15 June 2020 – 5:00 PM (CDT), 11:00pm (BST), 8:00am +1 day (AEDT)

The influence of discipline on teachers' knowledge and decision making

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Abstract

The knowledge required by teachers has long been a focus of public and academic attention. Following a period of intense research interest in teachers' knowledge in the 1980's and 1990's, many researchers have adopted Shulman's (1987) suggestion that expert teaching practice is based on seven forms of knowledge which collectively are referred to as a knowledge base for teaching. Shulman's work also offered a decision-making framework known as pedagogical reasoning and action which allows teachers to use their seven forms of knowledge to make effective pedagogical decisions. Despite the widespread acceptance of these ideas, no empirical evidence exploring the connections between knowledge and decision-making are evident in the research literature. This paper reports on a pilot study in which the connections between knowledge and decisions in science, mathematics and information technology teachers' lesson plans are quantified and represented using epistemic network analysis. Findings reveal and levels of complexity that have been intimated but, until now, not supported with empirical evidence.

Simon Buckingham Shum

0:04
Okay, welcome everybody to back to the quantitative ethnography webinar series. It's great to have you whether it's very early or very late fully or pleasant and to, to

0:17
your afternoon

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reminder that the quantitative ethnography series here is the chance to see what it looks like when you apply this methodology to all sorts of different areas. Last last webinar that kickoff one, we had from Sylvia Orko and JJ Peters and they were talking about how they applied QE to transcripts of patients in alternative health care explaining why they didn't chosen alternative health care. Today, we're going to switch to education. In particular, the ways that teachers use their knowledge, their stem knowledge to plan their lessons, because we've got Mike Phillips here from Monash University down in Melbourne, just south of me coming to you from Sydney. Mike I'll just ask you to put your slides up ready to go. While I just explain to everybody how this works just as a reminder, we'll spend the first half an hour with Mike, giving us a briefing on on the work. There'll be a paper you can read it for more detail afterwards. And he wants to ask questions in the chat, then feel free to post them there. It's up to Mike whether he wants to pick those up on the fly. Otherwise we'll pick them up at the end and start working through them. We'll ask you to open your participant panel as well and you can stick your hand up if you want to ask a question that the hand is under the little three dot dot dot more button on that participant panel, and you'll get pushed to the top of the queue and we'll we'll take you in order.

2:02
Okay.

2:04
So, without further ado let's, let's get to the good stuff. It's my pleasure to welcome Mike Phillips who's a senior lecturer at Monash University in Melbourne, and he focuses on the knowledge that expert teachers, develop, when they're training and practice, and he's going to talk to us today about the challenge of actually seeing literally seeing how does their knowledge of STEM affect the way that they design their lesson plan. So, without further ado, Mike over to you. Great to have you with us.

Mike Phillips

Thanks very much, Simon it's lovely to have so many people in so many different parts of the world here and it's, it's fantastic to see such a great community emerging from what is a fantastic idea as Simon said, I'm based in Melbourne, and I've been living here for a number of years. And before coming to Monash I was actually a high school teacher, and consult with these things 15 years and so it was during that time that I really started to get fascinated by the ways in which my colleagues were able to make such amazing decisions in really complex situations, and to seem to get those decisions right, a lot of the time. And so, my doctoral work was really around teachers knowledge and decision making in technology rich contexts, and that work is has developed since, since I completed that. And so today I want to share with you a bit of a journey that I've been on in the ways in which I've been able to explore these ideas in different kinds of ways. Thanks to quantitative ethnography along the way I want to introduce you to a number of people that you can see on this opening slide, who have been really important and influential as part of that journey. But I want to take you to where this idea sort of all really stemmed from this person is a man by the name of glaceon. And for those of you who are not in education. Sherman is a really important figure. When it comes to considerations of teaching knowledge, he wrote a really seminal paper back in 1986 that introduced a couple of things that really changed the way people think about teachers knowledge and decision making. But Sherman has always been a big advocate for teachers and and the professional nature of their work.

