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Chapter 13

Bifurcating Worlds? A Systematic Review of How Visual and Language Data Are Combined to Study Teachers and Their Teaching

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Connecting teachers' perspectives with their practice is an enduring challenge shaping what and how we understand teaching. Researchers tend to bifurcate teachers' work between their private and their public lives. These "worlds" bring particular meanings that are rendered through the analyses of visual documentations of teaching and teachers' language-based accounts of their teaching. Combining these two forms of data is a basic research challenge both operationally and conceptually. Operationally, the researcher determines how the forms are connected and which decisions reflect (and are anchored in) conceptual warrants. This review identified 52 studies that combine visual and language data to study teachers and teaching to examine how data were collected and analyzed in the studies and what types of the theoretical frameworks were used to warrant the interpretations resulting from the connections. The review found only seven studies that balanced both worlds by explicitly warranting how the two forms of data were interconnected. Otherwise, most studies foregrounded one form of data and drew on the other to support or explain the first. Whereas most of the authors rationalized the connection between the forms of data in their studies, few took the more complex step of theorizing how the two worlds were connected. We argue that such incomplete connections risk inaccurately representing the work of teaching. We propose some design questions and research procedures that researchers may use to avoid bifurcating teachers' worlds.

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The mind is so near itself
 It cannot see distinctly.
 And I have none to ask,
 Should you think it breathed
 And had you the leisure to tell me,
 I should feel quick gratitude.

—Poet Emily Dickinson writing to General Thomas Wentworth Higginson to solicit his comments on several of her poems¹

FRAMING THE PROBLEM CONCEPTUALLY AND METHODOLOGICALLY

Uncovering what another is thinking, and how that thinking is connected to what they do, has been a central undertaking in the creative arts as well as in research. In education, identifying procedures that enable researchers to connect teachers' perspectives to how they enact their classroom practices presents a continuing conceptual and methodological challenge. The poet Emily Dickinson's eloquent phrasing, "The mind is so near itself/It cannot see distinctly," expresses a version of this conceptual problem that is rooted in the Cartesian mind–body problem in philosophy: How to gain access to another person's thoughts? In research, the methodological problem comes to the fore when researchers look to document the relationship between thinking and actions in order to study the connection. "Documenting the relationship" includes the procedures that are used, as well as the warrants researchers use to connect thinking with actions, to make claims, and to anchor findings. This chapter addresses one specific procedural context of this challenge: How education researchers have documented teachers' perspectives on their *own* classroom teaching. We argue that, although there has been attention to the "world" of teachers' "mental lives" (Walberg, 1977) and a recognition that classroom teaching and learning cannot be fully understood from the public world alone, research procedures for studying these worlds have not kept pace conceptually.

How education researchers relate thinking and action specifically in the context of teachers' work in classroom teaching entails a cluster of conceptual and methodological decisions. The decisions about research procedures determine "what we see" about the inner and outer worlds of teaching being studied. Decisions about conceptualizing the relationship between teachers' thinking and knowing and what is observed in their actions determine "what we get" from employing those procedures. This chapter reviews studies to examine these relationships between what we see and what we get: How specifically do research procedures capture, document, and reflect teachers' perspectives on their own classroom instruction?

Speaking broadly about methodology, researchers have used interviews (e.g., Kvale, 2008; Mishler, 1991), surveys (e.g., Becker, 2000; McMillan et al., 2002), or explicit measures of teacher knowledge (e.g., Hill et al., 2008; Moats, 1994) to document the inner world of teachers' thought processes. These procedures hinge on the

conceptual and methodological assumption that these aspects of teachers' thinking—their private world—can be rendered indirectly through language. Thus, asserting that researchers can gain access to teachers' thinking and perspectives through the language exchanged in interviewing or through responses to survey questions. Researchers can document the inner world of what teachers know through the explicit measures of teaching such as surveys of teachers' knowledge that are expressed in language. In these ways, *language data* are supposed to provide access to, or to capture and represent the private worlds of teachers' thinking. For the purposes of this review, we define language data as teachers' verbal expressions of their thinking. Meanwhile, the external world of classroom activity and instruction is usually documented visually, generally through observational instruments and field notes, and sometimes through images and recordings of practice. These *visual data* are held to directly document the public world of teaching.

Making the connections between language and visual data methodologically introduces assumptions about how these worlds relate to each other. We refer to private and the public as “worlds” inasmuch as each brings a particular set of meanings that are rendered through these analyses of visual or language data. We argue that education research in this area has usually focused on (or foregrounded) the meanings of one world and drawn on the meanings from the other to support or “explain” the first. Perhaps because it seems more immediate and accessible, studies have tended to focus more on the visual world of teaching rather than on the thinking or intentions behind actions (Kennedy, 2016). We refer to this disconnect between the private worlds of teachers and the public worlds of classroom activity as “bifurcating worlds.”

This systematic review examines how the worlds of teachers' thinking can become connected to their public actions through the methodological procedures that researchers use and the conceptual assumptions they make. Writing about this issue in qualitative work more broadly, Maxwell (2013) has admonished fellow researchers to

think about what particular sources of error or bias might exist, and look for specific ways to deal with this, rather than relying on your selection of methods to do this for you. In the final analysis, validity threats are made implausible by evidence, not methods. (p. 128)

Although this problem is not limited to education research, it becomes centrally important to understanding and improving classroom practice. Research that focuses exclusively—or even primarily—on the public world of teaching risks building interpretations, explanations, and findings about classroom practice that omit the private world of the teacher as a principal protagonist. To rely on what can be observed and documented in this public world as evidence essentially tells only part of the story. In contrast, research that relies, through interviews, for example, on the private world of teaching risks making assumptions about how the perspectives expressed are linked

to practice without evidence of this connection. Connecting the public and private worlds then, treating them as complementary, can create a fuller, more complex, though often messier understanding of how classroom teaching unfolds. Overcoming this bifurcating of worlds is more than a methodological undertaking, however. It involves more than how the language and visual data are collected. The challenge entails working on how the meanings of the two forms of data are positioned relative to one another in analysis and how the connections asserted by the researcher are grounded theoretically.

AIM OF THIS CHAPTER

In this review, we examine data collection methods that purport to connect the two worlds and thus to allow the researcher to make and warrant, through analysis, connections between visual data with language data. Importantly, we have focused on the methods used to solicit in-service teachers' perspectives on their *own* classroom instruction. The particular focus on *in-service* teachers' perspectives rules out work using video in preservice teacher preparation or in-service teacher education, in which the recordings and the visual data they produce are used for pedagogical purposes (e.g., Abell et al., 1998; Masingila & Doerr, 2002; Xiao & Tobin, 2018). We recognize that much of this work is often anchored in similar assumptions about how teachers' thinking and their actions are connected; however, this review sought to examine research that involved the ongoing, established practices of teachers. Whereas there are a variety of research methods that elicit perspectives, we focused particularly on methods for connecting the public and private work of the individual teacher. We were specifically interested in three dimensions of these data collection methods: (1) the collection procedures themselves, (2) the frameworks on which these procedures are anchored explicitly or implicitly to theorize or justify the connection, and (3) the assumptions about what is represented in visual and language data that these methods make.

In examining studies that use data collection procedures of in-service teachers' practices that combine data from the public and private worlds of their teaching, the review asks the broader research question: *What can be understood about teaching through the use of data collection and analyses procedures that integrate language data and visual data?* Within this question, we are specifically concerned with the following:

Research Question 1 (RQ1): Which *data collection procedures* are used to combine visual and language data to study teaching?

Research Question 2 (RQ2): Which *theoretical frameworks* support the collection and integration of these two types of data in these procedures?

Research Question 3 (RQ3): What *assumptions* are made in linking or "warranting" the analyses of the visual and language data, and how do these assumptions vary by data collection procedure?

We address each of these subquestions in the Findings section and then return to the overarching question at the close of the discussion.

