A design thinking approach to
innovative knowledge discovery and pedagogy
with a case study example from enterprise sustainability

Wesley HERCHE
Arizona State University, USA
wherche@asu.edu

"Tomorrow's illiterate will not be the man who can't read; he will be the man who has not learned how to learn."
— Alvin Toffler (Future Shock, 1970, p. 414)

"The best way to predict the future is to invent it." — Alan Kay (1971)

Challenges of modern knowledge discovery and pedagogy

While a collectively agreed upon definition of "traditional teaching" may be persistently elusive; undoubtedly, long-held assumptions are being questioned around pedagogy and the future role of the public research university (Toffler, 1970, Fuller, 1971; Christensen & Eyring, 2011; Thomas & Brown, 2011; Anderson & Whitford, 2016; Gilbert, Crow, & Anderson, 2017). As just one contemporary example, the National University of Singapore created the Institute for Application of Learning Science and Educational Technology with a fundamental mission of "learning to learn better" (NUS-ALSET, 2018). But this begs the follow-on question: *What will future learners want to learn, how will they best learn it, and do our institutions have the organisational dexterity, innovativeness, and design thinking approach to meet those demands?* To answer this, our aim should be to design a complex adaptive knowledge enterprise, and to aspire for universal learning that is responsive to the rapidly evolving real-world demands of (current and future) learners.

A recent World Economic Forum report warned, "65% of children entering primary school today will ultimately end up working in completely new job types that don't yet exist" (World Economic Forum, 2016, p. 1). Antiquated notions of knowledge being a static "stock" that is uni-directionally transferred has largely yielded a misguided techno-centric fixation on commoditisation of the delivery mechanism (Brown, 2012). But as Michael Crow (President of Arizona State University) warned, "a lot of people are doing this, but if you do it separated from the knowledge core…separated from the knowledge creation process, it will be nothing but a *gizmo*; it will have no material impact whatsoever," (Crow, 2018).

The burgeoning field of sustainability science and education as a case study

As an exemplar, I investigate the development of sustainability science as an academic field, and moreover a case study examination of the creation of the world's first "School of Sustainability" at the Arizona State University (ASU-SOS). This case study highlights the challenges and achievements of taking a design thinking approach to create an inclusive new field of study, and a comprehensive suite of research and educational offerings ambitiously aimed at meeting current and future global challenges via a solutions-oriented strategy (Fuller, 1957; Brundiers, Wiek, & Redman, 2010; Wiek, Withycombe, & Redman, 2011; Wiek, Xiong, Brundiers, & van der Leeuw, 2014; Miller *et al.*, 2014).

This stands in contrast with more familiar avenues traversed by many other universities for this still nascent but growing field. Many peer intuitions have largely taken a gingerly approach such as ancillary course offerings and minors relegated to existing academic departments, or "feel good" university marketing efforts (Velazquez, Munguia, & Sanchez, 2005; Hoover & Harder, 2015). The trepidation is understandable. Creating a degree programme that fails to attract students—or worse yet, one that produces graduates in a new field who then struggle to find employment—are worrisome outcomes for any university. However, looking at the data for the last decade, findings indicate encouraging outcomes. In an average year more than 1,500 students are actively enrolled in sustainability programs at ASU (Boone, 2015). Furthermore, post-graduation employment rates for ASU-SOS graduates are above the U.S. national mean average; and of those, 73% are working in a career field related to sustainability (Abel & Deitz, 2013; ASU-ASOS, 2018). These and other preliminary outcomes are examined in this working paper presentation.
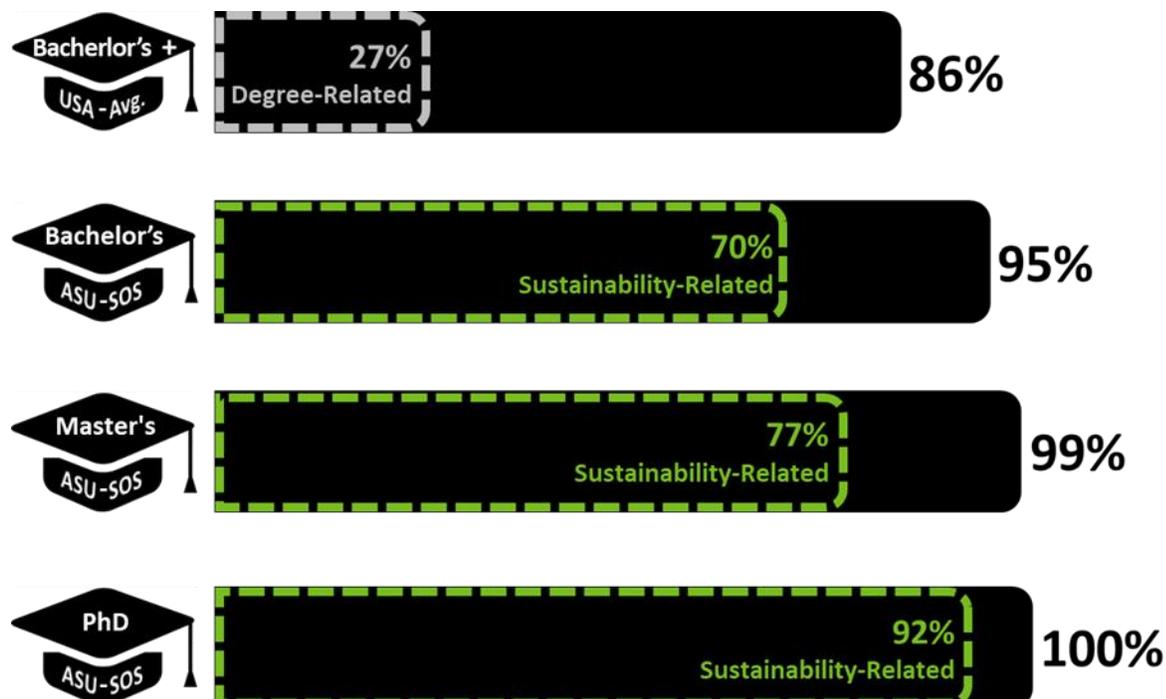

