

## Reference

Keirl, S., (2013), 'Binarial hermeneutics for exploring the phenomenon of Technology in support of Design and Technology Education', in (Eds.), Williams, P.J. & Gedera, D., (2013), *PATT27: Technology Education for the Future: A play on Sustainability*, Conference Proceedings, pp. 253-260, 2-6 December 2013, Christchurch. Pub: Technology Environmental Science and Mathematics Education Research Centre, University of Waikato, NZ.

ISBN 978-0-9922497-2-4

## **Binarial hermeneutics for exploring the phenomenon of Technology in support of Design and Technology Education.**

**Steve Keirl**

**Goldsmiths, University of London**

[s.keirl@gold.ac.uk](mailto:s.keirl@gold.ac.uk)

**Keywords:** binarial hermeneutics; Design and Technology Education; curriculum theory.

## **Abstract**

The phenomenon of technology remains a challenge for philosophers of technology itself let alone for the field of Design and Technology education. Because 'technology' is a complex concept it defies definition and finds itself the object of study of multiple disciplines such as philosophy, sociology, psychology, anthropology, history, and more.

This paper introduces the concept of 'binarial hermeneutics' as a means for exploring, in a non- or anti-disciplinary way, the phenomenon of technology. The concept of binary is clarified and used to locate the kinds of spectra that present themselves when technology is under discussion. Examples of such spectra could be (technology as): arts-science; theory-practice; subject-object; utopia-dystopia; product-process; etc. There is no prescribed set of binaries but a key point is that the binaries are not dualisms, that is, they engage with 'both-at-once' rather than 'either-or'.

Having used a binary to locate a particular spectrum, a hermeneutic approach is then taken. This approach draws upon the field of philosophical hermeneutics which addresses questions of *interpretation*, while resisting Cartesian dualism and serving to develop what Bohman (1999) has described as, '...understanding as continuing a historical tradition, as well as dialogical openness, in which prejudices are challenged and horizons broadened'.

The paper seeks to locate the kinds of discourses that arise in the theorising of Design and Technology Education (and curriculum) as well as in the areas of public and policy-making discourse. It is written to help articulate the identity of Design and Technology Education as a contested, yet distinctive and worthy, educational enterprise.

**Keywords:** binarial hermeneutics; Design and Technology Education; curriculum theory.

## **Introduction**

For a variety of reasons, (Design and) Technology (D&T) Education is one of the more problematic and challenging areas of the educational world. While, at one level, this is a matter for internal educational discourse, curriculum theory and political debate, at another level it is a symptom of the designed technological world at large.

What happens in society with regard to Technology (big T, as opposed to multiple individual technologies, little t) is often reflected in education. This paper seeks both to illustrate the richly nuanced and problematic nature of Technology as well as to show how this interplays with D&T

Education. The *phenomenon* of Technology is powerful, pervasive and complex yet it remains misrepresented through simplistic and reductionist interpretations and stereotypes found in the public realm. Critiques of technologies and our relationships with them often present themselves as controversial *issues*: the environment; surveillance; waste; obsolescence; communications; production techniques; genetic engineering; xenotransplantation; identity; democracy; inter-species and environmental justice; consumerism; mechanisation; un/employment; urbanisation; robotics; transport; and, privacy, are a few.

The phenomenon can be expressed thus: Humans cannot ‘be’ without Technology and Technology ‘is’ by human intention and action (design). Technologies and humans co-exist intimately. The ongoing problem is that this enormously significant human-technology phenomenon is not matched by an equivalent or appropriate Technology Education. Currently, Technology Education is partial – in at least a couple of senses. First, it is prone to biases. Second, it only partly addresses the whole that is Technology. This analysis argues that the field is inadequate in a couple of ways.

Accompanying the phenomenon is the ‘invisibility problem’ – the situation where, for all we live by technologies, are surrounded by them, and use them with little or no reflection, they remain largely invisible to us and our discourses. We are with our technologies as the fish is with water. How, then, can the rich, complex, nuanced, holism of the phenomenon of Technology be explained and understood? Further, how can it be properly represented in and through education? What follows is an overview of a strategy for exploring both the phenomenon and the educational shortfall.

