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Design and Technology Education as learning agency: and the fourfold of 'critiquing skills'

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Abstract

This paper offers a brief exploration of conceptual issues around 'skills' and its derivatives. It offers some theoretical background and it invites consideration of Design and Technology as a 'learning agency'. The core argument is that *critiquing skills* are necessary skills for the field and that the term 'critiquing skills' can be considered in four ways. There is much to be researched around the genre of skills in Design and Technology and the paper also suggests four curriculum considerations: the politics of skilling; the ontologies of skilling; the temporalities of skilling; and, education of, for, and through skilling. The aim of the paper is to help see the notion of 'skills for the 21st Century' as problematic for education.

Key words Skills, critiquing, curriculum, knowledge, ontology, technological literacy

Orientations

After the toddling-age we walk on pavements without minding our steps. But a mountaineer walking over ice-covered rocks in a high wind in the dark does not move (his) limbs by blind habit; he thinks what he is doing, he is ready for emergencies, he economises in effort, he makes tests and experiments; in short he walks with some degree of skill and judgement. If he makes a mistake he is inclined not to repeat it, and if he finds a new trick effective he is inclined to use it and to improve on it. He is concomitantly walking and teaching himself how to walk in conditions of this sort. It is of the essence of merely habitual practices that one performance is a replica of its predecessors. It is of the essence of intelligent practices that one performance is modified by its predecessors. *The agent is still learning.*' (Ryle, 1949/1973:42. My italics)

Skill is intensive and refined world engagement. Skill, in turn, is bound up with social engagement. It molds the person and gives the person character. (*He cites Sturt's excellent 1923 chronicle: The Wheelwright's Shop*) (Borgmann, 1984/2004:116. Comment added.)

Throughout history, at least in the Western world, the project of technology has been to capture the skills of the craftsman or artisan, and to reconfigure their practice as the application of rational principles the specification of which has no regard for human experience and sensibility. (Ingold, 2006:78)

Skills – sketching the background

If ever there was a term to excite epistemological discussion it could be 'skill'. Skill resists fine definition or being positioned in any particular knowledge camp. When Ryle (1949/1973:17) set

about challenging ‘...with deliberate abusiveness...’ what he called “the Ghost in the Machine” (Descartes’ hugely influential separation of ‘mind’ and ‘body’) he contributed helpfully to Design and Technology’s (D&T’s) own deliberations. This paper offers a brief exploration of conceptual issues around ‘skill-skills-skilling’; examines some associated contextual considerations; invites consideration of D&T as a ‘learning agency’; and; suggests that *critiquing skills* are necessary skills for the field and that they might be considered in four ways.

Ryle distinguished between ‘knowing that’ (sometimes: propositional or declarative knowledge of the ‘fact’-type) and ‘knowing how’ (procedural knowledge). Mitcham (1994) explores the idea of technology-as-knowledge and offers a spectrum of distinctions. The ‘least conceptual’ of these is sensorimotor skill. For him, such skills ‘...of making and using are preconscious “knowhow” more than “know that”, acquired by intuitive as well as trial and error learning or imitative apprenticeship...and thus do not qualify as knowledge in the strict sense.’ (Mitcham, 1994:193). However, he also reports how phenomenologists such as Dreyfus (below) see skills as cognitive development and that, in the domain of skill: ‘...there is no transformation, even at the level of expertise, to abstract or formal and therefore conceptually teachable knowledge.’ (Mitcham, 1994:196).

The nature of skill-knowledge is differently articulated by Polanyi’s (1958/1974; 1966/2009) work on tacit knowledge – that which we have but which we can neither show nor accurately describe. This includes ‘...the performance of skills, whether artistic, athletic, or technical. We have here examples of knowing, both of a more intellectual and more practical kind; both the “wissen” and “können” of the Germans, or the “knowing what” (sic) and the “knowing how” of Gilbert Ryle. These two aspects of knowing have a similar structure and neither is ever present without the other.’ (Polanyi, 1966/2009:6-7). Polanyi_(1958/1974:54) has also differentiated between skill (as the art of doing) and connoisseurship (as the art of knowing) – both of which, he contends, are transmissible.

Collins & Evans (2007/2009) expand a tacit knowledge thesis and present their ‘periodic table of expertises’. They describe what they call ‘ubiquitous expertises’, that is: ‘...all the endlessly indescribable skills it takes to live in a human society; these were once thought of as trivial accomplishments.’ (Collins & Evans. 2007/2009:16) This distinction is helpful when considering the multiplicity of skills development expected of education.

