helping users see what terms are used with specific curricula or in specific communities	-Practicing teachers -Teacher educators -Educational Researchers -Administrators -Curriculum developers/specialists
Tool for learning and/or practicing highlighting parts of one's teaching practice that are valuable on the job market and applying the tags that reflect the language hiring committees want to hear	-Teachers on the job market -Teacher educators
Tool for collaborative discussion and debate about definitions of educational terms and types of practice	-Educational researchers -Teacher educators -Practicing teachers -Administrators -Policy makers

Tool for Facilitating Reflection on One's Own Practice

All of the pre-service teachers remarked on how segmenting and tagging could be used to facilitate reflection on their own teaching practice. Reflecting on video of one's own teaching practice is a common and deliberate feature of their teacher education program. At the time this study was conducted, these pre-service teachers were very comfortable and experienced using video of their own practice in order to assess how well they enacted the lessons they planned, and in order to identify areas of their practice in need of further improvement. Throughout their program, they used a variety of methods for marking their thinking. One of the most common and low-tech methods was to write a reflection paper as a part of an assignment. Pre-service

teachers were often instructed to find segments of videos that could serve as evidence of the way they enacted a particular form of practice or as specific problem of practice that they wanted to unpack. In the reflection paper they would mark the relevant parts of a video using time codes. The video of practice would be submitted along with the reflection paper, and the teacher educator reviewing the work would then look at the portions of the video along with the written reflection. Pre-service teacher participants generally acknowledged that segmenting and tagging a video of their own practice could facilitate that process. However, participants were not fully aware of the limitations of user-generated segmenting and tagging exposed by this study. Therefore, the question of *how exactly* user-generated segments and tags might aid the process of reflection and learning from one's own practice becomes more pertinent.

Participants described a process of noticing and marking specific aspects of practice or moves they were making. Without using the terms, participants talked about tagging's affordances of knowledge discovery and knowledge rediscovery. Many pre-service teacher participants in particular were enthusiastic about the idea of using segments and tags to mark specific elements of their own practice or students' behavior. They framed this as a way to investigate their own practice more deeply and more systematically over time. Participants voiced three main purposes: 1) to investigate how their practice was changing over time; 2) to investigate how specific moves or strategies impacted student learning; and 3) to investigate how specific students behaved over time and what factors might be contributing to that behavior. Participants were not very explicit about what this might look like in practice.

If a participant wanted to investigate how his or her practice was changing over time, how might segmenting and tagging mark that change? If a participant was particularly interested in tracking and improving the ways she was teaching guided reading, for example, then the

participant could segment and tag videos that captured her guided reading practice. Segmenting and tagging in this way would allow her to easily find instances of guided reading that she could review at some point in order to reflect on how her practice was changing. In that scenario, the segments and tags merely mark specific examples of the same type of teaching or phenomena so that they can be grouped together and located (or rediscovered) at a future point in time. The reflection about changing practice happens in relation to a collection of segments rather than an individual segment.

Alternatively, the participant could mark what he/she was noticing and reflecting on after watching each video, as well as tagging or marking for instances of guided reading. This would enable the participant or user to mark what they reflect on after watching each video and then see what patterns emerged from their marking, if any, as well as how his or her practice was changing over time. In this scenario the reflection happens more often. Such reflection is likely to be more generative, in terms of the number of things that a user notices, but also less focused. Longitudinal research could be designed to track if and how users engage in such reflection. Would one strategy for using segments and tags to aid reflection support learning and improvement in teaching practice better than the other? What other factors might contribute to how effectively educators use segmenting and tagging tools to reflect on their own practice over time?

Tool for Sharing Video of One's Own Teaching with Peers and Soliciting Feedback

Many participants imagined a scenario where a teacher (pre-service, practicing, or teacher educator) could upload a video of his or her own teaching to an online social platform, and segment off a small portion of the video they wanted feedback on and tag and/or comment

on that segment in order to communicate what type of feedback they would like on that specific segment of instruction. Some participants imagined that everything (i.e. videos they uploaded, and any segments, tags, or comments that they or others associated with that video) would be public and accessible to anyone in the online community of practice. Other participants imagined that they could keep their video, segments, tags/comments hidden from the general community and instead specify the individuals who would have access and be invited to provide feedback.

