

Professional Narratives in Mathematics Teacher Education¹

João Pedro da Ponte
University of Lisbon, Portugal
jponte@fc.ul.pt

In recent years, narratives gained prominence in many educational fields, especially in teacher education and in research on teaching. In this paper I discuss why narratives may be of interest both for mathematics teachers' professional development and for researchers that investigate teachers' professional knowledge.

The narrative representation of experience

A narrative or story is a way of representing experience for oneself or for others. A narrative involves three basic elements: (i) a situation involving some conflict or difficulty, (ii) one or more agents that act on that situation with their own intentions, and (iii) a plot, that is a temporal sequence of related events in which the conflict is resolved in a certain way. It involves people, settings, and events that take place in a given time frame.

According to Bruner (1991), we organize our experience and our memory of past events in the form of stories. In this sense, we live through stories, that is, we think, perceive, imagine, and make moral choices using narrative structures. Every human being is a storyteller, perceiving reality in a narrative way. Telling stories enables us to establish order and coherence in our experience and to make sense of the events in the world around us (Carter, 1993).

Stories are imbedded in the culture. A story is a conventional way of thinking, culturally transmitted, and is as much constrained by the social and institutional context as by the capacities of each person (Bruner, 1991). Also, the culture speaks through stories, stories that are constructed around themes that yield the projection of human values (Carter, 1993; Riessman, 1993). To ask whether a story is true or false is to ask the

¹ Ponte, J. P. (2001). Professional narratives in mathematics teacher education. *Proceedings of the 2001 Annual Meeting of the Canadian Mathematics Education Study Group* (pp. 61-65). Alberta: University of Alberta.

wrong question. The issue is what the teller is trying to say, the interpretation that is being offered, the interpretation that the reader may draw of that story, and the understandings that it may lead to. The acceptance of a story is ruled by convention and by “narrative necessity” (Bruner, 1991).

Teachers’ stories

Stories are one powerful way that humans use to make sense of their experiences. This includes the experiences that teachers have in their professional activity. Indeed, teachers tell each other about classroom events, about the professional meetings they attend, about their ongoing projects. They share their experiences with children, with parents, administrators, and colleagues. Professional stories, besides being a natural way of registering teachers’ experience, may serve formative goals, notably for those who tell them, for other practicing teachers, and for prospective teachers.

Stories constitute a way of knowing closely related to action. According to Carter (1993), stories are ways of knowing emerging from action that attempt to explain human intentions in the context of action. Allowing for a multiplicity of meanings, they are a suitable way of expressing knowledge related to the complexity of action. As teaching is an intentional activity in a given situation, teachers’ professional knowledge is inextricably related to teachers’ practice. Therefore, to understand teachers’ knowledge we may begin by scrutinising the stories that provide structure to their thinking about classroom events—their practical theories. However, one must do that in the understanding, that in their stories, teachers do not just recall and report their experiences. They recreate their own stories, reconstructing meanings, redefining their personal and professional self (Cortazzi, 1993).

The thinking, the perceptions and the experiences of teachers are integral elements of their culture and, therefore, the mark of the cultural contexts is present in their thinking: “what teachers tell us about their practices is, most fundamentally, a reflection of their culture, and cannot be properly understood without reference to that culture which is interpersonal” (Olson, 1988, p. 169). Stories select in a special way the richness, the *nuances* of meaning, the ambiguities and the contradictions in human affairs, contrarily to paradigmatic or scientific thinking, that requires consistency and absence of contradiction (Bruner, 1991). They have a strong ability to represent life and promote linkages between it and the educational experiences. Stories are ways of capturing the complexity, specificity, and internal and external connections of phenomena, overcoming the limitations of atomist and positivist approaches. They are, therefore, a way of knowing and thinking particularly apt to deal with the issues that we face in educational research (Carter, 1993).