METHOD

Article Search

To address these specific research questions, we undertook a systematic literature review to assemble and describe a set of empirical studies, including those using quantitative, qualitative, and mixed methods, which met predetermined criteria (Gough, 2015). We began by searching for research studies published in refereed sources that used procedures that combined language data with visual data to understand teachers' perspectives as linked to their public practice. We followed procedures used by other researchers who had reviewed literature on the use of videos (Gaudin & Chaliès, 2015) as well as procedures used by the authors in previous work (Schachter, 2015; Schachter & Freeman, in press). We started by searching common education research databases, including ERIC, Education (SAGE), PsycINFO, Wiley Online Library, and Social Science Citation Index; however, we found that these search results were not as thorough or exhaustive as we had anticipated. After consulting with an education research librarian, we expanded our search to ProQuest, which draws from the above databases and included access to a total of 95 databases at the second author's institution.

We undertook multiple steps in conducting this search and narrowing the data set. We began by combining the terms "thinking" AND "teaching" to broadly capture research on the private processes involved in teaching. Then, based on preliminary searches, we developed a Boolean search query with variations on terms related to "language data," "visual data," "teach*," "thinking," and "reflection." We then narrowed the search by limiting it to articles in peer-reviewed journals. We set a date range from January 1, 1975, to December 31, 2018.² To further bound the search, we excluded document and source types that were not explicitly empirical articles, such as "conference papers and proceedings" and "literature reviews." We also did not include articles in languages other than English. Both of these parameters resulted in a very small reduction in the total. The entire process resulted in 607 articles.

Exclusion and Inclusion Coding

To be included in this study, each article had to meet the criteria presented in Table 1. To identify the final data set, these criteria were applied sequentially to the 607 articles. The coding then proceeded in two phases.

Phase 1 Coding

Articles were excluded that did not meet the specific characteristics related to the research questions, described subsequently. The three authors and a graduate student researcher read the abstracts of each article and excluded articles that were (1) not empirical studies; (2) not about teaching and learning in pre-K to 12th-grade settings *with in-service teachers*; (3) not about classroom practices, in which we included the activities that teachers initiate, direct, manage, or take part; and (4) did not specifically study teachers (see Table 1). The latter criterion is central to this review as we are

TABLE 1
Criteria for Including or Excluding Articles in the Search

Phase 1	Phase 2
<ol style="list-style-type: none"> 1. Does not meet criteria for rigorous quantitative or qualitative research (based on criteria outlined in Brown & Lan, 2015; Schachter, 2015). 2. The participants in the study are not teachers. 3. The study does not examine some form of classroom practice. 4. The study does not take place in a pre-K to 12th-grade setting. 	<ol style="list-style-type: none"> 1. Must contain visual and language data. 2. Must include in-service teachers. 3. Must elicit teachers' accounts or perspectives on practice. The focus must be on teachers and not on students. 4. Must specify collection methods of visual and language data. 5. Must be published in 1975 or later. 6. Must be peer-reviewed. 7. If professional development (PD) is involved, the study must focus on uptake of PD in the classroom or on understanding PD-related changes in the classroom.

concerned with how visual and language data about classroom teaching can capture and represent teachers' perspectives. Thus, articles that focused on students in classrooms were excluded, whereas those that involved teacher–student interactions and data on the teacher's views on that activity were included. For example, Vetter (2010) studied how a teacher facilitated student identities during English language arts (ELA), thus examining the teacher's role and practice although the outcome was connected to students. In total, 87 articles remained after this process.

Phase 2 Coding

The processes of exclusion coding ruled out articles, but we then needed to confirm that the final data set only included articles that were relevant to our research questions. To this end, the remaining 87 articles were each read in their entirety by the three authors and the graduate research student to confirm suitability for inclusion in the study (see Table 1). Only articles that specified the collection and the analysis of both language and visual data in their data methods and findings were included. Furthermore, articles were included only if the language and visual data elicited teachers' thinking or perspectives about their own teaching. For example, Vetter (2010) discussed previously used language data from teacher interviews and visual data from recorded observations to understand how the teacher facilitated student identity development. This process resulted in 18 articles that were relevant to our search.

Additional Searches

Based on best practices in such reviews (Gough, 2015; Schachter, 2015), the third author and the graduate research student used the references listed in the included

articles to search for other studies that met the criteria. The main authors of the included publications were also searched to locate additional studies from their work that might be relevant. To make these determinations, we first examined the article titles and then, as needed, the abstracts and even the full texts of articles themselves. The two phases of coding criteria described previously were then applied to the articles from this secondary search. In total, 27 additional articles were located through this process and included in the final data set. As the chapter was being prepared, expert reviewers also suggested additional authors or publications to examine as part of the search. This process added 10 articles to the review.

Article Coding and Analyses

The final data set included 52 articles that used both visual and language data to examine the public and private worlds of teaching. We conducted a content analyses (Hsieh & Shannon, 2005) to review the contents of the included articles, using both inductive and deductive coding to address the research questions. A priori codes were generated to identify the research design and data collection procedures (RQ1) and to identify how researchers connected the visual and language data to understand teaching (RQ2 and RQ3).

Additional grounded codes related to the research questions, use of language data, and data sources were developed based on patterns identified in the data via inductive analysis (Corbin & Strauss, 2008; Schachter, 2015). As with most grounded analyses, this combined coding strategy supported a nuanced approach in addressing the research questions. Specifically, we noted that in some of the studies it was difficult to identify theoretical frameworks that connected the visual and language data (RQ2). Thus, we developed codes based on how researchers used theory to support the collection of language data more generally. Additionally, codes related to the purpose of the studies as well as codes that foregrounded the different forms of data (i.e., visual or language) also emerged (RQ3). Table 2 provides a list of codes, definitions, and, when appropriate, the number of studies meeting the code.

FINDINGS

In total, 52 articles were included in the analyses for this review. We had initially intended to exclude articles that integrated visual data with language data elicited before or after their enacted instruction (i.e., in the teacher's planning or post hoc reflections on their teaching). Invoking this criterion would have significantly reduced the final data set, however. Therefore, we chose to broaden the scope of this study beyond in-the-moment practice to consider practice more generally (Lampert, 2010). Given our focus on understanding how researchers connect the public and private worlds in the act of teaching, we only included these articles if the researchers used the data to elicit teachers' perspectives about their own practice.

The resulting set of 52 articles included research from 1991 to 2018 that studied preschool (e.g., Alanís, 2018; Baker, 2019; Schachter, 2017), elementary (e.g., Drake

TABLE 2
Coding Categories by Research Question (RQ)

Code	Definition	Number of Studies
RQ1: Procedures		
Research design	Researchers' description of their design	See Table 3
Visual data collection procedures	Identified from data methods	See Table 3
Language data collection procedures	Identified from data methods	See Table 3
Explicit connection	Two types of data were explicitly linked to understand connections between the public and private worlds of teaching from the teacher's perspective.	21
Implicit connection	No explicit description of how visual and language data were combined to understand connections between the public and private worlds of teaching.	31
RQ2: Theoretical frameworks		
Knowledge	Researchers providing theory regarding teachers' knowledge—must use the word "knowledge."	17
Beliefs	Researchers providing theory regarding teachers' beliefs—must use the word "belief."	17
Teacher or student identities	Researchers providing theory regarding the role of identity for teachers or students.	11
Classroom practices	Researchers focusing on the inner world as a way to understand classroom activities that teachers initiate, direct, manage, and participate in.	37
RQ3: Assumptions or warrants		
Foregrounding visual data and backgrounding language data	Research design/presentation of findings favors or foregrounds visual data or the public world of teaching.	18
Foregrounding language data and backgrounding visual data	Research design/presentation of findings favors or foregrounds language data or the private world of teaching.	21
Balanced	Research design/presentation of findings ascribes similar importance to the public and private sides of teaching.	13

