Ontology, epistemology and context – and our social construction of educational technology

Rune Johan Krumsvik
Editor-in-Chief

At the time of writing this editorial, we are in the middle of a global crisis because of the coronavirus – this is a very special and serious situation. Due to the coronavirus, we are being told to avoid human contact and physical face-to-face meetings as much as possible, and to stay in our homes. In many ways, such incidents of such epidemics have ontological implications since they have a severe impact on our basic need for human contact and other human aspects of life, as well as our basic view of being in the world. In such situations, it is of course of greatest importance to protect the health of all of us and to show solidarity, and we have all a collective responsibility to do this.

At the same time, life must go on, and for the coming weeks and months we are being told to perform our teaching and research from our homes since schools and universities are closed; pupils and student must study from home, and so in these circumstances digital tools and remote teaching will have to be applied. This will be a new situation for the majority of us and in many ways we can see that digital technology can help us, making it possible to keep pupils and students involved in learning, even in a global crisis such as this. But this disruptive situation requires us also to reconsider “how teachers teach and students learn” as distance learning, virtual learning and remote teaching dominate in the following weeks and months. This implies that we keep in mind the pro and the cons of physical face-to-face meetings versus virtual meetings, which in many ways have ontological aspects we should be aware of. Emmanuel Lévinas states that physical face-to-face meetings have strong ethical aspects grounded in human nature, which calls for empathy, human touch and understanding (Morgan 2011). The sociologist Zygmunt Bauman (2007) has followed up the ethics of Lévinas, also taking the physical face-to-face meeting as his point of departure. Bauman is particularly concerned about social structures that do away with “face meetings”, only to be replaced by virtual communication through social media (in addition to being anonymous). Nevertheless, with this awareness in mind, the coronavirus situation calls for immediate action and we might say that this adds a new layer to our perception of physical face-to-face meetings versus virtual meetings, where we are now not only forbidden from having physical contact (with anyone other than immediate family), but also have to deal with it as best we can in this global crisis.

And since this very special situation obviously has ontological implications, now might be the right time to take an ontological and epistemological step back regarding the pro and the cons of educational technology on a more general basis. We might ask ourselves how we per-
ceive the digital artefacts we are using in practice, as well as how these are socially constructed within or across different contexts. A somewhat simplified example of a social construction is that a banknote can be perceived purely as a piece of paper (object-oriented ontology), while in a purely subject-oriented ontology it has an economic value. In many ways, a banknote becomes a social construction that has real value for the human being, and is part of our socially designed finance institutions locally, regionally, nationally and globally (Searle 1997, 2015). However, it depends on the context – in the middle of nowhere, far from people (e.g. on the North Pole), it has no value other than being “a piece of paper”, while situated in societies and cities all over the world it has monetary value. Looking further to a similar dichotomy associated with epistemology, a statement like “Glittertind is more beautiful than Galdhøpiggen” (two famous Norwegian mountains) is a subjective assessment that cannot be “quantified” or “measured” in the correct sense of the word, and therefore, relates more to a constructivist centre of gravity and a subjectivist epistemology. On the other hand, the statement “Galdhøpiggen is higher than Glittertind” can be quantified as well as measured based on an objectivistic epistemology (Searle 1997, 2015). But what actually is a mountain? When we try to see what is defined as and qualifies to be named as a mountain the Oxford English Dictionary, the UK Government and the majority of British hill walkers and mountaineers say that a mountain has to be at least 2000 feet (609.6 meters). Heights less than 2,000 feet high are hills, ridges, etc. (Go4awalk.com 2020; Oxford English Dictionary 2020). We can then observe that while there seems to be some kind of consensus on how to define a mountain in the abovementioned example from Great Britain, we find quite different perceptions and social constructions of what a mountain is in e.g. Norway. In Norway, there are no clear definitions of what a mountain is, and you will find 200 to 300-metre hills in nature perceived as and called mountains, which in the British contexts would be perceived as and called hills. And several of the most popular events in the Norwegian summertime are actually hillwalking, but are called mountaineering (in the English sense of the word). From this we can observe that how we define mountains depends on our social construction of mountain in some way (even if its objective ontology is quite clear), and depends on the cultural context.

