

CHANGING BELIEFS AS CHANGING PERSPECTIVE

Peter Liljedahl

Simon Fraser University, Canada

There is a phenomenon that has been observed in my work with inservice teachers. This phenomenon can be seen as embodying profound and drastic changes in the beliefs of the teachers participating in various projects. In this article I first describe this phenomenon and then more closely examine it using a framework of perspective. This framework allows for the articulation of the changes of beliefs as a foregrounding (or a reprioritization) of already existing beliefs. In doing so, I put forth a theory that allows for beliefs to be seen as both stable and dynamic – but always contextual.

INTRODUCTION

I work with inservice teachers. My reason for doing this is to affect change in these teachers' classroom practices, and ultimately, to affect change in the mathematical experiences of their students. In general, I try to accomplish this change through a focus on teachers' beliefs – beliefs about mathematics and beliefs about what it means to learn and teach mathematics. My assumption is that there is a link between teachers' beliefs and their practice (Liljedahl, 2008) and that meaningful¹ changes in practice cannot occur without corresponding changes in beliefs.

Recently, my main method of operating in this regard is to work with groups of teachers to co-construct some artefact of teaching – a definition, a task, an assessment rubric, a lesson, etc. This has proven to be a very effective method of reifying² the fleeting, and sometimes delicate, changes to beliefs that teachers experience within these settings (Liljedahl, in press, 2007). Within this context I am both a facilitator and a researcher. However, I am not a facilitator and a researcher in only the obvious sense. Although it is true that I facilitate the various activities that the teachers engage in – from discussions to the crafting of artefacts – it is also true that I facilitate the environment within which this all takes place. The sort of inservice work that I am involved in is more than simply the delivery of workshops, it is the provision and maintenance of a community of practice in which ideas are provisional, contextual, and tentative and are freely exchanged, discussed, and co-constructed. At the same time, while it is true that as a researcher I am interested in the down-stream effects of the work that I am engaged in (changes in teachers' practice in the classroom,

¹ Meaningful change is seen as a shift in teaching towards a more reform oriented practice. This change needs to be pervasive and robust.

² In this paper *reify* and *reification* is used in the tradition of Wenger (1998) rather than in the tradition of Sfard (1994). As such, reification means to make concrete – to turn some ephemeral aspect of teaching into *thingness*.

improvement in students' experiences and performance, etc.), it is equally true that I am interested in researching the inservice setting itself. There is much that happens within these settings. It is this later context which is the subject of this paper.

Working as both the facilitator and the researcher interested in the contextual and situational dynamics of the setting itself I find myself too embroiled in the situation to adopt the removed stance of observer. At the same time, my specific role as facilitator prevents me from adopting a stance of participant observer. As such, I have chosen to adopt a stance of *noticing* (Mason, 2006). This stance allows me to work within the inservice setting to achieve my inservice goals while at the same time being attuned to the experiences of the persons involved. I notice, first and foremost, myself. I attend to my choices of activities to engage in and the questions I choose to pose. I attend to my reactions to certain situations as well as my reflections on those reactions, both in the moment and after the session. More importantly, however, I attend to the actions and reactions of the teacher participants both as individuals and as members of a community. I observe intra-personal conflicts, interpersonal interactions, the dynamics of the group, as well as the interactions between individuals and the group. And in so doing, from time to time I notice phenomena that warrant further observation and/or investigation. Often these are phenomena that occur in more than one setting and speak to invariance in individual or group behaviour in certain contexts. Once identified these phenomena can be investigated using methodologies of practitioner inquiry that combine the role of educator with researcher – in this case teacher educator with researcher (Cochrane-Smyth & Lytle, 2004)³. Using a methodology of noticing I have observed rapid and profound changes in beliefs among individual teachers within a context of reification (Liljedahl, in press, 2007) and, more recently, among groups of teachers within this same context. It is this later phenomenon that I report on in this paper.

