Transsituating education.

Educational artefacts in the classroom and beyond

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Abstract

In this paper a socio-material perspective on education is proposed that takes the local practices of teachers and learners seriously while still accounting for practices that extend beyond the here and now of a given situation. Through this transsituative shift education is not understood as being confined to local sites of instruction but understood as a nexus of practices conducted at various sites connected to each other via material objects and other material entities. This also reconciles ethnographic research with the institutional dimension of education and allows a micro-sociological account of wider societal implications of education. Throughout the article examples from ethnographic research on the epistemic role of material objects in science and mathematics classes in German secondary schools are used.

The materiality of education and SSTE

Education is not only a cultural domain in which humans interact and communicate with each other, but also a socio-material endeavour that relies on a number of material artefacts. Taking cues from Science and Technology Studies, an increasing number of studies acknowledge this material dimension of education (e.g. Sørensen 2009; Bollig/Kelle/Seehaus 2012; Nohl/Wulf 2013; for an overview see Fenwick/Edwards 2010). Material objects are no longer seen as neutral tools facilitating teaching or as symbols representing cultural worlds. Instead, their effects on education are described as transformation processes in which both human practice, but also the material objects themselves are changed. In that vein the Social Studies of Teaching and Education (SSTE) (Kalthoff 2011; Röhl 2013: 24-27) strive to transfer theoretical and methodological findings of the new sociology of scientific knowledge onto the field of sociology of education. SSTE go along with the idea that schools are “people-changing” as well as “people-processing organizations” (Hasenfeld 1972: 256) that produce knowledge for and about students. Their primary objects are not forms of abstract knowledge but students themselves. Students are concentrated in a place (“school”), separated in groups (“classes”), continuously confronted with school knowledge and repeatedly assessed and categorised. SSTE trace how this everyday fabrication of school knowledge and human differentiation is practically and materially produced and processed in schools. With regard to the performance of school
lessons, several interrelated modes of (re)presentation can be distinguished: knowledge is (re)presented verbally, bodily, via written signs, and with artefacts. In the classroom these different modes refer to each other and are transformed into one another: e.g. teachers and students talk about a phenomenon that is later witnessed in the material form of a demonstration experiment, and this observation of a phenomenon is finally recorded as generalised mathematical formula in written form on the blackboard. Following these transformations SSTE take a close look at the interplay between material entities and their practical use by human actors. In the case of educational artefacts this can empirically be achieved by not only analysing their use in school lessons but also their design: SSTE consequently encourage researchers to leave the classroom and to observe the construction of school knowledge in the manufacturing industry in order to develop a broader theoretical and empirical perspective of learning in school (Kalthoff 2014: 104-106). Consequently, the socio-material perspective of SSTE entails two shifts:

(1) *Agential shift*: If we follow practice theory, our idea of the intentional human actors becomes fragile (Reckwitz 2002). Practices are not seen as the result of meaningful intentions, but as complex arrangement of things, bodies, and bodily activities (Schatzki 2002). In contrast to actor-network-theory (ANT; Latour 2005), Schatzki and other authors within practice theory assume an ontological difference between these entities. While ANT allows research to include a vast number of different human and non-human actors in heterogeneous networks, this symmetrical indifference also creates a sensual desert in which everything is connected indifferently to each other. SSTE is in contrast interested in human practice with its bodies and their sensual and meaningful relations to artefacts and world. Drawing on post-phenomenology material objects are seen as part of bodily human-technology-relations in which they invite certain actions and inhibit others (Ihde 1990; Verbeek 2005). How are artefacts designed to evoke specific bodily sensations? How are they practically and semiotically transformed in situated uses? While the agency of artefacts is acknowledged and thus the agency of human actors put into perspective, the focus of research remains centred on *human* practices. Material objects are thus not stabilised and closed entities determining practice but ambiguous and open entities that require practical knowledge and interpretation in their use (cf. Hörning 2005).