& Sherin, 2006; Henderson & Palmer 2015b; Levitt, 2002), middle (e.g., Hofer & Swan, 2008; Martin et al., 2001), and secondary (e.g., Alazzi, 2008; Chiodo & Tsai, 1997; Vetter, 2010) teachers. Among these studies, multiple content areas were investigated, including ELA (e.g., Camburn & Barnes, 2004; Flynn & Schachter, 2017; Hamel, 2003; Maloch, 2002; Worthy et al., 2015), science (e.g., Diezmann & Watters, 2015; Levitt, 2002; Savasci & Berlin, 2012), and social studies (e.g., Alazzi, 2008; Hofer & Swan, 2008), with researchers examining a variety of practices such as grouping students (e.g., Maloch et al., 2013), using technology in the classroom (e.g., Hughes & Ooms, 2004; Swan & Hofer, 2011), and working with dual language learners (DLL; e.g., Gersten, 1999; Musanti, 2017; Musanti et al., 2009; Palmer et al., 2014). In terms of topical focus, we noted three broad groups of research questions that guided the studies: questions focused on classroom practices ($n = 33$), particular groups of teachers (e.g., novice, Latinx; $n = 16$), or the implementation or uptake professional development ($n = 10$). The following section presents the findings by research question.

RQ1: Procedures

The first question asked which *data collection procedures* were used to combine visual and language data to study teaching. The majority of studies in the sample collected a range of data to build cases or to address their research questions descriptively. These procedures were often discussed in the context of the broader research design; other times they were simply mentioned in describing the data collection. Researchers reported a variety of study designs; the most common design was some form of “case study” ($n = 22$). The next most frequent research paradigm and design was “qualitative” ($n = 9$). A variety of other research designs were used less frequently and are presented in Table 3. Notably, all the studies included qualitative components in their research designs with some researchers collecting quantitative descriptive data (e.g., through surveys). Although these research approaches did allow for the concurrent collection of language and visual data, very few researchers described explicitly how they combined both visual and language data in data collection; the exceptions are described subsequently.

Researchers used a variety of data collection procedures to collect visual and language data as presented in Table 3. The majority of these procedures depended on observations of classroom practice ($n = 44$) and teacher interviews ($n = 49$). Indeed, only three studies did not use interviews to gather language data; relying on group discussions of some form to elicit teacher perspectives (de Vocht, 2015; Kullberg et al., 2016; Runesson, 2013). Generally, the interviews were semistructured, yet researchers noted a variety of interview types, also displayed in Table 3. For instance, in some cases researchers mentioned “debriefing” interviews or “informal” conversations with teachers before or after observing instruction ($n = 6$), which raises an interesting question about whether researchers simply saw these interactions as procedural or included data from such informal debriefings in their studies. In addition to interviews, researchers collected language data through teacher logs (e.g., Camburn

TABLE 3
Included Articles and Their Data Types

Author(s)	Year	Instructional Context	Research Method With Relevant Procedure	Visual Data	Language Data
Aguirre & Speer	1999	Secondary teachers' mathematics instruction	Qualitative study	Classroom observations (recordings, field notes)	Interviews
Alanís	2018	Preschool teachers' work with DLLs	Qualitative study	Class observations (recordings, field notes)	Interviews
Alazzi	2008	Secondary social studies teachers	Qualitative study	Classroom observations (video recordings)	Interviews
Baker	2019	Preschool teachers' work with DLLs	Multiple case study	Classroom observations (recordings and field notes)	Semistructured interviews, structured debrief conversation about video-recorded lesson or activity
Baker	2018	Preschool teachers participating PD	Qualitative case study	Classroom observations (field notes)	Semistructured interviews, surveys
Camburn & Barnes	2004	Elementary teachers' ELA instruction	Log validation study	Classroom observations (field notes)	Teacher logs, interviews
Celedón-Parrichis	2010	ESL mathematics teacher	Case study	Classroom observations (field notes), textbooks, teacher records	Interviews
Chiodo & Tsai	1997	Chinese secondary social studies teachers' critical thinking instruction	<i>Not specified</i>	Classroom observations (recordings), ministry guidelines, teacher manuals	Interviews
Crockett	2002	Elementary school teachers participating in a mathematics PD	Clinical case study	Classroom observations (recordings)	Formal and informal interviews, teacher inquiry group sessions
de Vocht	2015	Preschool teachers' teacher-child interactions	Dialogic research	Classroom observations (recordings)	Teacher-researcher discussion of video-recordings
Diezmann & Watters	2015	Novice secondary teachers' science instruction	Case study	Classroom observations (recordings)	Semistructured interviews
Drake & Sherin	2006	Elementary teachers' mathematics instruction	<i>Not specified</i>	Classroom observations (recordings and field notes)	Interviews, personal narrative generation
Flynn & Schachter	2017	Preschool teachers' ELA instruction	Exploratory study w/ stimulated recall	Classroom observations (recordings)	Stimulated recall interviews
Friesen & Butera	2012	Preschool teachers' ELA instruction	Multiple case study	Classroom observations (field notes)	Semistructured interviews, questionnaires
Gersten	1999	Elementary teachers' work with DLLs	<i>Not specified</i>	Classroom observations (field notes)	Semistructured interviews

(continued)

TABLE 3 (CONTINUED)

Author(s)	Year	Instructional Context	Research Method With Relevant Procedure	Visual Data	Language Data
Hamel	2003	Secondary teachers' ELA instruction	Qualitative case study	Classroom observations (field notes), classroom artifacts of student learning, video-recorded student think-alouds	Semistructured interviews, surveys
Henderson & Palmer	2015a	Preschool teachers' work with DLLs	Ethnographic approach	Classroom observations and weekly planning meetings (recordings, field notes)	Semistructured interviews
Henderson & Palmer	2015b	Elementary teachers' work with DLLs	Ethnographic approach	Classroom observations (recordings, field notes)	Semistructured and informal interviews
Hofer & Swan	2008	Middle school ELA and social studies teachers using technology	Interpretive case study	Classroom observations (field notes), teachers' project plans	Open-response survey questions, interviews
Hughes et al.	2005	Middle school humanities teachers participating in a technology PD	Longitudinal embedded multiple-case study	Classroom observations (field notes)	Pre- and poststructured interviews
Hughes & Ooms	2004	Middle school arts-humanities teachers participating in a technology PD	Longitudinal, multiple case, embedded research design	Classroom observations (field notes)	Interviews, inquiry group discussions
Jiménez & Gersten	1999	Latina elementary school teachers' ELA instruction	Qualitative study	Classroom observations (field notes)	Semistructured interviews
Kullberg et al.	2016	Secondary teachers participating in mathematics PD	Phenomenographic research w/ learning study	Classroom observations (recordings)	Teacher discussions during lesson planning and after lesson implementation
Levitt	2002	Elementary teachers' science instruction	<i>Not specified</i>	Classroom observations (field notes)	Semistructured interviews
Machado et al.	2017	Middle school teacher's ELA instruction	Case study	Classroom observations (recordings and field notes), class artifacts	Semistructured interviews
Maloch	2002	Elementary teacher's ELA instruction	Qualitative study	Classroom observations (recordings and field notes), recorded literature discussion groups	Formal and informal interviews, teacher logs/notes
Maloch	2004	Elementary teacher's ELA instruction	Qualitative study	Classroom observations (recordings and field notes), lesson plans, student work	Formal and informal interviews
Maloch	2005	Elementary teacher's ELA instruction	Qualitative study	Classroom observations (recordings and field notes), planning notes, class artifacts	Formal and informal interviews
Maloch	2008	Elementary teacher's ELA instruction	Case study	Classroom observations (recordings and field notes), class artifacts	Formal and informal interviews

(continued)

TABLE 3 (CONTINUED)

