



Article

Speculative Futuring: Learners as Experts on Their Own Futures.

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Abstract

Anticipating the challenges of a range of possible futures is a daunting task. To future in a way that includes the voices of an increasingly diverse population of learners adds a complexity to learning design. While extensive research is available to inform learning design that is future focussed, the learner's voice remains largely absent. We propose a method to capture learners' voices as the experts in their own futures and introduce the concept of a Speculative Alignment between those futures and learning design. We expect this co-design approach, based on speculative design concepts, to support the design of future focussed learning experiences.

Keywords

Learning Design, Learner voice, Heutagogy, Education Foresights, Futures Design, Speculative Design

Introduction

Humans have created androids that are incredibly human like as a workforce to serve mankind. The androids are conscious of their own being and intelligence to an extent similar to human awareness, and they are evolving emotionally. To maintain the status quo of the human /android hierarchy the androids have been programmed to retire after four years of work. A specialised policing unit has been established to control uncompliant androids. The difference between the emotionally evolving androids and humans is becoming increasingly blurred. The year is 2019, this is Blade Runner and this was speculative futuring in the 1960s (Scott, 1982).

Today (April 2021), as the global death toll from COVID-19 approaches three million people, most of us sit in various states of lockdown in response to the challenge of the reality of 2019 (*Confirmed COVID-19 Deaths*, 2021). In the 1960s when Philip Dick sat down to write the story we now recognise as Blade Runner, he may well have viewed our current situation as equally speculative as the dystopian future portrayed in his novel (Dick, 1968). So, on reflection how can we prepare for the range of future tomorrows we may face?

As Kesson (2020) suggests education is at the heart of the future, and learning is the path from which the new human will emerge. It is the role of the Learning Designer to create the opportunities that will prepare us for that future. Yet the design of learning today is still anchored in the application of reductionism to knowledge, understanding, and capabilities in order to deliver the human capital needed in an economy driven by embedded neoliberalism- the "economisation of curricula" (Savage, 2018; Wheelahan, 2012). Therefore, the question tugging at the sleeve of the learning designer today must be whether the learning being designed today provides enough value in the future of our learners- the new humans in the new world. In other words, has the learning been designed to be relevant for a world long past COVID19?

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It is fair at this stage to question whether those designing the learning are best positioned to speculate as to what those futures might look like. It is also contestable as to whether learners themselves are any better placed to speculate about the future (Kirschner & van Merriënboer, 2013). However, we have ample evidence from de-colonisation of curriculum, feminist curriculum, and other emancipatory and participatory approaches to expect a more equitable outcome with increased learner participation (Mackinlay & Barney, 2014; Nouri & Sajjadi, 2014; Revelles-Benavente, 2017; Sallah, 2020). Surely, the learners' perceptions of their own future should be a dominant design consideration? While heutagogy has provided design principles to place the learner in the driving seat of learning in the here and now (Blaschke, 2012), there is little evidence of it being explicitly linked to futuring.

So, how can learners be placed to drive their own learning towards the range of futures they envision? This article offers a means for learning designers to respond to this question by drawing on Future Studies methodologies and Speculative Design. It begins by describing and situating speculative futuring in the context of learning design, and then in the context of a specific programme. The programme is a post disciplinary bachelor's degree based on heutagogical principles and enables learners to shape their study around their desire to lead change and make a difference- The Bachelor of Leadership for Change. The application of a method to allow a group of learners to create foresights about the range of futures they see will impact upon them is then described. The concept of Speculative Alignment is then introduced and used to examine the extent to which the foresights aligned with the design of the programme in which the students are enrolled- recognising the learners as experts in their own futures.

What is Speculative Futuring?

Futuring as a verb has emerged as a mainstream concept, with a rapidly expanding body of work to support it in scientific, social and more popularist research (Amer, Daim, & Jetter, 2013; Damm, 2019; Inayatullah, 2012; Puglisi, 2001). The themes of exponential growth, artificial intelligence, universal basic income, extended life expectancy, climate change, indigeneity, equity and increasing anxiety about the future in general are all being explored through various forms of futuring or future studies approaches (Guthrie, 2019; Inayatullah, 2017; Kurzweil, 2004; Makridakis, 2017; Van Der Well, 2018).

There have been a broad range of approaches to futuring (Bawder & Reichenbach, 2010). Some see futuring as somewhat deterministic and dependant on one's understanding of change on an exponential curve (Diamandis, 2018; Kurzweil, 2005). It can be a predictive and predominantly quantitative activity based in the extrapolation of insights from current data trends into the future. Challenges are addressed through complicated models to describe an expected outcome.

In contrast, others adopt a more speculative approach to futuring that can be based upon foresights from creative scenarios and the application of critical design principles (Bardzell, Bardzell, Forlizzi, Zimmerman, & Antanitis, 2012). Challenges are recognised as complex, interrelated and dynamic (Snowden & Boone, 2007). The idea of creating conceptual distance between the current world and future scenarios, is key to the freedom and creativity needed to sculpt novel futures. As Inayatullah suggests, distancing provides the "link between post-structural thought and future studies" (2012, p. 44). The multiplicity of possible, probable or preferred futures is embraced. The bridging between the present and those futures is more likely to be a process of backcasting than extrapolation (Dreborg, 1996; Höjer & Mattsson, 2000; Soria-Lara & Banister, 2017).

While there are great examples of communicating speculative futures in business reports or academic articles, there are a broad range of channels used to communicate visions of the future

(Auger, 2014; McGuiness, Henley, Foster, & Perquin, 2008). *Black Mirror*, *Black Panther* and *Blade Runner* are all examples of future fiction portraying utopia or dystopia in a speculation of possible futures (Brooker, 2011; Coogler, 2018; Scott, 1982). Indeed, much speculative futuring sits in the grey lands between art and design, bounded on one edge by fantasy (Dunne & Raby, 2013). By drawing on the engaging richness of art our understanding of the potential futures moves beyond the cognitive and becomes increasingly visceral. This manifests in concepts such as transgenerational empathy, where we can viscerally connect to a range of futures as the potential ancestors in those futures (Wallach & Zaki, 2019).

In this article, the act of Speculative Futuring is characterised by the application of critical thinking to generate new evaluative questions. It is not tied to what we know of today or yesterday, but rather what we can imagine for a range of tomorrows. The same range of tomorrows that today's learning should be designed to prepare us for. To explain the application of speculative futuring to Learning Design is necessary to establish a clear definition of Learning Design and how it related to Speculative Futuring.

What is Learning Design?

While Learning Designer is a job title, the process of designing learning is embedded in many different roles. These roles include, but are not limited to, Instructional Designer, Lecturer, Curriculum Designer, Learning and Development Manager, Curriculum Leader, Learning Architect, Chief Learning Officer, Training and Development Advisor, and Learning Strategist. Learning Designer is a contemporary term that is applicable to a broad range of pedagogical and organisational approaches (Conole et al., 2004). The emphasis is deliberately placed on the learner, rather than the instructor (Dalziel, 2015).

