A teacher changing her practice: a tentative explanation for the reasons behind it

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The aim of my PhD research project is to investigate interventions that foster equity in teachers' practices and also to understand why specific actions in the classroom promote more equitable learning environments. This paper is focused on what I have learnt from lesson observations and from an interview with a mathematics teacher, while she experienced a discussion group about a new approach to teach fractions. It was possible to observe changes in her practice. I will argue that these changes were the result of her operating in her 'innovation zone'; acting with confidence even though she was incorporating new elements into her practice. There is evidence to suggesting that specific features in the discussion group fostered these changes. The features can be seen as elements to be included in professional development initiatives aiming to change teachers' practices.

Keywords: collaboration; teaching practice; change; low achieving; equity

Introduction

This study began with a period of reconnaissance. In order to develop a better understanding of teachers' daily routines in a British school, I began to observe some lessons in Purple Valley (a pseudonym). The school was not chosen randomly, as my supervisor has been visiting the place for some time. Purple Valley is a secondary school in the East Midlands, England and, at the time of the research, the school had been placed under 'special measures' by OFSTED for almost a year. Thus, teachers in the mathematics department were inclined to seek actions that could help improve the learning and teaching of mathematics in the school.

Besides teacher willingness to engage in initiatives to foster student learning in general, my focus was on low achieving students. As many researchers have pointed out, socio-economic status is a relevant factor in mathematics performance (Gates & Noyes 2014). My purpose is to investigate features in teachers' development that can foster equity in their practices and, consequently, promote more equitable learning environments.

As an initial step towards this goal, I observed lessons and talked to teachers during breaks. After three months, the research team and the teachers agreed to schedule meetings to discuss lessons about fractions for the low achieving students.

The discussion group

There were three teachers and three researchers in most of the meetings. Over a period of five months we had six meetings, each lasting for approximately one hour. The meetings were not equally spaced; they were scheduled according to teachers' availability and willingness to discuss lessons we were planning together.

The discussion group presented many features suggested by previous research for effective professional development. This text does not intend to describe in detail

the specific professional development initiative in place, but the main contributions came from Yoshida (2008). The paper described 'lesson study' emphasizing the benefits from that process, such as opportunities for teachers to collaborate with their peers, experience new approaches to teaching and learning, and evaluation and support for new practices.

Another idea that contributed to the initiative adopted in Purple Valley was the 'teacher study group' from Crespo & Featherstone (2006). They comment on an initiative where a facilitator is responsible for choosing a problem and guiding the group of teachers through the phases of: (a) solving the problem; (b) adapting it according to their classroom; (c) teaching their version of the problem; (d) reporting to their peers; and (e) reflecting on the whole process. According to the authors, the most important moments in promoting professional development were when teachers explored mathematics together, shared stories of practice and shared perception on students' thinking across grades (Crespo & Featherstone 2006, pp.104–108).

The emergent structure drawn from these studies is: based on the discussion of tasks, teachers collaboratively design a lesson and teach it (with other participants observing); they make their impressions, difficulties and achievements public and put ideas together to improve the initial lesson. The cycle starts over when another participant teaches the improved lesson for a different group of students and all the phases are revisited.

The discussion group we had with the teachers in Purple Valley had this structure embedded, but we did not reach the phase of re-teaching the improved lesson. The six meetings we had are described below:

Meeting 1 - introduction

We talked about the interests of the research team. It was also agreed that the approach to teaching fractions would be based on visual representations (Gates 2015). Finally, we established that the lesson would be designed by everyone involved; they would not be 'ready-to-use' tasks or lesson plans, mainly because we all wanted the lesson to be specific for each teacher and flexible in terms of structure and time.

Meetings 2 and 3 – tasks about fractions

During these two meetings, we discussed different lesson plans and tasks. The research team was interested in presenting several styles of tasks expecting that it would initiate the development of a common vocabulary among the group. At the end of the third meeting, it was agreed that Julia, one of the teachers, would sketch the first lesson plan to be discussed in the next meeting.

Meeting 4 – improving the first lesson plan

During this meeting, one member of the research team suggested the use of animations to introduce the rectangular area model for fractions without any interference from the teacher, i.e. not talking. Julia and the other participants agreed and a few more changes were settled by email.

