Using cases as triggers for teachers' thinking about practice:

A comparison of responses to animations and videos.

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Abstract

This study compared conversations among groups of teachers of high school geometry that had been triggered by either a video or an animation representation of instruction and managed with an open-ended agenda. All triggers represented scenarios that departed from what was hypothesized as normative. We used as dependent variable the proportion of modal statements about instructional practice made by a group, which we argue is a good quantitative indicator of the presence of tacit group knowledge about the norms of practice. Animations and videos produced similar proportion of modal statements, but that the types of modal statements differed—with animations being associated with more statements of probability and obligation and videos being associated with more statements of inclination.

Objectives

It is important to understand teachers' knowledge about instructional practice to gain perspective on how and why teachers do the things they do and thus inform efforts to improve practice (Ingram, Seashore Louis, & Schroeder, 2004; Westerman, 1991). Knowledge of teaching is diverse: Writing about organizations in general, Cook and Brown (1999) note that some knowledge is explicit while other knowledge is tacit; those kinds of knowledge can be possessed and handled by individuals or by groups.

We focus on tacit knowledge of mathematics teaching held by the group of practitioners responsible for congruent curricular goals (canonically, teachers teaching the same course of studies): this knowledge could be described as knowledge of the norms of practice associated to teaching such course. The proposed paper aims at validating a new technique for the elicitation of that knowledge: The use of animations (of cartoon characters that represent problematic instances of an instructional situation taken from the course of interest) along with an open-ended agenda for facilitating a case-based discussion with a group of practitioners. The paper examines the data one can get from such conversations by comparing it with data that that can be obtained using a similarly open-ended agenda and video based episodes.

Theoretical Framework

Various studies have used video representations to engage teachers in discussions about practice (Cwikla, 2010; Gonzalez, 2011; Sherin & van Es, 2009). Unlike written cases, video records of practice can immerse viewers in a temporality similar to that of real classroom events. Video records also capture much of the idiosyncrasies and personal characteristics of the people and settings involved in those events and they could therefore be too particular as representations of possible practice (see Chazan & Herbst, 2011). An alternative media for representing teaching are animations of nondescript cartoon characters (animations hereafter), which, while lacking the face value of video records, allow designers more control on how to depict a scenario (e.g., how much to individuate characters and setting). Herbst, Chazan, Chen, Chieu, and Weiss (2011) proposed *temporality* and *individuality* as dimensions that span the set of different representations of teaching: While animations resemble video records in that both of them can approximate the temporality of real events, animations do not necessarily display the individualities of participants and settings as video records do. Moreno and Ortegano-Layne

(2008) studied what kind of media form (case, animation, video) is best to support the learning of individual explicit knowledge of prospective teachers but no such comparisons have been done for tacit group knowledge of practicing teachers.

Tacit group knowledge, such as the sense that colleagues have of what is appropriate to provide and expect when assigning a task to students, is hard to bring to the surface using direct questionnaires. The ethnomethodological approach in sociology (Garfinkel & Sacks, 1970) contributed the technique of breaching experiments to precipitate that kind of tacit knowledge: Breaching experiments consist of involving usual participants of a social situation in an instance of that situation where one of its normative characteristics has been deliberate altered. The commentary from participants in which they notice and elaborate on the alterations is then examined for clues that point to their tacit knowledge of the situation. Herbst & Chazan (2003; also Nachlieli & Herbst, 2009) showed how videotaped episodes of instructions that record out of the ordinary instances of an instructional situation can be used to engage teachers in a modified version of a breaching experiment. Jacobs and Morita (2002) showed that videos of teaching in a different culture could elicit practitioners' tacit knowledge of teaching in their own culture. Since animations could be created deliberately to represent breaches of instructional situations that might be hard to find and record in video, it is useful for researchers on teacher thinking to know how animations rank against video in their capacity to elicit tacit knowledge of practitioners about practice. The present study sought to answer that question.