In similar ways, educational technology is perceived and socially constructed in a variety of ways, depending on context and a number of different discourses within educational technology attached to teaching, research, and use of digital tools in one’s spare time. Across these contexts and discourses we can often find that our perceived affordances versus real affordances (Kirschner, Martens & Strijbos 2004) varies and will come into play in our social construction of educational technology.

To illustrate this, I will use an example from how digital artefacts sometimes provide affordances that contribute towards developing the didactics of teaching in higher education, but at the same time have limited affordances outside its educational context. In the period 2004–2006 it was rather hard to involve and engage students in large lectures (150–200 students) at the university, and if I, as the teacher, posed questions during these lectures or invited plenary discussion, many students refrained from raising their hands out of fear of being publicly embarrassed (Krumsvik, 2012). Consequently, it was difficult for me as lecturer to interact with the students, to know what the students understood or not during such lectures, as well as it being challenging to know what they were actually discussing during peer discussions in these lectures.

In 2006, I attended an international conference at which response technology (physical “clickers”) was presented and where children were playing around with this technology in the form of quizzes, etc. Following this conference, I had an opportunity to reflect upon my own challenges when teaching in large lecture halls. Since I had experiences with action
research and design-based research, it was natural for me to examine how the dialectic relationship between teaching and research could support innovation within response technology in large higher-education lecture halls in order to overcome some of the challenges I had experienced. Ann Brown’s (1992) and Allan Collins’ (Collins, Joseph & Bielaczyc 2004) Design Experiments were applied as a starting point to examine how such mediating artefacts (Wertch 1998) like response technology could be socially constructed in situ in large lecture halls within a didactical framework in such settings.

Based on this, I initiated a design-based research project (DBRC 2003) in 2007 based on my own teaching experiences in large lecture halls in recent years at that time. The main aim of the project was to examine if, and eventually how, mediating artefacts like response technology could support formative assessment and feedback in large lectures. The project (https://app.cristin.no/projects/show.jsf?id=516274) aimed to focus on educational technologies’ affordances in such settings, attempting to go behind the stereotypes about large lectures (150–250 students) and examine if it was possible to increase the interactivity and engagement in such lectures. Inspired by the socio-culturist James Wertsch, ideas and reflections regarding “... how the introduction of novel cultural tools transforms the action” (Wertsch 1998, p. 42), I examined how different interventions with cultural artefacts such as Student Response Technology (SRS), in combination with video cases and formative assessment, influenced psychology students’ perceptions around their engagement and learning outcome in such lectures.

In order to try to continuously improve the teaching design, I applied the response technology over approximately 400 teaching hours in the period 2008–2016 in large lectures with psychology students. However, it was necessary for several epistemological steps back along the way to reflect upon and examine how well-planned teaching designs, Student Response Systems, and video cases may play a role in transforming large lectures into a more student-centred way of organising learning and teaching. On a general basis, these mediating artefacts (“clickers”) changed the premises for participation and created new affordances for both students and lecturers in large lectures. Professor Carl Wieman (Smith, Wood, Adams, Wieman, Knight, Guild & Su 2009) also revealed the same findings (I had a brief collaboration with Wieman in 2015 regarding the use of response technology in large lectures).

After nine years, such mediating artefacts were in many ways socially constructed and interwoven into a didactical design with certain affordances to empower students’ “voices” and participations in such settings. However, beyond this setting it had no affordances for either students or lecturer, and it was in many ways perceived and social constructed as artefact with no affordances other than (object ontologically) being a piece of plastic.

