Conference Research Paper

DOI: https://doi.org/10.18357/otessac.2023.3.1.278
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Technological Distance: A New Way of Conceptualizing the "Distance" in Distance Learning

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Abstract

This paper presents the concept of *technological distance*, which describes a gap between technologies (broadly defined to include methods, tools, principles, and processes) available for a learner to learn, and those needed to complete that learning. This gap is a measure of both the participation and autonomy of learners in the process. Available technologies may include those provided by teachers and institutions as well as from many others, most notably including the learners themselves. The technologies that make up the assembly—pedagogies and regulations as much as digital devices or classrooms—are only components, however. What matters most is how learners fill the gaps between them to achieve their learning goals. These are fundamentally situated, idiosyncratic, and human. Technological distance provides new insights into other models that use spatial metaphors, such as the presences of communities of inquiry and transactional distance.

Keywords: technology, learning, assembly, participation, Community of Inquiry, transactional distance

Introduction

In the field of distance learning we have long understood that, in most contexts, physical distance is largely irrelevant to learning outcomes and that transactional distance, that describes the communications and psychological gap between a learner and a teacher/institution, matters far more (Moore, 1997). There are, though, other ways to conceptualize distance between a learner and their teacher(s) than this. The Community of Inquiry (CoI) framework (Garrison, 2016), for instance, describes teaching, social, cognitive presences, to which others have added emotional presence (Cleveland-Innes & Campbell, 2012) or agency presence (Anderson, 2016). *Presence,* used this way, is a continuously variable notional scale that may equally be inverted to describe teaching, social, cognitive, emotional, or agency *distance*. Distance also figures metaphorically in the Vygotskian notion of zones of proximal development or ZPD (Vygotsky, 1978), describing what is adjacently possible for a learner to learn. Beyond this, we may also identify cultural, temporal, economic, body-mind ability, structural, or many other forms of distance (Dron, 2023). It is never *one* distance, though, because, even in a traditional classroom, there are likely to be many playing a teaching role, including textbook authors, institutional regulators, designers of classrooms, software designers, other students, and students themselves (Dron, 2022a). In the pages that follow I will propose an alternative way of thinking about distance, as a measure of the gaps between the technologies that are assembled to bring about learning, and what needs to be added by the learner for it to occur. This concept of *technological distance* may clarify some of the dynamics of other conceptions of distance, while offering new insights into the learning process of its own.

The Technological Nature of Education

Education, like art, poetry, music, dance, and culture (Kelly, 2010), is a fundamentally technological activity. Technologies—language and pedagogical methods, as much as classrooms and computers—are what make it possible and what give it its form. What makes it meaningful and effective are the countless *ways* that those technologies are assembled by innumerable human beings, especially including learners themselves. These assemblies are *themselves* technologies in their own right (Dron, 2022b).

Technologies are defined by Arthur (2009) as ways that phenomena are orchestrated to achieve a purpose. Technologies may be nouns or verbs (Kelly, 2010)—writing, for example, is both. They may be what *has* been or what *is* done, and what we *do* with what has *been* done. Virtually all technologies are assemblies of and with other technologies (Arthur, 2009). While the parts may play critical roles in the assembly, in an educational system it is the whole assembly that teaches, not just the parts (Dron, 2023). All of the parts of the assembly matter, however, and some—notably those, such as rules and regulations, that force participants to behave as cogs in the machine—may dominate the activity, as may the larger, slower changing parts that provide context and substrate for the rest (Brand, 2018).

Almost invariably, the whole assembly includes the techniques of the people, including students and teachers, who are performing the assembly. Techniques are technologies enacted by humans (Dron, 2022b). One aspect of technique is hard and functional: rules for multiplication, memorized facts, spellings of words, etc. Hard techniques are cognitive gadgets (Heyes, 2018) that could, at least in principle, be mechanized but that are instantiated in individual minds. Another aspect of technique is soft, malleable, and idiosyncratic: distinctive handwriting, styles

of drawing, ways of expressing ideas, etc. For such soft technique, the *way* something is done typically matters as much as or more than *what* is done. Objectively poor hard technique may, often, be compensated for by good soft technique, that fills gaps between hard components with creativity, style, and expression. For example, a lecture may be a poor choice of technology, objectively speaking, but (if done well) it *may* move us greatly.

Technological Distance

With the foregoing in mind, I propose that, in part, the various forms of distance listed in the introduction may usefully be reframed as dependent upon and/or forms of *technological* distance. By this, I mean the gap between what available technologies (including pedagogical methods, digital tools, cognitive tools like language and arithmetic, and so on) provide, and what the learner needs to do with them in order to learn: the soft techniques they need to develop and deploy themselves to complete the process. Some of these technologies may be cognitive gadgets provided by the learner, some by a designated teacher, some by institutions, many by a vast number of others, from web developers to classroom designers to writers of open educational resources. Together, these add up to the sum total of teaching: a distributed intertwingularity in which many actors, most of all the learner, may have played a significant role.

When technologies are mostly orchestrated by others, then the learner mainly needs hard technique as a participant in that orchestration, (if effective) the need for further orchestration may be low, and so technological distance is low. When much is (literally and figuratively) left to their own devices, the learner's soft technique matters more, and the technological distance is therefore higher. The greater the technological distance, the greater the need for autonomy in the learner, and thus the more of their own techniques and skills are needed.