A platform supporting such an online community of practice could be designed in many different ways. One of the many design choices that would have to be made is how exactly users would share videos of practice with each other and if and how users could share with a select few other users as opposed to the whole online community. There are many affordances and constraints associated with this design choice that would impact the types of valuable data that could be produced and aggregated, as well as the ways educators could potentially build off the work of and learn from others. However, more indirectly related to the findings of this study, this design choice would have a major impact on how participants behave regarding the three observed tensions: findability vs. nuance, concerns about being critical, and a social context and community of practice. Based on the findings of this study, I strongly encourage anyone designing such a platform to prototype models with different levels of privacy and public availability, and specifically investigate how users engage in each social context.

Tool for Marking Off Segments of a Video that Demonstrate Problems of Practice that can be Used in Discussions/Training with Teachers

Several members of the teacher educator/educational researcher group acknowledged during their interviews that they would want to segment off and tag portions of videos that

captured dilemmas of practice and in-the-moment decision making that they could incorporate into their work training teachers. Participants 7 and 9 both commented on how challenging it can be to find videos of practice that demonstrate specific teaching practice, and at multiple skill-levels. For this group of participants, the user-generated segmenting and tagging on a social platform could enable them to find and keep track of videos (or segments of videos) that they could use in their work with teachers. Such a platform could also aid in the sharing of video segments among teacher educators and others who mark dilemmas of practice.

Tool for Teaching Teacher Educators How to Effectively Work with Video Records of Practice

While the idea that segmenting, tagging, and sharing video records of practice for the purposes of training or professional development for teacher educators did not come up in any of the interviews, it seems like a logical and possibly useful extension of the implications already suggested. A novice teacher educator (or a teacher educator less experienced in using video) who was being mentored by a more experienced teacher educator could be given the task of first selecting and articulating the reasons for selecting a specific video of teaching practice in the context of the current needs of the pre-service teachers and the learning goals of the program. Secondly, the novice teacher educator could have to use segmenting and annotating tools to mark off parts of the video that act as evidence and be given the task of finding a video that represents a specific tension or problem of practice, relevant to the articulated focus or selection criteria.

At time this dissertation was completed, there was little if any literature addressing how tools could be designed to support teacher educators in learning how to effectively use video as a part of their teaching. Bacevich's (2010) case study on building curriculum for teacher education using video records of practice discusses how demanding it is for teacher educators to study and

teach with videos of practice featuring the pre-service teachers they teach. She articulates how "practice-based teacher education with the focus on preparing novices for 'ambitious teaching' as it is conceived for PK-12 schools (Lampert, 2001) requires that the teacher educator responsively teach a diverse group of pre-services starting at what they are able to do, while holding them accountable to ambitious learning goals" (Bacevich, 2010). Bacevich's case study illuminates some of the challenges for teacher educators using video of practice in the context of practice-based teacher education. She points out that a practice-based teacher educator must have the knowledge base and skill set of a clinic educator, which Pamela Grossman defines as being "able not only to profess about teaching, in the abstract, but able to provide skilled feedback and coaching" (Grossman, Hammerness & McDonald, 2009). She also points out that therefore the selection and training of teacher educators will need to be more deliberate, a recommendation that was also supported by the research of Dinklelman, Margolis and Sikkenga (2006).

Clearly there is a need for well-designed tools to support teacher educators in effectively working with video records of practice, learning how to effectively work with records of practice, as well as find, organize, and share quality videos of practice that afford learning opportunities. As the field of education and the country continue to focus more and more on high-quality teaching as the main avenue to improve student learning, teacher education will continue to be put under the microscope. It is important that we also consider the learning and teaching of those at the higher end of the food chain. If video is truly a powerful tool for improving teaching practice (and therefore student learning), then we not only need to teach teachers how to use videos of their own teaching effectively, but also teach teacher educators how to effectively work with video records of practice.

Tool for Modeling and Teaching Self-Critique Using Video Records of One's Own Practice

In the discussion of the tension: concerns with being critical, Participant 14 explained how she uses video of her own teaching practice to model respectful and constructive self-critique of her own teaching practice. She said that she "hopes" that this modeling supports the pre-service teachers that she works with to learn how to constructively engage in the critique of video records of practice. Though Participant 14 did not specifically say that she would want a tool or feature specifically designed to support her in this work, it is a possible application. A tool could be designed specifically to mark or highlight how teacher educators are using video records of their own practice to improve their practice. The tool could also be designed to enable pre-service teachers to mark their own self-critique in a similar way, scaffold that experience, and provide ways for the teacher educator to provide feedback to those pre-service teachers on their use self-critique or reflection.