The origins of learning design spring from the instructional design methodologies developed by the US military to transfer skills and knowledge in the quickest most replicable way possible- a reductionist approach supported predominantly by behaviourism (Case & Bereiter, 1984). Today's corporate world and education sector require learning designers who understand how to create learning experiences that make the development of knowledge, skills and capabilities engaging, interesting, productive and directly relevant (Malamar, 2017). Learning experiences increasingly need to be available on demand, asynchronously and online. This is a complex dynamic environment, subject to significant technological disruption (Bodinet, 2016; Boud & Solomon, 2018; Chattopadhyay, 2016; Diamandis, 2018; Hartley, 2007; LeBlanc Vaughan, 2016; Scott, 2015).

Whether designing learning as part of a broader role, or in the context of a centralised specialised unit, it is clear that the role of the Learning Designer is bound to evolve at a rapid pace (O'Brien, Hartnett, & Rawlins, 2019). Core to this change is a progression from designing instructor-led and content-led learning, to learner-led learning. While the term pedagogy still prevails across all education sectors its original intent was to describe the process of learning at different stages of human development (Mortimore, 1999). Two further 'gogies' are more relevant to the trend toward learner led or learner determined design- andragogy and heutagogy. Andragogy describes the process of learning where the learner can lead the *when*, *where* and *how* of their own learning (Davenport & Davenport, 1985; Holmes & Abington-Cooper, 2000; Merriam, 2001). Heutagogy takes the progression one step further in that the learner can determine the *what* and *why* of their learning (Agonács & Matos, 2019; Banerjee, 2019; Blaschke & Hase, 2016; Mann, et al., 2017; Narayan, et al., 2018).

It is this trend towards a co-design of learning, where the learners can determine the learning to

the same or greater extent as the designers, which prompts questions about how learning is designed to be relevant to the future- who's visions of the future is it being designed for?

What Could Speculative Futuring Offer Learning Design?

There has been considerable work to support the integration of futures thinking capability into learning experiences and learning outcomes, but not into the learning design process itself (Chen & Hsu, 2020). When Dunne and Raby (2013) proposition the idea of *Speculative Everything*, they include art that communicates images of the future, fiction that presents dilemmas of the future, and product designs which inform prototypes for the future, but they do not include learning design that prepares learners for the future.

The integration of foresights from speculatively designed futures offers several potential benefits to the current practice of learning design. Just as the principles of design thinking have had an uplifting effect on perceptions of the discipline of learning design, applying the ideas of speculative futures design has the potential to further uplift perceptions so that learning design can stand alongside other design disciplines (Cochrane & Munn, 2020). Integration of speculative futures design and learning design could go some way to addressing this. This may be particularly important where learning is intended to be to some extent emancipatory (Freire & Freire, 2004). The Korekorenga-Future Making model is a good example of the decolonisation of learning design through the integration of foresights and futuring practice (Māori Futures Collective, 2019), and Milojević and Inayatullah (2018) provide an example of applying the six pillars approach of future studies to inform workforce learning design for Australian Aboriginal peoples. These are however isolated examples and do not represent a fundamental change to the process of learning design.

The integration of Speculative Futuring also speaks to a need for wider revisions of what learning design is- *The new rules of learning design* (O'Brien, 2018). This revision is based on responding to three core challenges: the growing tension between compliance and the need for individualised future-focussed learning, the exponential rate of change in education, and the need for learning experiences to be fit-for-future-purpose including supporting sustainable development.

How Can We Create Foresights for Learning Design?

In this section we will extend the relationship we have proposed between speculative futuring and learning design, and propose a method of generating foresights. A case study of a future focussed change leadership programme at a New Zealand Vocational Education College (The Bachelor of Leadership for Change) is used to illustrate this method.

The Bachelors of Leadership for Change (BL4C) was in its second year of delivery. As part of the ongoing developmental evaluation, staff wanted to understand if the learning design process had adequately addressed the needs of the graduates for the range of futures they envisioned (Malcolm, 2020; Mann, et al., 2017).

The method used to create the foresights was influenced by Participative Action Research, which is common practice in the disciplines of Scholarship of Teaching and Learning, and Futures Studies. Both disciplines sit comfortably in a pragmatic research paradigm (Chevalier & Buckles, 2019; Divan, et al., 2017; Inayatullah, 2012, 2017; Mayo, 2003; Neck & Corbett, 2018). Figure 1 provides an overview of the method followed.