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As you can see here, he talks about teaching being a really complex challenging demanding subtle and nuanced activity. And I can certainly attest to the fact that it's sometimes pretty frightening, and I would have actually originally agreed with Shannon's idea that was the most frightening activity species has ever invented, until last year I went to a conference, and I was for the first time in Las Vegas, and I actually met ended in Las Vegas on St Patrick's Day. And so the whole the craziness went up a whole series of different levels. So now I'd probably suggest that maybe it's the second most complex and frightening activity or species that ever invented. However, in the paper that Sherman wrote in 1986. This particular paper here. He talks about a knowledge base for teaching, and he talks about the different forms of knowledge that teachers draw upon when they're working in classrooms with young people. And when you sort of break that down. What he talked about what these are meant to the knowledge base for teaching. So he says that, as a great teacher, you need to have knowledge of content so if you're a physics teacher, you need to know something about physics, you need to know something about learners and curriculum. Most of those are probably things that are pretty self explanatory. The one down the bottom pck actually stands for pedagogical content knowledge. It's a particular type of knowledge that teachers draw upon where they understand the relationship between the students the people that they're teaching, and the content that they're trying to communicate to them. And that was a thing that at the time, caused quite a stir. In, in education. What you might also have heard of, is something that's been built on to this idea of this knowledge base and in particular pck. So, T pap or technological pedagogical and content knowledge has been one of a number of additions to this particular knowledge base for teaching in the 30 or so, 35 years since, since Sherman first talked about this in the same article that he was talking about these knowledge base with teaching Sherman also started to articulate this notion of pedagogical reasoning and action, and essentially that's a decision making process by which teachers use this knowledge to then do something in their classrooms. So what we're seeing when teachers are working is not necessarily then the knowledge itself, but the decisions they make in relation to that particular knowledge. So pedagogical reasoning and action Sherman talks about these six steps that teachers go through, but the way that he talks about it in the article and a lot of the work that's been done since then, is actually somewhat unhelpful because Shulman said that teachers go through these stages, these processes in different order in a different border to another teacher they don't necessarily all go from comprehension to transformation to instruction and so on, that they can actually jump around, and he also says that some teachers may spend more time in some of these stages than others, and some teachers may miss some of these stages completely. So, there's not a whole lot of information that people have been working with when it comes to this particular model of teacher decision making. And more than that I had a lot of questions that are starting to read this kind of work, because there were actually a lot of studies that started this show, what are the connections between these different elements. So what are the connections for example between content knowledge and knowledge of educational ends. None of these connections, then between different knowledge forms transferred across 10 notions of teaching decision making and pedagogical reasoning and action. So, I was starting to ask a whole lot of questions to myself about what are the connections between these different things what forms of knowledge that certain teachers use to make certain kinds of decisions, and nothing in the literature teacher education literature that I could find was really helping me make a lot of these different kinds of connections. So I was asking all sorts of questions, and some of them are just here. Does it look the same for all teachers how do we actually begin to do this sort of thing. And how do we get teachers to talk about this. And so that last question was one that I took to two great colleagues of mine in the teacher education space, how do we get teachers to talk about this because they had been exploring Shawn's notion of pedagogical content knowledge or pck with lots of different teachers. So, two people that I want to introduce you to two professors from Monash Mandy Barry on the left, and john Logan. On the right, and two very well known pck researchers. And so when I said to them, how do you get teachers to talk about this kind of thing that seems really difficult, and we don't have a really great way of being able to do this, we just keep persisting and working with teachers over really long periods of time developing a rapport and a relationship with them, which is important, but I thought then there's got to be a different kind of a way, there's got to be an easy way to be able to get teachers to articulate these ideas that they use and that they think about but they don't talk about in the same way that researchers talk about. So I stepped away from the teacher education, community that I knew so well. And I started to think about who might be able to give me a different way of exploring this particular question. And so I was really fortunate that about 12 months before I started asking these kinds of questions. Dr. gassaway joined Monash University, and I had a lot of fantastic conversations with Dragon, and I thought he thinks about these kinds of challenges in different ways. So I went and asked Greg and how would you go about doing this kind of work. And so, with literally without hesitation dragon said, I know this guy who's got an idea that I think is going to be helpful for you. And so, Dragon introduced me to David shake this work and to be honest when he first started talking about quantitative

ethnography and talking about epistemic network analysis. I was smiling and nodding, a dragon and I had no real idea of what he was talking about. But as soon as he sent me in a follow up email that day. A couple of videos and papers to read it became really really clear that this was something that was powerful, and was going to be really helpful for me. As part of this journey. So I went on and read David's book and a number of other publications that other people have written, and all of a sudden, it started to make sense to me as to why this was going to be important, why this was going to be different to the other kinds of studies that I'd seen that hadn't got to the, the essence of what it was that I wanted to explore. And so essentially what David was saying was that the fundamental assumption is that it's the pattern of connections between elements of expertise in this particular case knowledge and reasoning that are more important than the presence or absence of any one of those things in isolation. So really what we were saying was, instead of doing this, and measuring for example how much content knowledge a teacher might have. What I want it to be able to do was do this, say what are the connections between some of these kinds of things. And so I started to explore a tool, epistatic network analysis. But I very quickly realized that my background of largely qualitative work ethnographic kind of work. Didn't place me very well in terms of understanding DNA or being able to use in a, in the kinds of ways that I wanted to. So I realized that I had to reach out beyond the people that I was influenced by to get to this point, to say well how might I be able to take this further. So, from Dragon, and he's knowledge of people, and he's, he's connections, which led me to David and his ideas about quantitative ethnography, I realized I needed two more people as part of my team to help me make this work. So one of those people, was this man, his name's Ian Mitchell, and in is a teacher educator, but his particular expertise is being able to come up with different kinds of codes and be able to code documents in extraordinary detail, very very quickly. And so looking at what I wanted to do with, with the types of data that I was imagining. I knew that in probably would have to be involved in, and recognizing my own shortcomings, particularly in terms of the quantitative side of things. I asked dragon who could I get to help me with the DNA side of things. And so that led me to vieta who really Kevin has Kevin Novick, who is at the university. Set Australia, and he is an unbelievable practitioner when it comes to DNA so using his skills. I then realized that I had a team, to be able to explore a pilot study to see what the influence of discipline of subject area might be on teachers knowledge and their practices. So, I went to a local school, and they were kind enough to say, teachers in that school were kind enough to say yes they wanted to be involved so I worked with to math to science, and to it or technology, teachers from that particular school and recognizing the challenges that people like john and Mandy had encountered in getting teachers to talk about this kind of thing. We went about it in a different sort of way.

