Reflecting Together: Classroom Video as a Tool for Teacher Learning in Mathematics

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With the aim of strengthening mathematics teaching | learning, classroom video is increasingly used as a tool for teachers to reflect on their practice. In the first phase of a two-phase design-based study, a group of primary teachers selected, viewed and discussed video excerpts from mathematics lessons. Engaging with and working to reconcile differences that emerged in the teachers' ideas about practice catalysed productive conversations for their learning. What was noticed and picked up for discussion mediated what conceptual resources were made available for teachers' reflections. Sharing classroom video provided teachers with both a window into the otherwise private practice of others, and a mirror in which to reflect on their own practice.

Groups of teachers using classroom video as a tool for professional inquiry to support reflection and strengthen mathematics teaching | learning is increasingly prevalent. In a two-phase, design-based study which explored how participation in collaborative inquiry generates teachers' knowledge for mathematics teaching | learning (see Eden, 2019), the author and a group of teachers used excerpts of classroom video in the co-design and enactment of an approach to collaborative teacher inquiry. The study is founded on a view that collaboration and inquiry are important for teachers' learning, and that teachers' collaborative inquiry activity is a productive site for developing adaptive expertise, needed to address inequities in mathematics classrooms. An underlying assumption is that teachers' noticing is important for reflection and that reflection is essential for understanding and enhancing classroom practice. The use of video as a tool for supporting teachers' noticing of classroom events was a particular characteristic of the teachers' shared activity in the first phase of the design process.

Collaborative Teacher Inquiry

This study is premised on the idea that inquiry is a stance teachers take, and that collaborative activity can afford teachers opportunities to learn in the context of their work.

Collaborative Inquiry

Collaborative inquiry situates teacher collaboration within the notion of an inquiry community (see Jaworski, 2003). Inquiry communities are characterised by systematic teacher inquiry whereby teachers "articulate questions, problems and dilemmas" and knowledge is developed through the structured analysis of data "and/or conversations which generate new, revised, or more explicit understandings" (Levine, 2010, p. 112). Central to the activity of inquiry communities are reciprocal processes of co-learning (Jaworski, 2008). Collaborative inquiry for teachers can be powerful in fostering the "kinds of thinking that lead to development" (p. 7). Collaborative teacher inquiry has been seen to promote expanded teacher knowledge, for example through lesson study (Hunter & Back, 2011), and improved student learning in mathematics (Ingvarson et al., 2004). It is widely accepted that teacher community represents productive conditions for improving teaching and raising student achievement (Eaker & Keating, 2012) wherein teachers engage interactively with colleagues in professional learning within the context of their work (Desimone, 2009). As argued by Fullan, Rincón-Gallardo and Hargreaves (2015), "collaboration focused on the improvement of teaching and learning is one of the highest-yielding strategies to boost student, school and system performance" (p. 8).

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Noticing

The importance of teacher noticing as an aspect of teachers' expertise is commonly acknowledged (Kaiser & König, 2019; Scheiner, 2016), generating ongoing interest in the development of mathematics teachers' noticing (Santagata et al., 2021). Noticing has been described as a "hidden practice of in-the-moment decision-making that is needed to respond to children's … strategy explanations" (Jacobs et al., 2010, p. 197). Teaching mathematics is contingent; in any lesson there are many things happening simultaneously. Noticing is non-routine and complex, requiring a repertoire of interconnected skills including attending to the mathematical details in students' strategies; interpreting the underlying conceptual understandings; and determining how to respond (Jacobs et al.). Furthermore, as Deborah Ball (2011) suggests, a "paradox of expertise is that ideas that seem obvious are not so to the learner" (p xxi), pointing to both the importance and complexity of teachers' noticing. In other words, the more extensive a teachers' knowledge of a subject, the more challenging it can be to recognise and respond to students' understandings, and misunderstandings.