(2) *Transsituational shift*: This agential shift also implies a transsituational shift that reconciles micro-sociological research with wider societal and institutional issues. Different authors argue against a micro-macro divide between local interactions and global structures that dominated classical social theory in general and functionalist accounts of education in particular (e.g. Durkheim 1956; Parsons 1959). It is argued that this results in an artificial gap and fails to explain how these two levels are connected to each other. Consequently, a number of educational researchers propose alternative accounts in which the local and the global are seen as intertwined, for instance, via an incorporated habitus (Bourdieu/Passeron 1990; Helsper et al. 2013). The socio-material perspective of SSTE proposed here assumes that material objects extend an ethnographic focus on situations beyond local interactions and co-present actors (cf. Knorr-Cetina 2009). Two authors are of particular relevance here. Latour (1996) proposes a network perspective in which local elements are at the same time locally constrained and globally connected to other places and times. This is enabled via material objects and other “non-humans”: “Any time an interaction has temporal
and spatial extensions, it is because one has shared it with non-humans.” (ibid: 239) Similarly, Schatzki’s “site ontology” (2002) sees contexts not as something external to practice but as inherently part of it. These contextual sites are constituted by a “mesh of practices and [material] arrangements” (Schatzki 2005: 473; emphasis in original). Both authors point out that material artefacts link together different sites and thus perpetuate social order beyond idiosyncratic situations. This idea allows us to follow material extensions while avoiding any (metaphysical) assumptions about external structures that inscrutably affect interactions. Instead, we can describe how educational sites are connected to other sites via material objects. Distant locations are indirectly present in the classroom and other places of instruction. By inscribing knowledge into material objects, educational institutions prefigure educational practice and, to a certain extent, structure what happens there. In other words: school lessons can be described as interactions that are “organizationally framed” (Vanderstraeten 2001: 270f.) via material objects.

In the following I will show how the socio-material perspective of SSTE can be employed to analyse the connections between the classroom and other sites. In doing so, I will also identify the epistemic consequences of this transsituative endeavour in which several actors across different sites are involved. Throughout the paper I will make extensive use of examples taken from ethnographic research on the epistemic role of material objects in mathematics and sciences classes in German secondary schools.

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**The design and use of educational artefacts**

Mathematics and science teachers in particular rely on a number of material objects in their daily affairs: blackboards not only visualize mathematical operations and scientific formulas, but serve as cognitive tools; experimental set-ups demonstrate scientific phenomena and laws; science kits grant students hands-on experience of science; plastic models embody geometrical knowledge etc. These objects are of particular importance in teaching these disciplines. They not only represent but also embody disciplinary knowledge.

Let us first take a look at the *design* of a particular technological artefact often used in science classes: a multimeter (see figure 1). This multimeter measures several physical quantities (voltage, current, resistance) in an electric circuit and is specifically designed for educational use. It presents its measurement in an enlarged way so that everyone in the classroom can see the result of an experiment. In contrast to non-educational multimeters, its surface is reduced to a few key elements: a scale, a display, one knob for the physical quantity measured (voltage, current, resistance), another one for AC/DC, the name of the manufacturer, and some connectors.
Furthermore, the multimeter seen here is an analogue measuring instrument that makes use of an indicator needle. While other types of measurement devices often make use of a digital display, this is not the case here. The indicator needle has the advantage that it shows any differences in its measurement as a clearly visible movement, its direction connected to the change: an increase is conventionally associated with a movement to the right, and a decrease with a movement to the left.

Such measuring instruments are an example for the educational disambiguation and reduction of material objects. Educational artefacts are specifically designed to match the anticipated needs of school lessons. In the design process these objects are purified and simplified in order to avoid ambiguities. Relevant features are highlighted, others are hidden behind a black box or in another way reduced. When educationally designed artefacts enter the classroom their educational disambiguation and reduction is, however, not completed. Teachers and students have to act upon them locally to transform them into educational objects. First of all they have to be introduced verbally and with a range of pointing gestures as objects of interest:

After verbally introducing today’s topic (“refraction of light”) Mr Martin announces “a little experiment”. The teacher points to the experimental set-up on his cart and comments, “here you see a container filled with water, a coin and a copper pipe.” A clamp attaches the copper pipe to the container so that one end points toward the water surface, while the coin lies on the ground of the container.