Stories may fulfill many roles in teacher education and professional development. Of course, teachers' stories are a fundamental part of the profession's heritage and constitute rich resources for teacher education activities. But the most important role of stories in professional development involves teachers constructing their own narratives about past experiences. This autobiographical work may focus on single events or classroom episodes or reflect the complex movements of an extended career. An autobiography is not just a description of a professional career—it is a means by which teachers may become aware of key issues that may lead to substantial changes in their professional activity.

Although much less than in other educational fields, narratives are present in some mathematics education work. For example, in a theoretical paper, Burton (1997), discusses how to combine an emphasis of individual agency of constructivism with the prevalence of external authorship in sociocultural theories, proposing to regard mathematics learning as a narrative process in which learners have agentic control in authoring. Mostly concerned with methodological issues, Love (1994) noted that teachers' accounts about their practices, in interview settings, should be regarded as narratives and, therefore, the analysis of such accounts should take in consideration the specific features of narratives. Chapman (1999) uses the process of storying and restorying to help preservice mathematics teachers to reflect on their thinking and actions, in relation to mathematics and mathematics teaching and learning, aiming to broaden their understanding of new curriculum orientations. And Shifter and Simon (1996), used teachers' narratives as starting points to explore issues related to the teaching of particular topics, to enacting new teaching approaches, and to the challenges posed by curriculum reforms to teachers' professional identities.

Constructing narratives

In education, stories can take myriads of forms. For example, teachers' anecdotes are simple episodes teachers tell each other about classroom events or other events such as their own history as learners. A personal history is an extensive account of firsthand experiences of learning and of being in a school. An autobiography is a reconstruction that involves a conscious and reflexive elaboration of much of the author's life, including personal and professional experiences. A collaborative biography is the joint description and interpretation of a teacher's life experience carried out by the teacher working together with a researcher (Cortazzi, 1993). Narrative inquiry, as carried out by Connelly and Clandinin (1990), is the process of making meaning of personal experience through collaborative storytelling.

A narrative always involves a narrator that produces a text, in oral or written form. A teacher may produce it on his or her initiative (such in autobiography), but more often it is a joint production of a teacher and a researcher. Such production may come about in a rather standard interview setting, through open-ended questioning, in a more informal reflection on past experiences, or as a deliberate construction in sessions devoted to “narrative inquiry”. In a joint production, there is a range of possible roles of both participants—narratives may be just produced orally by a teacher and then passed into writing by a researcher or may evolve in oral and written steps as a collaborative activity.

The sources of narratives may be unstructured interviews, journal entries, field notes of shared experience, etc. Many stories are first expressed orally and then in a written way. The construction of a narrative in educational research involves several steps. Riessman (1993) describes them in the following way: (i) attending, that is, living the experience; (ii) telling the experience; (iii) transcribing the experience, (iv) analysing the experience, which implies the elaboration of a new text (usually written); and (v) reading, involving a new recounting. Steps (i) and (ii) must be undertaken by the person that lived the experience; steps (iii) and (iv) may be carried out just by the researcher or by the teacher and the researcher, as a joint production; and step (v) involves all possible audiences of the narrative.

For Riessman (1993), these steps are different levels of representation of an experience. First, one must note that there is an inescapable gap between the lived experience and the telling and writing that is done about it. Telling an experience also implies the creation of an identity—a way how one wants to be known by the others—as every narrative is inescapably an auto-representation. Transcribing is (as the other levels of representation) necessarily incomplete, partial and selective—it is an interpretative action as much as it is photographing reality. Decisions about transcribing, as well as about speaking and listening are guided by theory and rhetoric rules. Analysing implies to select, emphasize, relate and compare. As in any research activity this is a most critical step in the creative activity of research. Such analysis should not pervert the voice and the meaning of professional practices, but enrich and clarify them as it draws on further experiences and perspectives. And, in its final form, the narrative is still open to different readings and interpretations as the meaning of a text is always a meaning for someone. A story, once told (orally or in written form), does not belong anymore to the narrator. It gets an existence independent of his or her will, intentions or interpretations and becomes the property of all of the educational community (Clandinin and Connelly, 1991).