Tool for Marking Questions That a Teacher Educator Would Want Pre-Service Teachers (or Practicing Teachers in the Context of PD) to Respond to

Several participants tagged segments with questions. The teacher educators/educational researchers who tagged with questions were primarily[33] marking the question or questions that they would ask the pre-service teachers after showing this segment in the context of teacher training. This is a very particular type of tag created by the study's participants. As a form of annotation, commenting is arguably a better form for this use. A social platform supporting educators' use of video records of teaching practice could develop a specific feature or form of annotation specifically for these types of questions. If such a feature was designed and used by a

[33] The exception to this use of questioning was using the tag to transcribe the question that the featured teacher asked during the segment.

large number of teacher educators, it could provide a vast resource of questions about teaching practice. Teacher educators could share and build off of the questions of others. Educational researchers focused on practice-based teacher education might find this collection of questions to be an interesting and new source of data to be mined for patterns.

Tool for Helping Users See What Terms Are Used with Specific Curricula or in Specific Communities

A social platform collecting metadata from users (including but not limited to segmenting and tagging) on the content of the videos of teaching it hosts could be designed to collect, utilize, and visualize data in ways that would help users see and uncover patterns for themselves. For example, if the platform supported the application of both user-generated and formal taxonomies of tags, then a large corpus of videos would be likely to be tagged with standardized descriptors that would, for example, name the form of curriculum being used and some location information (such as district or state). Designers of this type of platform could provide tools to visualize this metadata in order to show possible relationships and patterns in the data. Through the use of the standardized metadata, a user might be able to see the range of curricula represented in a specific location represented in the corpus of videos. That information could be valuable to those interested in how and where a curriculum is being used. But by adding in user-generated metadata (such as segment and tag data) that marks meaning, it could be possible for users to gain more specific insights into how a particular curriculum is used and how that might be different from the ways it is being used in other locations. However, as this study points out, user-generated segmenting and tagging together can provide some insight into users' meaning-marking, but currently with very limited reliability. Therefore, the application of user-generated

metadata to uncover patterns would have to be further tested, and the tool or visualizing feature itself would need to be very transparent about its explanatory power.

Tool for Learning and/or Practicing Highlighting Parts of One's Teaching Practice That are Valuable on the Job Market and Applying the Tags That Reflect the Language Hiring Committees Want to Hear

Participant 2 suggested a very particular application of social user-generated segmenting and tagging during her interview. She focused on the affordance of segments and tags as way to mark and decompose teaching practice and then applied it to a need she had at the time: getting a teaching job. Participant 2 commented on how the language and curricula throughout her teacher preparation program was not necessarily the same as that used in places where she was applying for jobs. She expressed uncertainty as to how to talk about her teaching practice in a way that would resonate with potential employers. She also recognized that in some cases, potential employers are looking to "check off the box," demonstrating that she used the "right term." However, as she pointed out, she was not always sure what the right term was. She expressed a desire to know how educational language is used to describe similar phenomena or practice in the context of different curricula. She mused about how a social platform aggregating and utilizing a vast amount of user-generated data about videos of teaching practice might help her see what terms are used in specific districts, with specific curricula, and possibly how different terms are related to each other. She suggested that such a tool or feature of a social platform would help her gain employment and feel more confident describing her teaching practice to other professionals.

Tool for Collaborative Discussion and Debate about Definitions of Educational Terms and Types of Practice

The final application of segmenting and tagging data that emerged from this study is a feature of a social platform that would enable users to investigate and debate what counts as an example of a particular type of practice. One example of a particular practice is the first high leverage practice: making content explicit through explanation, modeling, representations, and examples. Participant 7 suggested that if segments and tags marked specific instances of practice, then they could be aggregated to a space or "forum" where they could be reviewed, evaluated, discussed, and debated by educators studying and teaching those specific practices. In this scenario, all of the segments of videos tagged with a specific form of practice become common examples that can spark generative discourse around what it means to enact a specific form of practice. What does a specific form of practice look like at different stages of a teacher's learning? What criteria do we use to define various levels of enactment of teaching practice?