THEORETICAL BACKGROUND

Green (1971) classifies beliefs according to three dichotomies. He distinguishes between beliefs that are primary and derived. "Primary beliefs are so basic to a person's way of operating that she cannot give a reason for holding those beliefs: they are essentially self-evident to that person" (Mewborn, 2000). Derived beliefs, on the other hand, are identifiably related to other beliefs. Green (1971) also partitions beliefs according to the psychological conviction with which an individual adheres to them. Core beliefs are passionately held and are central to a person's personality, while less strongly held beliefs are referred to as peripheral. Finally, Green distinguishes between those beliefs held on the basis of evidence and those held non-evidentially. Evidence-based beliefs can change upon presentation of new evidence.

³ It should be noted that the main distinction between a methodology of noticing and a methodology of practitioner inquiry is that noticing doesn't presuppose a research question. It is a methodology of attending to the unfolding of the situation while being attuned to the occurrence of phenomena of interest.

Non-evidentiary beliefs are much harder to change being grounded neither in evidence nor logic. Instead they reside at a deeper and tacit level.

A person's belief system can, subsequently, be seen as a collection of beliefs competing for dominance in different contexts. Metaphorically, it is like a scene that is photographed from different perspective, with each perspective allowing something else to be foregrounded. Changes to learners' belief systems can then be seen as changes in perspectives⁴. Green argues that changing learners' belief systems is the main purpose of teaching. I argue that changing teachers' beliefs is the main purpose of inservice education.

METHODOLOGY

The data for the results presented here comes from three different, but similar, contexts in which I worked with groups of teachers in different schools and school districts. The first context (c1) involved a group of grade 5-8 mathematics teachers (n=10) working to design a task that could be used as district wide assessment of grade 8 numeracy skills in a school district in western Canada. This inservice project was comprised of 6 sessions (3 hours long, 3 weeks apart) during which we were to co-construct a working definition of numeracy (later adopted as the district definition) and design and pilot test a number of tasks that would reflect the qualities of our definition. The second context (c2) involved a group of grade 8 mathematics teachers (n=6) from a different district engaged in a very similar project. This time we were attempting to design a task that could measure the numeracy skills of their own students only. This project was comprised of 3 full day meetings 6 weeks apart. The third context (c3) involved all the mathematics teachers (n=18) in a middle school (grades 6-8). In this context we were working to design an assessment rubric that could capture some of the mathematical processes necessary for effective mathematical thinking. This involved a series of 12 one hour meeting held every two or three weeks.

As already mentioned, my method of operating within these inservice environments is through *noticing*. What this means from a more methodological perspective is that there is a great reliance on field notes taken both during the inservice sessions and more prolifically immediately after the inservice sessions. These field notes serve as a record of the things that I have noticed during individual sessions. Of course, they are limited in that they are only a record of that which has been attended to. However, these notes (or *noticings*) then form the basis of what is attended to in future sessions thereby creating an iterative process of refinement of attention. As this process continues phenomena that are deemed to be interesting receive more and more attention. This may simply mean a heightened awareness or anticipation of certain occurrences. Other times this means an adjustment in the facilitation practices in

⁴ This is not to say that changes in beliefs cannot also be seen as changes in beliefs, but for the purposes of this paper I stay with the metaphor of changing perspective.

order to more aggressively pursue the phenomenon. And sometimes it may mean stepping outside my role as a facilitator to investigate the phenomenon more directly as a researcher through methods such as interviews or questionnaires.

As such, the data for this study comes from a number of different sources. First and foremost, are the field notes from each of the aforementioned contexts. These notes increased in detail with each occurrence of the phenomenon. From c2 and c3 there are also transcriptions from interviews with different participants conducted at opportune times during or after certain sessions. These interviews were aimed at uncovering the participants own thoughts about the changes I was observing. The questions were of a semi-structured nature meant to preserve the conversational atmosphere that I had established with all of the participants while at the same time helping to illuminate the phenomenon itself.

THE PHENOMENON

The *exo/endo-spection* phenomenon, as I have come to call it, is comprised of a series of either three or four distinct phases, always in the same sequence, each having its own associated name. The names are an amalgamation – the prefix *exo-* and *endo-* comes from Greek meaning outer, outside, external and inner, inside, internal respectively; while *-spection* comes from the Latin *specere* which means 'to look at'.