### **Witnessing the phenomenon...**

The *phenomenon of Technology* is only newly studied and *philosophy of technology* is still emerging as an academic field. There are exciting intellectual challenges opening up for scholars of both Technology and D&T Education, yet, as scholars of the field know, ‘technology’ not only defies definition but is complex.

It is only sixty years since Heidegger, a seminal influence on interrogating technology, put the challenge of addressing the phenomenon into context: ‘...the essence of technology is by no means anything technological. Thus we shall never experience our relationship to the essence of technology so long as we merely represent and pursue the technological, put up with it, or evade it.’ (Heidegger, 1953 trans 1977:4)

More recent authors have captured the issue thus:

Pinning down the concept...of technology is like trying to nail jelly’ (Green, 1994:xxix)

We speakers of English...seem to be able to tolerate a high level of ambiguity with respect to our use of the term “technology”.’ (Hickman, 2001:11).

Though we may be competent at using many technologies, most of what we think we know about technology in general is false. Our error stems from the everyday conception of things as separate from each other and from us. In reality technologies belong to an interconnected network the nodes of which cannot exist independently *qua* technologies...It turns out that most of our common sense ideas about technology are wrong.’ (Feenberg, 2010:3).

It is no longer possible (or appropriate) to describe technologies simply as ‘things’, or as ‘hi-tech’, or as ‘applied science’, or as ‘tools’, or as only that which is ‘new’, or as their being ‘neutral’. Whilst there is an obvious need to bring the complexities of Technology into manageable forms for educational practice, simple reductions, soundbites or stereotypes are not helpful.

### **Some emergent theoretical approaches...**

There have been many scholarly engagements with Technology and there is no 'right answer' or 'one way' to approach the phenomenon. Explorations can be descriptive, analytical, personal, political, social, and so on. Four differing theorisations, *very* simply presented, illustrate the phenomenon's challenges:

*Critical theory* (eg Habermas, 1971) suggests that we not only look at what counts as knowledge in any situation (eg what is technological knowledge) but we should also look to *whose interests* are served by the knowledge. (Critical theory underpins the conceptualisation of technological literacy used in the South Australian Design and Technology curriculum [DETE, 2001]).

*Actor-network theory* (ANT) (Latour, 2007) developed out of studies of complex technological systems. Human and nonhuman components are attributed equal respect in terms of their significance. Two forms of relations are explored within systems – the material (things) and the semiotic (concepts) – both key to understanding technologies.

Ihde's (1979) phenomenological approach advocates *variational theory* (Ihde & Selinger, 2003; Sobchack, 2006; Ihde, 2009): '...a series of multiple perspectives to recognise the shape, structure, and complexity of the phenomenon (being investigated)' (Eason et al., 2003:125). Hermeneutics, simply put as the business of interpretation, is key to phenomenological work.

*Narrative theory* (Kaplan, 2009) 'reads' the 'narrative' or 'story' of technologies. Kaplan argues: '...a critical reading of technology evaluates technical things and systems in terms of their role in achieving social justice and happiness. Technology should...(be)...read in relation to universalist concepts, such as truth, impartiality, and equality' and he talks of: '...narrating things differently to create new ways of seeing the world so that we might imagine, argue for, and create new ways of being in the world.' (Kaplan, 2009:96).

All such theorisations offer ways of 'seeing' technologies and their methods collectively embrace critique, translation, interpretation, reading, describing, and explaining – all valid educational tools.

### **Tools to engage the phenomenon...**

What tools might help us not only *see* Technology but also to *better understand* the phenomenon? Might it be possible to develop a method of enquiry that is accessible to researchers and educators alike? One starting point is philosophy itself. As Hickman says: '...philosophy is one of the most effective tools we have for tuning up technology.' (Hickman, 2001:41).