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We got lesson plans from these teachers that looked like and my computer's just broke anything that looked like this. This is a math lesson plan. The start at one. And one of the interesting things about this particular example is that in the middle column, what you'll see is a heading that says what teachers A and B are doing. The teachers that I was working with, were all team teaching, though, teaching the same group of students. So there were 50 students in the class rather than the typical 25. And those teachers were working together, teaching these speaking students. So the lesson plan had to articulate what it was that they're intending to do with these students. So one of the challenges in doing this kind of work and the next few slides will actually I'll just keep going through that. Just an example of one lesson plan. One of the things that you'll see it Is that there were some hyperlinks in these lesson plans. So in that right hand column, there's a bit that says, Here are the questions in slides. They linked to a lot of different resources. And so one of the questions that we had was, do we also coat the resources for teaching knowledge? Or do we just speak to the lesson plans. And what we ended up deciding for better or worse was to stick to the lesson plans, but to look at the resources for additional clarification or confirmation of the kinds of codes that we were putting into the lesson plans. The other challenge that we had was that this kind of documentation doesn't represent the typical kind of way that or the two kind of data set that ama has been used within the past. Typically, DNA is used with a conversation with the idea that there'll be lions of talking of utterances, whereas this is clearly Not like that. So the idea of a stands out a part of the conversation that you're looking at was another challenge was to try to explore, how do we start to think about how much of a lesson plan or a sequence of lesson plans do we include to look for co occurrences of different forms of knowledge and different kinds of decision. And after lots of conversations backwards and forwards, largely beta, we decided, again, for better or worse, that we would go with one lesson plan as the compensation as the standard window. And so what we did is what Aaron and I did is we actually code this in in vivo, if I was doing it now. I do it in a different kind of a way in Excel. But at that point, we were familiar with in vivo so we we actually coded as you can see The types of knowledge and decision

making on the right are coded to different components of the lesson plan. And we went through and indeed all of the usual kinds of things to make sure that we had.

3:14

We did some some checking of our coding to make sure that we were both on the same page. So we went through and as I said, we coded 16, lesson plans for the math teachers 16 for the science teachers and 16 for the technology teachers that are all teaching the same age group of students. So the students were in year 10, or that 16 years of age, and they'll all for the same timeframe in the school year. And what we wanted to see was, was there some kind of difference based on discipline. And so once we've done this particular stage, we then sent the invivo file to beta. We did some amazing things in the background. I'm not from from that tradition, so I don't exactly know what was involved in and packing all of that. But then visa was able to send us back some representations. And I was blown away with what I saw. So the first thing that I saw was this sort of a representation. This was for the math teachers. So for people who might be new to na, essentially what you're looking at here, the forms of knowledge that I showed you earlier on in this presentation, represented by the purple circles, and the types of decision making the green circles and essentially, the the easiest way for me to describe this is that the closer that those circles are to one another, and the thicker the lines connecting them, the stronger that co occurrence is, the stronger the connections are between those different kinds of things. So you can see for example, the line between instruction and evaluation for these math teachers. was particularly strong. The connections between learners and pck towards the top of this representation, were not as strong. They were connected, there was evidence of them co occurring in these lesson plans. But it certainly wasn't as strong as some other aspects. But largely, you can see these math teachers in these 16 lesson plans, were showing connections, strong connections between lots of different elements. When we did that, with the science teachers, we've got a different kind of representation. Very much wore out on the right hand side, you'll see that there are still some strong connections. But the the representation of those connections looks very different to the math teachers. When you look compare this one. To this one, you can see some fundamental differences in the way teachers will use different forms of knowledge to make different kinds of decisions. When we did that, with the technology, the it teachers, we got this

6:08

something incredibly different again.