The teacher introduces the experimental set-up as an object of interest and singles out some of the components. By selecting some of the components and ignoring others (e.g. the clamp and the cart), he signifies some of them as relevant and others as irrel-
evant. Sometimes teachers have to state explicitly that some components are not relevant:

Mr Schmidt picks up a wooden box from the cart and puts it on his desk. On top of the wooden box he places a tuning fork setting it vibrating by tapping on it. The sole purpose of the wooden box, he explains, is “merely to serve as a resonating body”.

By moving conspicuously an artefact in front of the class and placing it on the elevated and central surface of the desk, the teacher draws the audience’s attention (students, researcher) towards it. The teacher consequently has to relegate the thing to a mere functional device in a setting in which the tuning fork and the sounds it emits are supposed to hold the centre stage. And later these artefacts are further transformed into mathematical and scientific objects by recording them as written inscriptions on the blackboard and in students’ notebooks. The statements and formulas on the blackboard reduce concrete and contingent artefacts to abstract and generalizable features, omitting “irrelevant” elements like colour, auxiliary components, and so forth. In doing so teachers and students work on a disciplinary vision of these objects. They shape these artefacts as objects that are relevant to a perspective of a discipline like physics or mathematics (cf. Lynch/Macbeth 1998). Without such practical efforts nothing of importance can be seen.

For achieving such a disciplinary vision the design of objects is of great importance. Educational practice in the classroom and the design of educational artefacts are tightly intertwined (Kalthoff/Röhl 2011). This becomes especially apparent when one compares educationally designed objects with items from non-educational contexts, like household items that are used to demonstrate scientific principles and phenomena. In a mathematics class two different objects were used to teach geometry on two different occasions (see figure 2). The first object in question was a geometrical prism containing three pyramids. The prism was used to teach students the formula needed to calculate the volume of pyramids. After briefly introducing the object and its components the teacher could easily show (or at least convince) the students that the volume of a pyramid is exactly one third of a prism with the same height. To do so he simply held the object prominently in front of him, retrieved the pyramids from the prism, pointed out that they all share the same height with the prism, slid them back into the prism (“And they all fit in here...”) and announced the respective formula. Whether the students understood the mathematical or geometrical thinking behind the formula cannot be discerned. Most students, however, remembered that three pyramids with the same height fitted into the prism and by simply referring to the demonstration the teacher can invoke the formula in latter lessons (T: “Remember what I brought along last time?” S: “Ah! The three pyramids! The formula is [...]”). As educational object the prism worked and ensured that the “speech-exchange system” (McHoul 1978: 187) of the classroom could move along. No one questioned whether the demonstration was about something else than geometry.
In contrast, the airplane model resists such a straightforward educational use. First, the teacher and his class talked about this particular type of aircraft, its airline, general problems in aviation and so forth. By referring to the problem of air conditioning in commercial aviation, he was then able to point out geometrical characteristics of the airplane embodied by the plastic model in the classroom. He concluded this discussion by letting the students figure out what type of air conditioning an aircraft of that size requires. Thus, the pupils had first to decide which geometrical body best fits the plane. Then they had to calculate the volume of that idealized body in order to estimate the volume of the actual plane. During the whole time he held the aircraft model in his hands, reminding the students of the actual body of an airplane and urging them to see the underlying geometrical body. A mundane artefact (a model of an airplane) was thus – step-by-step – transformed into an educational object in a mathematics class on geometry. After having been introduced, the item became a topic of lengthy classroom discussion on practical problems in aviation (air conditioning at large altitudes). Only then could a mathematical problem be formulated (volume of the cabin of an aircraft), which in turn could be tied to the object at hand and thus finally transform it into a mathematical object (aircraft model as a cylinder). As with the prism, this transformation required work from teacher and students. However, the airplane model required much greater efforts by the teacher and his class to achieve this transformation than the prism.