Author(s)	Year	Instructional Context	Research Method With Relevant Procedure	Visual Data	Language Data
Maloch et al.	2013	Elementary teachers' ELA grouping practices	Interpretive study w/cross case comparison	Classroom observations (recordings and field notes)	Formal and informal interviews
Martin et al.	2001	Beginning middle school teachers	Case study	Classroom observations (field notes)	Formal and informal interviews
Musanti	2017	Novice elementary teacher's bilingual practices	Case study	Classroom observations (field notes)	Semistructured interviews, unstructured debriefing conversations
Martínez et al.	2015	Elementary teachers' work with DLLs	Qualitative study	Classroom observations (recordings and field notes)	Semistructured interviews
Musanti & Celedón-Partichis	2013	Bilingual elementary teachers' mathematics instruction	Case study	Classroom observations (recordings and field notes)	Interviews
Musanti et al.	2009	Elementary teachers participating in DLL instruction PD	Case study	Classroom observations (recordings and field notes)	Semistructured interviews, unstructured debriefings
Palmer et al.	2014	Preschool and elementary teachers' work with DLLs	Ethnographic methods w/ discourse analysis	Classroom observations (recordings)	Interviews
Runesson	2013	Elementary teachers participating in a mathematics PD	<i>Not specified</i>	Classroom observations (recordings)	Audio recordings of planning and debriefing meetings
Riojas-Cortez et al.	2013	Early childhood teachers	Qualitative design	Classroom observations (field notes)	Interviews, oral reflections, focus groups
Savasci & Berlin	2012	Middle and secondary teachers' science instruction	Multiple, cross case study	Classroom observations via researcher tool (field notes), class documents	Interviews, questionnaire
Schachter	2017	Preschool teachers' ELA instruction	Phenomenological w/ stimulated recall	Classroom observations (recordings and field notes)	Planning interviews, stimulated recall interviews
Souto-Manning	2010	Preschool teachers in Head Start program	Action research and ethnographic practices	Classroom observations (recordings and field notes), photographs, and notes taken by teachers during home visits	Interviews, informal debriefings
Swan & Hicks	2007	Secondary social studies teachers' integration of technology	<i>Not specified</i>	Classroom observations (field notes), instructional artifacts	Pre- and postinterviews
Swan & Hofer	2011	Secondary social studies teachers' technology use	<i>Not specified</i>	Classroom observations, teacher's project plans	Interviews

(continued)

TABLE 3 (CONTINUED)

Author(s)	Year	Instructional Context	Research Method With Relevant Procedure	Visual Data	Language Data
Tobin	1988	Japanese preschool teachers	Visual anthropology and multivocal ethnography	School observations (recordings)	Teachers' autoethnographic discourse
Vetter	2010	Secondary teacher's ELA instruction	Micro-ethnography	Classroom observations (recordings and field notes)	Formal and informal interviews
Vetter	2013	Elementary teacher's ELA instruction	Qualitative study	Classroom observations (recordings and field notes)	Formal and informal interviews
Watters & Diezmann	2016	Beginning elementary teacher's science discourse	Single embedded explanatory case study w/ stimulated recall	Classroom observations (recordings & field notes)	Interviews and semistructured debriefing sessions
Watters & Ginns	1997	Elementary school teachers participating in a science PD	Problem-based methodology w/ case studies	Classroom observations (recordings and field notes)	Semistructured interviews
Westerman	1991	Novice and experienced elementary school teachers	<i>Not specified</i> w/ stimulated recall	Classroom observations (recordings)	Prelesson structured interviews, stimulated recall interviews
Whitney et al.	2008	Middle school teachers' participating in a writing PD	Case studies	Classroom observations (field notes), teacher-selected collection of documents from classroom activities	Interviews
Worthy et al.	2015	Elementary teachers' ELA instruction	<i>Not specified</i>	Classroom observations (field notes), video recordings of guided reading lessons	Formal and informal interviews
Zuniga et al.	2018	Preschool and third-grade teachers	Ethnographic methods	Classroom observations (recordings), class artifacts	Semistructured and informal interviews

Note. PD = professional development; ELA = English language arts; DLL = dual language learner.

& Barnes, 2004; Maloch, 2002), recording teacher meetings (e.g., Crockett, 2002; Hughes & Ooms, 2004; Kullberg et al., 2016; Souto-Manning, 2010), researcher-teacher discussions of videos (e.g., de Vocht, 2015), by gathering teachers' autoethnographic and oral reflections (e.g., Riojas-Cortez et al., 2013; Tobin, 1988), or administering questionnaires (e.g., Friesen & Butera, 2012; Hofer & Swan, 2008). Among these, researcher-teacher discussions of videos, reflective writing, or questionnaires were used much less frequently as collection procedures.

Visual data were collected through video recordings of practice (e.g., Drake & Sherin, 2006; Machado et al., 2017; Worthy et al., 2015), field notes regarding classroom practices (e.g., Levitt, 2002; Musanti & Celedón-Pattichis, 2013; Watters & Ginns, 1997), and photographs taken by teachers (e.g., Souto-Manning, 2010). Some researchers also collected visual documentation of products of practice, such as student work (e.g., Hofer & Swan, 2008; Maloch, 2008; Palmer et al., 2014), lesson plans (e.g., Hofer & Swan, 2008; Maloch, 2004), or curriculum standards (e.g., Alazzi, 2008). Importantly, just over half of the studies utilized audio and/or video recordings of classroom practice ($n = 32$); the rest relied solely on researcher observation via field notes ($n = 20$). Only 16 studies used both recordings and field notes to collect visual data.

The procedures for observing and interviewing teachers varied across studies. For example, Gersten (1999) used "open-ended qualitative classroom" observations (p. 41) to study the ELA practice of four teachers working with DLLs. These teachers were observed at least six times for an hour each time, and observers recorded segments of lessons deemed to be representative of practice. Teachers were formally interviewed twice via semistructured interview protocols and then were debriefed informally by the researchers after the observations. In their study of a technology professional development delivered via inquiry groups, Hughes and Ooms (2004) interviewed teachers once, observed in the classroom and collected field notes once a month, and then relied on recordings of the teachers' inquiry meetings to collect their data.

In most studies, particularly those identified by authors as qualitative or case studies, data were gathered without making explicit connections between the two data forms or making clear how these two forms might be capturing both the private and the public worlds of teaching. For example, Martin et al. (2001) were interested in investigating the experiences of new teachers. They conducted interviews and observations and engaged teachers in formal conversations. Although they collected visual and language data, they did not explicitly discuss the affordance of these forms of data in connecting teachers' perspectives with their public practice. In 31 studies, the connection between the forms of data was drawn implicitly; this general approach seemed the default approach, a point to which we return in the Discussion section.

Some procedures were explicitly intended to combine the visual and language data, such as the stimulated recall procedure used by Watters and Diezmann (2016) in their case study of a career-change teacher. Working with recorded examples of classroom practice, the researchers and the teacher selected salient instances to use to

“stimulate” discussion of the teacher’s perspectives on the practices they saw. Here the two forms of data were explicitly linked in the collection process to understand connections between the public and the private worlds of teaching from the teacher’s perspective. The stimulated recall procedure was used in four articles (Flynn & Schachter, 2017; Schachter, 2017; Watters & Diezmann, 2016; Westerman, 1991) in this review.

Other procedures also connected visual and language data. In her researcher-teacher dialogue study, de Vocht (2015) engaged in reflective exchanges with two preschool teachers after she had watched recordings of their interactions with children, thus using the videos to elicit teachers’ perspectives. Camburn and Barnes’s (2004) log validation study offered a final example of explicit collection and use of the two forms of data. In this study, the researchers collected four types of data: observer log data and observer narratives of classroom practice—and combined these with language data from teacher logs and interviews. All four data sources were focused on a single classroom observation. The aim was to examine differences in how classroom practices were documented from researcher and teacher perspectives in the two types of logs. These data were connected through the teacher interviews that were used to explain differing interpretations of the public observations of teaching in the two logs. These three procedures—stimulated recall, dialogic exchanges, and the log-interview analyses—each explicitly linked visual and language data and came the closest to capturing teachers’ in-the-moment thinking. These procedures were in contrast to the default approach mentioned above that combined interviews with field notes or other types of visual data to interpret classroom practices.