A second tool, coming from within philosophy's toolbox is that of *hermeneutics* (the theory of *interpretation* and *understanding*). Historically, hermeneutics was concerned with the interpretation of religious texts to establish what meaning they carried and what the whole-parts relationships might be. Over the past century hermeneutics has moved beyond texts and has refined and deepened its methodological approaches (see eg Palmer, 1969; Habermas, 1971; Gadamer, 1976, 1975/2004; Mitcham, 1994; Bohman, 1999).

To work hermeneutically is not only to explore holistically and analytically but is also to look to cultural, historical and political relationships. Hermeneutics becomes an existential event for the interpreter. That is, hermeneutics today is seen as much for how the hermeneutic act itself shapes us as for how it serves as an interpretive tool. When we work hermeneutically, understanding comes of one's own historical and cultural positioning and new possibilities present themselves to us. In hermeneutics, all of analysis, synthesis, critique, judgement, dialectical and logical reasoning, and reflective conversation (with oneself and with others) combine to bring new understandings. The familiar is made strange and new ways of seeing emerge.

Hermeneutic work around technologies can take us away from the field's mythologies (eg technologies as 'neutral', 'hi-tech', 'applied science', 'new', 'good', etc) and fresh possibilities emerge to develop new language, theories and analyses.

Given the complexity of Technology and the multiplicity of technologies, where could appropriate hermeneutic investigations begin? A clue comes from Gadamer (1975/2004) who reminds us that 'Hermeneutic work is based on a polarity of familiarity and strangeness;' and that '*(t)he true locus of hermeneutics is (the) in-between.*' (Gadamer, 1975/2004:295. Original italics). This brings us to the use of binaries.

### **Using binaries to locate hermeneutic work**

It is important to note that binaries are not dualisms. Whilst 'binary' in mathematics means 'having a base of two' it has also acquired a popular (and inaccurate) sense of *either-or* which is in fact what dualism means. Dualism in philosophy means two *distinctly exclusive* things such as mind and matter (after Descartes). In contrast, binary means *both-at-once, two-together, a compound* or, perhaps, a *co-dependence*. Where dualism is about distinction, binary is about indistinction. This validates the hermeneutic approach.

While hermeneutics offers *engagements* with complex phenomena, binaries can locate sites to expose or invite hermeneutic enquiry. Using binaries allows us to capture or signal a range of issues that we may wish to address. The nomination of any binary intentionally *foregrounds one aspect of Technology* while backgrounding (but still accommodating) others. In short, the binaries locate spectra of issues while hermeneutics facilitates interpretations.

To give an example... We can set up a binary of 'Technology as *at-once-both arts and science*'. If we try to say that technology is *only* arts (eg as crafting and creativity) or that it is *only* science (eg as objective study) we come unstuck because we cannot argue the exclusivity of one over the other. On the hermeneutic journey we might explore: what constitutes a science or an art; in what ways technology reveals itself to us as art, as science; whether technology is 'applied science', a branch of science, or (after Lueckenhausen, 1989) is art made useful; investigate Mitcham's (1994) juxtaposition of engineering with humanities; ask whether/how art and science meet in technology; consider how a technology can be both science and art at once; and so on.

The educational point is not to resolve a dualism but to learn from the understandings and meanings that develop from the hermeneutical practice – to interpret fruitfully. Subsequently, understandings gained from the hermeneutic explorations of any (big-T) Technology binary can also be *tested and refined* by applying case studies of particular technologies (eg a washing-up brush, an aeroplane or a bridge).

### **Putting binarial hermeneutics to work**

When the three tools of philosophy, hermeneutics and binaries are combined the term given for the practice is *binarial hermeneutics*. The following (illustrative) binaries signify Technology discourses in which there are multiple possible positions – they echo the *arbitrary* nature of the phenomenon of Technology and the notion of technologies being *multistable* (Ihde, 2002; Ihde & Selinger, 2003) or *polypotent* (Sclove, 1995). There is nothing sacrosanct about the binaries – they are starting points and other candidate binaries could be nominated. The binaries are not qualitatively the same – some allude as much to informed (or ill-informed) public discourse as they do to orthodox philosophical enquiry.

