Teachers and Curriculum

Journal website: http://tandc.ac.nz

ISSN 2382-0349

Published by the Wilf Malcolm Institute of Educational Research

Wilf Malcolm Institute of Educational Research
Te Pūtahi Rangahau Mātauranga o Wilf Malcolm
THE UNIVERSITY OF WAIKATO

Volume 21 Issue 1, 2021

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Editor: *Kerry Earl Rinehart*

To cite this article: Prescott, P. (2021). Creating well-rounded learners or code monkeys? *Teachers and Curriculum, 21*(1), 31–36. https:doi.org/10.15663/tandc.v21i1.379

To link to this volume: https://doi.org/10.15663/tandc.v21i1

CREATING WELL-ROUNDED *LEARNERS OR CODE MONKEYS?*[i]

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Before having a very clichéd epiphany on the Inca Trail that I should change careers and pursue teaching, my experience of New Zealand's education system and curriculum was all from within, and I hadn't given much thought to the structure or aims of it all. While I was a Software Engineer, I'll admit that I held the somewhat arrogant viewpoint that schools weren't doing enough to teach kids how to code. It didn't even occur to me that there might be loftier goals that education would want to reach for. What follows is more than an assignment. It's a documentation of how I've transformed from a very segregated, industry focused way of thinking, to a deeper appreciation of *The New Zealand Curriculum for English-medium teaching and learning* (*NZC*) (Ministry of Education [MoE], 2007), and how the principles, values, and learning areas all work together to create a cohesive framework to build up our children for the challenges (and joys) the future is bringing us all.

Curriculum through the lens of industry

From around intermediate school, I slowly started to become aware of education as a tool for the country's economic growth. The questions began rolling in from the teachers: "What are you going to do for a job when you leave school?" The questions started to come in from the students as well: "Why are we learning this?" And the answers were almost always to do with being able to make money when you were older. At the time I mostly took it from a capitalist point of view that we were being primed for our own individual success. But after maturing and entering the IT industry (a high growth area), and hearing the constant cries of "We need more students coming through", I began to realise that IT was being sold to students as a way for individual success, when really it was the businesses that needed students for greater growth and, as you could argue, the greater economic good.

From inside the IT industry, you would have thought that web and software development was the second coming of Jesus. Learn it and you'll be #blessed for the rest of your life! Why isn't everyone studying it? Look at all this money and all you need is a computer and Internet connection. Kids love those things! What's happening? Ian McCrae, founder of Orion Health (healthcare software), a man who is undoubtedly a tech giant in our small land, has been quoted saying: "You should be looking at this as a great career opportunity. The jobs are very well paid" (CIO New Zealand article about how the tech industry wants the MoE to step up its game when it comes to IT) (as cited by Paredes, 2017). This isn't necessarily a case of IT vs. MoE though. Orion Health is one of many IT companies walking the talk and providing extra education and resources to schools in the hopes that this will increase the output of future developments from the education system.

In most situations you expect the curriculum to gently flirt with industry and give small nods to industry concerns in policies. The 2002 stocktake of the previous national curriculum mentions that it's reviewing the curriculum in the context of the current economic climate. Even though the stocktake has a heavy focus on cultural issues, it still recommends that the Achievement Objectives should reflect the future-focused theme of enterprise and innovation (MoE, 2002). It's not explicit, but it's there. What's happening now with IT though is the other way round as a full-on courtship of the curriculum by industry. As part of the New Zealand Government's *Curious Minds* plan, and after months of review

[i] Editor's note: The third of five articles written by beginning teachers about the New Zealand Curriculum (NZC, MoE, 2007) reprinted in the original order (see https://www.tandc.ac.nz/tandc/article/view/286). This series of five is followed by two new invited commentaries especially for this issue.

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ISSN: 2382-0349
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with industry, Minister Hekia Parata announced her intention to introduce Digital Technology as a strand within the Technology Learning Area (New Zealand Government, 2016). Industry leaders think this is too little, and it took too long. In an open letter to the Minister, our friend Ian and a couple of other IT moguls, suggested that Digital Technology should actually be moved out of the Technology Learning Area and be treated as an academic subject on par with Maths and Science. They have a genuine concern that a lack of students coming through will stunt New Zealand's tech sector growth (McCrae et al., 2017). While it may be naive to think that industry has never courted curriculum before, I haven't been able to find any evidence of such a blatant and direct play for the curriculum as taken by IT in New Zealand.