RQ2: Theoretical Frameworks

The second question was directed at understanding how *theoretical frameworks* anchored the collection of both visual and language data. It asked which theoretical frameworks support the collection and integration of these two types of data in these procedures. However, there were few examples of theoretical frameworks that explicitly supported both types of data collection. In one example, Maloch et al. (2013) examined how ELA teachers grouped students within the context of guided reading. The authors organized their study around the concept of teachers as sense-makers whose “enactments of practices necessarily take into account their background, their experiences, their beliefs, and their local contexts” (p. 284). With this conceptualization, the researchers needed to elicit language data to understand this sensemaking process and how it was connected to the teachers’ enacted practice.

In a second example, Schachter (2017) developed a phenomenological framework that explicitly outlined the connection between the two types of data in order to understand participants’ experience of the phenomenon. She stated,

There are two important components to phenomenological work: describing the phenomenon of interest, in this case, teaching young children, and describing the participants’ experiences of the phenomenon. In the context of this study, phenomenology is used as a way to understand how teachers reason about their practice as it is enacted. (p. 97)

In a third instance, Levitt (2002) made the theoretical claim that beliefs comprised part of the private world of teaching, which she called “non-observable,” and influenced their “observable” public practice. Using observations as a starting point, she interviewed teachers to elicit their beliefs about science teaching, arguing that “teachers’ actions in the classroom and the *observable* effects of those actions can be better understood if the *non-observable* phenomena of their thought processes, including their beliefs, are made public” (italics added; p. 5).

In many of the studies, the research designs often implicitly linked the two forms of data. As described earlier, about half of the studies ($n = 22$) in the review characterized themselves as “case studies.” In working to build these cases, the researchers collected robust data (Yin, 2014) that usually included observations or field notes and language data via interviews. In this sense then, these methodological moves, which were inherent in the research design, played the role of a de facto theoretical framework that linked the two forms of data.

We do not mean to say that the reviewed studies lacked theoretical frameworks to support their research; indeed, they were generally well theorized. For example, Friesen and Butera (2012) were interested in early childhood teachers’ reading practices and the role that beliefs played in informing these practices. Their theory held that beliefs mattered in practice and therefore it was necessary to capture this private world of teaching to understand the public classroom practice. They explained that “[they] sought to find examples of how the teachers made instructional decisions about reading and the professional, practical, and personal experiences that contributed to these choices” (p. 363). In this way, like many other researchers they foregrounded the language data and drew on the visual data to interpret the private world it represented. Generally, however, researchers focused solely on the need to elicit language data separate from the visual data, providing different rationalizations for this dichotomous focus. Somewhat ironically though, the rationalizations that supported dichotomous data collection procedures were often similar to the rationalizations made by researchers who explicitly connected the two forms of data.

We noted four principal rationalizations for trying to access teachers’ perspectives. These rationalizations were connected to teachers’ knowledge ($n = 17$), teachers’ beliefs ($n = 17$), classroom practices ($n = 37$), and teacher or student identities ($n = 11$). Thirty-four studies included multiple rationales; the majority of these combined understanding classroom practices and teachers’ knowledge. An example of this is from Friesen and Butera (2012), described previously, who differentiated beliefs, which included “professional, practical and personal experiences,” and the knowledge gained through those experiences, thus nominating beliefs and knowledge as two dimensions of teachers’ private worlds.

The studies included in this review recognized the role of teachers’ private worlds in the work of teaching; however, the ways in which they linked teachers’ perspectives to the public world of their practice were often tacitly assumed. These assumptions seemed to turn on how the two forms of data were interrelated in both collection and

analysis. In the data collection process, what each form of data was actually capturing and how those were interconnected was often tacit or unexplained by the researchers. Similarly, in data analysis, the ways in which the two forms of data were linked entailed assumptions made by researchers. These assumptions hinged on which form of data was foregrounded. The process of foregrounding one form of data led to how both forms of data were interpreted and to the claims that the authors could make in their findings. We return to these issues regarding connecting and foregrounding data in the Discussion section. At this juncture, however, we are simply highlighting the relative lack of clear theoretical framing of the relationship between the two forms of data in most of the studies reviewed.

RQ3: Assumptions or Warrants

The issue of assuming an ambiguous connection between the public and private worlds of teaching goes to the core of the problem in this systematic review—that is, how researchers *warranted* the connection and what they could reasonably say about teaching from their studies. Interestingly, and perhaps to be expected, these warrants were not generally laid out in the theoretical frameworks in the studies. Rather, the warrants were often evident in the way in which the researchers foregrounded one or the other form of data.

One can argue that a researcher's assumptions are, by definition, inaccessible to others, as Dickinson writes of poetry in the epigraph. How data are collected and analyzed do reflect theoretical positions, however. Thus, we use the term “assumption” to refer to this underlying rationale, whether or not it is explicitly stated. The way in which researchers presented their findings, what they directed the reader to focus on, and which type of data seemed to play a larger role in their efforts to address their research questions all reflect these assumptions. Some studies in the review foregrounded the public practice of teaching and used language data to explain the teachers' thinking about these public phenomena. Other studies did the reverse: They foregrounded the private world as captured in the language data and placed it in the context of the public practice of teaching as documented in visual data, which often included field or observation notes.

For example, Vetter's (2013) study of how a secondary ELA teacher supported the language interactions of students speaking African American language (AAL) foregrounded the data on these classroom practices while using the teacher interview data to elaborate them. In the data analysis, she used discourse analyses to examine the classroom interactions, focusing heavily on the visual data of the classroom dialogue and interactions through field notes and recordings. Vetter then used the teacher interview data, which elicited the private world of teaching, to deepen and broaden her understanding and interpretations of the visual. She explained,

I examine how Gina leveraged AAL in ways that contributed to her expectations for the literacy community. Second, I investigate how Gina leveraged AAL that appeared to conflict with her expectations for the literacy community. (p. 185)

Here, she foregrounds the public world of teaching and categorizes how it fits within the teacher, Gina's, thinking about her teaching. Vetter states explicitly that "discourse analysis framed around positioning theory [was used] to interpret classroom interactions" (pp. 179–180), thus indicating how she led with the visual data in analyzing and presenting teaching.

In contrast, Savasci and Berlin's (2012) study of teachers' reported beliefs about science and constructivist practices relied heavily on the language data to describe teachers' perspectives. Their findings included many excerpts from teachers' interviews with short summaries of their visual data to demonstrate how public practices did or did not align with these reported beliefs. In describing their findings, they stated, "In summary, teacher expressed beliefs were not consistent with their classroom practice" (p. 76). Their study exemplifies how the language data representing the beliefs was foregrounded in the presentation with discussion of public practices. Furthermore, their statement, "Expressed beliefs were not consistent with their classroom practice," defaults to the visible world as the "correct" view of their teaching, in their use of the word "consistent," in spite of the fact the researchers emphasized the language data in their findings.

In most instances, we observed that the research design favored or foregrounded one form of data over the other. In studies in which the connection was theorized, the findings and interpretations were warranted through that theorization. In other cases, where the theoretical connection was not explicit, the connection was often drawn implicitly in the data analyses. Consider two examples discussed previously, Vetter (2013) and Savasci and Berlin (2012): Neither provided an explicit theorization of how the visual and language data were connected. Instead, the connections were assumed in the analysis and interpretation of their findings. For Vetter, the assumption was operationalized in using the language data to elaborate the visual data, whereas for Savasci and Berlin it was operationalized in using their observations to contrast with what teachers said in their interviews. In so doing, each focused more heavily on one form of data and then used the other form to support the claims they were making about the foregrounded data. We would argue that without a theoretical connection, combining the visual and language data occurs in the interpretation process, which usually leads to the foregrounding of one form of data over the other. There is an important implication here: If the two forms of data are not treated equivalently, and therefore an explicit connection drawn between them as parallel and interrelated versions of the phenomenon, researchers run the risk of misrepresenting one of the two worlds in their interpretation of teaching.

