Reaction to Part I
Resources Can Be the User’s Core

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How does a resource become “lived”? If we may play on the etymology for a moment, becoming “lived” means enlivened, to get full of life, to become, to be born. The four chapters of this part tell us how a resource enters the world “mewling and puking in the nurse’s arms” (Shakespeare, As You Like It, Act II, Scene 7). The bard gets it right, again. The carer of the resource is responsible for nurturing and shaping its potential, helping it to grow, ignoring the unseemly squeaking, and clearing up the spilt milk.

On the one hand, Adler shows us how the nurse invests herself into the new life: how does teacher knowledge emerge during events in the classroom? Gueudet and Trouche want us to focus on the nurse’s actions in caring for the baby: how do resources become transformed in a particular teacher’s hands? Sensevy, on the other hand, wants us to look at the nurse’s aims: how are the teacher’s actions driven by developing intentions? Mariotti and Maracci ask us to watch the baby itself as it interacts with the nurse and others in the world: how can resources change the way people think and act?

The common stance is one of mediation, the transformation of resources by teachers as they are reborn from a prior, relatively fixed state to a new dynamic existence in action in the classroom. I am tempted to play with etymology yet again. Mediation does not derive from media, but in this section we are being asked to pay attention to media. Famously, “the medium is the message” (McLuhan, 1964), or, more appropriately for this context, The Medium is the Massage (McLuhan and Fiore, 1967). Not only the resource but also the form of the resource alter the way it can be used and transformed by a teacher.

We are presented with four different ways to conceive of resource mediation. The authors draw heavily on established theory, modifying it for their purpose, and we are left with a strongly grounded feeling. What do the four perspectives offer us?

Adler draws on social practice theory to present us with an integrated view. Teacher’s knowledge, their access to texts, the classroom environment, the language
resources available, and the pre-defined curriculum merge through the act of teaching to legitimise a particular view of mathematics. Teachers, whether they like it or not, whether they are prepared for it or not, are central in this process and bear its responsibility. I understand immediately the research-based wisdom that teachers are the most important factor in learning. As mathematics educators we are asked to pay attention to how we, in teacher education, open or close opportunities for particular mathematical perceptions.

Gueudet and Trouche introduce documentational genesis, the evolution of teaching materials in the hands of a teacher drawing on several resources for a particular classroom outcome. On the basis of activity theory and an instrumental approach, the focus on documents changes the way we look at teaching. Tracing documentary evolution enables us to see, physically, the teacher’s moves in the game of instruction, and also the development of a teacher’s ideas, intentions and pedagogic orientation over a long time. For me, the importance of this perspective is the way it highlights continual change. I believe that many teachers would regard their practice as relatively stable – and many developers and education researchers comment on teachers’ resistance to change. A documentational genesis is likely to prove the lie to such statements, and thereby challenges us all to think again about the way development can be influenced. For example, it will reveal constant but gradual change – the antithesis of many programmes of teacher development.

Sensevy also relies on documentation, and follows Bourdieu’s idea of a social game and Brousseau’s didactic contract. He asks us to pay attention to the way a teacher sets up the game (or contract), embedding explicit pedagogic intentions in both the resources and the elaboration of the game. The research data forces me to consider the ways the process goes wrong: during classroom interaction the response to the resources can diverge from the intention. This creates a didactic moment, a decision point, a phenomenon investigated by many researchers. Mason (1999, 2010) also focuses on teaching moments, and Schoenfeld (1987, 2008) persists in his analysis of classroom decisions. Schoenfeld’s KOG analysis (knowledge, orientations and goals) of teacher behaviour resonates with Sensevy’s work. My response to this perspective is to wonder anew how to prepare for such moments. The very act of Sensevy’s research sensitised his teachers to their predicament. They knew that they would be questioned on their actions at the critical moments, and it was almost as if that knowledge altered the decision they made. Can heightened awareness be a mode of professional development? How could we bring this about?