What is a 21st century learner?

> If we're not just trying to teach factual recall like we often did in the past, what are we trying to do? Well, I guess we're trying to teach higher level skills. We're trying to teach critical thinking. We're trying to teach synthesis, analysis. We're trying to raise a generation that are cleverer than we are (Parsons, 2013).

There's a great clip of Dr. David Parsons introducing the notion of teaching 21st century learners (Parsons, 2013). The development of the Internet and increases in processing power has reduced the need to memorise information, seeing as we are now almost never without a world of experts in our pockets. There's a not at all academic funny video of Eddie Izzard talking about life before Wikipedia and how if no one around you knew the answer to a question, then instead of going to a library and looking it up you would probably just forget about finding the answer all together (Izzard, 2012). When you take out the need for rote-learning, what do you replace it with? In order to create this generation of world-changers, we need to teach them analytical skills, the ability to work with and relate to others, and how to use all the tools available to them.

This move towards a more connected and empowered citizen is well represented within the Values, Principles, and Vision of the *NZC*. In the Vision section of the curriculum, the Ministry of Education (2007) states that it wants to create young people "who will seize the opportunities offered by new knowledge and technologies to secure a sustainable social, cultural, economic, and environmental future for our country" (p. 8) and "who will be confident, connected, actively involved, and lifelong learners" (p. 8). A Future Focus is listed as a principle underpinning curriculum decisions, which involves encouraging students to explore "sustainability, citizenship, enterprise, and globalisation" (MoE, 2007, p. 9). And in terms of what we want students to value, we have "innovation, inquiry, and curiosity, by thinking critically, creatively, and reflectively" (MoE, 2007, p. 10) and "community and participation for the common good" (p. 10). It seems there are two key traits that we are trying to instil in learners—critical thinking and connection to the community.

Dealing with the outbreak of pseudoscience

There are all kinds of issues facing the global community alongside all the benefits gained by the rise of the Internet. One just needs to look at the recent US election and how Facebook went from a website to share pics of your cats, to a site where you can spread misinformation and propaganda. All of which has prompted Facebook to develop measures to avoid fake news (Hunt, 2017). But the damage is done, and now we're all stuck wondering when Ashton Kutcher is going to jump out and tell us all that we've been punk'd (if only). We need to prepare our students to deal with the mass of information available to them.

As well as the spread of fake news, the Internet has also facilitated easier distribution of pseudoscience. Before, if we wanted to keep things civil when socialising, people would say, "Never talk about politics or religion." These days though, you should probably add vaccinations to the list! In 1998 Andrew Wakefield and his colleagues published a study with a small sample size of 12 that suggested that the MMR (Measles, Mumps, and Rubella) vaccine caused autism. Afterwards, studies were published that refuted the study, and Wakefield and his colleagues were found guilty of fraud in regard to falsifying

data used in their study. Despite all this, scientists have still ended up spending huge amounts of time and money conducting studies to prove that vaccines do not cause autism (Sathyanarayana Rao, & Andrade, 2011). 'Anti-vaxxers' is the colloquial name given to people who, despite all the overwhelming evidence against it, believe that vaccines cause autism or some combination of illness and death, and so refuse to vaccinate either themselves or their children. All of which has serious consequences for those relying on herd immunity. This rise of vaccine refusal is associated with a higher risk of contracting measles amongst both the non-immunised and fully immunised individuals (Phadke et al., 2016).

I know that it seems that we are getting way off the beaten track here. What part does the curriculum play in all this? This is a very real thing that our children have to face. Sure, it's the adults that make the decisions, but it's the children that get caught up in the quarantines, outbreaks and bans throughout our playcentres and schools. And then once they've grown up, depending on how this plays out, they'll be the ones trying to make the best decisions for their children. For arguments sake let's think about how a child raised through the New Zealand curriculum might tackle this issue as young parent—raising a child in amongst the controversy. The Mathematics and Statistics Learning Area teaches students to interpret statistical information, evaluate data-based arguments, and deal with uncertainty and variation as well as giving them the opportunity to design an investigation of their own (MoE, 2007, p. 26). So, if our hypothetical parent had looked at the original study and seen how poorly it was designed and how it had such a small sample size, right off the bat it would have introduced some scepticism about the validity of the study. The job of teaching critical thinking shouldn't rest solely on subjects like maths and science, however. A study was done to see if explicitly teaching critical thinking in a tertiary level History course would reduce belief in pseudoscience. The students already had pretty low belief rate in pseudoscience before taking the course, but it dropped further for students after the course, with the honours students with some background in science experiencing a greater drop (McLaughlin & McGill, 2017). Which just goes to show that when you take a multidisciplinary approach to teaching critical thinking, you'll get the best effect.