That said, a quarter of the reviewed articles balanced the language and visual data more or less evenly ($n = 13$), thus ascribing similar importance to the public and private worlds of teaching. For example, Drake and Sherin (2006) observed teachers multiple times as they taught a new mathematics curriculum. The researchers then interviewed teachers either before or after the lessons to understand their goals and to address questions that arose regarding practice. They also observed and recorded the teachers' participation in a monthly mathematics professional development and

conducted mathematics life story interviews with teachers. They were able to link the pre- and postconversations with teachers to the visual data of the classroom practice and interweave their mathematics life stories with teachers' accounts of their overall practice. They supported this balanced connection with their theorization of teachers whose "sensemaking about a mathematics reform curriculum and about their own mathematics teaching practices is situated in their identities as learners and teachers of mathematics" (p. 157). Their claim regarding teachers' "sensemaking about a mathematics reform curriculum and about their own mathematics teaching practices" anchored data collection strategies and the ways they interpreted and presented their data to warrant their claims and represent the thinking and actions of teachers.

In a second example, Aguirre and Speer (1999) used teacher interviews to identify different types of beliefs connected to teaching mathematics. They then mapped these beliefs onto observations of the teachers' practice to represent how beliefs were informing practice. This balance was achieved when they both theoretically and procedurally specified the connection between the two forms of data. From the start, the authors had a clear vision of how the two forms of data were connected in the study and therefore each was given equal weight in both the analyses and the presentation of the findings. From the standpoint of this review, the data analyses used by Aguirre and Speer did not use either data source to document teachers' in-the-moment perspectives on their teaching. Rather, the researchers used data gathered through more general interviews to link teacher beliefs with public practice. The study did, however, portray an integrated view that connected the private and public worlds of teachers.

As we examined the foregrounding of data sources, we recognized that researchers were making analytic decisions in designing their studies and in analyzing their data. Most often, the research design drove how data were analyzed and integrated to address the research questions. This use of research design to establish the connection *de facto* may make sense in terms of general research quality (Creswell & Creswell, 2018), however, it can prove problematic. In our review, we found that often researchers did not make explicit to their readers (and possibly to themselves) how they were justifying or warranting these connections between the public and private worlds of teaching. This was the opposite case in the studies that balanced the two forms of data: Most of these were also more explicit about the connection between the two forms of data and the warrants that were used to argue for those connections.

The use of stimulated recall as a data collection procedure was a notable exception to this analytic balancing act. This may be because in using stimulated recall, the researcher needs to determine who is connecting the visual data in the video and the language data in recalling what was captured on it. Hence, the procedure itself introduces a set of explicit choices and decisions (Schachter & Freeman, 2015) about why both visual and language data matter in the study and how they are to be interwoven in collecting and analyzing the data. These decisions include whether and how to deliberately allow the teacher to control the visual data (recorded observation) to elicit (or "stimulate") the language data. For example, Westerman (1991)

used stimulated recall interviews to look at the in-the-moment decision-making processes of novice and expert teachers. This procedural decision allowed the teachers to make the connection between what was documented in the visual data on the video and what was happening privately for them during the process of teaching. This decision about who made the connection illuminated how the private and the public worlds connected by identifying the decision-making processes from the teachers' perspectives.

DISCUSSION

This chapter has examined how researchers combine visual and language data to understand teachers' perspectives on their own teaching and to identify data collection and analysis procedures and theoretical frameworks that support this type of research. We found that relatively few articles—only 52 studies—met the criteria for this review. Furthermore, even fewer articles were explicit, either procedurally or theoretically, about how the two forms of data were connected. It would seem fair to say based on this review that, to date, research connecting the private and the public worlds of teachers' teaching is limited.

Expanding this type of research is important in light of the current U.S. education context, however. Many teacher evaluation systems and reform efforts, either in use or contemplated, are based on teachers' observable practice (Cohen & Goldhaber, 2016). Although these aspects of instruction may be more amenable to measurement schemes, they do not present the entire picture of the teaching process. For this reason alone, there is a risk of oversimplifying the work of teaching and not effectively improving classroom practice. Furthermore, there is a growing body of research that identifies the risk of using observation measures as the sole mechanism for interpreting quality of practice (e.g., Bailey et al., 2016; Campbell & Ronfeldt, 2018; Hill & Grossman, 2013). The policies that focus on observable teaching only position teachers within deficit or punitive orientations (Holloway, 2019) and do not account for the specialized knowledge that is necessary to bring about successful teaching (Ball et al., 2008; Shulman, 1987). In this education context, it is critically important that the research community pursues work that presents the complexity of the work of teaching by highlighting and examining how the private and public worlds are interwoven. Simply put, one cannot document—let alone seek to improve—the public activity of teaching without accounting for, and indeed highlighting, the private world of teachers' thinking.

Affordances of Combining Visual and Language Data to Study Teaching

Before turning to the particular methodological challenges in conducting research that combines visual and language data to study teaching, it is important to note the contributions these studies can—and do—make to understanding of teaching. Although the ways in which language and visual data are combined varied across studies in this review, we saw patterns that support the continued combination of

these two types of data in research designs. Posing research questions about a range of issues in student and teacher learning, including how particular classroom practices are being enacted or about teachers' experiences in, and uptake from, professional development all turn to some degree on combining visual and language data. Studies can also focus on instruction in relation to specific types of teaching or content areas, as well as on how teacher or student identities shape teaching and learning. Furthermore, it can be argued that simply through collecting language data in conjunction with visual data, researchers are recognizing the private worlds of teachers, even if these connections are not drawn explicitly. Studies of this nature underscore the critical point that practice does not happen in a vacuum. To separate classroom practices from teachers' beliefs, knowledge, intentions, or their identities leads to partial and incomplete accounts of the work of teaching.

Warranting Data Collection Designs and Procedures

The chapter findings identify a broader pattern of what seem to be established norms for studying teachers' thinking about their work. Each study involved at least some form of qualitative data collection, either through observations of the public world of teaching or interviews to gain access to the private world of teaching. In fact, all but three studies ($n = 49$) used interviews to collect language data, and all the studies we reviewed included observations, although these were documented in various ways (e.g., recordings, field notes). These are common research procedures employed by qualitative researchers (Marshall & Rossman, 2006). However, the majority of researchers were not explicit in stating why they used the procedures they chose, or how the data generated in using these procedures were connected to represent both worlds of teaching. It may be that, given the prevalence of these procedures in the field, researchers are simply assuming the warrants or reasons for using both visual and language data in their studies. As Booth et al. (2016) have argued, "Experienced researchers rarely state their warrants explicitly when they write for specialized readers in their fields because they can safely assume that these readers already know them" (p. 158). Although it is true that readers may know the value of these research procedures, this review indicates that the field may be oversimplifying the research process when combining procedures to collect multiple forms of data.

The implicit assumptions about warrants and research design is borne out in the finding that nearly half of the reviewed articles ($n = 22$) were designed to be some form of case study. Case studies afford researchers the decision to bound their foci of study while also collecting robust data to understand their research question and build their "case" (Yin, 2014). In terms of data collection, these studies draw on both visual and language data, often combining observations and document collection with interviews and member checking. The implicit warrant seems to be that all the data combine to elucidate the particular case. However, we found that researchers often used the case study as the research design to serve as a proxy for defining how the research procedures and warrants connected the visual and language data they

had gathered. In this fashion then, the overall study design served researchers as a warrant in and of itself.