Reflection

Reflection is fundamental to improving teaching as teachers interpret and derive meaning from classroom events to inform and shape future teaching. Teacher noticing is a key aspect of reflection. Accordingly, Jacobs, Philipp and Sherin (2018) argue that "noticing is a critical component of mathematics teaching expertise and thus a better understanding of noticing could become a tool for improving mathematics teaching and learning" (p. xxvi). Linking reflection with noticing, Jaworski (2003) argues that an increased awareness of classroom events supports critical intelligence, a kind of 'metaknowing' for teachers. Thus, she suggests, engaging in critical reflection beyond the classroom enhances teachers' explicit awareness of conditions and events within the classroom which can then expand possibilities for action. With a focus on challenging the tacit assumptions that underlie teachers' practice, Larrivee (2000) suggests that critical reflection entails:

> a deep exploration process that exposes unexamined beliefs, assumptions, and expectations … Reflective practitioners challenge assumptions and question existing practices, thereby continuously accessing new lenses to view their practice and alter their perspectives (p. 296).

Critical reflection in collaboration with others can support future noticing thereby affording new possibilities for teachers' decisions and actions (Mason, 2009). In line with a view of teaching as complex, this suggests that teachers may be better able to notice important aspects of both the practice and the impacts of their teaching (Jaworski, 2003). Furthermore, collaborative critical reflection on previous practice can promote enhanced noticing within future practice thus influencing classroom actions and potentially improving teaching (Jaworski, 2008).

The Role of Video in Teacher Inquiry

Mathematics teaching | learning is complex and largely private, and there is increasing interest in video as a window through which to view classroom activity. Classroom video offers a tool that teachers, and students, can access and use with readily available equipment and little preparation. Unsurprisingly, perhaps, video is commonly regarded as a valuable source of evidence to support teachers' reflection on and responses to classroom events, and is increasingly used in teachers' professional development (Gaudin & Chaliès, 2015). Nevertheless, the use of video for the professional learning of teachers does not always align with research evidence about what and how teachers learn from video (Sherin & Dyer, 2017).

Classroom video is commonly regarded as a useful tool for teacher inquiry and, within inquiry communities, teachers reflecting together on classroom video has been seen to promote teacher learning (Borko et al., 2008). Video has been used to support the development of teachers' pedagogical content knowledge, provide a model of effective classroom practice, promote reflection

and noticing, and examine equity-oriented approaches to teaching (Santagata, 2014). Accordingly, videos used for teacher reflection may range from commercially-produced videos depicting "exemplary" classroom practice (e.g., Santagata, 2014) to videos from teachers' own classrooms (e.g. van Es & Sherin, 2008). Research has tended to focus on excerpts of classroom video recorded and selected by researchers and/or by the teachers themselves. In many cases, teachers' reflections are guided by explicit tools and discussion protocols (Santagata et al., 2021).

A range of outcomes have been associated with using video for teacher learning, including the development of knowledge for teaching mathematics, shifts in teaching practice, and improved teacher motivation (Gaudin & Chaliès, 2015). The nature of the videos, how and why they are selected, and how teachers interact with them all influence their potential for supporting teacher learning (e.g., Blomberg et al., 2014). What aspects of classroom life can be perceived in video is influenced by decisions that are made as the video is captured. Ongoing, rapid technical advancement has expanded teachers' and researchers' possibilities for capturing classroom video whereby decisions about what to record and how to record it can be made "in the moment" as classroom events emerge (Santagata et al., 2021).

Learning from classroom video is generally assumed to occur as teachers are watching and discussing excerpts, however Sherin and Dyer (2017) found that there are important considerations and associated teacher actions for recording and selecting productive clips at three time periods: before, during and after the lesson. Accordingly, they highlight the importance of selecting excerpts that provide access to student thinking and, particularly, the depth of the thinking that is captured.

The Study

This paper is concerned with the initial phase of a two-phase design-based study that explored the question: How does participation in collaborative inquiry generate teachers' knowledge for mathematics teaching | learning? The aim of the broader study was to co-design and enact an approach to teachers' collaborative inquiry, and explore opportunities for, and constraints to, the teachers' professional learning within their inquiry activity. A participatory and collaborative approach was taken in line with the research focus and Hintz and colleagues' (2013) observation that teachers can and should "build more detailed visions of ambitious teaching through [their] work together" (p. 10).

A group of four teachers and the author met three-weekly over a six-month period to co-design, enact and refine an approach to collaborative inquiry, with the teachers' inquiry activity focused on developing the practice of using talk moves to facilitate mathematically productive student discussions. At the study's end, the teachers' collaborative inquiry activity centred on co-teaching mathematics lessons involving co-planning, co-instruction, and co-reflection. This paper focuses on the initial phase wherein the inquiry activity concentrated on viewing and reflecting together on classroom video excerpts from the teachers' mathematics lessons.