Prior research that elicits tacit knowledge of teaching practice have typically come in the form of examining video records or other representations of teaching in the context of group encounters (e.g., Borko et al., 2008; Rosebery & Puttick, 1998; Sherin & van Es, 2009). Agendas for such examinations have varied between explicit problem posing, where researchers ask direct

questions (Makhanya, 2002), to more open ended agendas where practitioners are free to pick what they want to talk about (Tochon, 1999). The former kind of agenda may be illustrated also by those researchers who have looked at practical argument (Fenstermacher & Richardson, 1993) , while the latter includes researchers who have used more open ended tasks for participants (e.g., tap the table when they want to say something; Nachlieli, 2011). The latter approach appears more adept for examining practitioners' tacit knowledge since the openness of the tasks helps develop discussions about what the group deems important and how the group feels about it. The present inquiry compared the discourse data obtained from groups of teachers in response to video and animations when both responses were obtained with an open-ended agenda described.

We were interested in comparing sessions developed around video or animation in regard to proportion of statements about the norms of practice the groups of practitioners made. Since we were interested in knowledge of practice shared by the group, we compared utterances that were marked as seeking other voices. The notion of modality, as constructed in systemic functional linguistics, provided us with a construct with which to fashion a measure. Modality is a system of language resources with which speakers open the content of their speech to other speakers' participation—as if seeking agreement or disagreement. Modality can be realized by the use of modal auxiliary verbs (e.g., could, would), or modal adjuncts (always, never) or by projective verbal or mental clauses (e.g., I say, I think). While the modality system is diverse from a lexicogrammatical perspective, its function in discourse—to open the discourse by acknowledging other possible views—is what gives unity to it (see Martin & White, 2007, chapter 3).

Methods

The paper reports a secondary analysis of group conversations among teachers of high school geometry. Each of these groups would watch a representation of classroom teaching, either video or animation, and engage in discussion about the teaching depicted. The teaching depicted in each of those included practices that were not normative (e.g., in the video the teacher was seen encouraging a student to assume a statement without immediately providing a justification, in the context of doing a proof), though other practices were normative (e.g., the teacher posed the problem and led students' work on the problem). The video-based sessions were ones that had been successful in eliciting responses from participants that informed about the norms of practice. The present study compared that data with data generated by confronting similar groups of teachers with animations that, likewise, depicted scenarios with at least one breach of a norm. The agendas for both kinds of group sessions were open ended and, in particular, participants were not told whether the representation (either video or animation) was proposed as a good or bad example, or that it contained a breach of a norm: Participants were told that the representation was a case of high school geometry instruction. They were invited to comment freely, all comments were accepted and not evaluated. Quite often participants would engage with each others'comments and the conversation would continue without the need for facilitation.

We examined transcripts from 10 group sessions, half were from sessions where video representations were used and half were from sessions where animated representations were viewed.

Analysis and Results

To compare teacher group responses in video and animated sessions, we used Systemic Functional Linguistics (SFL; Halliday & Matthiessen, 2004). Specifically, we examined teachers' use of modality, which is a language resource that enables speakers to fulfill what Halliday has called the interpersonal metafunction of language: to relate to other voices. We examine the four categories of modality presented in Table 1.

Table 1

Modality classifications.

Probability	High	(+)	*Alpha <u>definitely</u> marks the diagram.*
		(−)	*Alpha <u>certainly</u> doesn't mark the diagram.*
	Median	(+)	*Alpha <u>probably</u> marks the diagram.*
		(−)	*Alpha <u>may not</u> mark the diagram.*
	Low	(+)	*Alpha <u>might</u> mark the diagram.*
		(−)	*Alpha <u>might not</u> mark the diagram.*
Usuality	High		*Alpha <u>always</u> marks the diagram.*
	Median		*Alpha <u>usually</u> marks the diagram.*
	Low		*Alpha <u>rarely</u> marks the diagram.*
	Zero		*Alpha <u>never</u> marks the diagram.*
Appropriateness	High	(+)	*It is <u>required</u> that Alpha mark the diagram.*
		(−)	*Alpha <u>must not</u> mark the diagram.*
	Median	(+)	*Alpha <u>should</u> mark the diagram.*
		(−)	*Alpha is <u>not supposed to</u> mark the diagram.*
	Low	(+)	*Alpha <u>may</u> mark the diagram.*
		(−)	*It's <u>unnecessary</u> that Alpha mark the diagram.*
Inclination	High	(+)	*Alpha is <u>determined to</u> mark the diagram.*
		(−)	*Alpha is <u>unwilling to</u> mark the diagram.*
	Median	(+)	*Alpha is <u>inclined to</u> mark the diagram.*
		(−)	*Alpha <u>dislikes</u> marking the diagram.*
	Low	(+)	*Alpha is <u>willing</u> to mark the diagram.*
		(−)	*Alpha <u>wouldn't</u> mark the diagram.*