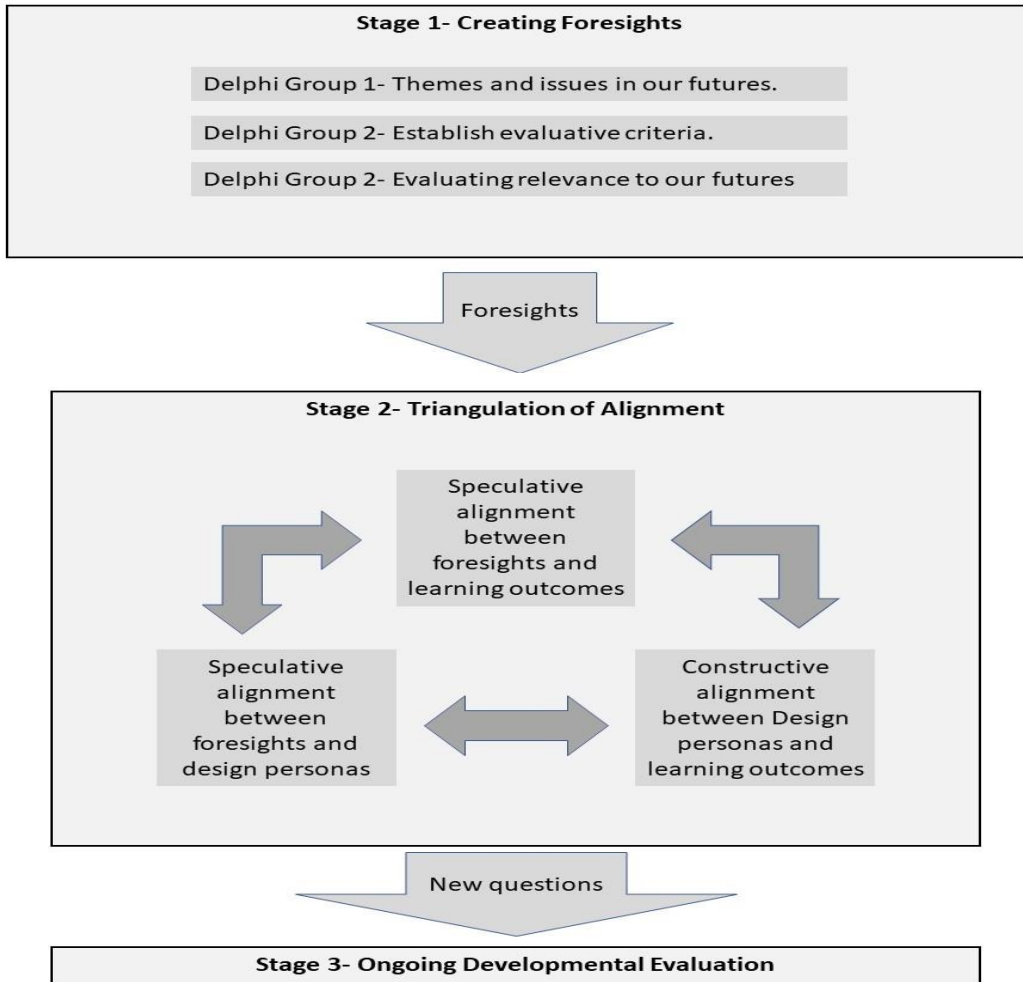


Fig 1: Process of creating and using foresights to inform the developmental evaluation of the Bachelor of Leadership for Change.

A group of current learners volunteered to take part in a futuring exercise in the understanding that their contribution would be used to inform adaptations and further development of the programme. The fact that they were seen as the experts in their own futures was explicit in the information distributed to recruit volunteers. The group generally represented the population of the learners on the programme in terms of age and gender, but Māori and Pacifica learners were less well represented.

The Delphi method, developed by Helmer (1967) to gain foresight onto how future technology

may influence war. Delphi groups take many forms, and have been used in a range of participatory research on the future of education (Géring et al., 2018). The common characteristics are that of a facilitated expert group, with the objective of reaching a decision or consensus. The Delphi method used is an example of participatory action research intended to develop concepts of a range of futures based on what Inayatullah refers to as “deep participation” (2012, p. 45). The twelve participants in this study took part in a three stage Delphi process over a four-week time period. Each stage involved a facilitated group discussion and a small amount of preparation for each session.

Prior to the first stage the participants were supplied with a range of text, video and audio (podcasts) resources from a wide range of perspective to prime them for thinking beyond the immediate future.

The first stage was focussed on the participants describing the future themes or issues that they thought would be significant in their perceived futures. No specific temporal range was prescribed, but most discussion related to futures beyond twenty years. The researchers acted as facilitators for this group discussion by providing priming questions and collating the themes as they were identified. Intervention in the discussion by the facilitators focussed on maintaining focus on long term thinking rather than short term operational considerations. Between the first and second meeting the researchers edited the collected themes, deleting duplicates, making the collated list easier to read, and adding it to a shareable spreadsheet.

The second stage began by revisiting the themes identified in the first stage. Some additional themes were added. A summary reflecting these emerging themes was prepared by the facilitators and approved by the participants with some amendments to better represent the conversation. The conversation then turned to what evaluative criteria the learners felt would be useful to differentiate the most significant issues and themes in their futures and how could those criteria be applied. This led to a discussion around how paradigmatically challenging ranking the significance of the themes was for many of the participants.

The criteria created by the participants were described in three levels which was based on Mang & Reed. (2014), to what extent will the issue or theme impact at an individual level or a whole systems level? Secondly, to what extent is the issue or theme based on assumptions about the future? Thirdly, to what extent will the issue or theme have a significant impact on happiness?

The facilitators again prepared the notes from the second stage and updated the notes from the first stage for ease of use in the final meeting. Participants were asked to prepare for the final stage by individually sorting themes into levels of significance based on the criteria they developed as a group. The levels of relevance (which the participants developed themselves) were Highest Relevance, Strongly Relevant, and Relevant.

The third stage focused on the participants creating foresights based on what the most relevant themes will be in the range of futures they envisioned. The foresights were then formatted and shared with all participants to confirm agreement. Within each category there was no hierarchy of how relevant each theme was in relation to the other themes within that same category.

Foresights into the themes that were seen to have the **highest relevance** were:

- Reconciliation of indigenous and colonial value clash/history
- Increased impact of artificial Intelligence/automation
- Paradigm shifts around value and trust leading to the adoption of a more critical view
- The Increased resilience needed due to increased uncertainty

Foresights into the themes which were seen as **strongly relevant** were:

- The diversity of perceived futures will expand
- There will be a short fall of specific skills for living more locally
- We will reimagine value of work

Foresights into the themes which were seen as **relevant** were:

- There will be increased flexibility and range of work options that are less full time
- Aging community
- Replacing the social function of work
- The variety of ways of learning and knowing will increase

Several themes that were initially identified were not seen as relevant and therefore not considered withing the foresights generated through the Delphi process.

Given that the Bachelor of Leadership for Change programme has a relatively small cohort size (less than 20) and actively recruits learners who are open to see and lead significant change for the future, it is likely that the responses that led to these foresights are not reflective of the wider population. However, they can be seen as generally reflective of the learner community in the programme. It is also possible that the material supplied to prime the learners has directed some of their responses. The material was re-examined and was seen to provide a broad range of themes and approaches which did not appear to have pre-determined the foresights the learners developed.

Integrating Foresights into Learning Design- Introducing Speculative Alignment

Despite some influence from complexity (Mason, 2008; Mayo, 2003; Ng & Lee, 2014; Snyder, 2013) and ecological thinking (Bronfenbrenner, 1979; Ryn & Cowan, 2013; Wahl, 2016), learning design remains a largely linear and sequential process that has not strayed far from the constructively aligned, step by step, waterfall approach (Branch, 2009). Constructive alignment is an outcomes-based approach to teaching in which the learning outcomes that learners are intended to achieve are defined before teaching takes place (Biggs, 1996; Kandlbinder, 2014). Constructive alignment locks the sequence from one design step to the next, linking progressively more reduced units of learning back to higher level outcomes. At one end of the process is the gap or needs analysis that provides design insights, and at the other end the activities that will close that gap or meet those needs. Figure 2 illustrates the main stages of the design process used to develop the Bachelor of Leadership for Change (Mann, et al., 2017).

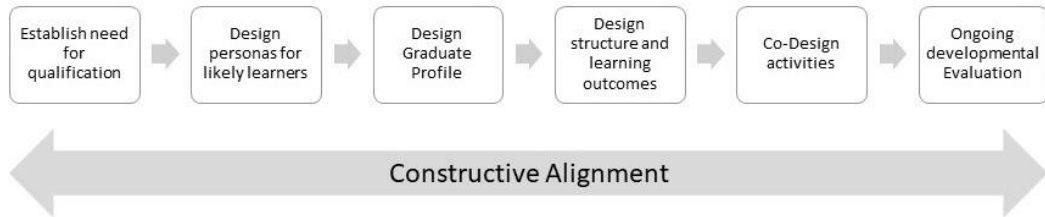


Fig 2: Constructive alignment in design process

As described by Mann et al. (2017) the design process included the development of personas to describe a range of possible learners, their motivations to study, and their expectations of career pathways. These personas were developed iteratively and in collaborating with over 300 change-makers from a range of sectors and countries. Figure 3 is one example of the design personas. The personas directly informed the graduate profile outcomes and were used to hypothetically test the risks and benefits for future learners as the structure and learning outcomes were designed. Based on the principles of heutagogy, the assessment and learning activities were co-designed with learners through an individual learning agreement. This strong emphasis on co-design meant that learners already had an expectation that they would be directly involved in influencing the iterations of design in this programme, more so than in a typical higher education programme.