The different ways of using these two objects rest on the design of these objects. The airplane model is endowed with a number of details that resemble their real-world counterparts: there are windows, engines, the logo of the airline and so forth. This lifelike appearance creates the image of an airplane for the students. This makes it difficult to see the geometrical problem behind that image. Teacher and students have to take discursive detours in order to reach the geometrical object and the mathematical problem connected to it. This can of course be useful for teaching purposes, since it teaches students how to view different objects geometrically – and this is indeed what constitutes disciplinary vision, i.e. seeing things a specific way, knowing what is relevant about them and what is not. But using these objects for educa-
tional purposes makes a range of practices necessary that turn the airplane into a geometrical object. The geometrical model on the other hand is a prototypical exemplar of a prism. There are no signs on its surface, it does not resemble anything else but stands for itself. It is a rather purified artefact created for the purpose of showing a specific feature of a geometrical object. Its transparency lets one see inside and thus the three pyramids it contains. The pyramids are clearly distinguished by their colour – indeed, the sole purpose of the different colours is to identify quickly the shapes of three individual pyramids.

Educational artefacts like the multimeter or the prism invite a specific way of looking at them; a selective disciplinary vision is inscribed into them via [150] educational disambiguation and reduction. This stabilises a certain way of doing (science) education – in that case transforming ambiguous things into clearly defined entities that become part of the epistemic order of science. Material objects – whether specifically manufactured as educational artefacts or not – are, however, not naturally endowed with educational qualities. Teachers and students as well as manufacturers have to work together in order to create educational artefacts that are subject to disciplinary knowledge. The educational and disciplinary qualities of material objects are a practical achievement. This achievement is not solely brought about by the participants in the classroom, but also by manufacturers and developers of educational artefacts. Consequently, education can be described a transsituative endeavour in which the local situation in classrooms is transcended and connected to different sites that are indirectly involved in it.

**Leaving the classroom – following the mediators**

A number of different institutions indirectly govern the classroom by developing material objects and other material entities. Recent developments in social theory argue for an extension of materiality beyond things (e.g. Schatzki 2010). Besides material objects there are a number of other entities that can become part of socio-material arrangements: bodies, architectures, texts (cf. Smith 2001), organisms etc. Instead of treating them as neutral carriers of social forces beyond the situation, a socio-material perspective understands them as “mediators” (Latour 2005) that transform and translate every element connected to them. To name just a few of these institutions and their mediators (see figure 3): ministries of education devise curricula that govern what is taught in schools (cf. Edwards et al. 2009); future teachers are (bodily) trained at universities and in seminars (cf. Alkemeyer/Pille 2008), before they enter schools; academic disciplines like pedagogy and educational science influence how teaching is done through the development of pedagogical concepts and methods set forth in written texts; publishers select curricular knowledge and decide how it is presented in textbooks (cf. Macgilchrist 2012); architects build schools and create spaces where certain forms of teachings are enabled (cf. Grosvenor/Burke 2007; Göhlich 2009); and – as shown by the previous examples – manufacturers of educational artefacts inscribe knowledge into material objects so that they can be used in school lessons. Furthermore, there is a number of interconnections between these different institutions. The ministry of education is, for example, linked to publishers, who have to adapt their textbooks according to the curriculum, or to archi-
tects, who need to follow regulations that govern the size or the lighting of classrooms (Burke 2005) etc.

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Figure 3: network of sites connected to school lessons

School lessons are thus not self-contained situations, but part of a transsituative network in which various mediators provide links between distant situations. This transsituative perspective has important consequences for research. If one wants to study education, one has to leave the classroom and other sites of instruction. In contrast to accounts of education that distinguish between structures/contexts and interactions/situations, this allows us to preserve a “site ontology” (Schatzki 2002) through which one can trace how exactly educational sites are connected to other sites without referring to a metaphysical realm of structures. The researcher thus has to follow the different mediators present in the classroom to the sites they are originating from. Such a “multi-sited ethnography” (Marcus 1998) aims to show how school lessons are remotely prefigured.