Meeting 5 and 6 – improving the second lesson plan

The group discussed the most appropriate topic for the next lesson. In order to make our selection, we talked about what the students had achieved and where we were expecting them to be after all the lessons in general and after this second lesson in particular. As a means to guide and inform our decisions, we collected students' responses from the first lesson and field notes.

The teacher and an overview of her regular lessons

The teacher I will focus on here is Julia, who is in her twelfth year of teaching and, for almost all these years, she has been teaching in Purple Valley. Her first degree is in mathematics, after which she did her teacher training. She has been teaching ever since.

Julia agreed with me when, in the interview, I mentioned that her regular lessons were highly structured, always in similar sequences:

> [Y]ou are right, my lessons are very structured. You come in, there is a starter, there is normally me talking, then we do an activity, probably a bit more of me talking. (08:18, Julia's interview)

Although the students are always at tables of three or four, the tasks are individual and students rarely speak to each other. Eventually, they comment on an answer, but there is no intense discussion about mathematics. In addition, students participate in the lesson by raising hands and giving answers to Julia. Even though Julia asks for further explanations from the students, they never go to the board or present their solutions for whole class; Julia is in total control of the situation.

Collaboratively developed lessons

Lesson 1 – visualising fractions

The teacher showed an animation with a square being cut in 2 halves, 4 quarters and so on up to sixteenths, accompanied by the corresponding fractions. The last part of the animation displayed three sums equal to one. Then, the students were given a set of cut-outs of the shapes they had seen in the animation. They were supposed to use these cut-outs to solve three tasks: 1) write sums equal to one; 2) identify two equivalent fractions; and 3) explain what 'equivalent' means.

Lesson 2 – adding fractions

The teacher began the lesson with one half and one sixteenth shaded in a square and asked students to find out how much of the shape was shaded. The solution was presented in an animation. Then, the students could use the same cut-outs from the previous lesson to solve several other similar questions and also for items where they had the fractions written, but not the diagrams.

Lesson 3 – thirds, sixth and ninth

This time, the students did not have the cut-outs. They were encouraged to draw diagrams for thirds, sixths and ninths. Julia did not show how she expected them to draw the fractions. Finally, the last task was about adding fractions.

Data collection

The data used to write this paper consisted of ten lesson observations of Julia teaching in two different groups, Year 7 Set 4 (out of 5) and Year 8 Set 2 (out of 6), audio recordings of the six meetings, video recordings of the three lessons planned collaboratively, one interview with Julia after the three lessons, and conversations before and after her lessons.

The changes and some possible reasons

It was possible to identify differences between Julia's regular lessons and these three lessons. Below, I present brief descriptions of the changes, even temporarily, in Julia's practices.

From my observations and informal talks, I identified the following changes:

1 – Doing less talking: In the first lesson, besides the animation being silent, Julia did not give further instructions for the students. Their only guidance was two questions presented on the slide.

2 – Trusting the students: There were no sets of steps to be followed, which was the rule in her regular lessons, and there was always more than one correct answer. This situation happened at least once in all three lessons.

3 – Different types of task: due to (2), the tasks acquired an investigative component and the concepts were built from the tasks instead of the tasks being solved by repeating a known procedure.

The interview highlighted other changes; here are some examples from Julia's words:

1 – "I think perhaps prior of doing this [the meetings and the lessons] I would have done the example first."

2 – "The idea of them having some tangible resource and creating different fractions and being able to lay things out in front of them, that is completely new."

3 – "I think I consciously made more of an effort to 'have a go first' rather than 'this is how you do it'. So I think in that respect I am consciously doing that more. […] [the meeting and the lessons] kind of opened me up to the fact that actually lower ability classes probably know perhaps more than you perceive, sometimes."

The search for reasons for the changes

To investigate the reasons that fostered Julia's changes, I looked for research about change in teaching practice and the factors that influenced those changes.

Joubert, Back, De Geest, Hirst, & Sutherland (2010) focused on two teachers and the changes they reported after participating in a professional development course. The aim was to investigate which features of the course made it effective. The authors suggested three factors: 1) experimenting in the classroom and taking risks; 2) working collaboratively to have access to new ideas, share experiences and reflect about them; and 3) having time away from school to think and discuss. These factors will be considered when I analyse my data further on this section.