6:12

And we were puzzled as to why there were. So few connections in the technology teaches lesson plans. And I'll share that with you in just a few moments time. But one of the other really cool things that we were able to do when we were comparing these three different kinds of network maps, was to then actually break this down even further. So if you imagine that the math teaches representation on that left hand side, there is a three dimensional object that you could hold in your hand. Then within that three dimensional object, there's kind of going to be a center of mass or a center of gravity within that, and what you can actually do is represent that central point With a cut with one circle with a dot, yeah as a centroid. And what we can do is we can look at that centroid for each of the individual lesson plans. So if we do that, we can actually see that for the first lesson plan at the top there next to the number one, the teachers lesson plan was largely focused on learners. So if you look across as to where that actually sits in that network map, it represents something around the learns. And given that this was at the start of the school year, that sort of seems to make some sense, but the focus has the the scope and sequence of the lesson plans move through this unit of 16 lessons didn't focus just on the learners. What you'll see is by the time we get down to number 16, that the bottom it was actually focused on evaluation. So When you start to think about it, it seems to make some kind of sense that they that this progression represents a different a different focus for the teachers as they move through. So, I thought that this was really fascinating. But I didn't want to just leave it there. We got to the point where we had this quantitative representation of what was going on with the teachers. But I wanted to know whether this actually made sense to the teachers themselves. I wanted to go and take these edik representations and try to get some understanding of that. So what I did is I recorded a video that was really brief, but explained, and I sent it to the teachers that explained what I meant by each of these kinds of dots. What what I meant by pck knowledge of context or instruction, so that when I went to talk to the teachers, we had somewhat of a shared language. And so I took these representations to the teachers. And I audio recorded those interviews, which we've been recoded, again, using the same kind of codebook. And what it turned out was that teachers lesson plans weren't necessarily very good at being able to show all of the the information that we needed to understand about what these teachers are doing. So the it teachers, for example, had very few connections on

within their lesson plans. But in talking to them, I found out something really interesting that we're actually the only two it teachers in this particular school. And so they team taught every single lesson together. So they didn't teach with anyone else. They only taught together and they taught every single lesson together. They also in the staff room had their desk next to one another. So So then we're having conversations all the time about what it was that they were reflecting on from a previous lesson about what it was that they might change or tweak in the upcoming lesson. But that didn't necessarily get translated into the kinds of documentation they had in school. They were doing this on the fly in real time. And so, all of a sudden, I realized that just using one of these data sources didn't necessarily give me the full picture. One of the other things that we can do is go into classrooms and video record teachers and actually have them encode what it is that they're doing in those kinds of spaces as well to give us yet another kind of a representation of what teachers do. I think if we overlaid those three elements on top of one another, then we get this really cool and interesting, multi perspective understanding of the complex relationship between Teachers knowledge and their practices.

11:04

But before I got to that final point of doing all that work, I was then asked another question, which made me bring in a couple of other people. One of them is here today with this. And I started to explore this idea that is this actually representative of a teacher's epistemic friend. And so these are some questions that I've been asking of people on the screen Aaron test on the right hand side, MIT, and Mandarin zap from from David's lab. Because what I realized all of a sudden was that we were talking about teachers knowledge. But if you look back on some of the work that people like David and others have done, then an epistemic frame that underpins a notion like epistemic network analysis goes beyond just Knowledge. So people like David and others have written about things like skills, knowledge, identity, values, epistemology, these kinds of ideas that people draw upon when making professional kinds of decisions. And so I spoke with Aaron about the notion that he comes from a very strong tradition of teacher education. I was talking to him about the kinds of things that teachers draw upon when making decisions. And it became clear very quickly, that is not just knowledge. And so I then started to talk with Zack and Amanda, about the notion of an epistemic framework that we're continuing to develop on try and develop at the moment. And so my initial pilot study that I've talked about today, I think shows some promise some ways to be able to not only represent the the complex relationships between different elements that combine to help teachers make decisions, but also to give us a way to enable teachers to be involved in that conversation for us to be finding out whether the representations that we're creating are actually somewhat representative of the way that the teachers see their work.

13:22

So a big part of this journey has been not just in, in getting to that kind of end point, that midway point part my point of starting to get a more nuanced understanding of teachers knowledge and decision makings, but also beginning to realize that I'm only just starting this journey in many ways. And that it's been really exciting having lots of different people join me on that drag and then these networks leading me to David and his ideas, which led me to Ian and his coding vieta and his coding of a different sort, which has now led me to Amanda and Zack While everybody else on this page seem to have brains the size of small planets, but think about things in really exciting and interesting and different ways, to the way that I think about them, and to Aaron, who asks me lots of questions to which I don't have answers. And that's a really important thing to keep pushing the boundaries of where we might be taking these things. So when I finished putting this slide together, I realized that a lot of the work that that comes out of people from this quantitative ethnography community is really beautiful representations of networks. And this is probably not a beautiful representation of a very important network to me. So I thought about how else could I actually better represent this group of people? So my first thought was maybe to go with something like this. And it's actually really bad except I think I nailed David In terms of the Look there, but everybody else is not so great. So I thought, well, maybe we'd be better off having something like this. But then I thought, No. So I'm open to suggestions from anybody who might have a better way of thinking about that representation. But I just wanted to finish by saying, there are two key things that I think that I've learned as part of this project. The first one for me is, it's all about people. And it's all about community. Without having that group of people around them, there is no way I would have got anywhere near to what I've been able to do now understand, as a result of their contributions to this work. So I think considering who you might reach out to in this amazing community, people who always seem to say yes, and be willing to help is a really important and valuable thing. If you're new to this community. Don't try and do it all yourself, because I don't think you'll be able to But the second part is, there's been a lot of focus on things like a DNA, encoder and other tools. And that is a really important part because without that, we

wouldn't be able to get these sorts of representations. But if we just focus on the cue on the tools on the kind of quantitative element of this work, then I think we end up with maybe an impoverished view of what's going on. Don't forget p, because together, they are much more powerful than elements that are just separated by themselves. So with that, I'm going to finish sharing, and I wonder if people might have questions or conversations that they'd like to stop.