Maxwell (2012) makes a similar observation in his argument about causation or “causal realism”³ in qualitative work more broadly. He argues that such research “identifies process as a necessary and central aspect of causation . . . makes context intrinsic to causal explanation . . . [and] extends causal efficacy to beliefs, values, intentions, and meanings, not just to physical objects and events” (p. 657). In that case studies are often used to examine processes, social contexts, and “beliefs, values, intentions, and meanings,” it seems to make sense that researchers would use case studies as research designs to draw causal connections between the private and public worlds of teaching. Our concern is that case study designs can often skirt the central issue of how the two forms of data are connected. Many of these studies still rely on foregrounding one form of data in their designs and analyses and then drawing on the other form of data to confirm, disconfirm, or extend findings that have been developed from the first. Although these types of studies were proposed as “cases” of teachers’ perspectives on their classroom teaching (e.g., Diezmann & Watters, 2015; Friesen & Butera, 2012), when organized in this way they tended in fact to reify the assumption that all the data contributed to defining the case without the need to theorize the interconnection between the two forms (e.g., Martin et al., 2001).

This overall lack of explicit theorization about how visual and language data connected was striking across the studies in this review; in fact, only seven studies (13%) were explicitly theorized. We had anticipated that since the core problem in this work involves connecting worlds of teaching, theory would be used regularly to make these connections explicit. We did not find this to be the case. Although most researchers provided a rationale for the need to understand the private processes of teachers, they did not connect these to the public process of teaching. Only a few researchers referenced specific theorizations (e.g., sensemaking, Maloch et al., 2013; phenomenology, Schachter, 2017; sociocultural theory, Henderson & Palmer 2015a) to connect visual and language data. The other 45 studies left this relationship unarticulated or assumed, foregrounding of one or the other forms of data in various ways.

We want to underscore a distinction that has emerged in this review that we believe could be useful going forward. It is the distinction between *rationalizing* the need to collect both forms of data and *theorizing* how language and visual data in a study are connected. *Rationalizing* entails the researcher acknowledging that there are data to be gathered about both the public and private worlds of teaching, and that both forms can be related to the research questions and contribute in the analyses and findings. In these cases, the two forms of data are usually linked *de facto* when one form is foregrounded in the analysis and the other is used to amplify, extend, or even explain it. For example, Martin et al. (2001) foregrounded language data (interviews) to gain insight into “what new teachers experience in their first three years of teaching” (p. 60). The collection of visual data (classroom observations) was rationalized as a way to triangulate the findings.

In *theorizing*, the researcher goes a step further to determine that the connection between the two forms of data is integral to the claims they are seeking to make and to warrant. This determination happens in the design of the study, when the researcher recognizes that how these data are to be collected, how they are to be integrated in analysis, and how they will be represented in findings are essential decisions both conceptually and procedurally (Freeman, 1996). For example, de Vocht's (2015) study in this review used Bakhtinian concepts of dialogue and moral answerability, as well as a "dialogic research methodology" (p. 323) to make explicit connections between the visual and language data in the research design and procedures, as well as in the findings. She theorized the relationship between the two forms of data claiming that, through dialogue and "collaborative meaning making of video-recorded encounters between teacher and children," the teacher and the researcher "gained a deeper understanding of the complexity of teacher-child dialogue" (p. 329).

The foregrounding of one form of data in favor of the other is a *de facto* manifestation of rationalizing the need for the forms in a particular study without fully working out the connection between them or what that connection may warrant in the claims of the study. Theorizing, on the other hand, entails actively working to avoid bifurcating worlds in designing the procedures of the study and in warranting the claims in the findings. Although there are procedural and methodological dimensions to these decisions, at their core they are determinations of whose version of the phenomenon gets told in the study. We refer to this determination as "authoring" the connection between language and visual data.

Connecting Language and Visual Data as an Authoring Continuum

When we embarked on this review, we hypothesized that connecting visual and language data was a temporal problem that necessitated understanding teachers' perspectives in-the-moment as they enacted instruction. In this sense, stimulated recall as a data collection procedure addressed this temporal issue head-on. Our understanding has evolved over the course of the review, however. We now would argue that combining the visual and the language data can actually be framed as a question of positionality in who "authors" the connection between the two forms. Indeed, who connects the two forms of data, and how, matters considerably in bridging the two worlds. When the researcher is the primary author of the connection, the work is told from the third-person perspective. When the teacher authors the link, the first-person account comes to the fore.

Authoring is a way of positioning the bifurcation between the worlds and managing it within the research study. In the review, we found there was a continuum of how the connection between the two forms of data was authored. In almost every case, the researchers were the main authors, making the connections between—and thus making meaning of—the language and the visual through the analytic and descriptive processes they used. In these cases, the researchers made the decisions about how the data were connected and authored those connections either explicitly

or implicitly. At times, the decisions asserted the primacy of the researchers' interpretations as, for example, in the Savasci and Berlin (2012) study cited earlier. Here, the researchers decided to use observational data to demonstrate how practice did not align with teachers' stated beliefs about the teaching practice the researchers had observed.

These moves tend to align with more traditional research methods in which researchers tend to maintain teacher-researcher boundaries. The distinction in roles is structured into the research process, although this line can typically be more fluid in qualitative research (Creswell & Creswell, 2018; Marshall & Rossman, 2006). Researchers seemed aware of this possibility with all incorporating qualitative procedures in their studies and many being explicit and reflexive about their roles in shaping the research process. This reflexivity included the researchers as participants/providers of a professional development, co-teaching, or having taught a study participant in a preservice program. But it is noteworthy that this reflexivity did not translate into how the researchers analyzed and connected the visual and language data. In fact, such studies often tended to cleave to a more conventional positioning in which researchers "studied" what teacher-participants were doing and thinking.

At the other end of the continuum were the few articles (e.g., de Vocht, 2015; Schachter, 2017; Watters & Diezmann, 2016) in which the teachers authored the connection between the two forms of data. This was accomplished through the use of a few particular procedures: stimulated recall, teacher study logs, or dialogic research study designs. In each of these studies, the researchers asked the teachers to language their perspectives on the visual data. For instance, during interviews, Hamel (2003) asked teachers to explain and assess artifacts that demonstrated students' understanding of literature. These artifacts, which included papers, journals, tests, and video/audio tapes, led to teacher discussion about the kind of teaching practices that might support student learning. In this way, the teachers were able to decide when and how to make the connections between the two forms of data. This move offered teachers the possibility of authoring the meaning of the observed practices.

There are several other nuances in the continuum in which researchers provided teacher-participants opportunities to author the connection between the forms of data, albeit in a more circumscribed role. This authoring could occur procedurally through the use of debriefing meetings that followed observations of teaching ($n = 6$), which allowed teachers to express perspectives on the observation even though they did not explicitly connect the language directly to the visual data (e.g., recorded observations, field notes). It was also not always clear how researchers accounted for these debrief data in the overall analytic process of the study. A second procedural strategy involved the explicit inclusion of member checking (Patton, 1980) to triangulate findings ($n = 12$). In essence, member checking allowed teachers to proofread the written analyses that were authored by the researcher. A third type of authoring on this continuum involved research design-related or genre-related protocols that engaged teachers in authoring their experiences through the use of narratives. However, these procedures were limited to the language data. It is intriguing, and worth noting, that

the search process did not surface any teacher-research studies, which would be the logical extension of the authoring continuum (see Freeman, 1996).