Audio-recordings of the group's meetings and semi-structured interviews with each teacher at the start and the end of the project were the primary data sources. Research notes and informal classroom observations provided additional context to understand the events discussed in the meetings and interviews. The exploratory nature of the research meant that the design of the teachers' collaborative inquiry activity was continuously renegotiated. Cultural-historical activity theory (CHAT) provided a theoretical lens through which to analyse the complexity of the inquiry activity. Having identified both theoretically-derived and data-derived codes from the transcribed meetings and interviews, CHAT was used as a conceptual tool to analyse emerging themes in terms of the different elements of the teachers' collaborative inquiry activity, and to identify the nature of any contradictions and the impact of actions taken to resolve them (see Eden, 2019 for additional details of the process).

Findings

During their first two inquiry meetings, the group had negotiated an overarching inquiry focus on using talk moves and discussed related research literature. The teachers then agreed to select excerpts of video from their classrooms to share at subsequent meetings:

> select something that you think the group could learn from, something that has that focus on student talk and in this case we're talking about trying out talk moves [Raewyn].

The following three examples are drawn from the group's discussions of the video excerpts, and focus on how the teachers made sense of the classroom events captured therein.

Example 1: Doing the Wrong Thing

The first of the teachers to share a video excerpt with the group was Sam. In her lesson, students had been solving a problem that involved finding the number of dots on four dominoes missing from a set. Sam had deliberately chosen the excerpt as an example of a missed an opportunity to extend the thinking of her students:

> it's just me completely doing the wrong thing [laughs] which I thought was a really good one because as soon as I thought about it afterwards it was like "why did you do that?" and I thought it would be a good example of the opportunity that I could've used those [talk moves] but I didn't

The students had been working in small groups to solve the problem. Responding to a group that was finding the task challenging, Sam described how she had immediately provided a solution strategy rather than prompting students to share their thinking with one another:

> I just get up and say "oh you've got lots of different answers let's try and do it with multiplication" [laughter] when I should've just said "can someone show us? When I did it, I was like "ahhh that was so silly." The whole idea was for them to have different ideas and I went "once you've all got ideas I'm gonna show you" [laughs].

During the group's discussion of the video excerpt, Sam provided some commentary about the events and other group members asked clarifying questions and offered suggestions and feedback. Drawing the discussion to a close, the group affirmed Sam's decision to share classroom video that highlighted a problematic aspect of her practice:

Sam:	I was just thinking I just completely shut [student A] down and he could've gone on and him and [student B] could've got there and they wouldn't've needed me. That was an 'aha moment' which I think will be good in the future.
Pat:	But that's part of the reflection process anyway, you see that as your next step and that's basically how we learn.
Casey:	And we all learn from that.

Choosing an excerpt to share, and the subsequent discussion of the excerpt by the group together appeared to support Sam to reflect on her own practice. However, despite Casey's suggestion that "we all learn from that", there appeared to be less opportunity for the learning of other group members. Few explicit connections were made by the other teachers with their classroom practice and, despite an intended focus on students' thinking, the questions and comments that emerged in the discussion were for the most part directed at Sam's teaching. Interestingly, although Sam had noticed and commented on some of the students' responses to the task, these were not picked up for discussion by her colleagues. The lack of attention to the impacts of Sam's teaching appeared to be a missed opportunity for the group to reflect on their own teaching.

Example 2: A Picture Paints a Thousand Words

During the same meeting, Pat shared an excerpt of video from her classroom. Posing the problem *"I had 24 lollies and I ate ¾ of them. How many lollies did I eat altogether?"* to her class of 7- and 8-year-olds, she invited them to draw a picture to help with solving the problem and explaining their thinking. Pat had chosen the excerpt to illustrate how students had used wait time to think about their contributions to the mathematical discussion in their group. She described different students' approaches to solving the problem with a focus on how students talked about the pictures they had drawn to represent the problem, and how this talk had elicited descriptions of the mathematics ideas they were engaging with. As the group discussed Pat's video excerpt, Kris asked her to justify her pedagogical actions:

> how do you know that them drawing the pictures is effective to help them understand?