<p>Piri Purpose</p> 	<p>Piri has a clear mission—they can see what needs fixed. They are wanting to develop a very specific skill set and know where they expect to apply it. Their first jobs re likely to include Entrepreneur, Community Support Worker, or Policy Analystist. Their dream roles include Community Development Consultant, Sustainability Consultant or Member of Parliament. The broadening of experience they may need in their first year might create some frustration as they want to get on with the specific task they have in mind. One risk they may face in the course is early channelling leaving them exposed if their mission changes. They may need some support in working with peers who have not yet defined the change they want to make.</p>
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Fig 3: Example of a Bachelor of Leadership for Change design persona

In a review of the first year of delivery the characteristics described in the personas were seen to closely match the characteristics of the first cohort of real students (O'Brien, 2019). This was a positive indication that the learning design created based on the personas was likely to be relevant to the actual learners, and that the marketing based on the personas had been effective. However, there was no mechanism to examine whether the learning design aligned with the learner's expectations of the future. Armed with the foresights developed in the Delphi groups two opportunities were identified where foresights could influence the design. The first being through the examination of the personas, and the second being the examination of the learning outcomes. This could then inform the ongoing developmental evaluation of the programme.

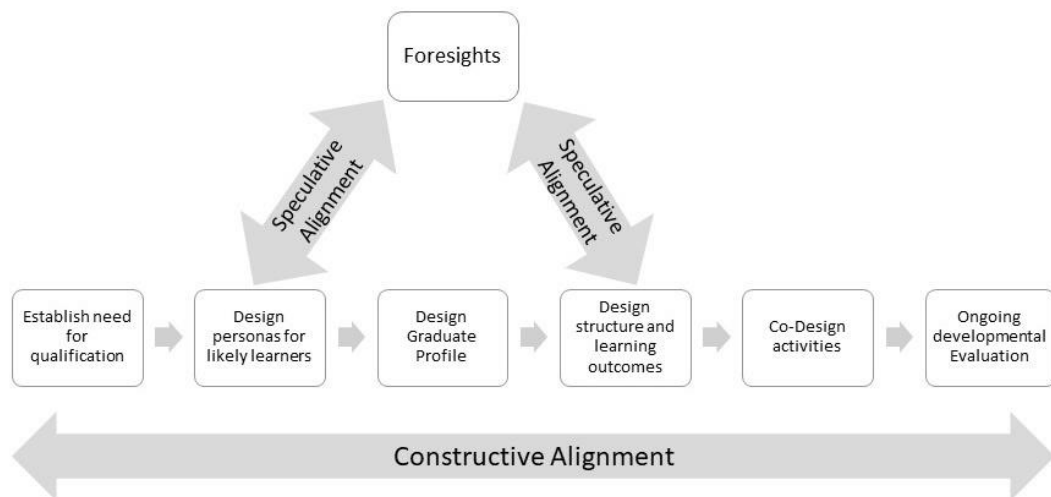


Fig 4:Integration of futuring through speculative alignment

As illustrated in figure 4, this integration is not through the strong linear logic expected of constructive alignment (Biggs, 1996; Wang, et al., 2013). Instead, it embraces the ambiguity, multiple possibilities and uncertainty of speculative futuring (Auger, 2013). It was not possible to find a term commonly used in learning design that adequately recognised this type of relationship. Therefore, to differentiate this alignment from constructive alignment the term *Speculative Alignment* has been adopted. The intent is not to claim the same level of descriptive or causal relationship implied by constructive alignment. Speculative alignment is intended to provide a tool for reflection upon the design, generating questions and discussion. It is generative rather than descriptive. The validity of the alignment being based upon the “critical capacity of individual stories” being shared by learners.(Galloway & Caudwell 2018,p.88)

Speculative Alignment with Learning Outcomes

The Bachelor of Leadership for Change is made up of a series of courses over three years of study. Each course has several learning outcomes. These learning outcomes are all mapped to the graduate profile which was largely based upon the insights generated in the design process- strong constructive alignment. The same mapping process was used to map every learning outcome against every foresight generated by the Delphi groups. This mapping was done by speculating about the alignment of the learning outcomes with the foresights generated in the Delphi groups. The strength of alignment was indicated by a score from 1-3 as follows:

1. This learning outcome has some tangential relevance to preparing the learner for the future they see.
2. This learning outcome is relevant to preparing the learner for the future they see.
3. This learning outcome is highly relevant to preparing the learner for the future they see.

For example, the third year learning outcome that expected learners to be able to “Integrate cultural competencies into their professional practice as they apply to the bicultural context of Aotearoa New Zealand and the Treaty of Waitangi” was seen as highly relevant to the foresight that

that there will be a reconciliation of indigenous and colonial value clash/history. The strength of speculative alignment therefore scored a 3.

Each learning outcome could align with more than one foresight. The scores were then summed for each year of the programme. As there was a higher number of learning outcomes in years one and two than in year three, the scores were expressed as a proportion of the alignment for each year. This allowed comparison of the emphasis on each foresight across the three years of the programme. Figure 5 illustrates the extent to which the learning outcomes for each year were aligned to each of the foresights. From this we can see that the learning outcomes demonstrate a level of speculative alignment with all the foresights, across all three years of study.