Phase 1: exo-spection (x)

The teachers work on an activity which, at the time, occupies their focus. This could be a problem solving exercise or the designing of a lesson, task, or assessment rubric. Whether or not the activity is relevant to their own teaching practice is immaterial as the teachers' focus is on the completion of the task, rather than on the potential for the task to inform their own practice. That is, the teachers are looking at the activity as lying outside of themselves.

Phase 2: eXo-spection (X)

The teachers realize that the problem they have solved, or the lesson or task they have built, is not commensurate with their own classroom context. They see this as a large scale problem bemoaning the poor state of affairs of all students and the educational system in general. They look at the source of the problem as lying far outside of themselves – societal expectations, the curriculum, the evils of external examinations, deterioration of standards, etc. – and speak of systemic reform as the only solution. As such, they are not only pushing the problem further outside of themselves, but also broadening its scope.

Phase 3: eNdo-spection (N)

Suddenly there is a change in the teachers' disposition – the problem, regardless of where it lies, must be solved within their own practice in the scope of the classroom. Now the conversations are about what they can do

within their teaching in order to enable their students to be successful in solving a specific problem, completing a specified task, or performing well on a given assessment. The teachers' are no longer pushing the problem, and any subsequent solutions, away from themselves, but are rather bringing it back to their locus of control.

Phase 4: endo-spection (n)

For some teachers there is a final shift of attention to the plight of individual students. The conversations shift from the classroom to a particular student or subset of students, and with it comes a narrowing of focus on their influence as teachers. This final shift is also marked by a subtle shift in discourse from *teaching* to *learning*.

It should be noted that I have deliberately avoided using the term *introspection* which means to examine one's own thoughts and feelings. This is not what I am trying to capture here. *Endo-spection* is not about looking inside oneself, but about looking at something as lying inside of oneself or one's locus of control. Conversely, *exo-spection* is about looking at something as lying outside of oneself or one's locus of control.

In c1, x occurred in the first two sessions, X during the third session, N during the fourth session, and for two participants, n occurred in the last two sessions. In c2, x and X occurred in the first session, N in the second, and for one participant there was evidence of n in the third session. Finally, in c3, x occurred in the first 3 sessions, X in the fourth and fifth session, N in the sixth session, and for some of the participants, n occurred at various times during the last four sessions.

In general, the adoption of an exo-spection stance was uniformly a group position. That is, without prompting, every member of the group adopts an exo-spection stance and the group as a whole adopts an exo-spection stance. The discourse of the group did not deviate from this stance and there was a general sense that there was no need to do so – until there was a sudden transition to the eXo-spection stance. This transition, as well as the transition to eNdo-spection, was initiated by one or two members of the group, but then uniformly taken up by the group as a whole. It is almost as though the initiators were merely articulating what was already in the minds of the other members of the group, or the initiators merely precipitated an inevitable position. Conversely, the shift to an endo-spection stance, although articulated within the group context, was not taken up in the same way.

ANALYSIS

Because, for this paper, I am most concerned with changes in beliefs I will constrain my analysis to those points of greatest change – that is, the transitions between phases (x → X, X → N, and N → n). Further, I will look at these changes through a lens of changing perspectives.

exo-spection to eXo-spection ($x \rightarrow X$)

As already mentioned in the description of the exo-spection (x) phase, the teachers are initially contentedly working at completing the task at hand. In c1 and c2 this involved designing a numeracy task that conforms to a taken-as-shared definition of numeracy. In this case the teachers made extensive references to the published curriculum learning outcomes, the rationale that forms the underpinnings of the curriculum, as well as some ministry documents pertaining to the positioning of numeracy vis-a-vis the curriculum. In c3 the tasks that occupied the teachers in the first few sessions were increasingly challenging⁵ problem solving activities. Here the teachers were caught up in the excitement of doing mathematics that does not explicitly rely on mastery of specific learning outcomes. This can be seen in Barry's comments during one of the early sessions.

I love these problems. I mean, it's been a long time since I worked on problems myself, and I really like it. That card trick problem had me scratching my head all weekend. (Barry, c3, session II, field notes)

In either case, the teachers were focused on their own completion of these tasks, without much consideration for how they applied to their own practice.