Mariotti and Maracci turn our attention to the learner to learn about the teacher’s mediation of resources. Semiotic mediation of artefacts require us to investigate the meaning given to a resource, and how that meaning changes (or can be changed) with teacher action. A key word I take from the chapter is “invoking”. Meaning is invoked; learning does not reside in the resource, it is invoked by it. My reaction, then, is to think about the invoking power of a resource. This gives us, for example, a way of investigating technology: does modern technology have a greater power to invoke, perhaps because it is interactive and dynamic compared to texts. Are recorded lessons to be seen in the same way? Mariotti and Maracci note in their last paragraph that written texts have the advantage (over spoken words and gestures)
of permanence and reproducibility. No longer! Video recordings, where the richness of gesture and articulation are preserved, may have more invoking power than conventional texts.

In several places Mariotti and Maracci themselves invoke the multiple roles of resources: the double semiotic link, Wartofsky’s triple classification of artefacts and Winsløw’s pragmatic and didactic roles. Artigue (2002) distinguishes between three “values” when discussing the role of technology in mathematics education. The pragmatic value or productivity of the technology: how it helps us in the mathematical action we are currently undertaking. The epistemic value: how technology helps students understand the mathematical objects they are dealing with. The heuristic value: how technology contributes to understanding future or more advanced concepts. Hence, not only is the mediation of the resource transforming a generalised object into an object-in-action, but the mediation occurs on several levels simultaneously. To what extent are teachers aware of this in general, and in the moment?

Taken collectively, the four chapters raise the issue of teacher awareness of their mediation role with respect to resources. Assuming the analyses are well-founded (and I have argued that indeed they are), we must ask ourselves how teachers come to know to transform as well as how to transform. We must also ask about developing both the confidence (to undertake mediation of resources) and the habit (to do so). If nothing else, these chapters emphasise the importance of such tasks.

But, seated as they are in well-tried theoretical frames, we might expect that the four chapters will illuminate familiar phenomena within classroom experiences. Do they do this?

The familiar phenomenon of teacher resistance to change has already been mentioned, and we are asked to re-evaluate this perception in the light of evidence that teacher change evolves over long time periods. University lecturers’ reluctant weaning from blackboards and slow adoption of technology can be better understood as being wedded not to the practice of chalk dust and dusters, but to the particular construction of mathematics that blackboards activate.

Similarly, the apparently wasteful teacher habit of writing and rewriting mathematical notes that are readily available in neatly formatted and triple-checked textbook form can be explained by documentational genesis, and the need to personally transform ones’ pedagogical intentions through the resource.

What about the research-verified phenomenon of teachers excitedly engaging in mathematical content whether or not it relates to their teaching? Their enthusiasm is not just a product of an inordinate love of their subject. Teachers’ mathematical knowledge also goes out of date, and they are aware of it. They are also aware that subject knowledge is one of the most powerful sources of effective teaching – and it needs to be re-sourced. We would think twice about using a 30-year-old text, but many teachers are still using their 30-year-old mathematics. No wonder that a judgement-free opportunity to re-source is welcomed with open arms.

And finally, what does the analysis tell us about the powerful effect of communities of professional teachers? Why is teacher development so much better when done in a community? Because resource mediation is a social practice. Explicitly,
Sensevy’s thought collective but also implicitly. An unmediated resource is someone else’s voice; the teacher, through mediation, has a conversation with its originator. How much more powerful it is when the dialogue is a discussion.

Teaching resources, like their fuel namesakes, must be mined. Often the extraction is an expensive business, requiring an investment of time and money (e.g. software or textbook production). Sometimes there is significant pollution and waste (e.g. travesties of repetitive exercises masquerading as mathematics), corruption (e.g. false claims for technology) and a carbon footprint that needs to be compensated (wasted teacher time in top-down workshops). Nevertheless, when their energy is released by the internal combustion of a teacher in action, the results can be explosive and, as the anagram of the title to this reaction suggests, become the core of the teacher’s task.

References