Lucky for us, the Ministry of Education's (2007) *NZC* has weaved critical thinking throughout the learning areas. Through the English learning area, students will "understand the ideas within language contexts" (p. 10). Through Learning Languages students will gain "the cognitive tools and strategies to … increase their understanding of their own language(s) and culture(s)" (p. 24). Through science students learn "how science ideas are communicated and to make links between scientific knowledge and everyday decisions and actions" (p. 28), and through the social sciences learning area the student will have learned about past events and experiences as well as how to use a social inquiry approach to gather and process information. The social inquiry part of the social sciences is key here, as its aim is to enable a deeper understanding within students of the community around them (Wood, 2013). All of these statements reflect the key competency of *thinking* that enables students to "reflect on their own learning, draw on personal knowledge and intuitions, ask questions, and challenge the basis of assumptions and perceptions" (MoE, 2007, p. 12). For our theoretical student navigating the vaccination controversy, it is through a combination of the learning areas' knowledge and skills that they would be well equipped to make sense of all the information flying at them as well as then effectively communicating their findings to peers and fellow parents, perhaps themselves acting as a vaccine against pseudoscience.

Fostering community in a digital world

Aside from critical thinking, there is a strong focus on community in the front of the *NZC*. Again, along with all the treasures the Internet has introduced to our modern lives, we've gained new challenges. A study of how internet use related to happiness, social support, and introversion, showed that heavy internet use in the entertainment domain (gaming etc.) was related to a decrease of a person's perceived social support as well as a higher likelihood of introversion (Mitchell et al., 2011). Youths with depressive-like symptoms are two and a half times as likely to use the Internet at school compared to home use, which might suggest that these individuals are choosing to spend time on a computer instead

of interacting with their peers (Ybarra et al., 2005). To further that, even when we are having face-to-face conversations, the presence of a mobile device during the conversation results in less fulfilling conversations as well as the participants in the conversation experiencing less empathetic concern (Misra et al., 2014).

If that wasn't depressing enough, we have a new breed of bullying. There has always been bullying in our playgrounds, it's often just viewed a part of growing up. Now though, you don't need to be face to face with your bully or at school to be harassed. Thanks to the Internet you can now be antagonised 24/7. The Internet is lauded as a social equaliser; the idea being that everyone's voice has the same weight, and that the anonymity of it can empower those who have no power in traditional society. This is lovely to think about, but humans use the Internet, and so the landscape of the online world is still a very human place to be. The 'empowering' nature of the Internet is having an interesting effect on the demographics in relation to cyber bullies compared to traditional bullies. Victims of traditional bullying are "significantly more likely to harass others in online environments" (Ybarra & Mitchell, 2004, p. 332). They may be powerless in the physical world, so they use the online world to gain that power back.

Schools have domain over their playgrounds but not the Internet. Policies aren't going to save these kids. There is a lot of support in the curriculum, however, that when enacted, could contribute greatly to providing students with a framework and state of mind to maintain a real sense of community on and offline. The key competencies are full of skills that will help students maintain their respect of others no matter the forum. Under the *Using language, symbols, and texts* competency, students "recognise how choices of language, symbol, or text affect people's understanding and the ways in which they respond to communications" (MoE, 2007, p. 12). Within the *Relating to others* competency, students become "aware of how their words and actions affect others" (MoE, 2007, p.12). The *NZC* also recognises that students "who participate and contribute in communities have a sense of belonging and the confidence to participate within new contexts" (p. 13). Across all learning areas there is great opportunity to teach and demonstrate those key competencies. An education in the arts "explores, challenges, affirms, and celebrates unique artistic expressions of self, community, and culture" (MoE, 2007, p. 20); through health education students will learn to "contribute to healthy communities and environments by taking responsible and critical action" (MoE, 2007, p. 22); through studying the social sciences students develop the skills to "better understand, participate in, and contribute to the local, national, and global communities in which they live and work" (MoE, 2007, p. 30); and in technology students will "come to appreciate the socially embedded nature of technology" (MoE, 2007, p. 32).