The transition to X occurred in all three contexts when there was a sudden awakening to the fact that what the teachers were working on was not commensurate to their own classrooms contexts. This is nicely captured in the sudden change of tone in Barry's comments.

These problems are all fine and good. I mean, I enjoy doing them, but I don't have time for this with my kids. I have WAY too much stuff to get through to play around with these kinds of problems. Besides, my kids don't have enough patience for this kind of work. (Barry, c3, session V, interview transcripts)

It is also seen in the comments of Heidi and Charlotte working in c1.

I think we're getting it. The task is really starting to look like a numeracy task rather than just a word problem. It's not easy fitting all this stuff about communication, ambiguity, and multiple solutions into a task. But we're getting there. (Heidi, c1, session II, field notes)

I think these tasks are great, we've done a good job, but parents [of my students] are never going to go for this. The first time I send something like this home the phone will be ringing off the hook. We constantly have to work on drills to get the kids ready for the FSA's [Foundational Skills Assessment – an external high stakes exam, the results of which fold back onto the teacher]. And if we're not we're hearing about it from the parents and not because of the FSA's. They don't care about that, but these parents, a lot

⁵ This does not mean an increase in the mathematical complexity of the tasks. What is increasing is the demands on particular problem solving skills required (ability to organize work, communicate thinking, group work, deal with ambiguity, etc.).

of them are from Asia, and to them drills are important. (Charlotte, c1, session III, field notes)

The beliefs that these teachers are expressing (drills are important, learning outcome is curriculum, what parents want is important, kids are not capable) are not beliefs that have suddenly manifested themselves in latter sessions of the project. These are deep-seated beliefs (primary, core, evidential, tacit, or otherwise) that have been in the background during the teachers' initial encounters with their respective tasks. Working alone, or in a group, on something away from the multifaceted demands and expectations of their job less dominant beliefs (mathematics can be fun, numeracy is important, etc.) were able to come to the fore and inform their work in the initial sessions. But as the reality of their job rushed in on them the more dominant beliefs once again moved to the forefront, eventually paralysing their ability to see their initial work as being relevant to their own practice. However, there is still a wish that relevance could be found, but it is overwhelmed by the deep-seated belief that the problem is systemic AND can only be solved systemically. This can be seen in Adam's remarks.

Look, I agree that this is all very important. But there is just no way that we can make this work. There just isn't enough time, the kids aren't strong enough, we don't have administrative support, and, at the end of the day, the Ministry of Education just doesn't care. If they did, this is the kind of stuff we would see on the provincial exams. Until we can get them to change everything from the top down it just isn't going to work. I wish it were different, but it isn't. (Adam, c2, session I, interview transcripts)

eXo-spection to eNdo-spection ($X \rightarrow N$)

Initially, this transition is what drew my attention to the xXNn phenomenon. After commiserating about the negativity and hopelessness experienced in prior session of c1 there was a sudden rebirth of professional growth. This can be seen in Charlotte's comments in the fourth session of c1.

We have to keep pushing on in the direction we are going. If we don't design a task that shows what the kids can't do we're not ever going to be able to make any changes. We won't have anywhere to start. (Charlotte, c1, session IV, field notes)

Adam expressed a similar sentiment in the second session of c2.

In my opinion, these tasks aren't telling me enough. I'd like a task that really showed that these kids don't have a clue how to work together, for example. (Adam, c2, session II, field notes)

He adds details to these comments in a post-session interview.

I started to think about what we were doing here, with this whole project, and what it is we are trying to accomplish. I then started to think about how little I took away from my own math learning and what it is that is really important. We have an opportunity here to develop some really useful skills, stuff that these kids can use in grade 9, in grade 10, in

university, in life. They need to learn how to work together, how to deal with problems, how to tough it out, and stuff like that. But in order to do that we need to first show them that we are serious about this stuff. We can't just talk about it, we have to do it, and we have to mark them on it, and we have to start somewhere. (Adam, c2, session II, interview transcripts)

Tracey, also from c2, has a slightly different perspective.