Pat described how she had modelled the practice off a well-accepted strategy she used in literacy teaching of drawing pictures to understand ideas in texts. Casey endorsed the practice and affirmed Pat's justification:

> it's like a prompt isn't it for further explanation. It's the "hold it up and I can talk to it" and it lets other people see straight away

Describing her teaching supported Pat to elicit and make public her reasoning about aspects of her practice, the mathematics being explored, and the mathematical practices of her students. During the discussion of the video excerpt, Pat tended to focus her descriptions on her students' actions rather than her own. This appeared to support a robust discussion wherein Pat was pressed to justify aspects of her teaching which in turn deepened her descriptions. Attention was diverted away from Pat and her teaching which appeared to lessen the possibility of challenging questions being perceived as a personal attack. Interestingly, with the discussion more focused on Pat's descriptions of her teaching than on the video itself, the video appeared to serve as a spark and source of reference for a conversation in which space was created for members of the group to reflect on their own practice in light of Pat's.

Example 3: A Model of "Expert" Practice

At the following meeting, three weeks later, Casey shared a video excerpt in which she was working with a group of 6-year-olds who were exploring "teen numbers" using an array of materials such as ice-block sticks, tens frames and Cuisenaire rods. Two aspects of Casey's lesson that became a focus for the group's discussion were the use of concrete materials and how Casey facilitated the students' talk.

Kris drew attention to Casey's use of a variety of materials, suggesting that the approach exemplified good practice. Others in the group agreed and identified this as something they would like to adopt in their own teaching:

> I'll use a lot more materials thinking about it, so that's what I've learnt. I'll use a lot more materials [and] use them differently [Sam].

For Casey, this was an aspect of her teaching that was connected to her expertise as a teacher of junior children:

> I think that in the early years you do need to because they are so hands on, to explore a concept you do need a variety.

Reflecting on Casey's use of concrete materials, the teachers made connections between the students' talk and their use of materials to represent ten, and how this might support conceptual understanding of place value.

Later, Pat described being struck by how effectively Casey used wait time when asking one student to repeat another's idea. Elaborating on what she had noticed, Pat suggested:

> It was almost like you were throwing in a bit of your EAL experience as well where you asked the child to add a bit more and clarify something and where one person said something and you telling someone else to add more information onto it.

Aware that Casey had initially been reluctant to share, or even view, video from her classroom, the group's comments were primarily aimed at affirming aspects of her practice that they saw as strengths. Nevertheless, the discussion highlighted differences in individual teacher's beliefs and practices related to student talk in mathematics, and the role of the teacher in that talk, and created space to share teachers' different perspectives. For instance, reflecting on approaches to supporting mathematics discussions in mixed-ability groups, Pat suggested providing additional instruction to students who were experiencing challenge whereas Casey and Kris suggested strategies that promoted opportunities for students to support one another such as strategically pairing students.

The Use of Video as a Window into the Classroom

Sharing video excerpts gave the teachers access to view each other's classrooms and the usually private practice therein, and provided support to try new approaches. Kris noted the importance of discussing the excerpts together:

> There's such value in the discussion that comes from the videos and Casey deserves that. If we rush things then it loses the value of what we're doing.

Kris appeared to see the discussion both as a reward for Casey for sharing her video, and as an opportunity for the group to reflect and learn:

> Maybe we could think about what next for us, in our own teaching from watching Casey's footage. What can we take from her good practice into our practice or consider when we're planning or assessing?

In a subsequent meeting, Kris commented:

> With those videos, that was just the vehicle into the discussion, and the discussion actually then prompted you to think about your own practice. It's kind of getting that glimpse in and kind of taking, borrowing stuff.

Sharing video excerpts offered a resource for teachers to reflect on and think in new ways about their teaching. They saw potential for the video excerpts to be used as exemplars of effective practice, or as evidence of improvements in the impact of their teaching over time:

> My guess is that as time goes on and we video each other we would hopefully notice that there is a difference in who's doing the talking in our classrooms. So, the capturing video and keeping it is powerful and the talking to each other about what we notice and ways we could better include these is maybe the collaborative aspect that we're working on [Sam].

Viewing and talking about practices that were different from their own opened possibilities for teachers to extend their teaching repertoires by "borrowing" teaching ideas from one another. In some cases, the teachers noted practices that aligned with and expanded on their own current practices such as Chris who routinely used concrete materials in her teaching but saw new opportunities in adopting Casey's approach of offering a range of materials for students to choose from. In contrast, Casey's use of materials appeared very different to Pat's current teaching and the apparent effectiveness of the approach prompted Pat to suggest that she might adopt this easily observable aspect of Casey's practice.