If we follow educational artefacts in such a manner the researcher will sooner or later arrive at a number of manufacturers that develop and produce these objects. Despite a growing number of studies dealing with the materiality of education there is a lack of research on the manufacture of educational artefacts (cf. Oelkers 2010: 20). What I presented above, were first glimpses into the design of objects and how this design embodies certain ways of teaching and modes of knowledge. Taken seriously, however, a transsituative perspective on education must venture deeper into the offices and workshops of manufacturers of educational artefacts. Manufacturers of educational artefacts are important institutions contributing to school lessons. By observing the design practices in this industry, educational research can show how its contribution is accomplished long before the school bell rings. It is here that (ethno)theories of teaching and learning are materially devised and thus distributed to schools. Re-
search on design in other fields shows that the design of artefacts and their later use are not clearly separated but intertwined (Yaneva 2009). Anticipating the later use of technologies is an important part of the development process of material artefacts. Designers typically achieve this through different means (Verbeek 2011: 97f.), e.g. simulation, focus groups, or ethnographic research (Jullien 2007). With this knowledge about the potential use of technological artefacts, materials are selected and interfaces are designed. For the field of education the following questions arise: What kind of teaching and learning is envisioned by the designers and engineers? How are ideas about education inscribed into these artefacts? What means do manufacturers have to anticipate the use of their objects? And finally, how are the objects actually used in the classroom? Which design elements are relevant; which are irrelevant?

Once these educational artefacts have been produced they have to find their way into the classroom. I understand that process not as a simple transmission but as a complex transformation. After production, educational artefacts do not simply appear in schools and fulfil their role as educational tool. Instead they progress through several stages. In between the manufacturing industry and the classroom there are several intermediate sites in which the objects are transformed and subjected to change. Like other material objects educational artefacts are not static but dynamic entities with “biographies” (Kopytoff 1986) during which they change their status. This transformation is brought about by practical efforts of various actors.

**Figure 4: Intermediate sites between school lessons and manufacturers of educational artefacts**

There are at least two intermediate sites between manufacturers of educational artefacts and school lessons (see figure 4). The first intermediate site is the marketing of educational artefacts. In economic sociology some authors argue that marketing is not just an addendum to production but a central part of the production process itself (e.g. Cochoy 1998). It is here that artefacts are constituted as economic goods and thus as desirable objects for consumers. In that regard, marketing of educational artefacts provides a promising field of research. It is where educational artefacts become desirable products. Educational artefacts are part of a large industry in which significant sums of money are spent by schools and other educational authorities. In order to compete with other manufacturers, companies have to target teachers, school directors, and educational authorities. Important venues for these marketing endeavours are specialised trade shows like the BETT in the UK, or the didacta in Germany. Marketers attempt to create a desirable product for their customers by imagining possible scenarios of use and highlighting their advantages and benefits for teaching. Educational artefacts are shown as being valuable to teaching and making the lives of teachers easier. For example, marketing often points out the durability of
the products, thus addressing teachers’ fears of destruction by clumsy or unruly students. This is reflected by catalogues of science kits and other educational artefacts that come into direct contact with students: “All components are clearly arranged and robustly constructed for their use by students.” Some manufacturers even mention vandalism explicitly, as evidenced by this brochure advertising the interactive whiteboards of one particular manufacturer:

The danger of damages through vandalism is virtually non-existent – we employ an enamelled, robust and scratch-proof metal surface and give 25 years of warranty. Our high-quality projection screens are durable, because they were designed for rough use.

In order to prove those claims, salesmen even punch their products rapidly in front of prospective buyers at trade shows. In doing so, they demonstrate the trustworthiness of their claims and bring the educational artefacts into existence as durable objects. These examples show that marketing is an important site in mediating between manufacturers and schools.

Another intermediate site is the schoolrooms that store an assortment of different educational artefacts (see figure 5). These storage and preparation rooms mediate between the artefact as a product and its use in class as an educational object. Economic goods are transformed into knowledge objects that later can be selected by teachers to process knowledge in their lessons.