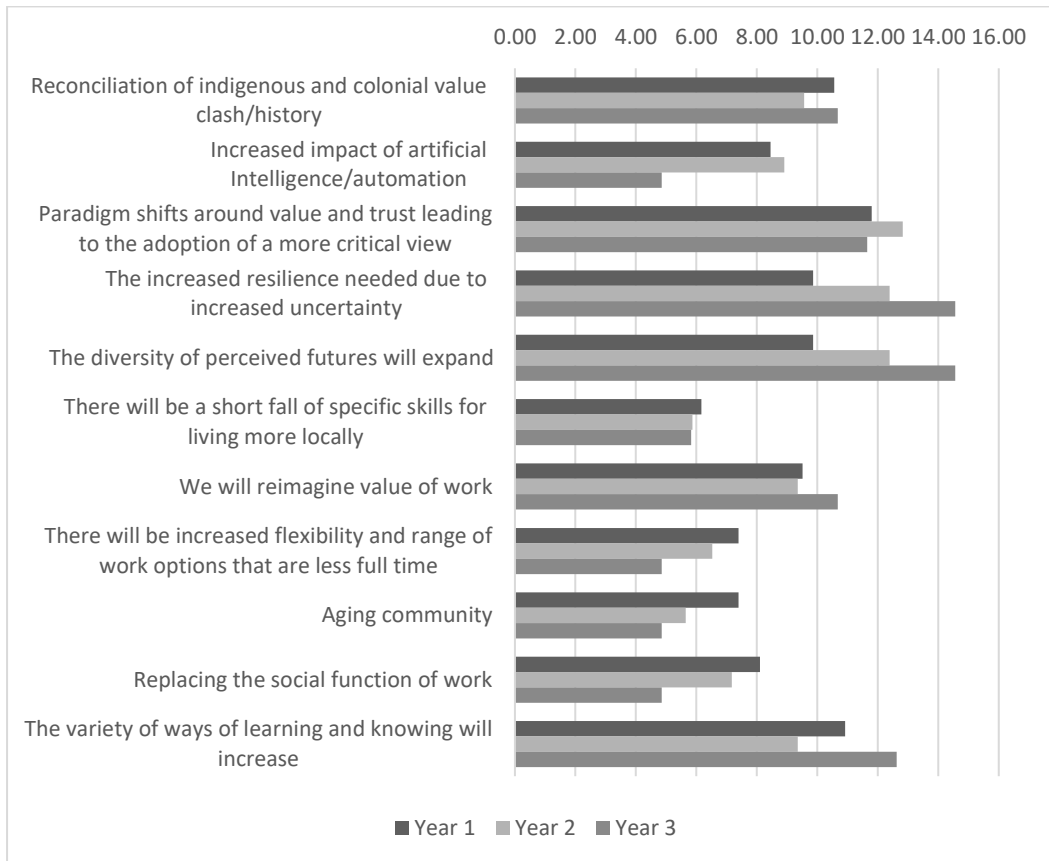


Fig 5: Foresights mapped to learning outcomes

Through reflection on the extent of speculative alignment across the programme several questions emerged. This generated interesting questions which were then fed back to the programme staff for consideration. These questions included:

- While learners saw the increasing importance of a variety of ways of learning and knowing as a relevant foresight, they saw it as having a low level of relevance to their futures. Yet, a high level of Speculative Alignment between increased variety in ways of learning and knowing and the learning outcomes of the programme was demonstrated across all three years of the programme. Is this a desirable design characteristic?

- The increased relevance of artificial intelligence/automation is seen as one of the most relevant foresight by the learners, but the learning outcomes demonstrate relatively weak Speculative Alignment with it. That alignment also diminishes as the learner advances through the programme. Is the impact of artificial intelligence/automation adequately addressed across this programme?
- As the learner progresses through the programme the learning outcomes demonstrate increasing speculative alignment with the need for increased resilience due to increased uncertainty. What can be learned from this strong alignment to inform stronger alignment with the other foresights seen as highly relevant to the learners?

Mapping the speculative alignment offered some benefits to the programme staff by generating new questions in the context of their developmental evaluation (Malcolm, 2020). This method however still has limitations that needed to be addressed. For example, the small number of participants and the lack of diversity in the group do not support any stronger claims about the effectiveness of the programme in preparing learners for the range of futures they envisioned. The scoring of the relevance of learning outcomes to the foresights provided a description of the relative alignment. This tells us whether one foresight is more (or less) supported by the learning outcomes than the others. It does not provide any information about how significant this alignment is compared to the whole programme. Thus, only the relative importance of each foresight is identifiable rather than the absolute importance across the whole learning experience.

One way to manage these limitations is to triangulate the findings with an analysis at another stage of the learning design process. This was possible to do by mapping the relevance of the foresights to the design personas used in the development of the programme.

Speculative Alignment with Design Personas

A similarly speculative mapping process was undertaken to identify the extent of alignment between the personas used to inform the design of the programme with the foresights generated by the learners in the Delphi group. Scores were assigned on the following basis:

4. This foresight has some tangential relevance to the future of this persona
5. This foresight is relevant to the future of this persona
6. This foresight is highly relevant to the future of this persona

This scoring was highly subjective and based on the researcher's opinion of what the future might hold for someone closely fitting each persona. To reduce this subjectivity two separate researchers scored separately and then agreed final scores. The total score for each persona was then summed to describe to what extent the foresights aligned with the potential future of each persona. This alignment is illustrated in Figure 6.

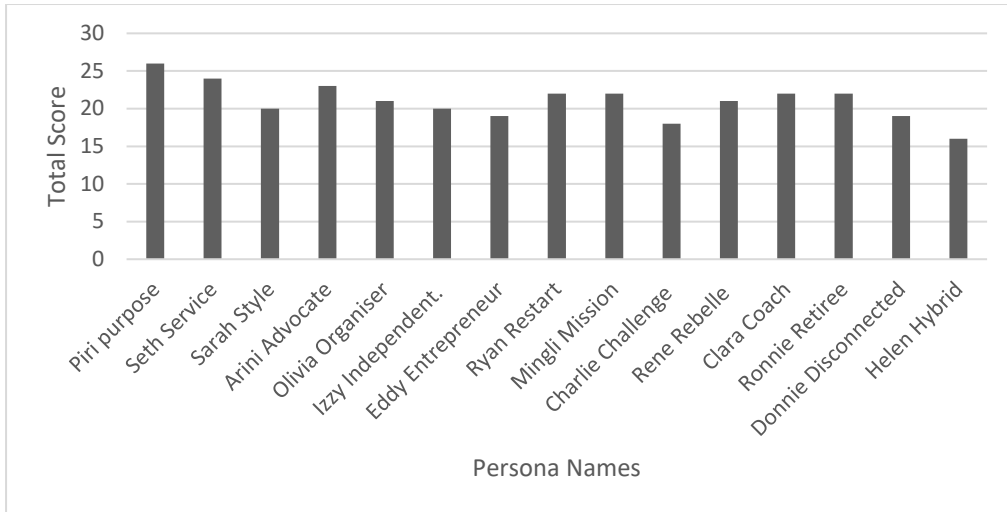


Fig 6: Alignment between persona and foresights

The total scores illustrated in Figure 6 show that there is some speculative alignment between the personas and the foresights. In other words, there are several foresights that relate to the speculated futures of every persona. While there is some difference in scores between personas the scoring process is too subjective to allow any conclusions to be drawn on why there is a variation. What can be said is that the foresights are speculatively aligned with the personas, and as the personas were used to develop the learning outcomes, they are also therefore indirectly aligned with the learning outcomes. This triangulation, illustrated in Figure 7, supports the speculative alignment described when mapping the alignment of the foresights directly to the learning outcomes.