Figure 1. ASU – School of Sustainability, Alumni Employment (ASU-SOS, 2018)

Keywords

Innovation, disruption, sustainability, interdisciplinary, design

References

Abel, J. R., & Deitz, R. (2013, May 20). Do big cities help college graduates find better jobs? *Liberty Street Economics*. Retrieved from http://libertystreeteconomics.newyorkfed.org/2013/05/do-big-cities-help-college-graduates-find-better-jobs.html

Anderson, D., & Whitford, A. (2016). The institutional design frontiers of publicness and university performance. *Public Administration Review, 76*(5), 753-755. http://dx.doi.org/10.1111/puar.12627

ASU-SOS. (2018). Employment data. *Arizona State University - School of Sustainability*. Retrieved from https://schoolofsustainability.asu.edu/careers/employment-data/

Boone, C. (2015). *The Development of Sustainability Education at ASU-A Case Study* [Video File]. Retrieved from https://www.youtube.com/watch?v=1AoHVEDGQh8

Brown, J. S. (2012, November 06). *#ecoo12 John Seely Brown Keynote* [Video File]. Retrieved from YouTube: https://www.youtube.com/watch?time_continue=294&v=YON9yX0MBgg

Brundiers, K., Wiek, A., & Redman, C. L. (2010). Real-world learning opportunities in sustainability: from classroom into the real world. *International Journal of Sustainability in Higher Education, 11*(4), 308-324. http://dx.doi.org/10.1108/14676371011077540

Christensen, C. M., & Eyring, H. J. (2011). *The innovative university: Changing the DNA of higher education from the inside out.* John Wiley & Sons.

Crow, M. (2018, April 24). *ASU GSV Summit: Keynote with Michael Crow, President, ASU and McGraw Prize* [Video File]. Retrieved from https://www.youtube.com/watch?v=SXLah4tA3d8

Fuller, R. B. (1957). A comprehensive anticipatory design science. *Royal Architectural Institute of Canada*, 357.

Fuller, R. B. (1971). *The world game: Integrative resource utilization planning tool.* Carbondale, Illinois, USA: World Resources Inventory.

Gilbert, C. G., Crow, M. M., & Anderson, D. (2017). Design thinking in higher education: Towards adaptive enterprise. *Stanford Social Innovation Review, 16*(1), 36-41.

Hoover, E., & Harder, M. (2015). What lies beneath the surface? The hidden complexities of organizational change for sustainability in higher education. *Journal of Cleaner Production*, 175-188. https://doi.org/10.1016/j.jclepro.2014.01.081

Kay, A. (1971). *We cannot predict the future, but we can invent it*. Retrieved from https://quoteinvestigator.com/2012/09/27/invent-the-future/

Miller, T. R., Wiek, A., Sarewitz, D., Robinson, J., Olsson, L., Kriebel, D., & Loorbach, D. (2014). The future of sustainability science: a solutions-oriented research agenda. *Sustainability Science, 9*(2), 239-246. http://dx.doi.org/10.1007/s11625-013-0224-6

NUS-ALSET. (2018, August 02). *Institute for Application of Learning Science and Educational Technology.* Retrieved from http://www.nus.edu.sg/alset/education.html

Thomas, D., & Brown, J. S. (2011). *A New Culture of Learning: Cultivating the Imagination for a World of Constant Change.* Lexington, Kentucky, USA: CreateSpace.

Toffler, A. (1970). *Future shock.* New York: Random House.

Velazquez, L., Munguia, N., & Sanchez, M. (2005). Deterring sustainability in higher education institutions: An appraisal of the factors which influence sustainability in higher education institutions. *International Journal of Sustainability in Higher Education, 6*(4), 383-391. http://dx.doi.org/10.1108/14676370510623865

Ware, M., & Mabe, M. (2015). *The STM Report: An overview of scientific and scholarly journal publishing.* (pp. 6, 27). The Hague, Netherlands: International Association of Scientific, Technical and Medical Publishers.

Wiek, A., Withycombe, L., & Redman, C. L. (2011). Key competencies in sustainability: A reference framework for academic program development. *Sustainability Science, 6*(2), 203-218. http://dx.doi.org/10.1007/s11625-011-0132-6

Wiek, A., Xiong, A., Brundiers, K., & van der Leeuw, S. (2014). Integrating problem- and project-based learning into sustainability programs: A case study on the School of Sustainability at Arizona State University. *International Journal of Sustainability in Higher Education, 15*(4), 431-449. http://dx.doi.org/10.1108/IJSHE-02-2013-0013

World Economic Forum. (2016). *The Future of Jobs.* Retrieved from http://www3.weforum.org/docs/WEF_FOJ_Executive_Summary_Jobs.pdf