![Figure 5: storage and preparation rooms](image)

Usually one teacher is formally made responsible for the administration of these rooms and the storage of a collection of educational artefacts. That person keeps an inventory of all the things stored in these rooms and decides which artefacts are purchased. When a new artefact arrives, that teacher notes down its name and its disciplinary field (e.g. mechanics), the date of purchase, its price and so forth in a list. This action not only creates a list of all the objects stored but also a meaningful collection of possible experiments related to different topics in a discipline. Educational artefacts and disciplinary knowledge are thus closely associated with each other. The

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1 Translated from German by the author.
experiments are not mere objects in the eyes of teachers but signify possibilities for teaching specific subjects.

After the teachers write down all the necessary facts about the object, they can place them into one of the many cabinets. These cabinets are clearly labelled as part of a disciplinary order of knowledge. There are cabinets labelled “mechanics I” and “mechanics II”, “acoustics”, “electricity I” and “electricity II”, and so forth. Thus, teachers not only put these objects in a place where they fit physically but in place within an explicit knowledge order. This disciplinary order of knowledge follows a curricular order in which different topics follow each other during a school year and also in the course of the educational lifetime of a student.

Not all cabinets are, however, labelled according to curricular topics: a few are named after the objects they hold. There are, for example, cabinets labelled “power supplies”, nameless hooks on which cables are hung, piles of various components, and so forth. This is evidence of a more pragmatic order of things that is also part of these rooms. In that regard, these storage rooms resemble more a workshop than a museum or archive (cf. Willems 2007: 215-219). And to some extent they are indeed workshops. Before an experiment takes place in class, teachers prepare it in these rooms. They go to a cabinet matching the topic in question and arrange the things needed for their experiment. In doing so, they not only select mere things but a curricular topic and an appropriate method of teaching.

For that purpose each teacher has a cart that is assigned to him or her (see figure 6). On these carts teachers arrange the experimental set-up and test if the devices are functioning correctly. Teachers thus translate lifeless items of a collection into well-functioning devices for teaching in front of a class. Moreover, they relegate parts of their conduct with the experiment to a place protected from their students and their gaze. The prep room thus becomes a “backstage” (Goffman 1990) in which a performance is rehearsed. During these rehearsals teachers not only reassure themselves that the devices are working properly but also if phenomena are clearly visible and consistent with curricular knowledge.
The carts also serve as a nexus connecting the storage room with the classroom in two ways. First, they have wheels so that they can be easily moved from the storage room to the classroom. Second, the carts also signify a translation between two orders. A curricular knowledge order is transformed into the situative logic of teaching. By arranging items and things on the cart teachers also try to anticipate what can be shown in a single school lesson. In order to allow for unforeseen changes, they may also put future and past experiments as well as spare parts on the lower level of the cart. Similar to a scientist’s lab bench (Lynch/Livingston/Garfinkel 1983), the cart stands for the temporal order of classroom teaching and signifies possibilities that are more or less likely: experiments on the upper level are more likely to be conducted and are made relevant in the eyes of students due to their prominent position; objects on the lower level are less visible and thus less relevant in the eyes of the participants.

To sum it up: Marketing and storing/preparing are not practices that are external to education and classroom interaction. Anticipating how the objects are later used, marketing and storing/preparing are geared towards education. They are educational practices that change the status of the object in question and turn it step by step into an educational artefact to be used in school lessons. Material objects change their status several times before they even enter schools. They are processed differently along a discontinuous path by different institutions. Marketing creates desirable products that promise to make teachers’ work easy by, for example, constraining students’ misuse of educational artefacts. The storage or preparation rooms serve as a nexus that mediates between manufacturers and the classroom. Economic goods become part of a curricular knowledge order of a discipline. This knowledge order is mingled with a pragmatic order of a workshop-like arrangement in which
teachers can transform a curricular order into the situative logic of teaching in school lessons.