#### *The arch-binary of at-once-both Human and Technology*

It occurs that there is one *arch-binary* that epitomes the challenges under investigation as it is the arena for the acting-out of all other binaries. As expressed in the paper's introduction, it is the binary of *at-once-both human and technology*. Starting points for hermeneutic explorations could include:

- how human are technologies, how technological are humans?
- degrees of identity, free will and the ways in which technologies and humans shape each other;
- examining *transhuman* and *posthuman* (technological) scenarios in light of unknown futures (Broderick, 2001; Kurzweil, 2005; Bostrom, 2009);
- reflecting on Foucault's (1989/2000:28) postmodern reminder that 'man' is 'a recent invention';
- considering whether *humanity*, *human-beingness*, and *humanism* are constructs that may not be sustainable (posthumanity in the postmodern sense, Badmington, 2000);
- critiquing Kurzweil's (2005) view that 'technology is evolution by other means'.

#### *At-once-both visible and invisible*

When technologies become so accepted, so unquestioned that they become almost invisible (that they are everywhere yet nowhere at once) does a taken-for-grantedness occur? What are the disruptions to such circumstances that remind us of what has become invisible – major catastrophes, shortages, climate issues, disruptive technologies? Is the invisibility of the everyday matched by an invisibility of our evolution?

#### *At-once-both positivist and antipositivist*

The *seemingly* tangible nature of technologies and traditional positivist ways of assessing them ('Does it work/does it do the job?') frames Technology as instrumental, material and aligned with science. Antipositivist critiques have offered antidotes to this but have been charged with creating mires of difficult-to-penetrate relativism.

#### *At-once-both utopian and dystopian*

Technology is basically good. Technology is basically bad. Here philosophical questions arise around values, existence, ethics, post/humanism, determinism, and eco-philosophy.

#### *At-once-both democratic and non-democratic*

How do technologies promote or deny democracy? At what point in any technology's development is ethical critique or democratic engagement allowed eg at pre-conception, at the design phase, during creation, after realisation? (Keirl, 2009).

#### *At-once-both modern and postmodern*

Post-modernism questions many of the 'givens' of Technology: the idea of 'progress'; of technological determinism; that there is one form of technological knowledge rather than multiple knowledges; that rationalism and optimism guarantee outcomes; and that there are no 'grand narratives' (Lyotard, 1979/1984) so far as Technology is concerned.

#### *At-once-both natural and artificial*

While it seems 'natural' for us to be creative and to act technologically upon the world there are clearly ways that such actions work against nature. Once we have created a technology is the creation an artificial entity? Taking Franklin's (1990/2004) lead, how should we consider the biosphere-biosphere relationship?

### **Technology Education binaries**

The idea of binarial hermeneutics can also be used for considerations of curriculum design and delivery. In some ways the educational binaries reflect those for *Technology* and *technologies* but their resolution is now towards curriculum action rather than philosophical-hermeneutic reflection alone. However, the better the philosophical-hermeneutic homework in the Technology-technologies arena, then the better the preparation for the educational challenges.

Some of these binaries apply across the curriculum, that is, beyond D&T but they matter because of the particular way that they apply to D&T Education. This is an important part of building the

integrity of Design and Technology in educational circles – as a field of special challenges and special circumstances which cannot be dealt with en masse with other subjects. These points made, what are the Technology Education binaries that present themselves for hermeneutical enquiry? The following, as with the Technology binaries, is a selection, they interplay, and are not exclusive.

*At-once-both status quo and change agent*

Is the role of the school to maintain the status quo or to bring about change? Technology Education has its own special challenges here with shifting social and workplace practices and new technologies constantly evolving. Which techniques and technologies are to be valued or abandoned? Should Technology Education be taught uncritically or critically?

*At-once-both local and global in perspective*

Is the curriculum inward- or outward-looking? Does a purely local curriculum operate? Is curriculum determination centralised and controlled? What international and global perspectives are articulated by the curriculum?