This feature could be designed similarly to a Wikipedia article. It could have a collaboratively edited page that lays out the working definition of the specific form of practice and various other subsections discussing disagreement in the field, how the practice varies across domain areas, and student levels, etc. In addition to access to the collection of videos that users tag with that specific practice, there could be links to video segments that users argue are exemplary examples of this practice, poor examples of it, and examples that bring up particular questions about how we define and/or teach these teaching practices. Unlike Wikipedia, I imagine it having a section of the page that provides high-level visualizations and a synopsis of how users are applying metadata to videos that demonstrate the specific practice. This type of

feature has potential to open up or democratize the conversation about how we develop and define the language of teaching, and also how we evaluate it.

CHAPTER 7
CONCLUSIONS

Overview

With this dissertation study, I set out to explore how user-generated segments and tags might represent participants' meaning making of one video record of another teacher's practice. The findings of this study add to the literature on what educators pay attention to when watching a video record of another teacher's practice and specifically how user-generated segmenting and tagging, as a form of annotation, represents what participants find salient in the video and what language they use to describe what they notice.

When I conceptualized this study I expected that after participants watched the featured video they would have little trouble constructing an imaginary, but authentic-feeling scenario with a clear frame and purpose for how and why they would segment and tag that video. I also anticipated that participants would primarily describe or decompose the teaching practice represented in the video. I expected participants to focus on similar actions in the video and to name specific teacher moves such as "turning back to the text" and "launching the discussion."

What I found was quite different. Most participants struggled to articulate a clear frame and purpose that felt authentic to situate the activity. Participants' tagging language often appeared to be a form of decomposing the lesson and practice (e.g. choral reading, picture walk, establishes purpose), but was often marking a dilemma of teaching practice or moment of decision making that the participants found salient. The salience of these moments was very often related to questioning or criticism of the featured teacher's choices. This highlighted an

emergent tension regarding how to mark dilemmas of practice while respecting the featured teacher. The fact that the study was situated in an imaginary social tagging community of practice further heightened the participants' concerns about respecting the featured teacher and illuminated the tension regarding how their segments and tags would be understood and used by others in an online community of practice. Participants demonstrated complex, sometimes purposely obscure, and culturally situated meaning-marking behavior. These findings fit within the framework of practice-based teacher education, which recognizes that "teaching is an enormously complex human endeavor" (Lampert, 1985; McDonald, 1992; Shulman, 1983) and that teaching and learning is situated in interactions between students, teachers, and the content being taught.

I expected user-generated segmenting and tagging might provide insight into the developing language of practice, but participants did not focus on practice as much as interactions between the teacher and student and especially interactions that could be used for learning. Many pre-service teachers thought about the video in terms of what they could learn from it, whereas many teacher educator/educational researchers focused on what they could use in their teaching. Perhaps user-generated segments and tags lend themselves more to identifying the *language of learning*, rather than a language of practice. However, the observed lack of focus on practice could have been a result of the study's design. Further research needs to be conducted to explore user-generated segments and tags in a more authentic setting. I suspect that the application of user-generated tags in conjunction with tags from a formal ontology to user-generated comments and segments of video will have more potential for marking the language of teaching practice.

This study showed that combining user-generated segmenting and tagging allows a more complex and valid picture to emerge of the participants' meaning making than examining tag and segment data separately. The rich interview data provided an opportunity for insight into participants' thinking, which was used to warrant emerging claims, and dig deeper into the tensions participants experienced, while marking what they found salient in an imagined social context. My study involves a rich exploration of the context of participants' meaning-marking. On the one hand, that approach might seem inappropriate for tags, considering the ways they are generally used for aggregation. However, the danger of data aggregation is the loss of valuable context. It was through this deep dive into the participants' meaning making and context that I was able to uncover the emerging tensions, specific behaviors, and the limitations of attempting to simply apply tag gardening techniques to the specific context of meaning-marking in video records of teaching practice. Despite the limitations of user-generated segmenting and tagging as a form of meaning-marking, I maintain that through the use of well-designed tools and platforms, it could be possible to understand the messy context of educators' meaning making even at scale.