Decisions about who gets to make meaning of the language and visual data depend on the layering of research design, data collection procedures, and analytic strategies. These decisions, which can allow or inhibit teachers from making meaning through the connection of data on their public and private worlds, are very much dependent on the theoretical frameworks and warrants that researchers use to rationalize and implement their studies. Recognizing that qualitative research is an iterative process (Maxwell, 2013), sometimes these decisions are made by researchers as they implement the study design to address their research questions. However, it is critical to point out that the initial conceptualization of a study and the ultimate analyses are not separate. As long as researchers tend to default to rationalizing rather than theorizing how visual and language data connect in their studies, the work they produce will be dominated by the researchers' views and interpretations. This fact has consequences for how teachers as the central protagonists are positioned in generating knowledge about classroom teaching and learning (Freeman, 1996).

Other researchers have likewise identified the challenge of negotiating power dynamics between the researcher and participants in education research, both in studying teachers (e.g., Adair, 2011; Souto-Manning, 2010; Tobin, 1988) and students (e.g., Martínez, 2010; Orellana & Bowman, 2003). Furthermore, a growing number of researchers have also explored these topics within the context of teacher education, particularly with preservice teachers (e.g., Abell et al., 1998; Masingila & Doerr, 2002; Xiao & Tobin, 2018). The connection between the private and the public introduces another way to consider these dynamics of positioning and authoring. In doing so here, our emphasis fits solidly within these orientations to research methods.

Limitations

In undertaking a review of this complexity, limitations are bound to emerge; we note two principal ones here. The first concerns how we bounded the search to conduct the review. Through the specific focus on in-service teachers, we have potentially excluded research studies that examine preservice teacher education. Although preservice teachers are certainly an important population to consider, we chose to narrow the focus for two reasons. Inasmuch as video is increasingly part of teacher preparation, the pedagogical procedure is often paired with research on its use and impact, as noted earlier in this chapter. This dual focus could potentially confound our particular interest in how connections between visual and language data are warranted. Additionally, we set the parameter on in-service teachers in order to consider established practitioners and how these two forms of data are connected in studies that have documented ongoing practices in teaching. For in-service teachers, these practices are shaped by the social contexts of schools and their communities, whereas preservice teachers are often in more constrained settings. Practically speaking, this parameter led us to identify a manageable body of literature. Politically speaking, we would argue that the focus on

practicing teachers is important in identifying a current gap in the research that combines both visual and language data at a time when there is an increasing focus on evaluating teachers through observation, as noted previously.

The second limitation was operational; it lay in the instability of the ProQuest database over time. The inability to replicate searches, even from one day to the next, was a challenge. It was a problem that several expert librarians with whom we worked at the two institutions noted was not uncommon in using ProQuest. Although we were able to address our concerns about locating relevant articles through backward searches and checking for additional works from authors we had already included, this problem of stability does raise larger questions about the replicability of these types of reviews. Whereas one wants the universe of studies to be permeable and to be refreshed by new work, the apparent fungibility of search parameters and terms does introduce challenges to replicating searches.

Avoiding the Bifurcation of Worlds: Implications and Recommendations

In designing their studies, researchers have the possibility of basing findings on what can be publicly observed in classrooms. They can also draw out what is private and therefore not directly accessible to them, and ascribe meaning to it. In making these decisions, researchers have the possibility of addressing the problem of bifurcating worlds head-on through intentionally designing their studies and focusing on authoring practices. These decisions blend the private and public worlds as Dickinson wrote in the epigraph to Higginson as the potential reader of her poems, “And I have none to ask/Should you think it [the mind] breathed/And had you the leisure to tell me.”

We argue that to address potentially bifurcating of these worlds researchers need to consider both private and public aspects of teaching throughout the research process: from how they orient the study and frame the questions that drive it, to what they designate as the data and what those data represent, to how data are gathered and analyzed, to how the findings are authored. We offer the following questions, which can bring to bear teachers’ perspectives, for consideration:

1. Why, as researcher, am I collecting visual and language data? How do these two forms of data elucidate the research aims or questions?
2. How do I connect the two types of data in the study? What will the connection provide? Am I theorizing the link or am I rationalizing the apparent need for both forms of data?
3. How will I connect these data in analysis such that they document the work of teaching?
4. Who, the researcher or the teachers, is the primary voice in authoring the findings? Are there ways in the study design to engage with participants to author the connection between the private and the public worlds of teaching?

The review identified several procedures that highlight the potential for avoiding bifurcating the public and the private worlds. Regarding data collection, the stimulated

recall interview is a procedure that offers theoretical, procedural, and analytic grounds to conceptualize the connection between visual and language data. Depending on the decisions of who manages the recall process, stimulated recall also has the potential to engage teachers in authoring the connection between them. But fundamentally, as a data collection procedure stimulated recall sets up a set of decisions that can—and indeed probably ought to—be applied in any study that draws on the two forms of data (Schachter & Freeman, in press). In this sense then, stimulated recall offers both a template for thinking through the questions posed above and a specific means of addressing them.

Photovoice is a second potentially promising data collection method (Wang & Burris, 1997). The procedure engages participants in creating their own visual data in the photos they take. The procedure often includes then connecting these images to language data as the participants explain those images. This procedure has been used with students in efforts to increase their agency in the research process (e.g., Smith et al., 2012; Warne et al., 2013). Interestingly, although the same principles can be applied with teachers, our review did not find any studies in which teachers used photovoice about their teaching. There are also ethnographic approaches that use video data (e.g., autoethnography, Tobin, 1988; video-cued ethnography, Adair, 2011). These procedures can allow the teacher to author the connection between their teaching and their thinking about it, thus decentering the researcher. Finally, teacher action research (Carr & Kemmis, 2003; Mills, 2000) allows teachers to investigate and interpret their teaching solely from their perspectives, thereby authoring the entire process. Researchers can both support teachers in engaging in this type of work and support the publication and dissemination of their findings (Freeman, 1998).

CONCLUSION

We trust that this chapter contributes useful insights to this developing concern of melding public and private in education research. The aim is to collect data that can meaningfully deepen the study of teaching through combining data on the public life in classrooms (visual data) and the private lives of teachers (language data). Central to this deepening, we argue, is becoming more systematic about assumptions of how visual and language data connect a priori in the research design and the choice of research procedures. Through illuminating these connections between teachers' perspectives and how they enact their classroom instruction and by highlighting the rather limited roles of teachers in authoring these connections, we hope readers of this review will identify new ways of thinking about and addressing an enduring problem in education practice and research: how to support teachers in improving instruction.

Although the use of visual data to investigate the public world of teaching has become a mainstay of education research, it only tells part of the story. From field or observational notes (e.g., Patton, 2005) to video (e.g., *Learning How to Look & Listen*, 2016), visual data do not speak for themselves; they generally need to be expressed in language. This dynamic between what is visual and what is language is elemental in how we study teaching. How these two forms of information are

connected and who authors that connection shape what is told and therefore what is understood about the work of teaching. The research challenge brings myriad possibilities for exposing the complexities of teachers' work and thereby advancing the teaching profession. It is fundamentally important to represent teachers' thinking about what they do to understand the relationship between what is public and what is private in their work. Operationally, this means connecting what is seen and observed with what is said. Epistemologically, it means warranting what is assumed in drawing those connections and thus in making research claims about them.

The work of teaching is paradoxical: It is at once individual, private, and performative, while it is simultaneously social, public, and interactive. These paradoxical qualities are at the core of the challenge of bifurcating worlds. Addressing and overcoming this bifurcation needs to be a collaborative endeavor between the researcher and the teacher. To borrow from the words of Dickinson in the epigraph, teachers often "have none to ask" to "see distinctly" what they are doing. The "leisure" of telling and hearing from another, perhaps in the role of researcher, may bring "gratitude" for the other's show of interest. More important though, it can open up a fuller understanding of the work itself, which, in turn, can support desired changes and needed improvements.

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NOTES

¹Quoted from Thomas Wentworth Higginson's (1891) essay in *The Atlantic*.

²This date was selected based on prior work of the authors identifying 1975 as the year of the first stimulated recall research publication focusing on pre-K to 12th-grade teachers.

³Maxwell quotes this term from Little (2010, p. 218).

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