Narratives carry a strong cultural and historical load. The “truths” that we construct are meaningful for specific interpretative communities in well-defined historical

circumstances. As Riessman (1993) underlines, each level of her model involves a reduction, but also an expansion—each teller selects to narrate the aspects of his or her experience and adds other interpretative elements.

There are several ways of analysing narratives. One of the most used models in education was designed by Labov (see Cortazzi, 1993; Riessman, 1993), who proposes that a narrative is made up of six fundamental parts: (i) abstract, with the summary of the substance of the story; (ii) orientation, providing information about place, time, context, participants; (iii) complicating action, that is, the sequence of events; (iv) evaluation, indicating the meaning of the action for the narrator; (v) resolution, stating what finally happened; and (vi) *coda*, through which one returns to the perspective of the present. Next, I use this model to analyse a teacher' story.

A professional story

The following story—entitled *The glory of knowing how to use a calculator*—was written by Maria João Simões, a teacher in a secondary school² in Lisbon, Portugal, as part of an activity in an in-service teacher course held in 1996. It was included in a book containing several stories constructed in the same way, published by the Association of Teachers of Mathematics (Ponte, Costa, Lopes, Moreirinha, and Salvado, 1997).

This year I have two tenth-grade classes and they're very different from each other. In class B almost half the pupils have already bought a graphic calculator, while in class C there isn't a single one—and this has nothing to do with economical differences...

I've had a graphic calculator for almost two years, but I must admit that I hardly know how to do anything on it because I have dedicated very little time to become acquainted with it. In one of the first classes on quadratic functions, I decided to take my calculator (the school doesn't have one!) to show the pupils in class C what happens when we changed the coefficients. But I don't know what I did, you couldn't see anything! This was right at the end of the class and next I was going to have a class with the ninth grade. But I didn't even leave the classroom because a load of tenth-grade B pupils came in. Among them was André, of whom I shall talk in particular.

André has a hearing impairment, as recognized by the Decree 319/91. He is a weak pupil who had a 10 in the first period³, not because that was "his"

² Escola Secundária do Lumiar Nº 1.

³ 10, in the grading scale 0-20, in use in Portugal at this school level, is a "just pass" mark.

grade, but because he is “different”, so he has a right to a different assessment. He is devoted to the graphic calculator, which he took just one day to decipher. As he puts it: “Teacher, pressing these buttons is how you learn!”

So this group, with André at the lead, came barging in, filled with self-confidence: “Hey teacher, what’s the problem? Can’t you handle this?” And they picked up the calculator. Meanwhile I’d already understood my mistake—the values of the axes’ scale weren’t very good. But I resisted and didn’t steal their glory. They did everything, got the graphics “working” and said goodbye: “If you need us we’re here!”...

André is sitting just in front of me (naturally) and he has a rather condescending attitude (which really amuses me) whenever I need to use the calculator. He gives me advice discreetly or else when he constructs something he thinks is interesting, he calls me and explains what he did in detail. This happens often for sometimes I have to take his calculator away so that he pays attention to the class.

What happened in the last test, which was without calculators, got me thinking. André didn’t pass but everything concerning function graphics he got right.

This episode shows that we do learn from pupils—and not just indirectly, as we usually think. But do we make this clear enough for them? André’s pride when he teaches me something shows how important this is to him; probably it’s just as important to the others... And they don’t respect me less for it!

Drawing on Labov’s model of analysis, we can see that this short teacher story is filled with different complications. At a first sight it is just a story about a teacher who was not quite well prepared to use the calculator in the classroom. Dealing with something unexpected, arising from a new instructional material or from any other source, is a common situation that teachers face in the classroom. But, on a second level, this appears to be much more a story about a teacher with a special pupil who has an officially recognized handicap and is weak in mathematics, but likes to show off in front of his colleagues. On a third level, one sees the complication regarding the questions that are puzzling this teacher: why a pupil who is able to explore so well with the calculator and make good use of it keeps getting poor marks in a test?