Framing an activity in terms of technological distance can help us to discern profound differences between what may, on the face of it, seem quite similar activities. For example, for a student in an instructivist in-person lecture, choices about what to do are often largely determined by a teacher and the institutional structures in which they teach as well as, perhaps, by further technologies such as instructional design models or the rules of professional bodies. The technological distance may therefore be quite low because most of the phenomena are supplied *to* the learner: transactional distance is high and, in the inverted CoI model, the teaching distance is low. The teacher, the design of the classroom, the regulations, and so on, provide a rigid context that allows relatively little (though far from no) extra orchestration by the students. In a recording of the same lecture the learner may experience a greater technological distance simply to operate the digital tools and systems through which instruction occurs. Other parts of the orchestration, such as the ability to raise a hand and ask a question, may also be lost, as well as phenomena like the presence of others that come for free in the in-person lecture. More orchestration must be provided by the learner to fill in gaps and supply motivation. The autonomy it brings, however, provides some compensating benefits. The student may rewind, pause, look up references, and skip parts of the lecture, for example, or talk with others about it while they watch. Those with hearing or cognitive disabilities may be able to use captions or audio enhancements, those with visual disabilities may use handwriting recognition tools for whiteboard notes. Thus, through their own orchestration, they are more able to adapt the teacher's orchestration to their own needs. However, this relies upon the not just autonomy but that capacity to use it: they must already have, or be ready to acquire, the hard techniques and other technologies needed to complete the assembly.

Subjectivist approaches such as problem-or inquiry-based learning may, on the face of it, appear to increase the technological distance. Learners must perform more of their own assemblies and orchestrations because, notwithstanding any scaffolding provided, the way that learning occurs is through working things out for themselves and, usually, with, from, and for others. However, as long as such interaction with others does occur, technological distance can still remain low, because each participant, especially the designated teacher, may adaptively add their own orchestration to the mix. Transactional distance *may* be low, and, in the inverted CoI model, social distance, teaching distance, and cognitive distance *may* also be low. However, much depends on the detail. When it works well, rather than being cogs in a pre-orchestrated machine, learners become active creators *of* the machine. Equally, if the student already has sufficient hard technique of their own then the technological distance will be similarly low, equating to cognitive distance in the inverted CoI model, autonomy in transactional distance, and the ZPD of Vygotskian theory. The success of such a model is, though, highly dependent on both soft and hard technique in the participants. As a result, the reliability of a subjectivist model as a means of predictably achieving specific learning outcomes is lower, on average, than more rigidly defined approaches (De Bruyckere et al., 2015; Hattie, 2013), albeit that other important but largely unmeasured goals may be achieved along the way.

Lower technological distance is normally desirable because teaching should make learning easier, safer, and more effective than a learner could achieve alone (Bruner, 1966). However, it is important to consider the value of how and, especially, *what* the learners themselves orchestrate. Learning can and usually does occur through the mastery and development of technique to fill the gaps, especially when techniques are pedagogical methods, ways of solving problems, approaches to inquiry, tools to apply in multiple situations, and so on. A designated teacher may help by, as much as possible, leaving only gaps that support such learning, assisting in “debugging” learners’ techniques, helping learners to find more efficient ways of enacting them, or providing feedback on how and why they are successful, thus decreasing technological distance.

Technological distance is rarely a single unfilled dimension but consists instead of a series of smaller and larger gaps between multiple different kinds of technology, be they digital, physical, or cognitive. While the whole matters more than the parts, the parts all play significant roles, and the larger the parts the more significant that role may be. Given that virtually all technologies are assemblies, there is therefore flexibility to be gained from building from many smaller parts. However, there is also increased effort needed in their assembly, compared with parts that are pre-orchestrated. The right balance of flexibility and effort will vary from one student to the next. When a designated teacher insists on one and only one process for learning, there is a high risk or boring or confusing some or all their students some or all of the time, but smaller parts demand more orchestration by the students. Pre-orchestrating series of such parts may help those with fewer cognitive gadgets to fill in the gaps, while allowing them to be separated out may help those who would be bored with this. Achieving the correct balance in formal teaching requires the teacher to know the many technological distances that their students much traverse: learners, and their learning, must be visible (Hattie, 2013), however that may be achieved.

Conclusion

Technologies are often seen as things that distance us from nature and our own humanity. However, a poem is as much a technology as an institutional regulation, and both are, or should be, concerned with changing us, expanding our horizons, becoming more than we are, and connecting us. Technologies are both ways we get stuff done and stuff that has been done. That stuff includes parts of us. The hard techniques that become parts of us in turn join the teaching interwingularity as ways of reducing technological distance when we wish to learn more. This is the recursive ratchet of education. It is what enables us to be members of our societies and cultures. The technologies of education are both expressions of our humanity and means through which, collectively and individually, humanity comes into being. Ultimately, technological distance is therefore a measure of the distance between us all, as much as it is a distance between who we are and what we want to be.

For teachers, understanding this distance matters. Only when we understand it well can we provide the technologies to fill the gaps, be they due to lack of conceptual tools, knowledge, physical abilities, or digital capabilities; only then can we help learners to discover or create those technologies themselves. Teachers are only ever parts of a massively complex interwingularity, not controllers of it, so we must learn to be humble. To teach is not so much to lead as to follow: to observe the distance and to offer ways to reduce it.

Author's Contributions

JS is the sole author.

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Ethics Statement

Ethics review was not applicable because this article is a conceptual paper.

Conflict of Interest

The author does not declare any conflict of interest.

Data Availability Statement

Data sharing is not applicable to this article because no new data were created or analyzed.

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