Education = anticipatory system?:
(educational) designing as anticipatory learning

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How does anticipatory learning happen? Might Education be an anticipatory system? Educating young people to become creative, ethical innovators inspired to tackle the complex, dynamic and interconnected challenges of our time is increasingly recognised as a priority in Australian higher education. At the University of Technology Sydney we have designed and realised a suite of undergraduate transdisciplinary degree programs, bringing together students, researchers, industry partners, public sector organisations and communities to work together and fundamentally transform university education. At core, students learn generatively as they collaborate with multiple stakeholders across disciplinary practice to create novel possibilities for addressing complex applied problems. In that process, they are supported to develop highly-valued future-oriented capabilities and equipped with the agency to enact personal and social responsibility.

In this paper, I begin to explore how the designing of these educational environments can be explained and understood as (anticipatory) learning. I question how Education might be theoretically conceived as an anticipatory system, in generative learning terms: "a system containing a predictive model of itself and/or its environment, which allows it to change state at an instant in accord with the model's predictions pertaining to a later instant" (Rosen, 2012, p. 313; Poli, 2010).

According to a biologically-based generative learning theory (Schaverien & Cosgrove, 1999), learning can be viewed as an adaptation, hedging our species' chances of survival. From this view of learning as selection, three central characteristics have been distilled which provide a framework in terms of which to examine the nature of (anticipatory) learning: namely, learning is driven by values, a process of generating and testing on these values, and developmental. The selectionist (g-t-r) mechanism of generate – test (on value) – regenerate (Plotkin, 1994) can be understood as a learning and teaching model of six contiguous acts: *exploring* with generation, *designing, making and operating* with testing, and *explaining and understanding* with regeneration (Schaverien & Cosgrove, 2000). A subsequent investigation into (educational) designing yielded a three-part value-selection heuristic of imagining

possibilities, interpreting ideas to form (educational) principles, and distilling quality (Golja, 2011; Golja & Schaverien, 2013). On that account, values provide a mechanism for development (decisions are made on value) but they also take a substantive role (aspirations, curriculum, assessment and evaluations are value-laden). In its findings, the investigation recognised educational designing as a case in point of (generative) learning – one in which the variants being tested are themselves value propositions. Here, the isomorphism of educational designing with learning suggests how the development of these transdisciplinary degree programs could be analysed and theorised as complex feedforward systems.

To be clear, a selectionist account of learning and designing anticipates emergent outcomes, relating imagination to critique, and does not reduce learning to slavish tracking of instructionist practice. It was Bronowski (1973/1992) who presciently recognised "the power of anticipation: the forward-looking imagination" as he explored the root from which all knowledge grows: in essence, we are *Homo prospectus* (Seligman et al, 2016). I conclude speculatively, suggesting the nature of fine-grained investigations now needed to yield insights into anticipatory learning.

Bronowski, J. (1973/1992) *The Ascent of Man.* London: Warner Books.

Golja, T. (2011), *Addressing the Challenge of Educational Design: Insights from Architecture and Architectural Design Education*, Ph.D. thesis, Sydney: University of Technology.

Golja, T. & Schaverien, L. (2013). Developing (architectural) design knowledge: A learner-researcher study. *Art, Design & Communication in Higher Education,* 12(2): 211-227.

Plotkin, H. (1994). *The Nature of Knowledge.* London: Allen Lane.

Poli, R. (2010). The many aspects of anticipation. *Foresight,* 12(3) 7-17.

Rosen, R. (2012). *Anticipatory Systems: Philosophical, Mathematical, and Methodological Foundations.* New York: Springer. (2nd edition).

Schaverien, L. & Cosgrove, M. (1999). A biological basis for generative learning in technology-and-science: Part I – A theory of learning. *International Journal of Science Education,* 21(12), 1223-1235.

Schaverien, L. & Cosgrove, M. (2000). A biological basis for generative learning in technology-and-science: Part II – Implications for technology-and-science education. *International Journal of Science Education*, 22(1), 13-35.

Seligman, M., Railton, P., Baumeister, R. & Sripada, C. (2016). *Homo Prospectus.* Oxford: Oxford University Press.