Penteado and Skovsmose (2009) use the terms 'comfort zone' and 'risk zone' to characterise practices involving the use of new technologies. Teachers in the comfort zone take predictable actions, do not try innovation even when unsatisfied with their practices and with student learning. While teachers in the risk zone are exposed to unexpected and unfamiliar situations, these may develop into new practices. According to the authors, to provide new learning opportunities to students, teachers need to operate in their risk zone, changing their practices. The authors suggest that peer collaboration represents vital support required for teachers to "ensur[e] that risks become not destructive but rather entrances to new educational possibilities" (Penteado & Skovsmose 2009, p.225).

After reconsidering my data in the light of these articles, I would suggest a model slightly different from what was proposed by Penteado & Skovsmose (2009) to explain the reasons behind the changes I observed in Julia's practice.

The model

In the interview, Julia said that putting the slides together gave her the confidence to teach in that different way. In addition, she commented that she was counting on old lesson plans as a backup in case the lesson was not running as expected. Based on that, it is reasonable to say that the feelings of confidence and control prompted Julia to act differently. Therefore, the 'comfort zone', as characterised by Penteado and Skovsmose (2009), does not seem appropriate to explain Julia's situation during the lessons.

On the other hand, there were comments in the interview that characterise Julia as acting in her risk zone. She said that the approaches discussed in the meetings, the use of tangible resources to promote independent thinking and the reduction in talking were all new to her. She said she took it all as a challenge.

Thus, I would argue that Julia was acting in both risk and comfort zones simultaneously during these lessons, so a transitory zone seems appropriate to better describe her situation. Based on that, I propose a different model composed of three zones: confidence, risk and innovation (see figure 1).

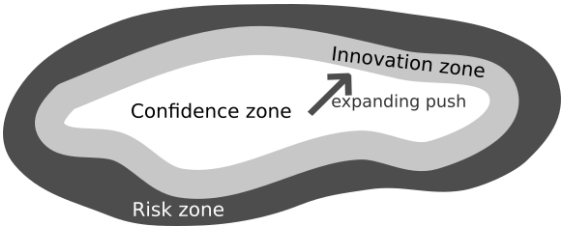

Figure 5: Schematic representation of the three zones

The confidence zone

This zone is characterized as the place where the teachers normally act. In my point of view, acting inside your confidence zone is positive. The teachers are comfortable and control the type of practice they are using in the classroom. However, if the confidence zone is too narrow the teachers will probably have problems creating opportunities for all students to learn. Hence, the bigger the confidence zone, the more flexible and diverse their practices will be. Teachers empowered with more practices have the tools they need to enhance the leaning opportunities for students.

The risk zone

This zone is composed of the practices teachers are not comfortable using. It is possible that a teacher will not use certain practices due to not knowing about them, not recognizing any advantage in teaching that way, apprehension and anxiety in relation to the unknown, or due to unsuccessful previous experiences.

The innovation zone

I propose a third zone, combining elements from the risk and the confidence zones in such a balance that allows the teachers to feel confident enough to deliver the lesson and, at the same time, incorporate new elements. The practices in this zone are not yet consolidated as part of their confidence zone but, once they have tried them, they have left the risk zone. If the experience with the new practice is successful it has the potential to be aggregated to the confidence zone, thus expanding it.

Expanding pushes

In addition to the zones, I could identify stimuli that pushed Julia towards her innovation zone, which I called 'expanding pushes'.

In this case, the features that prompted Julia to enter her innovation zone were:

1 – Being reflective: Julia said she had time to think more about the lessons due to our discussions in the meetings.

2 – Collaboration: Julia said that the non-judgemental environment in the meetings had a positive effect on her willingness to try the lessons.

3 – Motivation: Julia was already motivated by low retention levels presented by her students regarding fractions.

4 – Immediate results: Julia's first impression was that "they understood," meaning that, the new approach, with all the features that differed from how she normally teaches, presented a positive response from the students.

Identification of these factors is of the utmost importance in moving teachers towards their innovation zone and, consequently, promoting changes in their practices.

Discussion

The changes discussed here were limited to the lessons planned together with the group and it is impossible to guarantee that any of them will be incorporated by the teacher in any of her other lessons. Nevertheless, the fact that Julia tried approaches that were unfamiliar for her is an important step towards sustained change.

I recognize that teachers also have many 'retracting pushes', such as pressure for results, time, policy changes, lack of knowledge and others. However, I would argue that it is possible to identify routes for teachers to try new approaches to teaching, culminating in more learning opportunities for students if one can find a good balance between confidence and risk for a teacher.

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