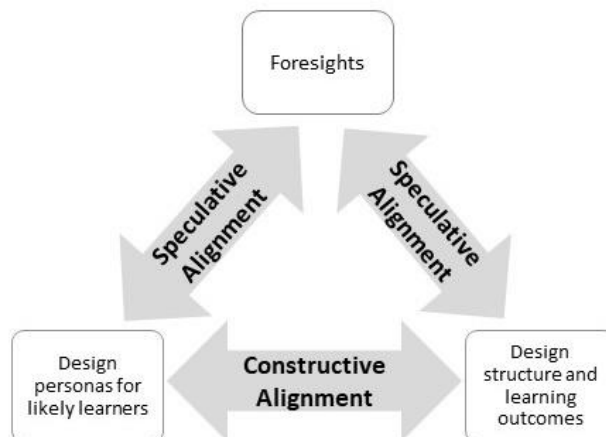


Fig 7: Triangulation of constructive and speculative alignment

Conclusion

This research sought to develop a method to integrate learner generated foresights into the process of learning design. Aspects of futures studies and scholarship of teaching and learning were integrated to develop a method to support that integration.

The constructive alignment expected in the traditional linear and sequential approach to learning design did not adequately describe the more speculative relationship between the learning design process and a range of very diverse long-term futures. Therefore, the concept of Speculative Alignment was proposed and applied to the design of a specific programme.

The application of Speculative Alignment was expected to support reflection upon the design. A generative approach rather than a descriptive approach. Even with a level of triangulation, the method used was too subjective to accurately or reliably describe the extent of alignment between a set of foresights and a learning design. It has however been a useful exercise from which to generate new questions that will inform an ongoing developmental evaluation, thus fulfilling the expectation of being generative.

Future research and learning design practice should focus on developing a more efficient method of generating foresights that demands less commitment from learners. This may lead to more learners opting into the process and the foresights being more representative of the learner population. The heutagogical basis of the programme to which the method was applied is a not a typical and the application of this or a similar method in a more traditional context would be a useful study to inform how generally foresights could be applied to learning design processes more generally

The concept of Speculative Alignment is new and the method, while leaning upon established methods in a range of disciplines, is still immature. This research has opened a door between speculative futuring and learning design and provided a new concept which can be integrated into learning design processes for both ongoing developmental evaluation, and the design of new learning experiences.

References

- Agonács, N., & Matos, J. F. (2019). Heutagogy and self-determined learning: A review of the published literature on the application and implementation of the theory. *Open Learning: The Journal of Open, Distance and e-Learning*, 0(0), 1–18. <https://doi.org/10.1080/02680513.2018.1562329>
- Amer, M., Daim, T. U., & Jetter, A. (2013). A review of scenario planning. *Futures*, 46, 23–40. <https://doi.org/10.1016/j.futures.2012.10.003>
- Auger, J. (2013). Speculative design: Crafting the speculation. *Digital Creativity*, 24(1), 11–35. <https://doi.org/10.1080/14626268.2013.767276>
- Auger, J. H. (2014). Living With Robots: A Speculative Design Approach. *Journal of Human-Robot Interaction*, 3(1), 20. <https://doi.org/10.5898/JHRI.3.1.Auger>
- Banerjee, D. P. (2019). Heutagogy: A self-determined approach enhanced constructivism. *International Journal of Scientific Research and Review*, 7(6), 223.
- Bardzell, S., Bardzell, J., Forlizzi, J., Zimmerman, J., & Antanitis, J. (2012). Critical design and critical theory: The challenge of designing for provocation. *Proceedings of the Designing Interactive Systems Conference*, 288–297. Association for Computing Machinery. <https://doi.org/10.1145/2317956.2318001>

- Bawder, R., & Reichenbach, M. (2010). Learning by experiencing: Systemics, futures thinking, and scenarios. In C. Maser & M. Reichenbach, *Sustainable Development: Principles, Frameworks, and Case Studies* (pp. 95–113). Taylor & Francis.
- Bhavaya. (2016). What Is The Role Of The Instructional Designer? ELearning Industry website: <https://elearningindustry.com/what-role-of-the-instructional-designer>
- Biggs, J. (1996). Enhancing teaching through constructive alignment. *Higher Education*, 32(3), 347–364. <https://doi.org/10.1007/BF00138871>
- Blaschke, L. M. (2012). Heutagogy and lifelong learning: A review of heutagogical practice and self-determined learning. *The International Review of Research in Open and Distributed Learning*, 13(1), 56. <https://doi.org/10.19173/irrodl.v13i1.1076>
- Blaschke, L. M., & Hase, S. (2016). Heutagogy: A Holistic Framework for Creating Twenty-First-Century Self-determined Learners. In B. Gros, Kinshuk, & M. Maina (Eds.), *The Future of Ubiquitous Learning* (pp. 25–40). Springer. https://doi.org/10.1007/978-3-662-47724-3_2
- Bodinet, J. C. (2016). Pedagogies of the futures: Shifting the educational paradigms. *European Journal of Futures Studies*, 4(21), 11. <https://doi.org/10.1007/s40309-016-0106-0>
- Boud, D., & Solomon, N. (2018). *Work-Based Learning: A New Higher Education?* McGraw-Hill Education.
- Branch, R. M. (2009). *Instructional Design: The ADDIE Approach*. Springer Science & Business Media.
- Bronfenbrenner, U. (1979). *The Ecology of Human Development: Experiments by Nature and Design*. Harvard University Press.
- Brooker, C. (2011). *Black Mirror* [Drama, Sci-Fi, Thriller]. Zeppotron, Channel 4 Television Corporation, Gran Babiaka.
- Case, R., & Bereiter, C. (1984). From behaviourism to cognitive behaviourism to cognitive development: Steps in the evolution of instructional design. *Instructional Science*, 13(2), 141–158. <https://doi.org/10.1007/BF00052382>
- Chattopadhyay, S. (2016). 4 Reasons Why There Will Be A Learning And Development Transformation. ELearning Industry website: <https://elearningindustry.com/4-reasons-learning-and-development-transformation>
- Chen, K.-H., & Hsu, L.-P. (2020). Visioning the Future: Evaluating Learning Outcomes and Impacts of Futures-Oriented Education. *Journal of Futures Studies*, 24(4). [https://doi.org/10.6531/JFS.202006_24\(4\).0011](https://doi.org/10.6531/JFS.202006_24(4).0011)
- Chevalier, J. M., & Buckles, D. J. (2019). *Participatory Action Research: Theory and Methods for Engaged Inquiry*. Taylor & Francis. <https://books.google.co.nz/books?id=F8eHDwAAQBAJ>
- Cochrane, T., & Munn, J. (2020). Integrating Educational Design Research and Design Thinking to Enable Creative Pedagogies. *Pacific Journal of Technology Enhanced Learning*, 2(2), 1–14. <https://doi.org/10.24135/pjtel.v2i2.58>
- Confirmed COVID-19 deaths. (2021). Our World in Data website: <https://ourworldindata.org/grapher/total-deaths-covid-19>
- Conole, G., Dyke, M., Oliver, M., & Seale, J. (2004). Mapping pedagogy and tools for effective learning design. *Computers & Education*, 43(1–2), 17–33. <https://doi.org/10.1016/j.compedu.2003.12.018>
- Coogler, R. (2018). *Black Panther* [Science fiction]. Walt Disney Studios. [https://en.wikipedia.org/w/index.php?title=Black_Panther_\(film\)&oldid=951547683](https://en.wikipedia.org/w/index.php?title=Black_Panther_(film)&oldid=951547683)