Directions for Future Research

As an exploratory study, this dissertation and creates more questions than it answers. In the section, "Discussion of larger possible design implications," I suggested various types of applications for user-generated segmenting and tagging tools in the context of teacher education and tools designed to support educators' use of video in teacher education. I also identified and discussed needed further research. Here, I articulate a research agenda that relates specifically to the results of this single study. This research agenda focuses on: 1) developing a better

understanding the ways educators make sense of video, 2) exploring these behaviors with a larger sample size, and 3) studying educators' behavior in an authentic context.

Developing a Better Understanding of the Ways Educators Make Sense of Video

The participants in this study demonstrated specific ways they were making sense of the featured video of teaching practice through the use of the segmenting and tagging tool. As previously noted, segmenting and tagging is one form of video annotation. Further research is needed into the affordances and constraints of segmenting and tagging as compared to and in conjunction with other forms annotation, such as commenting.

One arm of further research could involve a series of small studies aimed at further investigating some of the patterns or specific behaviors observed in this study. For example, one observed pattern of behavior was segmenting the video to mark the lesson's structure or to "create signposts," as Participant 14 called them. The participants who did this articulated the common goal of marking off the general sequence of the lesson so they could use those segments to more easily find and think about smaller moments in the video. In the discussion of design implications, I suggested that an online educational community of practice platform could afford the selection of an already created overlay of segments and tags marking the sequence of the lesson on the video timeline. A small and focused piece of research could be done to test how educators react to a video of teaching practice that already has segments and tags that mark out the structure of the lesson (or content of the video). Do participants trust the supplied segmentation and tags? What factors influence trustworthiness? How do participants understand the signpost segments and tags? How does that change their behavior? To investigate that last question, a simple A/B study design could be conducted where all participants have the same

video and the same task, but where one group has some supplied segments and tags and the other group does not.

Another specific behavior observed in this study was that participants segmented the video clip primarily on a fine-grain level and despite participants' familiarity with High-Leverage Practices, none of the participants segmented and tagged using that framework. This study suggests that participants wanted to focus in on smaller aspects of practice than are captured by High-Leverage Practices. However, these observed behaviors might be related to the length of the featured video participants watched. If participants were segmenting and tagging an hour-long video, would they have segmented and tagged on a larger grain-size? Further research needs to be done exploring the segmenting and tagging behaviors that emerge when users work with longer videos. Is the unit of analysis that users want to focus on proportional to the video length? Is the unit of analysis that users want to focus on determined by the purpose and/or frame that the user employs? How are these two factors related?

Exploring These Behaviors with a Larger Sample Size

In this study I examined participant group differences regarding segment length, mean number of segments created, number of tags created, and number of discrete tags created. When calculating statistical significance between participant groups, due to the study's small sample size, I relied on the more conservative nonparametric statistical, rather then the more powerful parametric statistical tests. Even with this small sample size, a Wilcoxon-Mann-Whitney test (nonparametric statistical test) found that the number of tags pre-service teachers used was marginally significantly greater than the number of tags generated by teacher educators ($z = 1.686$, $p = 0.0918$). A larger study is warranted to further explore these differences, as well as the

emergent themes. Using a post hoc power analysis based on parametric T-tests, I calculated how many participants per group would be required to show statistical significance with one of the smaller effects (the number of segments). A post hoc power analysis was performed to detect differences between the two groups. The average difference in the number of segments between the two groups was used with alpha of 0.05 at 80% power. For that same effect to be statistically significant, we would need 27 participants per group.

A similarly designed study with a larger sample size and focused on a different community of educators would help understand the generalizability of this study's findings. Would the same patterns emerge with more data and a different community of educators? A significantly larger study comparing participant groups from multiple institutions, such as different teacher education programs, might provide further insight and evidence to support the developing understanding of how educators use segmenting and tagging to mark meaning. Such a study would also increase the findings' generalizability and allow for an exploration of differences and similarities between and across participants' groups and institutions. This type of study could seek to answer questions such as: Would pre-service teachers who have had more experience watching videos and naming elements of practice make more discipline-specific tags than the rest of the pre-service teacher population? Would there be evidence to suggest that particular institutions have their own discourse communities, through an observed high frequency of specific tags regardless of their participant group? Would certain tags be popular across institutions?