Q&A

16:51
That's fantastic. Mike, thank you so much. Can we have some virtual applause, you can wave your hands, you can click the hand! The applause button on the participant panel, well done Thank you very engaging presentation. A fine example of how to communicate your work very succinctly and in a very engaging way as well.

So brilliant now, we've had a couple of questions into the chat and you can also stick your virtual blue hand up in the participant panel under that more dot button.

17:31
Peter Twining had a question in the chat. So, Peter, I'm gonna unmute you and ask if you would like to, to ask your question.

17:48
All right, yeah. My question was about the extent to which the different representations allowed you to differentiate between the kind of espoused and planned within the plans and the And acted in terms of what you saw is in observations. Yeah, it's it's really interesting, Pedro. It's a really good question, though, that the thing with the enactment, which is always tricky, I find is that things in classrooms don't always go as planned or very rarely go as planned. And so one of the challenges that we have is that a teacher may have, for example, a particular idea or type of knowledge that they're considering. But all of a sudden, when things change in the classroom, they then don't go and do something for a very good reason. But they're still using that knowledge to make a decision, but we don't see it evidenced in their enactment. And so that's why I think if we have this triangulation between what they plan to do, what they say they do, what they then go and do and then if we're able to get teachers to then reflect on why they do what they do in the way that they do it. Then we get a more fulsome picture. I don't know that we ever get The entire picture. But I think it's about trying to talk to people at different stages along the way, and actually helping teachers with tools like this to be able to better reflect on what's going on.

19:16
Right, that reminds me of Lucy such months work on plans and situated actions, as well from the the HCI world, you know, the fact that you have a plan is very different from what happens in situated action. And I doubt many teachers who want to be judged solely on the documentation.

19:37
And I know that's not what you're arguing at all.

19:39
No, it's the so the documentation really was just a way to begin the conversation. And it became very clear very quickly, that lesson plans are designed to do a particular thing. But that doesn't represent everything that the teachers think about or do. I think the it teachers is a very good example. That?

20:00
Absolutely Yeah. Yeah. Okay. Daniel, speak all over to you.

20:08
Well, thank you very much. First for your presentation. I liked it very much. I have a question regarding the segmentation you use. You said you use the whole lesson plan as one big co occurrence event. I wonder what would have happened if you segment the data in another way? Let's say you keep like the introduction part, the development part of the content. Do you think the data you would have gotten would have changed

dramatically in like its message or what you could read out of it? Or do you think the segmentation is kind of stable, or no, the analysis is kind of stable regarding the segmentation.

20:47
Thanks, Daniel. Yeah, again, that's a really good question i do think we would have ended up with with different representations. I think that one of the challenges was and so the example that I gave you that that ticular math lesson plan is probably probably one of the longer ones that we got. And so some of them were actually relatively short. And I think one of the challenges that we have is that if we had been broken those down even further into smaller segments, we would have ended up with such a short bit of text that we would have had very little co occurring with anything else. And so I don't have a good answer as to what the right balance is. And I think that's a challenge facing all of us in doing this kind of work. But I think that looking at the the kinds of representations that we did get by the choices that we made, I think that we got representations that were fair and valid representations of what the teachers had in those documents. So I'm not I'm I'm satisfied but I'm not stuck on on that. Paying the total. The final answer. I don't have a better one at this point. All right,

22:07
Gerald, ditto over to you.

22:11
Great. Thanks so much, Mike. Thanks so much for the presentation and for the really great work. I'm also a teacher educator. And I'm interested in adjacent interests, which maybe I'll approach about separately, but the the question I had was the lesson, the template that the teachers completed to refer their lesson plans. Was that something that they did you record? Did you ask them to use that template their schools require them to use the template?

22:41
Yeah. So so the schools required them to use that data, depending on the content area, they slightly modify it a little bit, but it's largely the same way that that was not not a requirement from us. It was a school based and that was part of the reason that I chose That particular school was because they have a strong tradition of documenting the lesson plans. Whereas in most a lot of the schools that I've worked in and I'm guilty of it myself in just don't do that kind of level of documentation all the time.

23:15
So one of the reasons I ask is that I have also seen, so there's the part that you mentioned was there's a difference between the plan and the enactment. Right. But there's also a difference between what the teachers intend to do and what the template captures, which I'm sure you've considered. And so one of the things that I've tried to do I don't know whether you consider this is to use concept mapping as a way of them documenting the plan in a particular way. And then you could use a similar analysis on the propositions that get general Anyway, I'm just, I just wanted to dive a little bit into that with you want to dominate the discussion,

23:56
yet? No, I think there are lots of ways of being able to get into those kinds of conversations with teachers. And I think I'd be fascinated to see what happens with with the idea of a concept map or there, there are lots of different ways that we could do that. And I think that that would produce some fascinating results or ways for us to be able to compare differences. The reason that I chose to go for these lesson plans was that as I as I mentioned, it was at the start of the school year when I went actually collected this data. And these teachers, like most teachers at the start of the school year, were just frantic, and they had no time to be able to probably really invest into that. And so I was just thinking about other sources that I could use to begin that conversation a little bit later in school. You.