**Conclusion**

The rising interest in the materiality of education with its technologies, media, architectures, bodies etc. challenges traditional views that treat material entities either as neutral tool or as external and opaque force. SSTE instead understands education as result of an interplay between humans and things. Neither humans nor things are seen as essential beings but as performative products of the practices and arrangements of which they are (and also were) part. In this paper I argued that such a socio-material approach consequently leads to a transsituative perspective on education.

Using school lessons as an example there are at least three ways in which education is a transsituative endeavour:

1. *Transsituating education I – following mediators:* School lessons are prefigured through different forms of knowledge that are inscribed into material objects during the manufacturing process or into teachers’ bodies during teacher education. Thus, different sites prefigure school lessons through connections established by various material mediators. By following these mediators to the sites they are originating from, research can analyse how educational work is distributed among different sites and actors. Between these sites and schools one can find a number of intermediated sites which gradually transform the mediator itself until it becomes a participant in a school lesson. Educational artefacts, for example, are subject to educational disambiguation in the manufacturing process and later in preparation rooms, before they are further purified during class by performative means. Next to this gradual trajectory one can also identify a discontinuous series of discrete changes in status: an educational artefact can be an engineering problem from a design perspective, for marketers it is a commercial product that has to be bought by prospective customers, in the storage room it becomes part of a collection ordered according to the curriculum, it signifies a temporal order of teaching during preparation on the cart, and in class it becomes an epistemic object embodying the knowledge of a discipline.

2. *Transsituating education II – following interconnections:* Furthermore, there are a number of interconnections between these different sites that configure school lessons. The ministry of education is, for example, also connected to the publishers of textbooks (via the curriculum) and to the office of the architects building schools (via regulations). By tracing these interconnections researchers can sketch hierarchies and relations of power between institutions and actors.

3. *Transsituating education – returning to the classroom and other instructional sites:* a transsituative perspective also implies that the local situation is still important. The knowledge inscribed into educational artefacts and other mediators interplays with educational practices and material resistances in the classroom. Here one can observe how local and inscribed knowledge interact. Since practices and material objects are seen as tightly interwoven, one needs to observe both: the use of artefacts in the classroom and their production by
specialised manufacturers (Kalthoff 2014: 104-106). Only in doing so, one can fully understand the (blackboxed) agency of objects vis-à-vis human participants in the classroom. Such an approach avoids assumptions about the agency of objects that relegate the explanation to a black box. This lets us identify how inscribed knowledge is made effectively relevant in a school lesson.

A transsituative perspective on education calls for a multi-sited ethnography in which the researcher follows the material mediators connecting different sites. In other words: in order to learn something about education one has to leave the immediate sites of instructions and trace the epistemic practices at the sites that configure it. This way, researchers can work towards a theoretical account of education that takes the practical efforts of teachers and learners seriously, while still acknowledging the wider environment in which instruction takes place. In contrast to classical notions of structure and context this “site ontology” (Schatzki 2002) still sees social order as a practical accomplishment. By remotely configuring mediators and locally enacting the knowledge inscribed into them, social order is stabilised over time. This is not to say that material objects are always used according to the designer’s intentions: students make fun of objects’ pedagogic intentions or misuse them, technological devices have malfunctions or simply break and thus introduce new instabilities themselves etc. Nevertheless, certain ways of doing education are socio-materi ally perpetuated and more likely to occur than others. A transsituative perspective thus enables educational research to trace the “trajectories” (Strauss 1993: 52-54) along which practice is aligned across different sites. One of these trajectories could be identified as an educational disambiguation and reduction of things resulting in closed and static entities. In that regard wider societal implicati-ons of and for education become available to micro-sociological research. One important question for socio-material research on education can thus be rendered as follows: What kind of education is socially envisioned through and with material objects? In line with more traditional ethnographies a socio-material perspective renders such “seen but unnoticed” (Garfinkel 1967: 118) features of mundane activities visible and thus researchable.

References


2 Of course, a number of other trajectories can be identified – some of them complementing or adjoining, and others opposing the trajectory described here. Science kits for elementary education, for example, translate mundane phenomena (like sunlight) into school science tasks by obstructing the self-evidence and familiarity of these phenomena (Wiesemann/Lange 2015).


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