Modality supports speakers' establishment of relationships with others because by qualifying the process it reports, a modal clause opens the floor for other voices, inviting to concur or lessening the cost of disagreeing. Martin and White (2007) include modality as an indicator of multivocality in discourse. Table 1 includes the four categories of modality identified by Halliday: Probability conveys the degree to which the speaker reports the likelihood of a process, while usuality conveys how typical a process is reported to be. Appropriateness refers to the degree to which a process is regarded as appropriate, while inclination expresses the speaker's consideration of a process as desirable.

To inspect the set of transcripts we used WordSmith 5.0 (Oxford University Press, 2004), a text analysis application, which could create concordances for a number of words that are often used as modals (e.g., would, likely, see Table I). The concordances were used to identify clauses that had those target words; the clauses were examined to determine whether the target word had been used as a modal (or instead was a false positive). Further, clauses that contained modals were also examined in regard to whether the process reported in the clause concerned the practice of teaching (as opposed to logistics of the session; e.g., food would be good now; these modals were excluded from analysis). Cohen's Kappa was used as a measure of the interrater reliability. Kappas ranged from .79 to .94, indicating substantial to near perfect agreement (Sim & Wright, 2005; see also Kosko & Herbst, 2011).

We compared the frequency of modal-usage between session types using the Wilcoxon-Mann-Whitney test. We divided the counts of modals in each session by the total number of words spoken by participants to weigh the frequencies. Results indicated no statistically significant difference between video and animated sessions in regards to the frequency of modal-

usage ($U = 17.5$, $p = .31$). This suggests both video and animated sessions had relatively similar

proportions of modal-usage.

Next, we calculated Chi-square statistics to compare the frequency of types of modal-

usage between video and animated sessions (i.e., probability, usuality, appropriateness,

inclination). Statistically significant relationships were found for probability ($\chi^2 = 4.15$, $p < .05$),

appropriateness ($\chi^2 = 7.17$, $p < .01$), and inclination ($\chi^2 = 5.99$, $p < .05$). These results indicate

for each of those modality categories that the extent to which a session scores higher or lower

than another in regard to the given category is not independent from whether the media used in

the sessions was video or animation. Examination of Table 2 shows that animated sessions had

proportionally higher frequencies for appropriateness and probability than video sessions, while

video sessions had proportionally higher frequencies for inclination than animated sessions. No

statistically significant difference was found for usuality ($\chi^2 = 1.47$, $p = .226$). While one session

type was more likely to elicit one form of modality over another session type, it is worth noting

that both animated and video sessions elicited more probability modals than appropriateness,

more appropriateness than inclination, and more inclination than usuality. This similarity in the

rank of modal-usage type shows that while video and animation sessions elicit similar kinds of

modal-usage in teachers' discussions, there are subtle differences in such modal-usage.

Table 2.

Presence of Modality Classifications.

		Video Session	Animation Session	Total
Probability	No	517	747	1264
	Yes	464	792	1256
Total		981	1539	2521
Usuality	No	879	1400	2279
	Yes	103	139	242
Total		982	1539	2521

Appropriateness	No	623	895	1518
	Yes	358	644	1002
Total		981	1539	2520
Inclination	No	703	1169	1872
	Yes	279	370	649
Total		982	1539	2521

Significance of the Study

A consequence of this study is that animations appear to be just as useful as videos to elicit modal statements about instructional practice. As long as that is the purpose of the research, producing animations to elicit that data seems not to threaten the work of researchers with loss of information, at least as far as its quantity. The study also suggests that there are subtle differences in the kinds of modal-usage elicited. The study is significant in that it helps validate a novel kind of instrumentation for research on teacher thinking, by demonstrating that when animations are used along with open ended agendas, they produce similar responses from groups of teachers as comparable video episodes do.

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