The future is here, but it's not all depressing news

Coming back to Dr. Parsons' optimism for the next generation, sure there are a whole lot of new challenges facing our children, but we have a curriculum that not only combats these issues but makes use of our new global village. Ian McCrae (Orion Health) thinks that what students need to develop the skills necessary to face the future is locked within IT. While yes, IT is a big player in our economic and social futures, the ability to code is just a small bit of it. Ian isn't an educator or educational theorist, which makes his desired influence over the curriculum a little bit worrisome. Rather than Ian, John Dewey and Paulo Freire are a couple of theorists whose ideas we see reflected in the curriculum. Both believed that education could be used to create social change, although Freire takes it a bit further than Dewey by believing that educators should also address inequalities in the classroom as well as in wider society (Singer & Pezone, 2003). Historically throughout the Aotearoa New Zealand education system, there have been disparities of treatment and achievement between Māori and Pākehā. In light of this, the *NZC* acknowledges The Treaty of Waitangi as a founding document of the nation and lists it as a principle that contributes to the foundations of curriculum decision making, along with the cultural diversity principle which states the curriculum "…values the histories and traditions of all its people" (MoE, 2007, p. 9). To complement this, teachers are required to be proficient in the cultural competencies laid out in *Tātaiako: Cultural Competencies for Teachers of Māori Learners* (MoE, 2011). If educators themselves are addressing these inequalities that are unique to us locally, and their students

themselves are part of using education to address issues, then it puts young citizens in good stead to take those same principles to the global stage.

The educational theorist Vygotsky appears to have influenced the *NZC* decision-making. Vygotsky believed that sociocultural processes have a key part in individual development and coined the term 'zone of proximal development' that relates to a child's current development and the distance to potential development as determined by working with a peer of a higher ability level (Penuel, & Wertsch, 1995). *Facilitating shared learning* is listed under the effective pedagogy section of the *NZC* and explains that students "learn as they engage in shared activities and conversations with other people, including family members and people in the wider community" and that as "they engage in reflective discourse with others, students build the language that they need to take their learning further" (MoE, 2007, p. 34).

Before I started studying education, I would have completely backed Ian McCrae in his opinions—Vygotsky, Dewey, and Freire be damned! The big picture would have been lost on me. Had I been given the platform, I would have passionately advocated for computer science to become a subject in its own right, with little to no thought about the kind of citizen we might be creating. I do see where Ian McCrae's coming from, and by no means do I mean him to be held up as an example of what's wrong with the current relationship between education and industry. There are some good ideas from his camp that should be explored. In actual fact I admire him for actively pursuing what he thinks will benefit kids, and I've seen first-hand the difference he's made in people's lives. So, Mr. McCrae, if you do by some crazy chance end up reading this, I apologise for using you as a backboard for my ideas to push off from, and I hope that you keep campaigning for what you believe is right, because I think we can count ourselves lucky to live in a country where entrepreneurs and industry are concerned about our future and act on those concerns.

Walking around with the world's libraries in their hands is only going to take our young people so far when it comes to dealing with the issues we've left them. But with the pedagogies supplied to our teachers reflecting the ideas of Vygotsky, Dewey, and Freire (among others I'm sure), I think we're in a good position to bolster our students with critical thinking, a sense of community, the ability to collaborate with each other to develop further, and a respect for others' cultures and values. I think the future's looking bright for our young people, and for the rest of us as well because, let's face it—everyone's future is on the line when it comes to education.

Pascale Prescott biography

After abandoning a degree in physics for another in computer science, I completed my Bachelors from the University of Auckland at the end of 2010. Before I sat my final exams, I'd already accepted a job offer at a large local software development company. This started me on a six-year journey of job title hopping—from Software Engineer to Information Security Analyst, then, after a brief hiatus taken to study design, to Web Developer and eventually Web Designer. I had Project Manager set in my sights as a title to add to my collection when I had a quarter-life-crisis style epiphany that the IT industry wasn't fulfilling me anywhere near as much as my side job as a Pole Dance Instructor. It wasn't the dance part that made it so satisfying, it was the teaching. So, to the surprised and mildly confused reactions of friends and relatives, I gave up a job with perks so good (you would think it was with Google), to study teaching. Even though it's still early days, this is by far the most challenging but most rewarding career decision I've made so far.

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