Discussion

Viewing and discussing classroom video excerpts has been found to support teachers' understanding of students' mathematical thinking by extending both what they notice about classroom events, and how they talk about what they notice (van Es & Sherin, 2008). The teachers in this study had opportunities to surface and discuss otherwise tacit aspects of their mathematics teaching practice. Eliciting differences in their teaching helped to spark conversations whereby teachers attempted to reconcile different perspectives and approaches, and new possibilities for their classroom practice arose. Highlighting differences in the teachers' practice prompted them to

explain and justify aspects of their teaching thereby making their thinking about their teaching public and available as a resource for others to reflect on and develop ideas about their own teaching.

The teachers' roles and perceived levels of expertise appeared to mediate group members' access to one another's thinking about different aspects of their teaching. Casey's use of concrete materials to support her students' understanding of place value aligned both with her recognised expertise as a junior teacher and teacher of students with English as an additional language (EAL), and with accepted effective practice for mathematics teaching | learning in New Zealand primary schools (e.g., Ministry of Education, 2008a). In contrast, Pat's approach of having students draw pictures to help solve a problem was seen as a more innovative approach; something she had invented. In their discussions, the group tended to endorse Casey's approach whereas Pat's less well-established approach prompted lines of questioning that pressed Pat to justify the practice as the teachers wondered how she knew that drawing supported the students to develop their understanding of mathematics ideas. Positioning Pat as more of a novice appeared to open space for the teachers, including Pat, to critically examine her teaching in relation to potential and perceived impacts on students. Opening Pat's teaching to questioning, as Hunter (2007) observed, allowed different ideas about practice to emerge and the discussion created opportunities for teachers to notice and reflect on otherwise taken-for-granted aspects of their own teaching.

As contradictions surfaced among the teachers' different ideas and actions, conversations were sparked whereby they worked to reconcile these differences. As differences emerged, the teachers were pressed to explain and justify their ideas and classroom actions to a greater extent and in more depth than previously, thus expanding their access to diverse ideas about practice. The teachers' conversations, sparked by their sharing of classroom video, enabled these differences to be made available as conceptual resources and reflexive objects for thinking about their practice (Powietrzynska et al., 2015).

The use of classroom video was largely intended to provide a window into classrooms whereby teachers could view and engage with aspects of one another's classroom practices. However, sharing and discussing classroom video appeared to also act as a mirror, a tool for teachers to notice and reflect productively on the impacts of their own teaching in light of the differences that emerged in their conversations.

References

Ball, D. L. (2011). Foreword. In *Mathematics teacher noticing: Seeing through teachers' eyes* (pp. xx–xxiv). Routledge.

Blomberg, G., Sherin, M. G., Renkl, A., Glogger, I., & Seidel, T. (2014). Understanding video as a tool for teacher education: Investigating instructional strategies to promote reflection. *Instructional Science, 42*(3), 443–463. https://doi.org/10.1007/s11251-013-9281-6

Borko, H., Jacobs, J., Eiteljorg, E., & Pittman, M. E. (2008). Video as a tool for fostering productive discussions in mathematics professional development. *Teaching and Teacher Education, 24*(2), 417–436. https://doi.org/10.1016/j.tate.2006.11.012

Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher, 38*(3), 181–199. https://doi.org/10.3102/0013189X08331140

Eaker, R., & Keating, J. (2012). Improving mathematics achievement: The power of professional learning communities. In J. M. Bay-Williams, & W. R. Speer (Eds.), *Professional collaborations in mathematics teaching and learning: Seeking success for all—Seventy-fourth yearbook.* National Council of Teachers of Mathematics.

Eden, R. (2019). *Restructuring mathematics teaching | learning: Co-teaching as a designed approach to teachers' collaborative inquiry* [Doctoral dissertation, Victoria University of Wellington]. Wellington.