24:45
Sure. Thank you so much.

24:47
You're welcome.

24:48
All right. Seong. Ha, you have a question?

24:53
Yes. Um, so I'm trying to understand how to best interpret the connection. generated by want this one teacher right one teacher.

25:05
So, the lesson plans were used by two teachers,

25:09
the teachers. Okay, so what? So how do you so? How would you interpret stronger co occurrence? Our connections have certain codes or elements were within a teacher's lesson plan, and one that imply you PLO?

25:35
Yeah, so the kinds of questions that I was asking the teachers when I took those representations back to them, so one of the things that I was really conscious to try and do was to not say that what I've produced here is is absolute fact and truth. This is this, as I said to them was this prompt for a conversation. And essentially, one of the questions I asked was, tell me where I got this wrong. Tell me where some of these things go. makes sense to you? And so for the it teachers that were saying, No, no, we see lots and lots of connections between all of these elements, they just not everything in our lesson plans for these reasons. And so I think that there are also there are also elements that are wrong, more strongly connected or closely connected for teachers in some different discipline areas. So for example, we talk about the the nature of the domain is one form of knowledge that is actually particularly strong in science education is also a really strong

26:37
history of research and interventions around pck pedagogical content knowledge in science education. And so those two things seem to feature more strongly in the kinds of work that science teachers were doing. So one of the other questions that came out of all of these is because of these different relatively different strengths and weaknesses in terms of connections or co occurrences was if you start to look at the policies of governments around the world, that a lot of the time people want to get talking about this notion of integrated stem where we bring science, technology and math teachers together to teach in the same classroom with the same group of kids at the same time. Well, if we have teachers who plan in these incredibly different ways, they almost speaking in different kind of a language. How do we effectively do that? Because it's clear that just bringing them together, and giving them planning time together isn't necessarily going to resolve some of those particular differences. Maybe we don't want to resolve those differences. Maybe we want to keep them as distinct, and to be able to point out to students, the ways in which people approach problems from different perspectives. So if you're thinking like a mathematician, and you're not getting any With this particular real world problem, then maybe think about it a bit more like a science teacher would or scientist would. I don't know. But that's that's something for another day. Hmm.

28:12
Yeah, I'm actually working with language, English language arts teachers. And if I would have chance to look at their lesson plan in this way, I think I would be able to find out. They are epidemiology, they're, they're thinking about certain topics and disciplines. So

28:34
yeah, and and again, even so the idea of pedagogical content knowledge is is largely about grain size. So people who who research this idea of pck will say, you can't have pck as a science teacher, like you can't cover all of the science curriculum and be expert necessarily in the same ways for every single topic along the way. Even as a biology teacher, you might have pck when you're, like high levels of pck when you're teaching dichotomous keys, for example, but when it comes to osmosis, you may not you'll have a different kind of level. So I think, even within the discipline, it's at a different grain size again. So when we started looking at these particular lesson plans, we just took things with it, sort of temporal boundary around at the time boundary around it, but we didn't really start to explore what this meant in terms of the understood or perceived expertise of the teachers within that sort of topic area. Okay,

29:48

so I think it's going to change again.

29:50

Very interesting. Yeah, yeah, we wouldn't want to just lump all science under one heading of science. It's so varied, etc. David You wanted to ask?

30:04

Yeah, sure. I would like I'd love to hear a little more about how those conversations with the teachers around the network representations unfolded. We've done some work trying to make consumable representations of of networks in different circumstances like for teachers and kids to interpret classroom discourse. So it's a different context. But not everybody has this hypothesis, I think, or at least everybody I've talked to, has this hypothesis that the network's Oh my god, they're so confusing. Nobody's ever gonna be practitioners will never be able to make sense of them, which may be true, but I just I'd love to hear what their reactions were, how those conversations went. Were they in fact helpful as prompts to talk with what kinds of sense did they make of what they were seeing?