Ryle argued skills to be ‘acquired dispositions’ or intelligent capacities and he distinguishes them from habits. Someone doing something by blind habit does so ‘...automatically and without having in mind what he (sic) is doing. He does not exercise care, vigilance, or criticism’. (Ryle, 1949/1973:41). More recently, Sennett (2008) offers a general understanding that ‘skill is a trained practice’ – which he contrasts with sudden inspiration. He notes that as skills develop, the *content of what is practised changes*. This fits with the notion of skills as tacit knowledge as that which is tacit grows and, in several senses, develops. It is not simply a fixed form of knowledge to be taken on board by the learner. Sennett further points to the role of skill development happening as more, and increasingly difficult, problem situations are encountered. ‘The open relation between problem solving and problem finding, as in Linux work, builds and expands skills, but this can’t be a one-off event. Skill opens up in this way only because the rhythm of solving and opening occurs again and again.’ Sennett (2008:38)

Ingold (1993/1994b) distinguishes amongst technology, technics and technique and the last of these refer to ‘...skills, regarded as the embodied capabilities of particular human subjects...’ and he reminds us (citing Mauss) that ‘...it is a fundamental mistake to think that “there is technique only where there is an instrument”’. (Ingold, 1993/1994b:433). Meanwhile Mitcham (1994:197) reports Bunge’s distinction between technical practice (engineering, medicine, etc) and technics (artisanal craft skills).

As with most scholars, Ingold resists the idea that skill might be considered the *application* of knowledge because ‘...acting in the world is the skilled practitioner’s way of knowing it. The

perceptual knowledge so gained is...an integral part of personal identity. Hence, in the constitution of their environments, agents reciprocally constitute themselves as persons.’ (Ingold, 1993/1994b:443) It is in such statements that the important ontological dimension of skills and skilling begins to present itself. The work of Dreyfus on Heidegger is very helpful here.

As Dreyfus reports, Heidegger moved away from an epistemological approach to argue an ontological one. No matter one’s take on how we think we ‘know’ this or that about the world, Heidegger brings matters down to the ontological, that how we make sense of things amounts to how we *are* in the world. ‘Thus Heidegger breaks with Husserl and the Cartesian tradition by substituting for *epistemological* questions concerning the relation of the knower and the known, *ontological* questions concerning what sorts of beings we are and how our being is bound up with the intelligibility of the world.’ (Dreyfus, 1991:3) Heidegger, Dreyfus reports, seeks to reverse Decartes conclusion from “I think therefore I am” to “I am therefore I think”.

For D&T education, Heidegger has led the way on showing how our very being is technological – whether through the skilful use of technologies; our adoption of them; our intimate relations with them; or for how they shape our futures. Importantly, he has said that ‘...the essence of technology is by no means anything technological’ (Heidegger, 1954/1977:4) reminding us that neat dictionary definitions or common stereotypes about the nature of technology are simply inadequate for our proper understanding of the phenomenon. Existential discourse offers invaluable critique of how we understand ‘skill’. Consider, for example, this statement: ‘...our understanding of our being is never fully accessible since (1) it is embodied in skills and (2) we dwell in our understanding like fish in water.’ (Dreyfus, 1991:35)

Dreyfus reports that Polanyi, Kuhn and Heidegger alike consider inadequate the view held for 2500 years that there exists ‘theoretical, disinterested knowledge’. They argue that such knowledge actually ‘...presupposes a practical and involved “know-how” that cannot be accounted for in terms of theoretical knowledge. According to these thinkers, theoretical knowledge depends on practical skills.’ (Dreyfus, 1991:46)

Dreyfus also discusses the inconclusive discourse around Leibniz’s view that skills amount to theories we are not yet clear about. (D&T can be well articulated via the playfully ambiguous ‘knowledge-in-the-making’.) To this end he cites, first, Habermas’s claim that in goal-directed actions such as skills ‘...an implicit knowledge is expressed; this know-how can in principle also be transformed into a know-that’ and then, Papert’s claim that ‘...even physical skills such as bike-riding and juggling are performed by following theories.’ (Dreyfus, 1991:86). Such cognitivist positions are countered, Dreyfus argues, by Heidegger’s claim that ‘...when we carefully describe everyday ongoing coping activity we do not find any mental states’. That is, in our everyday lives we operate skilfully and without conscious acknowledgment of any operational theory or thought process. This has its parallel in the learning of a skill when it might be said that someone is skilful when they no longer have to think about what they are doing. ‘The novice becomes skilled not through the acquisition of rules and representations, but at the point where he or she is able to dispense with them.’ (Ingold, 1993/1994a:462) Thus we consider the reflective feedback engaged when skilful practice encounters new challenges for which the skill is suited but which is in need of considered application (the thoughtful mountaineer’s footwork perhaps). Schön’s (1983) work on ‘reflection-in-action’ resonates here too.