Fullan, M., Rincón-Gallardo, S., & Hargreaves, A. (2015). Professional capital as accountability. *Education Policy Analysis Archives, 23*(15), 1–18. https://doi.org/10.14507/epaa.v23.1998

Gaudin, C., & Chaliès, S. (2015). Video viewing in teacher education and professional development: A literature review. *Educational Research Review, 16*, 41–67. https://doi.org/10.1016/j.edurev.2015.06.001

Hintz, A., Kazemi, E., Granger, J., Lind, T., Lewis, B., Simpson, L., & Crandall, D. (2013). Innovations in improving mathematics instruction: One school's story of implementing job-embedded school-wide professional development. *Washington State Kappan, 6*(2). https://journals.lib.washington.edu/index.php/wsk/article/view/14166

Hunter, J., & Back, J. (2011). Facilitating sustainable professional development through lesson study. *Mathematics Teacher Education and Development, 13*(1), 94–114.

Hunter, R. K. (2007). *Teachers developing communities of mathematical inquiry* [Doctoral thesis, Massey University].

Ingvarson, L., Beavis, A., Bishop, A., Peck, R., & Elsworth, G. (2004). *Investigation of effective mathematics teaching and learning in Australian secondary schools*. Australian Council for Educational Research.

Jacobs, V. R., Lamb, L. L., & Philipp, R. A. (2010). Professional noticing of children's mathematical thinking. *Journal for Research in Mathematics Education, 41*(2), 169–202.

Jacobs, V. R., Philipp, R. A., & Sherin, M. G. (2018). Noticing of Mathematics Teachers. In S. Lerman (Ed.), *Encyclopedia of mathematics education* (pp. 1–3). Springer International Publishing. https://doi.org/10.1007/978-3-319-77487-9_120-4

Jaworski, B. (2003). Inquiry as a pervasive pedagogic process in mathematics education development. *Proceedings of the Third Conference of the European Society for Research in Mathematics Education, 28*. http://fibonacci.dm.unipi.it/~didattica/CERME3/proceedings/Groups/TG11/TG11_Jaworski_cerme3.pdf

Jaworski, B. (2008). Building and sustaining inquiry communities in mathematics teaching development. In K. Krainer & T. Wood (Eds.), *Participants in mathematics teacher education: Individuals, teams, communities and networks* (Vol. 3, pp. 309–330). Sense Publishers.

Kaiser, G., & König, J. (2019). Competence measurement in (mathematics) teacher education and beyond: Implications for policy. *Higher Education Policy, 32*(4), 597–615. https://doi.org/10.1057/s41307-019-00139-z

Larrivee, B. (2000). Transforming teaching practice: Becoming the critically reflective teacher. *Reflective Practice, 1*(3), 293–307. https://doi.org/10.1080/713693162

Levine, T. H. (2010). Tools for the study and design of collaborative teacher learning: The affordances of different conceptions of teacher community and activity theory. *Teacher Education Quarterly, 37*(1), 109–130.

Mason, J. (2009). Teaching as disciplined enquiry. *Teachers and Teaching, 15*(2), 205–223. https://doi.org/10.1080/13540600902875308

Ministry of Education. (2008). *Book 1: The number framework*. Ministry of Education.

Powietrzynska, M., Tobin, K., & Alexakos, K. (2015). Facing the grand challenges through heuristics and mindfulness. *Cultural Studies of Science Education, 10*(1), 65–81. https://doi.org/10.1007/s11422-014-9588-x

Santagata, R., & Guarino, J. (2011). Using video to teach future teachers to learn from teaching. *ZDM, 43*(1), 133–145. https://doi.org/10.1007/s11858-010-0292-3

Santagata, R., König, J., Scheiner, T., Nguyen, H., Adleff, A.-K., Yang, X., & Kaiser, G. (2021). Mathematics teacher learning to notice: A systematic review of studies of video-based programs. *ZDM—Mathematics Education, 53*(1), 119–134. https://doi.org/10.1007/s11858-020-01216-z

Scheiner, T. (2016). Teacher noticing: Enlightening or blinding? *ZDM, 48*(1–2), 227–238. https://doi.org/10.1007/s11858-016-0771-2

Sherin, M. G., & Dyer, E. B. (2017). Mathematics teachers' self-captured video and opportunities for learning. *Journal of Mathematics Teacher Education, 20*(5), 477–495. https://doi.org/10.1007/s10857-017-9383-1

van Es, E. A., & Sherin, M. G. (2008). Mathematics teachers' "learning to notice" in the context of a video club. *Teaching and Teacher Education, 24*(2), 244–276. https://doi.org/10.1016/j.tate.2006.11.005