Studying Educators' Behavior in an Authentic Context

Clearly, extensive design-based research is needed to understand how educators can use user-generated segmenting and tagging in an authentic online community of practice. Future studies could explore how patterns of segmenting and tagging might develop differently when a collection of video records of practice, rather than a single record, is at issue. Other studies could explore how making users' segments and tags public might affect how users make meaning individually and as a group. Such research could explore whether or not users reference the segments and tags of particular community members who are high profile or who have similar interests. Furthermore, having a large collection of records of practice where users could segment and tag videos over time would create a way of monitoring both what users find salient and what language they use over time. This would create a tool for taking "snap-shots" of the field (or at least the user community).

Final Thoughts

"19th century culture was defined by the novel, 20th century culture by cinema, the culture of the 21st century will be defined by the interface."

-Lev Manovich (2011)

In closing, I wish to emphasize that while this study illustrates both the potential usefulness and the limitations of user-generated segment and tag and data in the context of a large platform designed specifically to support educational communities of practice, the affordances and constraints of segment and tag data are determined by the design of the interfaces, tools, and platform. The potential to accurately mark educators' meaning making of a

video record of practice, or make the developing language of teaching visible over time, depends on the designer of such interfaces and platforms. The designer must understand and take into account the purposes, needs, wants, and tensions that educators negotiate when using video records of practice to improve this "enormously complex human endeavor" (Lampert, 1985).

Appendices
Appendix A: Questionnaires

Questionnaire for pre-service teachers

This questionnaire was completed in SuveyMonkey on the computer used during participants' sessions.

Standardized Descriptive Questions:

1. What is your gender?
    - *Male*
    - *Female*

2. *What is your age?*

3. What is your race?
    - American Indian or Alaska Native
    - Asian
    - *Black or African American*
    - *Hispanic or Latino*
    - *Multi-racial*
    - *Native Hawaiian or Other Pacific Islander*
    - *White*
    - *Other (please specify)* _____

4. What career or ambitions were you pursuing before starting this teacher education program?

5. What college did you attend and what was your major or area of focus?

6. Why did you choose your teacher education program?

7. Please use the table bellow to provide some information on your experience with particular literacy practices.

Literacy Practice	**Has this been addressed in your course work? Where, when, how much?**	**Have you practiced this with students? Where, when, how much?**
Running Records		

Small Group Reading Instruction/Guided Reading		
Text Based Discussions/Questioning Strategies		

Questionnaire for teacher educators and educational researchers

This questionnaire was completed in SuveyMonkey on the computer used during participants' sessions.

Standardized Descriptive Questions:

8. What is your gender?
    - *Male*
    - *Female*

9. *What is your age?*

10. What is your race?
    - American Indian or Alaska Native
    - Asian
    - Black or African American
    - Hispanic or Latino
    - Multi-racial
    - Native Hawaiian or Other Pacific Islander
    - White
    - Other (please specify) _____

11. How many years have you been at your current teacher education institution?

12. Did you work at any other similar institutions before? If so, which ones and when?

13. Please use the table bellow to provide some information on what, where and when you studied education.

Degree Earned	Institution	Year

14. Please check off the content area(s) that you are specialized in?
    _ Math _ Literacy _ Science _ Social Studies _ Art/Music
    _ English Language Learners
    _ Exceptionalities (Gifted/Special Needs)
    - Technology
    _ Other (please specify): _____

15. Did you ever teach PK-12? If so, what grades and how long did you teach at each grade level?

16. How many years have you taught pre-service teachers and what have you taught?

17. How many years have you taught at the graduate level (including masters and doc students not in teacher certification programs)?

18. Please describe your current professional role (i.e. are you teaching? If so, what types of students, what types of courses? Are you doing research? If so, please provide a brief description.)

Appendix B: Interview Protocol

Prior Experience Analyzing Video:

- Q: Have you analyzed video recordings of teaching before? If so, tell me about what you did.
- Q: Did you analyze your teaching practice or someone else's teaching practice?
- Q: What were you focusing on and what was your purpose when you analyzed video?
- Q: Did you think analyzing the video in that way was a helpful learning experience? How so?

Prior Tagging Experience:

- Q: Before today, how familiar were you with tagging?
- Q: How much experience do you have with tagging technologies?
- Q: What tagging tools have you used and for what purposes?
- Q: Tell me a little about your technology use, generally. Do you consider yourself to be technically savvy? Are you an early adopter of technology?