In this story, not all three complications get a resolution. This teacher could easily fix the calculator problem and did not have trouble in finding a strategy to deal with André. Much more difficult—in fact unsolved—was finding a way to make this pupil

have success in mathematics. It is quite apparent that the teacher makes a positive evaluation regarding the way she relates with André, but she is much more ambivalent regarding wider issues in her practice.

There are several issues in this story. One concerns the relationship of the teacher with the calculator, at a quite basic level of operating with it. Another is the relationship of the teacher with a pupil that is behaving just borderline regarding what may be the teacher's tolerance for outspokenness. Comments such as those André is making may be acceptable for some teachers but not for others, and they may be acceptable once in a while but not constantly. A third issue concerns what is wrong with mathematics teaching and assessment that leads this pupil to fail when he shows interest and ability for mathematics. Still a fourth issue concerns the graphic calculator. If it must be used as a tool for experimentation and exploration, why does it not lead this pupil to a better achievement?

In pre-service and in-service teacher education stories such as this provide good starting points to discuss issues faced by a teacher in making curriculum decisions and conducting classroom instruction. Also, they may be the starting point for participants to tell and/or write their own stories dealing with related issues. In the work carried out in our research group, stories have also been produced to study teacher's knowledge in innovative teaching practices, such as dealing with mathematical investigations in the classroom (Ponte, Oliveira, Cunha, and Segurado, 1998).

Conclusion

This paper argued that narratives are a powerful tool for professional development and a useful research methodology for those interested in the study of teachers and teaching, including the teachers themselves. The story of Maria João was made in an inservice course—providing this teacher an opportunity to reflect on several issues concerning her practice—and has been used as a basis of discussion with preservice teachers. Stories such as this illustrate several aspects of mathematics teachers' professional knowledge and may be used in research. However, the use of stories in teacher education and research raises a number of issues. Questions regarding the quality, the value, and the ethics of work in narratives have to be addressed. We need to pay attention to the desirable and undesirable features of professional narratives and adequate and non-adequate ways of constructing and reporting them. We also need to find strategies to encourage teachers and mathematics educators alike to write professional narratives and to share them within their professional communities.

References

- Bruner, J. (1991). The narrative construction of reality. *Critical Inquiry*, 18, 1-21.
- Burton, L. (1999). The implications of a narrative approach to the learning of mathematics. In L. Burton (Ed.), *Learning mathematics: From hierarchies to networks* (pp. 21-35). London: Falmer.
- Carter, K. (1993). The place of story in the study of teaching and teacher education. *Educational Researcher*, 22(1), 5-12.
- Chapman, O. (1999). Reflection in mathematics: The storying approach. In N. Ellerton (Ed.), *Mathematics teacher development: International perspectives* (pp. 201-216). West Perth, Australia: Meridian Press.
- Clandinin, D. J., & Connelly, F. M. (1991). Narrative and story in practice and research. In D. A. Schön (Ed.), *The Reflective turn: Case studies in and on educational practice* (pp. 258-281). New York, NY: Teachers College Press.
- Connelly, F. M., & Clandinin, D. J. (1990). Stories of experience and narrative inquiry. *Educational Researcher*, 19(5), 2-14.
- Cortazzi, M. (1993). *Narrative analysis*. London: Falmer.
- Love, E. (1994). Mathematics teachers' accounts seen as narratives. In L. Bazzini (Ed.), *Theory and practice in mathematics education* (pp. 143-155). Pavia: ISDAF.
- Olson, J. (1988). Making sense of teaching: Cognition vs. culture. *Journal of Curriculum Studies*, 20(2), 167-169.
- Ponte, J. P., Costa, F., Lopes, H., Moreirinha, O., & Salvado, D. (1997). *Histórias da aula de matemática* (pp. 67-68). Lisboa: APM.
- Ponte, J. P., Oliveira, H., Cunha, H., & Segurado, I. (1998). *Histórias de investigações matemáticas*. Lisboa: IIE.
- Riessman, C. K. (1993). *Narrative analysis*. Newbury Park: Sage.
- Schifter, D. (Ed.). (1996). *What's happening in math class? Envisioning new practices through teacher narratives*. New York, NY: Teachers College Press.