*At-once-both traditional and emergent technologies*

Is the curriculum crafts-based, existentially passive, low production and low-tech or hi-tech, existence-changing and emergent technologies. What comparisons can be made between established and emergent technologies on the basis of costs, uses and consequences?

*At-once-both product and process (for the teacher)*

With regard to the *pedagogy* of D&T Education is learning best addressed through the creation of products - emphasising, say, technique, efficiency, quality, production methods and standards? Or is it a matter of process where students learn designerly behaviours and dispositions to work creatively in teams and alone? Is the 'output' of education to be the capacity to (re)produce or the capacity to adapt and (re)imagine new possibilities?

*At-once-both technical and designerly (for the student)*

Is Technology Education about technical skilling alone – simply learning how to use tools or software? Or is it about a more embracing curriculum of critical-designerly behaviours for being in the world – those that would serve the hermeneutical dispositions of the students? Is Design and Technology education a seeding ground for student self-expression and identity formation?

*At-once-both instrumental and liberal (for society)*

After Layton's (1994) research into the stakeholder interests in Technology Education, is the primary aim to serve the needs of the economy or is D&T: '...a distinctive form of cognition, unique and irreducible. As such, all children should have access to it, as a matter of right and in order to develop their full human potential.' (Layton, 1994:17)? Are some goals for short-term employability and specific industrial and business needs while others are to create an educated citizenry?

*At-once-both academic and practical*

Although this framing should be a quirk of history by now, in many societies the hands-head divide (a dualism with no place for heart?) remains embedded in educational culture.

*At-once-both cross-curricular and subject*

Several of these binaries resonate with this curriculum organization binary. The arguments for schools to deliver some kind of technological literacy for all students are gaining strength but understandings of 'technological literacy' vary widely - from the technical to the critical-emancipatory (see e.g. Dakers, 2006; Keirl 2006). Can/should D&T literacy be managed through a single subject, a learning area or should it be the business of everyone in a school?

## **Conclusion**

To reiterate, it is erroneous to see any binary as a dualistic ‘either-or’ – that would be a form of reductionism. Design and Technology’s curriculum challenge is the management of Technology as holism whilst also addressing what is appropriate so far as individual technologies/techniques are concerned. Binarial hermeneutics offers one approach to understanding and managing the holism of Technology’s/technologies’ complex and contested values. It builds on what Bohman (1999) has described as, ‘...understanding as continuing a historical tradition, as well as dialogical openness, in which prejudices are challenged and horizons broadened’.

It is argued that the issues this paper engages cannot be engaged through traditional disciplines. The issues are a matter for the D&T community to address. Disciplines either try to colonise Technology Education on their own terms or are inadequate for engaging the phenomenon. But such matters warrant a separate paper. If D&T Education is to develop its identity and credibility it must be able to do so on several fronts – from the philosophical to the pedagogical. If literacies of design and of technology are to blossom then rich understandings of, and opportunities for deep interpretations of, Technology will be needed. Perhaps binarial hermeneutic journeying can help all concerned.

## References

Badmington, N., (Ed.), (2000), *Posthumanism*, Palgrave, Basingstoke.

Bohman, J., (1999) ‘Hermeneutics’ in Audi, R., (Ed.), (1999), *The Cambridge Dictionary of Philosophy*, (2<sup>nd</sup> Edn.), p378, Cambridge University Press, Cambridge.

Bostrom, N., (2009), ‘The Future of Humanity’, in Olsen, J.K.B., Selinger, E. & Riis, S., (Eds.), (2009), *New Waves in Philosophy of Technology*, pp.186-215, Palgrave Macmillan, Basingstoke, UK.

Broderick, D., (2001), *The Spike: How our lives are being transformed by rapidly advancing technologies*, Forge, New York.

Dakers, J.R., (Ed.) (2006), *Defining Technological Literacy: Towards an epistemological framework*, Palgrave Macmillan, Basingstoke.