The genre of skills

Having some understanding of the theoretical underpinnings of ‘skill’ and its derivative terms is essential but their application demands perspective too. Habermas (1971) offers a practical philosophy informed by critical theory that invites us to be mindful of whose, and what kind of, *knowledge interests* are being served when we consider what it means to be skilled (or otherwise). In outline, he proposes we consider: i) the *technical* where knowledge remains at the instrumental or functional level; ii) the *practical-hermeneutic* that facilitates capacities to operate in and understand

the world; and iii) the *critical-emancipatory* that facilitates personal autonomy, fulfilment and critical-participatory being-in-the-world.

A ready starting point is the ‘skills agenda’ so evident in current political-economic ideology (for it is more than just policy) in many countries. A major question for the politics of education is whether education be led by the needs of industry and business. Claims that students should be ‘work-ready’ or need to be trained (sic) to meet skills shortages are all indicators of a particular politics of education. A different politics might, for example, privilege education over training; the democratic and social good over industry and business; or, the environment over ‘the market’.

Helpfully, one methodology of the Habermasian approach is *ideology critique* which seeks to interrogate the values, beliefs and practices of particular dominant groups. A prime candidate is the current neo-liberal economic ideology of aggressive capitalism while simultaneously demanding skills-as-needed and multiple forms of de-skilling: de-skilling ourselves by accepting ‘automated’ and ‘smart’ technologies into our lives; deskilling or displacing craftspeople; deskilling professions such as teachers by dictating curricula, assessments and pedagogies; and, deskilling participatory citizenship both by stifling debate and dissent, and by leaving technological decision-making to elites of experts (Sclove, 1995; Feenberg, 2010).

We might accept that it is useful to several parties to ‘be skilled’ but when we consider de-skilling, re-skilling, up-skilling; being unskilled; soft skills; hard skills; and more, it might be worth asking whose interests are being served. Further, there is the ill-distribution of skills or the control of the associated knowledge and practices whether historically by guilds, by apprenticeship models, by labour and market control mechanisms, or by discrimination. The more one looks the clearer it becomes that ‘skill’ can be a multifaceted and multi-located concept. We might further consider:

Gender politics and skills... ‘How has it come about that women have failed to achieve recognition of the skills required by their work? ...Definitions of skill can have more to do with ideological and social constructions than with technical competencies...’ (Wajcman, 1991:37; see also Haraway, 1991; Cockburn, 1999; Wajcman, 2004)

Levels of skilling, and for who’s good...? One’s capacities and power are informed by skill levels. ‘Limitations of skill confine any one person’s primary engagement with the world to a small area’ Borgmann (1984/2004:116). As with any form of education, if people’s skilling is limited then individuals and society alike are the poorer as a result. Sennett writes of ‘antisocial expertise’ as ‘...an inherent inequality of knowledge between expert and nonexpert’ as opposed to ‘sociable expertise’ which serves the common good (Sennett, 2008:248-249). Sennett (2008:52) also articulates a common concern around skill marginalisation by new technologies. ‘When the head and the hand are separated, the result is mental impairment – an outcome particularly evident when a technology like CAD is used to efface the learning that occurs through drawing by hand.’ (For a parallel D&T discussion, see McLaren, 2008)

Skill-suppression by association... Greenhalgh (1997) shows how, over the twentieth Century, ‘craft’ (and associated skills) has been positioned negatively against ‘progress’ and ‘industrial culture’. ‘To a considerable extent, craft has been seen as the cultural Luddism of our times... Consequently, in an age of mass communications and technology-driven positivism, it has been portrayed as a reactionary force and accordingly marginalised.’ (Greenhalgh, 1997:104)

Skills as personal re-invention... Ingold (2006) discusses the *fate of skill* and points to the ever-reinvention of skills – that as soon as humans endeavour to adapt skills and techniques into machines and computers, people have a fascinating habit of developing new skills with the new devices: ‘...the essence of skill has come to lie in the improvisational ability of practitioners to disassemble the constructions of technology, and creatively to incorporate the pieces into their own walks of life.’ (Ingold, 2006:79)

This brief section has given a flavour of the complexity and richness of what might be called *the genre of skills*. I'd argue that the term 'skill' and its derivatives are too lightly, and uncritically, used within, or about, our field. The term is problematic and should be treated problematically by educators. There is much to be researched around the genre of skills and D&T and this investigation suggests four D&T curriculum considerations: the politics of skilling; the ontologies of skilling; the temporalities of skilling; and, education of, for, and through skilling.