They loved it. They asked me yesterday when we are going to do another numeracy task. I couldn't believe it. But you know what, they don't have a clue how to work together. So, now I'm working on that in my classroom. (Tracey, c2, session II, field notes)

As did Mary, who brought in samples of students' work.

As you can see there isn't much here – especially the boys. Like, you have to have a secret decoder ring to figure out what they are doing here. BUT, you know what, they did it. They worked on it and they got answers. Now we have to go forward with it. (Mary, c3, session VI, field notes)

The belief that assessments can be used formatively to inform both the teacher and the students is, again, not new. It has now moved into the forefront, however, buoyed by the realization of what it is that it is important, what the students can (or cannot) do, and what it is that the students enjoy doing. Whereas the transition from x to X can be seen as a regression to the norm (a return to a lower energy level, if you will) that is achieved almost subconsciously, the transition to N is almost wilful in nature. This re-prioritizing of beliefs is taxing and will require much effort and energy to sustain. It requires effort and motivation, and that motivation is found both in the successes of the students and the recapitulation of what is important. Or it can be found in the realization that what has come before isn't working, as is articulated by Phil.

I'm not sure if this is going to work. But I know for sure that what I've been doing before isn't working and I can continue to blame the system for all its faults or I can decide to do something about it. All I know is that I'm tired of both teaching my students AND learning for my students. Something has to change. (Phil, c3, session VI, interview transcripts)

eNdo-spection to endo-spection ($N \rightarrow n$)

As already mentioned, only some of the teachers moved to the final phase of the $xXNn$ phenomenon. Those who did, however, did so for seemingly the same reason – they were focusing on the learning of particular students or subsets of students. This was seen in their discourse about particular cases. Whereas some teachers spoke about cases as being exemplifications of the norm or the outliers within their classroom, these teachers spoke about the individual cases as standing for themselves. This can be seen in both Tracey's and Mary's comments.

So, I still have this one girl who is just toxic to anyone I put her with. No matter what I do she just will not work cooperatively. I've talked to the councillor and we think it has to do with self-esteem issues. So, I'm starting to think that this is where I should be putting my focus when it comes to her. (Tracey, c2, session 3, field notes)

In general, the students are doing much better. My work using graphic organizers has really helped. But, I still have a set of boys who just can't figure out which graphic organizer to use, or even that they have to use one. I'm not sure what to do about it, probably just keep working on it. But for now I'm still telling them which ones to use so that they can get through the task. (Mary, c3, session 11, interview transcript)

The belief that students are individuals and, thus, require differentiated instruction is likely not a new belief. However, with the use of formative assessment as an information gathering tool the teachers were giving this belief more and more prevalence.

CONCLUSION

Beliefs are stable patterns of thought, conscious or otherwise (Green, 1971). It is, therefore, unlikely that the teachers in this study changed their beliefs as drastically as the data may indicate. An alternative explanation is that the profound changes in beliefs are not a change at all, but rather a reprioritization of already existing beliefs - an affording of prevalence to less dominant beliefs. Such an explanation allows for both the robustness of beliefs and the possibility of profound change. This idea of reprioritization, or perspective, also allows for a more useful application of Green's organization of beliefs along three dimensions. A person's beliefs are hidden from us. Indeed, they may even be hidden from the person themselves. As such, knowing that beliefs may be central or peripheral, core or derived, evidential or tacit does us no good. Instead, recognizing that in different contexts different beliefs will be foregrounded, wilfully or otherwise, will allow us to think more holistically about belief systems as dynamic and contextual.

The xXNn phenomenon is such a context. Using a methodology of noticing and a framework of perspective I have described and analysed this phenomenon and concluded that the profound changes that are occurring within this context might just be due to a reprioritization of already existing beliefs. Further research into the phenomenon is necessary. There is great potential in analysing it using frameworks of psychology, group dynamics, as well as Gestalt. But it is early days, and this research is still in its exploratory phase. Now that the phenomenon has been identified, articulated, and even anticipated⁶, however, more detailed data can be gathered and more thorough analyses can be performed.

⁶ In fact, since gathering the data for the work presented here I have already identified the phenomenon, or subsets of it, within a master's course, a single session of a lesson study cycle, and a 90 minute workshop.

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