- Dalziel, J. (2015). *Learning Design: Conceptualizing a Framework for Teaching and Learning Online*. Routledge.
- Damm, D. (2019). *SciFi D.I.: Design Intelligence for the Future of Learning*. Singularity University. <https://su.org/resources/graphic-novel/scifi-d-i-design-intelligence-for-the-future-of-learning/>
- Davenport, J., & Davenport, J. A. (1985). A Chronology and Analysis of the Andragogy Debate. *Adult Education Quarterly*, 35(3), 152–159. <https://doi.org/10.1177/0001848185035003004>
- Diamandis, P. H. (2018). A Model for the Future of Education. Singularity Hub website: <https://singularityhub.com/2018/09/12/a-model-for-the-future-of-education-and-the-tech-shaping-it/>
- Dick, P. (1968). *Do Androids Dream Of Electric Sheep?* Del Ray. <https://www.bookdepository.com/Do-Androids-Dream-Electric-Sheep-Philip-K-Dick/9780575094185>
- Divan, A., Ludwig, L., Matthews, K., Motley, P., & Tomljenovic-Berube, A. (2017). Research Approaches in Scholarship of Teaching and Learning Publications: A Systematic Literature Review. *Teaching & Learning Inquiry*, 5(2), 16. <https://doi.org/10.20343/teachlearning.5.2.3>
- Dreborg, K. H. (1996). Essence of backcasting. *Futures*, 28(9), 813–828. [https://doi.org/10.1016/S0016-3287\(96\)00044-4](https://doi.org/10.1016/S0016-3287(96)00044-4)
- Dunne, A., & Raby, F. (2013). *Speculative Everything: Design, Fiction, and Social Dreaming*. MIT Press.
- Freire, P., & Freire, A. M. A. (2004). *EPZ Pedagogy of Hope: Reliving Pedagogy of the Oppressed*. A&C Black.
- Galloway, A., & Caudwell, C. (2018). Speculative design as research method. In G. Coombs, A. McNamara, & G. Sade (Eds.), *Undesign* (1st ed., pp. 85–96). Routledge. <https://doi.org/10.4324/9781315526379-8>
- Géring, Z., Király, G., Csillag, S., Kováts, G., Köves, A., & Gáspár, T. (2018). Vision(s) of the University. Applying Participatory Backcasting to Study the Future of Higher Education. *Journal of Futures Studies*, 22(4). [https://doi.org/10.6531/JFS.201806.22\(4\).0005](https://doi.org/10.6531/JFS.201806.22(4).0005)
- Guthrie, R. (2019). Redefining the Colonial: An Afrofuturist Analysis of Wakanda and Speculative Fiction. *Journal of Futures Studies*, 24(2), 15–28. [https://doi.org/DOI:10.6531/JFS.201912_24\(2\).0003](https://doi.org/DOI:10.6531/JFS.201912_24(2).0003)
- Hartley, D. (2007). Personalisation: The emerging ‘revised’ code of education? *Oxford Review of Education*, 33(5), 629–642. <https://doi.org/10.1080/03054980701476311>
- Helmer, O. (1967). *Analysis of the Future: The delphi Method*. Rand Corporation.
- Höjer, M., & Mattsson, L.-G. (2000). Determinism and backcasting in future studies. *Futures*, 32(7), 613–634. [https://doi.org/10.1016/S0016-3287\(00\)00012-4](https://doi.org/10.1016/S0016-3287(00)00012-4)
- Holmes, G., & Abington-Cooper, M. (2000). Pedagogy vs. Andragogy: A False Dichotomy? *The Journal of Technology Studies*, 26(2). <https://doi.org/10.21061/jots.v26i2.a.8>
- Inayatullah, S. (2012). Futures Studies: Theories and Methods. In *There's a future: Visions for a better world*. Spain: BBVAopenmind. <https://www.bbvaopenmind.com/en/articles/futures-studies-theories-and-methods/>
- Inayatullah, S. (2017). Teaching and Learning in Disruptive Futures: Automation, Universal Basic Income, and Our Jobless Futures. *Knowledge Futures: Interdisciplinary Journal of Futures Studies*, 1(1), 11.

- Kandlbinder, P. (2014). Constructive Alignment in University Teaching. *HERDSA News*, 36(3), 5–6.
- Kesson, K. (2020). Three Scenarios for the Future of Education in the Anthropocene. *Journal of Futures Studies* website: <https://jfsdigital.org/2020/04/12/three-scenarios-for-the-future-of-education-in-the-anthropocene/>
- Kirschner, P. A., & van Merriënboer, J. J. G. (2013). Do Learners Really Know Best? Urban Legends in Education. *Educational Psychologist*, 48(3), 169–183. <https://doi.org/10.1080/00461520.2013.804395>
- Kurzweil, R. (2004). The Law of Accelerating Returns. In C. Teuscher (Ed.), *Alan Turing: Life and Legacy of a Great Thinker* (pp. 381–416). Berlin, Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-662-05642-4_16
- Kurzweil, R. (2005). *The Singularity Is Near: When Humans Transcend Biology*. Penguin Books.
- LeBlanc Vaughan, S. (2016). 2016 Instructional Design Trends Compass: Experiences, Ecosystems, Evaluations. Oh My! ELearning Industry website: <https://elearningindustry.com/2016-instructional-design-trends-compass-experiences-ecosystems-evaluation-oh>
- Mackinlay, E., & Barney, K. (2014). Unknown and Unknowing Possibilities: Transformative Learning, Social Justice, and Decolonising Pedagogy in Indigenous Australian Studies. *Journal of Transformative Education*, 12(1), 54–73. <https://doi.org/10.1177/1541344614541170>
- Makridakis, S. (2017). The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms. *Futures*, 90, 46–60. <https://doi.org/10.1016/j.futures.2017.03.006>
- Malamar, C. (2017,). What Instructional Designers Do. The eLearning Coach website: http://thelearningcoach.com/elearning_design/is-this-instructional-design/
- Malcolm, M.-J. (2020). A self-determined learning environment supporting change-makers. *Scope: Contemporary Research Topics (Work-Based Learning 1)*, 32–39. <https://doi.org/10.34074/scop.6001004>
- Mang, & Reed. (2014). *Three Lines of Work*. video transcript.
- Mann, S., Ker, G., Eden-Mann, P., & O'Brien, R. (2017). Qualified to surf chaos: A self-determined degree. *Scope: Contemporary Research Topics., Flexible Learning*(4), 24–38. <http://www.thesopes.org/assets/Uploads/Mann-BLfC.pdf>
- Mann, S., Ker, G., Eden-Mann, P., & O'Brien, R. (2017). Designing for Heutagogy: An Independent Learning Pathway Approach. *Capable – Scope: (Flexible Learning)*, 2, 59–70. <http://www.thesopes.org/assets/Uploads/Mann-ILP2.pdf>
- Māori Futures Collective. (2019). *Tokona Te Raki Learning Report*. Māori Futures Collective. Māori Futures Collective website: <http://www.maorifutures.co.nz/wp-content/uploads/2019/11/Tokona-Te-Raki-Learning-Report-OCT-2019.pdf>
- Mason, M. (2008). Complexity Theory and the Philosophy of Education. *Educational Philosophy and Theory*, 40(1), 4–18. <https://doi.org/10.1111/j.1469-5812.2007.00412.x>
- Mayo, H. E. (2003). *Toward collective praxis in teacher education: Complexity, pragmatism and practice* (PhD.) https://ir.canterbury.ac.nz/bitstream/handle/10092/1054/thesis_fulltext.pdf?sequence=1&isAllowed=y
- McGuinness, W., Henley, D., Foster, L., & Perquin, J.-C. (2008). *Four possible futures for New Zealand in 2058.*: McGuinness Institute.
- Merriam, S. B. (2001). *Andragogy and Self-Directed Learning: Pillars of Adult Learning Theory*.