Today's Tagging Experience:

- Q: What is your reaction to that video?
- Q: What were you paying attention to and thinking about when you watched this video?
- Q: Do you think your tagging was very similar to the way you just talked about the video? How so? Why do you think that was?
- Q: What did you think of this experience segmenting and tagging this video of teaching practice?
- Q: Where there questions that you were wondering about while you watched the video and completed this task that if you knew to answer to might have effected how you segmented and tagged the video?
- Q: How comfortable where you with the content area featured in the video?
- Q: How comfortable where you using the tagging and segmenting tool?
- Q: Looking at your segments, I notice…[insert observation about grain-size] Can you explain how you were thinking about gain-size of your video segments?
- Q: If you could go back and add more segments and tags, or just edit your segments and tags, would you? If so, what would you do and why?
- Q: If you were to do this exercise again with a similar video, would you do it differently? If so, what would you do and why?
- Q: Could you ever imagine yourself segmenting and tagging videos of teaching practice in the future? If so, for what purpose? What would you want to be able to see or do with the segments and tags?

Appendix C: Transcription Guidelines

The following transcription guidelines were created to insure consistent and accurate transcription of the interview data. These guidelines were compiled by the dissertation's author and shared with each of the three paid transcribers.[34]

- Screen capture video files shall be transcribed verbatim (i.e. recorded word for word, exactly as said), including nonverbal sounds (such as laughter or sighs), elisions, mispronunciations, slang, and grammatical errors.
- Background sounds such as paper shuffling, computer beeps, etc. do not need to be transcribed.
- Include any pauses in the transcript that occur when the participant is typing, as well as speaking counting seconds.
    - For example: "I just think… (pause 3 seconds) … that this could be really useful."
- As a part of the recorded activity, participants enter in "tags." The transcription should include the exact text that participants enter formatted as a comment.
    - For example: [Types: "Tying to the book"]
    - Please note, that the screen capture is not perfectly synced, therefore, you will hear the participant type before you see the words on the screen. Please try to have the transcript reflect the order of participant talk and typing as it mostly likely was in reality - to the best of your ability.)
- If the participant enters in a particular tag (or part of a tag) and then deletes some or all of the text, include the deletes portion in the transcript.
    - For example: [Types: "Tying to the book". Deletes entry and types: "Tying PK to the book".]
- When participants fill out the questionnaire at the end of the session they are asked to type in their full name. Instead of recording their name in the transcript write: [Participant entered full name].
- Please transcribe the rest of the questionnaire information typed into the questionnaire form and any extra commentary by the participant.
- If the participant or interviewer refers to specific tags in their conversation the tags should be formatted in *italics*.
- The transcriber shall identify portions of the recording that are inaudible or difficult to decipher. If a relativity small segment of the recording, such as a word or short sentence is partially unintelligible, the transcriber shall type the phrase "[inaudible segment]" including the square brackets.
- If individuals are speaking at the same time (i.e. overlapping speech) and it is not possible to distinguish what each person is saying, the transcriber shall place the phrase "[cross talk] immediately after the last speaker's text and pick up with the next audible speaker.

[34] These guidelines were created using McLellan, E., MacQueen, K. M., & Neidig, J. L. (2003). Beyond the Qualitative interview: Data preparation and transcription. *Field Methods, 15*(1), 63-84.

    - For example: “Turn taking may not always occur. People may simultaneously contribute to the conversation; hence, making it difficult to differentiate between one person’ statement [cross talk]. This result in loss of some information.”
- Use underline to denote a speaker’s emphasis.
    - For example: “Is there a way so the place-marker and the tags <u>don’t</u> go back together?”