Design and Technology as learning agency

The title of this paper was inspired by Ryle's (1949/1973) distinction between 'habitual practices' (agent as replicator) and 'intelligent practices' (agent as learner). I suggest that D&T could be considered as a learning agency, that is, as a *site of intelligent practices*, as a site for *knowledge-in-the-making*. Such an agency might be informed by the following notional criteria (noting that these are addressed to general education – the years of compulsory schooling for *all* children):

Contributing to an education where:

- all the 'agents': teachers, administrators, and pupils alike, are co-learners (Boomer, 1989/1999);
- the educational fulfilment of children is privileged over materialist outcomes;
- democratic and sustainable futures are privileged over unsustainable socially and environmentally harmful economic ends (Keirl, 2015a);
- critical-constructivist pedagogies are the norm; and,
- initiation (Peters, 1966), training, enculturation and indoctrination are each understood for what they are.

Within the above, D&T as learning agency:

- works to advance ethical-critical technological and design literacies (Keirl, 2015b);
- is celebrated as a 'doing' field, design-rich, critical in nature, and ethically-focussed;
- is resistant to, and critical of, divisions of the academic-vocational kind and is actively resistant to gendered and class-based division;
- practises rich and critical design-oriented pedagogies rather than those of narrow instrumentalism (Freire 1972, Keirl, 2016);
- is resistant to prescriptive content-dependent curriculum and celebrates the interplay of *knowing how* and *knowing that* through critical-constructivist pedagogy;
- initiates learners into a multiplicity of skills rather than an educationally restrictive few; and,
- uses assessment as a personal learning support for each agent and not as an instrument of classification.

Within the above, skilling:

- is understood richly as a combined ontological, epistemological and social good. 'The practice of skills is inventive; by concentrating our purpose on the achievement of success we evoke ever new capacities in ourselves.' (Polanyi, 1962/1974:128);
- is much more than learning 'how to'. Ingold (1993/1994a:462) cites Lave's (1990) distinction between 'understanding in practice' and 'the culture of acquisition'. He also distinguishes between 'enculturation' (into that which already exists) and '...*enskillment*, in which learning is inseparable from doing, and in which both are embedded in the context of practical engagement in the world – that is, in dwelling.' (Ingold, 1993/1994a:463);
- advances all three Habermasian *knowledge interests*: and,
- develops 'intelligent capacities' which '...involves the stimulation by criticism and example of the pupil's own judgement.' (Ryle, 1949/1973:42)

The fourfold of 'critiquing skills'

It is argued that talk of ‘skills for the 21st Century’ warrants interrogation. Thus, it is also argued that ‘D&T as learning agency’, along with the associated notional criteria set out above, calls for practices of criticism, critique, critical thinking, critical reflection (Schön, 1983), and more. (On the emergence of these in D&T, see Williams & Stables, 2016). Thus, the phrase *critiquing skills* might have four senses:

1. *skills of critiquing* at the meta or philosophical level. Here, critical thinking and critical discourse are practised as philosophical method. Skills of critiquing serve to interrogate philosophical arguments, positions and claims;
2. (applying 1, above) *critiquing ‘skills’*, that is, interrogating critically the very concept of ‘skill’ and its derivatives. Questioning meanings, purposes, interests, benefits, and limitations;
3. *skills of critiquing* in the micro and meso levels of practices of D&T learning. Here, critiquing plays multiple roles in enhancing technological and design literacies (Keirl, 2016); and,
4. *skills of critiquing* as a component of general education serving all learning agents to the benefit of a common good. Here, the practice of critiquing serves the wellbeing of democracy by enhancing discourses and debate while challenging passivity and blind acceptance of unworthy ways of being-in-the-world.

‘Skill’ and its derivatives are commonly linked to our field but responsible Design and Technology education must consider, in many ways, for all its learners, a suite of critically ‘intelligent practices’ for its own skilful being-in-the-world.

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