30:49

I think that that it was a probably a combination of two things. One, like for example, if you look at that, that math representation, like your lines going everywhere, and so for that, them, it was potentially a little overwhelming. And so that that conversation, which actually happened to be the third conversation that I've had out of the three, meant that we actually started to explore just a couple of represent I just picked out a couple of components have that representation to have a conversation around. Because for them, it was very difficult to start to see the wood for the trees. But, for example, where there were fewer connections, the it teachers came straight away both of them almost in exactly the same moment with exactly the same language set, or that's nothing like what we do. And so it was, it was a very easy conversation to then start to explore that. And one of the things that I actually got them to do, and I wish I'd done more of it was and maybe jail. This is kind of the idea that maybe sort of taps into some of the things you were talking about was to get them to actually draw what they thought the representation should look like that understand thicker lines, stronger connection. Okay, that's pretty simple. And so maybe that's a way that you could start to go about doing this kind of thing as well as is to say to teachers. So if you understand the premise by which this this tool works, draw me what you think this is going to look like. Now, let's overlay what the data that I was drawing from looks like, and the conversation could be around where there are points of difference. Because if we if the data and your perception are the same, it's probably a little point in talking about, it's going to reveal very, relatively little. But if we start to look at the points of difference, where you think that there's not a strong connection that there is, then there's a really good prompt for us to start focusing on certain things. So I think that there are better ways to do it, then then I've been doing it. And I'm hopefully looking forward to experiment and do more.

33:00

Did you also think about showing them the enacted models as a way of, of sort of prompt for reflection on the class or on their practice or on the method? And

33:12

yeah, I did. And I was also sort of starting to think about the notion of stimulated recall and about how, how watching the video, and when there was a particular moment if we could actually get a representation from that particular moment. So that in combining all of these different ideas together, one of the challenges, at least for me in doing this work at this point is because I'm new to it, like most things when you need to, you're slower at doing it. And so, from the time that I was actually able to capture what was going on in the class, to the time when I could then take back a representation to them, a reasonable amount of time has passed. And so one of the questions that I had for myself was for these people. How how valuable is that going to be in terms of an investment of their time for something that had passed some weeks ago? So if I could work out a way to be able to do it faster, so that, you know, later that day or the next day or a couple of days later, I could take it back to them, then I think it would be something that I'd like to explore. Absolutely.

34:22

I think this is a fascinating question of how First of all, we have a representation as researchers just trying to analyze a phenomenon. But that is a very different thing, from a representation to feedback to the objects of our inquiry on this question of how we engage them with a representation that we think is fascinating, but we need them to engage with it as a form of validation, right? And there's almost an interesting ethical dilemma emerging here because you show this thing to the it teachers as you said, for example, they go Hey, that's nothing like what we do, you know, and they want to make sure you want Understand that their their epistemology and practice is not as simplistic as your DNA diagram suggests, right? Absolutely any professional who felt that there will be reduced to a few nodes connected. And they, they, they make no reference to this or that, you know, would would would, would want to defend themselves. So it's a, you know, it, it certainly helps to elicit from them what they think they are doing. But it also shows the shortcomings of the representation or the data source you used, you know, lesson plans are not the be all and end all of what a teacher does. So very interesting questions coming up here about what exactly what game are we in here and how do we, how do we give our participants the voice?

35:38
Yeah, absolutely. And so one of the so a bit more background on this particular school was actually a specialist school that's located on the university campus where I worked. And so we actually have, I've had a very long relationship with a lot of these teachers and who work in this particular school. Because they're literally across the road from where I work. And so we're going in and out all the time and having conversations and then amazing group of teachers. So to start off with, I already had a really good relationship where there was trust between the teachers that volunteered to be involved in this, and myself. But the second thing that I made really clear was that this was in no way a judgment or performance evaluation kind of an exercise, that actually what I was doing here, was researching with these people not researching on them. And then what I needed them to do was to tell me where this representation falls down where it's not correct, as much as validating where it was correct. And I think that that, at least in in this kind of work, is a really, really important step to make sure that that people feel as though they're part of this research and that they're there. professionalism is not being judged in any way, shape or form.

37:05
Right. Right. And it will be interesting to, there isn't time now but you know, within within ethnography more generally. How do people think about this challenge of feeding back to people what your observations are? What's the tone of that conversation? Especially if there's any sense of of a judgement being made? Yeah, yeah. Okay, so look, we've got about five minutes left. Aaron Kessler, you have your hand up.

37:31
Yeah. So Mike, I want to build on this and talk a little bit about the idea of I think there's some work that needs to be done about thinking about how we limit who we feed it back to because of where they're at in their own professional trajectory. Right. So it's likely because of the fact that these teachers have a little bit more experience have been working with you how that relationship can reflect more, more valid in more valid ways on the work that they've done in the thinking they were doing in that moment, either some distance away, or even close. I think the natural inclination, especially for teacher educators, is to say, Oh, I can use this for my pre service teachers or my in service teachers, right. And the challenge that might come from that point is that they don't have necessarily all of the tools that they need to be able to reflect adequately on the thinking. And so I, somebody else mentioned this idea of like a trajectory of a teacher over the years and sort of doing this. I think that's interesting. It raises the question to me of like, at what point can they adequately respond in a way that helps us understand what's going on?