- New Directions for Adult and Continuing Education*, 2001(89), 3–14.
- Milojević, I., & Inayatullah, S. (2018). From Skilling for New Futures to Empowering Individuals and Communities. *Journal of Futures Studies*, 22(4). [https://doi.org/10.6531/JFS.201806.22\(4\).0001](https://doi.org/10.6531/JFS.201806.22(4).0001)
- Mortimore, P. (1999). *Understanding Pedagogy: And Its Impact on Learning*. SAGE.
- Narayan, V., Herrington, J., & Cochrane, T. (2018). Design principles for heutagogical learning: Implementing student-determined learning with mobile and social media tools. *Australasian Journal of Educational Technology*, 35(3), 86–101. <https://doi.org/10.14742/ajet.3941>
- Neck, H. M., & Corbett, A. C. (2018). The Scholarship of Teaching and Learning Entrepreneurship. *Entrepreneurship Education and Pedagogy*, 1(1), 8–41. <https://doi.org/10.1177/2515127417737286>
- Ng, F. S. D., & Lee, A. (2014). Complexity-based learning—An alternative learning design for the twenty-first century. *Cogent Education*, 1(1), 970325. <https://doi.org/10.1080/2331186X.2014.970325>
- Nouri, A., & Sajjadi, S. M. (2014). Emancipatory Pedagogy in Practice: Aims, Principles and Curriculum Orientation. *The International Journal of Critical Pedagogy*, 5(2). <http://libjournal.uncg.edu/ijcp/article/view/228>
- O'Brien, R. (2018). Social Edupreneurship – An Emerging Professional Framework for Educators. *Scope-Contemporary Research Topics, Flexible Learning*(3), 38–40. <https://www.thescopes.org/assets/Uploads/1a1c5ab9c7/38-Scope-Flexible-Learning-3-o-brien.pdf>
- O'Brien, R. (2019). *Bachelor of Leadership for Change External Moderation Pre Visit Information Pack* [Information for external moderator]. Otago Polytechnic.
- O'Brien, R., Hartnett, M., & Rawlins, P. (2019). The centralisation of elearning resource development within the New Zealand vocational tertiary education sector. *Australasian Journal of Educational Technology*, 35(5), 95–110. <https://doi.org/10.14742/ajet.4536>
- Puglisi, M. (2001). The study of the futures: An overview of futures studies methodologies. In D. Camarda & L. Grassini (Eds.), *Interdependency between agriculture and urbanization: Conflicts on sustainable use of soil and water: Vol. A* (pp. 439–463). CIHEAM. <https://om.ciheam.org/article.php?IDPDF=2001611>
- Revelles-Benavente, B. (2017). *Teaching Gender: Feminist Pedagogy and Responsibility in Times of Political Crisis*. Taylor & Francis.
- Ryn, S. V. der, & Cowan, S. (2013). *Ecological Design, Tenth Anniversary Edition*. Island Press.
- Sallah, M. (2020). *Generating disruptive pedagogy in informal spaces: Learning with both the head and the heart*. <https://dora.dmu.ac.uk/handle/2086/19499>
- Savage, G. C. (2018). Neoliberalism, education and curriculum. In *Powers of Curriculum: Sociological perspectives on education* (pp. 143–165). Oxford University Press.
- Scott, C. L. (2015). *The Futures of Learning 3: What kind of pedagogies for the 21st century? - UNESCO Digital Library* [Working Paper]. UNESCO. UNESCO website: <https://unesdoc.unesco.org/ark:/48223/pf0000243126>
- Scott, R. (1982). *Blade Runner* [Science fiction]. Warner Brothers.
- Snowden, D. J., & Boone, M. E. (2007). A Leader's Framework for Decision Making. *Harvard Business Review*, (November 2007). <https://hbr.org/2007/11/a-leaders-framework-for-decision-making>

- Snyder, S. (2013). *The Simple, the Complicated, and the Complex: Educational Reform Through the Lens of Complexity Theory* (OECD Education Working Papers No. 96). <https://doi.org/10.1787/5k3txnpt11nr-en>
- Soria-Lara, J. A., & Banister, D. (2017). Participatory visioning in transport backcasting studies: Methodological lessons from Andalusia (Spain). *Journal of Transport Geography*, 58, 113–126. <https://doi.org/10.1016/j.jtrangeo.2016.11.012>
- Van Der Well, P. (2018). Euthanasia for us all? Journal of Futures Studies website: <https://jfsdigital.org/2018/12/12/euthanasia-for-us-all/>
- Wahl, D. (2016). *Designing Regenerative Cultures*. Triarchy Press.
- Wallach, A & Zaki, J. (2019). *The Futures Need Feeling* [Whitepaper]. Longpath Labs Ltd.
- Wang, X., Su, Y., Cheung, S., Wong, E., & Kwong, T. (2013). An exploration of Biggs' constructive alignment in course design and its impact on students' learning approaches. *Assessment & Evaluation in Higher Education*, 38(4), 477–491. <https://doi.org/10.1080/02602938.2012.658018>
- Wheelahan, L. (2012). *Why Knowledge Matters in Curriculum: A Social Realist Argument*. n.p.: Taylor & Francis.