Department of Education, Training and Employment (DETE), (2001), *South Australian Curriculum Standards and Accountability Framework (SACSA)*, URL: <http://www.sacsa.sa.edu.au>

Eason, R., Hubbell, J., Jørgenssen, J. F., Mallavarapu, S., Plevris, N., & Selinger, E., (2003), ‘Interview with Don Ihde’ in Ihde, D. & Selinger, E., (Eds.), (2003), *Chasing Technoscience: Matrix for Materiality*, Indiana University Press, Bloomington.

Feenberg, A., (2010), *Between Reason and Experience and Experience: Essays in Modernity and Technology*, MIT Press, Cambridge, MA.

Foucault, M., (1989/2000), ‘The Order of Things: An Archaeology of the Human Sciences’ in Badmington, N., (Ed.), (2000), *Posthumanism*, pp.27-29, Palgrave, Basingstoke.

Franklin, U.M., (1990/2004), *The Real World of Technology*, Anansi, Toronto.

Gadamer, H-G., (1976), *Philosophical Hermeneutics*, (Trans. Linge, D.E.), University of California Press, Berkeley.

Gadamer, H-G., (1975/2004), *Truth and Method*, (Trans. Weinsheimer, J. & Marshall, D.G.), Continuum, London

Habermas, J., (1971), *Knowledge and Human Interests*, Beacon, Boston.

- Heidegger, M., (1954/1977), *The Question Concerning Technology and Other Essays*, (trans. Lovitt, W.), Harper & Row, N.Y.
- Hickman, L.A., (2001), *Philosophical Tools for Technological Culture: Putting Pragmatism to Work*, Indiana University Press, Bloomington.
- Ihde, D., (1979), *Technics and Praxis*, Reidel, Dordrecht.
- Ihde, D., (2002), *Bodies in Technology*, University of Minnesota Press, Minneapolis.
- Ihde, D., (2009), *Postphenomenology and Technoscience: The Peking University Lectures*, State University of New York Press, Albany.
- Ihde, D. & Selinger, E., (Eds.), (2003), *Chasing Technoscience: Matrix for Materiality*, Indiana University Press, Bloomington.
- Kaplan, D. M., (2009), 'How to read Technology Critically' in Olsen, J.K.B., Selinger, E. & Riis, S., (Eds.), (2009), *New Waves in Philosophy of Technology*, pp.83-99, Palgrave Macmillan, Basingstoke, UK.
- Keirl, S., (2006), 'Ethical technological literacy as democratic curriculum keystone' in (Ed.) Dakers, J.R., (2006), *Defining Technological Literacy: Towards an epistemological framework*, pp 81-102, Palgrave Macmillan, Basingstoke.
- Keirl, S., (2009), 'Seeing Technology Through Five Phases: a theoretical framing to articulate holism, ethics and critique in, and for, technological literacy' in *Design and Technology Education: An International Journal*, (2009), Vol 14, No. 3, pp 37-46.
- Latour, B., (2007), *Reassembling the Social: An Introduction to Actor-Network-Theory*, Oxford University Press, Oxford.
- Layton, D., (ed.), (1994), *Innovations in Science and Technology Education*, Vol. V. UNESCO, Paris.
- Lueckenhausen, H., (1989), 'Design is Art Made Useful', *Australian Art Education*, Vol.13, No.2, pp.33-37.
- Lyotard, J-F., (1979/1984), *The Post-Modern Condition: A Report on Knowledge*, Manchester University Press, Manchester.
- Mitcham, C., (1994), *Thinking Through Technology: The Path between Engineering and Philosophy*, University of Chicago Press, Chicago.
- Palmer, R.E., (1969), *Hermeneutics: Interpretation Theory in Schleiermacher, Dilthey, Heidegger, and Gadamer*, Northwestern University Press, Evanston.
- Sclove, R.E., (1995), *Democracy and Technology*, The Guilford Press, N.Y.
- Sobchack, V., (2006), 'Simple Grounds: At Home with Experience' in Selinger, E., (Ed.), (2006), *Postphenomenology: A Critical Companion to Ihde*, pp.13-19, State University of New York Press, Albany.