38:34
Yeah, and, and I think, Aaron, your point is really well made and links to sort of something that Vitali asked, which was, what would be my dream and goal in doing this kind of thing. And I could come back with a glib answer like an NSF grant or something, but instead, one of the things that I think is is really helpful, out of this will potentially help out of this work is enabling teachers to understand how and why they make the decisions that they make. And as Aaron pointed out at different points in your career, you are better or less well equipped to be able to do that. Particularly as you're starting out, I would even say, as a pre service teacher, maybe you're almost at some points, maybe better off better placed to be able to reflect because you have some time and space than maybe where as a graduate teacher in your first year, because you are so busy and you are chasing your tail so much, and you're just trying to survive, that this idea of deep reflection and

looking at your own practice is something that a lot of people find really difficult. So I think it's it's only valuable or helpful to do this sort of work if it helps people become better practitioners in some shape or form. So, ultimately, I guess that's that's really all What I want to do is help teachers understand that they are professionals. They make complex decisions, and how they actually go about doing that in the hope that they continue to make better and more refined types of decisions.

0:11
Okay thanks well Vitali. Do you want to add anything to your question or as Mike picked up on your, your question about dreams?

0:20
I think it's perfect and I'm glad that Peter actually elaborate. Is there a dream map or different maps for different contexts. Because here in the in the clinical simulation center we have in that series took Michigan we have like, you know, huge repository of this instructional plans, and then wonder if we map those out was it compared to your context. Yeah.

0:45
Yeah, and I think that's a really good point i don't think Peter there is a dream map like an ideal map I don't think there is an ideal teacher because they all work in different contexts, they're all working with different students, and by the nature of it they they have to do different things. If you think that to your own schooling. And if I asked you to imagine, or remember your favorite teacher from school. Everyone got that person in their head. That favorite teacher of yours was probably somebody else's least favorite teacher in school, and that that teachers actually their work resonates with students in different ways and so I think if we try to get everybody in this kind of cookie cutter mode of saying, This is best practice do this and you'll have a great lesson. I don't think it's ever going to work like that. But what I think we can do is start to understand what are some of the kinds of characteristics that seem, typical of effective teachers in certain situations, and to make those accessible for people who may have less experience, so that they can then start to experiment to try these things out, and to reflect on their own practices and to see what is more or less effective in their own particular context what works for them and their students.

2:06
Right. Um, I'm seeing a sort of parallel here with with work that's going on in learning analytics more broadly, which is, you know, as we try and get a higher order competencies in our students, or, you know, the ability of the machine to understand what's going on, is limited. And so, you know, the frame that we put on on on on our work and I think others are increasingly as these representations cannot be considered normative in any sense that they're provocations to deeper reflection and productive dialogue that mirrors We hold these mirrors up to the participants to say does that help you gain deeper insight into how you or your team work. And so we're pulling back from any kind of summative judgment. It could be that when we have huge data sets of good and poor teaching. However, we would gather that, that there might be some very robust patterns that emerge. But we have to be very cautious with these computational representations as well. And think about, as you say, I mean, not all researchers would agree with you saying there's no point me doing this unless I can improve practice and then for some researchers they just want to study the phenomenon, and be scientists, and they don't want to loop back to the objects of inquiry but for you and perhaps for many of us. This is very much about trying to improve practice as well as just describe the world. Yeah. So, in a final question might perhaps I can just ask you. Have you had the chance to present this to other educational researchers. Yet, and and what kind of reactions does this get from them, or if you haven't yet. What do you anticipate might be some of their reactions and how does that help you think about how you position this kind of work because as you say it is quite novel. If you walked into a conference full of showman academics, you know, how's this going to go down.

4:03
And it's funny so that I belong to. What in our particular Faculty of Education at Monash University we have these things called academic communities and so science and technology actually an academic community so academics from those different disciplines come together several times a year. And I was asked to actually present. Some of these, these work at our last coming together. And I will say the reaction was mixed. There were some people who are very invested in STEM and found this quite challenging and provoking because it reveals things that may be challenged the way that I was thinking about the interconnected nature is different

disciplines. I think that there was some people who if you actually, because a lot of teacher education. Not all but a lot of teacher education has a strong qualitative component to it. And so, I think, if there was not the ethnographic component where we were taking the representation, back to the teachers. I don't know that it would be very well received, or, or, it would be a lot of questioning of of this kind of data. I think that when, and this is, this is the power of QA that you're able to have these representations that enable conversations that people within that academic community have been struggling to have with teachers for a really long time, they can see the power of it immediately. With the data that you gather in the way that you're able to represent that in a different way. But I think when you kind of close that loop by bringing it back to the participants and bringing in some more qualitative methodologies that then that people within that tradition are more used to, then they start to see how this could be a really powerful tool, huh.

6:02

Yeah, nice put by expect we might be seeing that theme emerging in some of our future webinars as well. This this is a key question. Okay folks look we need to stop Let's have another round of virtual thanks to Mike, it's a great presentation. It's one of the things I love about these talks is even whether or not you're working in teacher Ed or alternative medicine or whatever the domain is these general methodological and process and ethical issues are sort of generic. Okay. Join us on the second of July, for the next webinar, which is a team led by Adam Lefstein. We're going to stick with the school's theme, but we're looking more at linguistic ethnography and classroom identities. So, a different angle, but still in school.

But meantime, stay well. Stay safe. And we'll see you on the second of July.