Appendix D: Sample Coding of Segment Lengths at the Very Fine Grain-Size

Segment Lengths: Very Fine Grain-Size

Participant #	Participant Group	Segment Length	Segment Time Code
Participant 1	Pre-service teacher	0:18	2:08 – 2:26
Participant 1	Pre-service teacher	0:13	2:13 – 2:26
Participant 1	Pre-service teacher	0:14	2:20 – 2:34
Participant 1	Pre-service teacher	0:10	4:13 – 4:23
Participant 1	Pre-service teacher	0:14	0:00 – 0:14
Participant 1	Pre-service teacher	0:41	0:14 – 0:55
Participant 1	Pre-service teacher	0:16	0:00 – 0:16
Participant 1	Pre-service teacher	0:25	2:54 – 3:19
Participant 2	Pre-service teacher	0:25	0:43 – 1:08
Participant 2	Pre-service teacher	0:37	1:08 – 1:45
Participant 2	Pre-service teacher	0:23	2:10 – 2:33
Participant 2	Pre-service teacher	0:10	4:54 – 5:04
Participant 2	Pre-service teacher	0:38	6:30 – 7:08
Participant 2	Pre-service teacher	0:49	7:11 – 8:00
Participant 2	Pre-service teacher	0:34	0:52 – 1:26
Participant 3	Pre-service teacher	0:17	2:45 – 3:02
Participant 3	Pre-service teacher	0:25	3:02 – 3:27
Participant 3	Pre-service teacher	0:26	7:07 – 7:33
Participant 3	Pre-service teacher	0:38	6:17 – 6:55
Participant 4	Pre-service teacher	0:54	0:19 – 1:13
Participant 4	Pre-service teacher	0:35	1:41 – 2:16
Participant 4	Pre-service teacher	0:45	6:20 – 7:05
Participant 4	Pre-service teacher	0:28	7:32 – 8:00
Participant 5	Pre-service teacher	0:40	1:11 – 1:51
Participant 5	Pre-service teacher	0:30	2:09 – 2:39
Participant 5	Pre-service teacher	0:41	7:30 – 8:11
Participant 5	Pre-service teacher	0:03	2:05 – 2:08
Participant 5	Pre-service teacher	0:07	2:13 – 2:20
Participant 5	Pre-service teacher	0:23	4:00 – 4:23
Participant 5	Pre-service teacher	0:14	4:31 – 4:45
Participant 6	Pre-service teacher	0:47	0:00 – 0:47
Participant 6	Pre-service teacher	0:39	1:58 – 2:37
Participant 6	Pre-service teacher	0:53	6:07 – 7:00
Participant 7	Teacher educator/educational researcher	0:58	1:09 – 2:07
Participant 7	Teacher educator/educational researcher	0:42	6:20 – 7:02
Participant 7	Teacher educator/educational researcher	0:10	2:13 – 2:23
Participant 7	Teacher educator/educational researcher	0:04	2:19 – 2:23
Participant 8	Teacher educator/educational researcher	0:36	1:10 – 1:46
Participant 8	Teacher educator/educational researcher	0:39	7:15 – 7:54
Participant 9	Teacher educator/educational researcher	0:56	1:48 – 2:44

Participant 9	Teacher educator/educational researcher	0:28	2:53 – 3:21
Participant 9	Teacher educator/educational researcher	0:07	3:45 – 3:52
Participant 11	Teacher educator/educational researcher	0:40	1:12 – 1:52
Participant 12	Teacher educator/educational researcher	0:46	1:02 – 1:48
Participant 12	Teacher educator/educational researcher	0:34	6:58 – 7:32
Participant 13	Teacher educator/educational researcher	0:56	7:08 – 8:04
Participant 13	Teacher educator/educational researcher	0:26	5:05 – 5:31
Participant 13	Teacher educator/educational researcher	0:31	0:45 – 1:16
Participant 14	Teacher educator/educational researcher	0:52	1:09 – 2:01
Participant 14	Teacher educator/educational researcher	0:14	4:54 – 5:08
Participant 14	Teacher educator/educational researcher	0:17	5:09 – 5:26
Participant 14	Teacher educator/educational researcher	0:35	5:26 – 6:01
Participant 14	Teacher educator/educational researcher	0:51	7:09 – 8:00
Participant 15	Teacher educator/educational researcher	0:38	1:09 – 1:47
Participant 15	Teacher educator/educational researcher	0:10	4:47 – 4:57
Participant 15	Teacher educator/educational researcher	0:13	5:08 – 5:21
Participant 15	Teacher educator/educational researcher	0:32	5:35 – 6:07
Participant 15	Teacher educator/educational researcher	0:42	6:17 – 6:59
Participant 15	Teacher educator/educational researcher	0:21	7:17 – 7:38
Participant 15	Teacher educator/educational researcher	0:13	7:37 – 7:50

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