The lesson learned from this anecdote is that our subjective ontological perception of such mediating artefacts will vary based on perceived affordances versus real affordances, where some will perceive “clickers” as “just another digital tool”, while others will perceive them as a powerful mediating artefact in such large lecture settings. So, how we socially construct educational technology artefacts are almost always based on our experience, perception, competence and context, and therefore we all have our good or bad experiences with educational technology in teaching. It is seldom “a walk in the park”, and the example above illustrates that even lecturers need some kind of volume training to become competent in using educational technology artefacts. What my perceived affordances were back in 2008 had changed markedly 400 teaching hours and 9 years later, and had perhaps moved closer to the real affordances of such artefacts. Along the way I experienced several pedagogical failures and pitfalls, serendipities, a-ha experiences (Skaar 2019) and moments of contingencies where both reflection in action and reflection on action (Schön 1983) were necessary “lenses” in the redesign and improvement of the teaching design. Twelve years
after, in 2020, there are many new possibilities with response technology since these have now moved from “old school” physical artefacts to digital artefacts. However, the research part of this DBR project reminds us about that even if there will always be a newer and more fancy digital tool “tomorrow”, we still need to go beyond these mediating artefacts in general and establish sustainable didactical frameworks that are able to encapsulate that educational technology artefacts are “moving targets” because of the area’s speedy development.

We should also keep in mind that there will be different opinions regarding what is the best research design within educational technology research; an old scientific joke related to Newton’s Third Law of Motion captures some of the essence: “For every expert there is an equal and opposite expert” (Petticrew & Roberts 2006, p. 166). This is natural and often leads to constructive discussions around research designs. However, even if e.g. RCT designs are widely accepted, we can also see that other subject disciplines (e.g. Glasziou et al. 2007) find that they are sometimes unnecessary. Well-designed DBR case studies can be good alternatives and highly relevant research designs when examining the early phases of new educational technology in higher education (Krumsvik, 2012; Krumsvik & Ludvigsen, 2013; Ludvigsen, Krumsvik, & Furnes, 2015; Egelanddal & Krumsvik, 2017; Egelanddal & Krumsvik, 2017; Egelanddal & Krumsvik, 2019). We also find that DBR case studies are suitable when examining adaptive learning technology in primary schools (Moltudal, Høydal & Krumsvik 2020). However, this requires an awareness of the importance of establishing a coherence in such DBR case studies where “The (…) researcher approaches the world with a set of ideas, a framework (theory, ontology) that specifies a set of questions (epistemology), which are then examined (methodology, analysis) in specific ways” (Denzin & Lincoln 2011, p. 5).

If we assume that our traditional perception and use of educational technology artefacts has been disrupted by the very special situation we are experiencing now with the coronavirus, this has underlying ontological implications: We have to reconsider the importance of the didactical implications of the “where, when and who” as underpinnings of the epistemological implications attached to the “why, what and how” in students’ and pupils’ learning trajectories. In practice, we have to reconsider and strengthen our didactics in remote teaching to able to handle such disruptive situations in the short and the long term (see e.g. Krumsvik, Jones, Salvesen, Høydal and Røkenes 2019). This adds a new layer to our perception of remote teaching and we can see that the disruptive corona-situation (with its object oriented ontological implications) has contributed to a social (re)construction of virtual mediating artefacts, where these have given new affordances of schooling in global crisis like this. This will also have epistemological implications of the pro and the cons with “how teachers teach and learners learn” with educational technology in virtual learning environments. How this will influence our basic need for human contact, and human aspects of life in general, as well as pupils’ and students’ Bildung journey, need to be considered in the months and years to come.

References

1. One serendipitous outcome is that “old school” physical response technology (“clickers”) has undergone a renaissance subsequent to the implementation of General Data Protection Regulations (GDPR, https://gdpr-info.eu/) in 2018. This is because they are completely anonymous when students use them in DBR projects, while newer digital response technology used through students’ mobile phones or learning platforms leaves many digital traces (mobile ID., IP addresses etc.), which can be a challenge in light of GDPR.


