



Thinking and Learning in the Postnormal Era: How Might we Respond to a Curriculum that Embraced Diverse Perspectives and Contested Issues?

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Abstract

We live in a time of chaos, complexity and contradiction [1]. Where rapid changes and transformations through technology, politics, globalisation and the climate, conspire against normality [2]. These times demand a fresh approach to education, one that provides learners with the thinking dispositions they need to turn challenges into opportunities, to connect their learning to their passions and emerge from their years of formal education as self-navigating life-long learners. This presentation will unpack how such an approach can be embedded into the existing curriculum and encourage dreams of a future curriculum that embraces this type of learning. It will explore strategies for embedding creativity, critical reflection, communication and collaboration into their curriculum. Building on the work of [3] in the domain of self-determination theory, we explore the forces which motivate our learners and provide the drive they require to take charge of their learning journeys. This presentation shares practices implemented by a school building a culture of thinking [4] influenced by the work of Harvard's Project Zero. Using strategies from Making Thinking Visible [5], Agency by Design [6] and Teaching for Understanding [7] we will explore the development of a cohesive learning platform that prepares learners to embrace diversity and develop acceptance and empathy.

Keywords: *learner agency, post-normality, creativity, critical reflection, communication, collaboration.*

These are times of chaos, complexity and contradiction [1] where education is challenged to reimagine how it prepares young people of today for their worlds of tomorrow. Confronted by rapid change from a conflation of transformative forces society appears to be in a state of flux. The grand unifying socio-political stories and underlying structures that we have relied upon in the past seem to have dissolved under our feet leaving us bewildered [8]. The beliefs, values and philosophies which we once relied upon for guidance, trust in reason and science, the valuing of human intellect and our understanding of fundamental political systems have been replaced by volatility, uncertainty, complexity and ambiguity [9]. The exponential acceleration of the capabilities of our digital systems carries with it a transformative potential with far-reaching consequences and opportunities [2]. Similarly, our reliance on technological innovations that emerged during the first industrial revolution is today driving climate change and represents what David Attenborough describes as our greatest threat [10]. "All that was 'normal' has now evaporated; we have entered postnormal times, the in-between period where old orthodoxies are dying, new ones have not yet emerged, and nothing really makes sense." [1 p. 435]

Five forces have combined to deliver this state of flux between stories which adequately informed our responses to societal challenges and our imagining of new stories capable of propelling us beyond these postnormal times towards a new age of enlightenment. Technology, climate change, globalisation, the internet and the dawn of the post-truth era. Each of these forces carries implications for the purposes and practices of education, and none is likely to cease driving change in the near future nor is the pace of change likely to slow. This paper explores technology and the dawn of the post-truth era.

In 1965, Gordon Moore, co-founder of Intel, predicted that the number of transistors and resistors on a chip doubles every twenty-four months and so introduced Moore's Law [2]. Subsequently embraced by the microprocessor industry as the benchmark to be achieved, Moore's Law has become a self-fulfilling prophecy. The human mind does not easily handle the concept of exponential growth behind Moore's Law [2]. Since 1965, based on Moore's biennial cycle of doubling, the capabilities of our microprocessors have doubled twenty-seven times. If we assign a measure of 1 to the capabilities of a 1965 processor, a chip of similar size and cost today would achieve a measure of 134,217,728. By 2031, the year in which our current Kindergarten concludes their formal education, this number climbs to over 8.5 thousand-million. While once we waited for each new processor to come to market in the

hope that it might better meet our needs, today and into the future, we will seek to exploit the opportunities of our extensive computational powers.

In the Industrial Revolution of the 1780s, human labour was replaced by machine power and the workplace was transformed. Workers retrained into the newly created jobs as humans shifted from providing physical labour to low-order cognitive labour. In today's industrial revolution, artificial intelligence (AI), born from the exponential growth in computational power and algorithms that replicate or exceed human cognition is forcing us to re-evaluate our position in the economy [8]. Two examples and a glimpse into the near-future demonstrate some of the implications that AI has for education. In 2011, IBM demonstrated that the human capacity to associate memories with natural-language questions could be replicated by a machine when Watson defeated its human competitors in the game 'Jeopardy' [2]. If education is merely about transferring knowledge from one generation to the next, then Watson reveals that we are developing a capacity that is easily supplanted.

The 1997 defeat of Gary Kasparov, the then world chess champion, by Watson's forerunner Deep Blue, is often heralded as a milestone for computers; however the events of December 2017 trump this in significant ways. The creatively named 'Stockfish 8' was the standing world computer chess champion until it encountered Google's 'AlphaZero'. While 'Deep Blue' required humans to programme it with the moves necessary to defeat Kasparov, AlphaZero learned to play chess the old-fashion way; by playing chess [8]. According to the '10,000-Hour Rule', made popular by Malcolm Gladwell in "Outliers" [11] it should have taken AlphaZero some 416 days to achieve sufficient mastery, but it went from novice to world champion in four hours and used moves considered unconventional demonstrating a level of creativity that might have been considered the realm of only a human mind [8]. If the purpose of education is to teach students to code or solve anything besides the most complex multi-dimensional problems requiring creativity and responsive dexterity, we are wasting our time.

If we believe that matters of the heart or emotional intelligence will separate humans from machines, we might be surprised when the next wave of AI handles this too. Merging machine learning with sensors allowing algorithms to read faces, monitor changes in pulse and body-temperature, listen for changes in our voice and learn our preferences, we unlock machines capable of responding to emotion, with emotion [8].

The post-truth era brings a different set of challenges. Post-truth is defined as "relating to or denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal belief" [12]. "Our beliefs come first; we make up reasons for them as we go along. Being smarter or having access to more information doesn't necessarily make us less susceptible to faulty beliefs." [13 p. 180] and "Experts are vilified as an ill-intentioned cartel" [17 p.8]. A combination of factors, including the rise of social media, twenty-four-hour news and widespread disenfranchisement from our knowledge elites, has led us to a time where reputation [15] and opinion trump wisdom and science [14]. In a world aflood with information, fake news and disinformation have risen to the fore[16]. Now more than ever, our students need to be skilled in the art of discerning truth from falsehood, to be ever questioning sceptics.

For education the challenge of postnormal times is immense and yet now is not the time to advocate despair. In imagining what education might offer our students as preparation for the lives they are likely to live, by seeking an understanding of lifeworthy learning [17], we see immense opportunity. Our perception of what matters in education must change. Mere factual knowledge, mimicry of methods, solving already solved problems, learning in isolation and a belief that education is a phase of our lives that terminates with graduation are ideas we must move beyond. We must look closely at what we emphasise in our curriculum and whether what we focus on is likely to feature in their future lives. "A vision of education that's more "future wise," reflecting our best guesses about what's most likely to happen and foregrounding flexible knowledge likely to inform whatever does happen." [17]

Our children will need a sense of agency empowered by capacities required to activate or perform their intentions [6]. "This entails thinking about the world not as something that unfolds separate and apart from us but as a field of action that we can potentially direct and influence" [4 p. 77]. They must become creative problem finders through learning opportunities that allow them to "sense that there is a puzzle somewhere or a task to be accomplished" [18 p. 95] and respond strategically, creatively and



collaboratively towards solutions devised with empathy and a long-term view of impacts and real-costs [19]. Our students must be shown the value of acquiring deep-understandings through weaving ideas together, going beyond information and figuring things out [4].

This demands that our students are routinely engaged with learning that requires them to do thought-provoking things with what they know, such as considering different viewpoints, reasoning with evidence, uncovering complexity and building explanations [6] [7]. Such complex thinking does not occur automatically, and our students will need to master structures which support this. Visible thinking strategies assist teachers to make deep thinking a routine part of their classrooms and allow them to 'see' the way their learners are engaging with ideas [6]. All learning is a consequence of thinking and schools must transform themselves into "cultures of thinking" [4]. This demands a continual evaluation of the culture that is experienced by students and teachers. We must come to value thinking in all its forms and appreciate that our collective futures depend upon the quality of our thinking.

"The fullest representations of humanity show people to be curious, vital, and self-motivated. At their best, they are agentic and inspired, striving to learn; extend themselves; master new skills; and apply their talents responsibly" [3]. When educators consider how every move they make, every message they send aligns with achieving the fullest representation of humanity, we ensure our children are well prepared for their tomorrows.

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