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## Challenges to Innovation: Obstacles Encountered on a Journey to Engage Students

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### Abstract

**Purpose** – As an interdisciplinary team of higher education (HE) professionals, teaching in the first Sino-foreign HE institution (SfHEI), in mainland China, we wanted to investigate how best to enhance student engagement and interaction in our classrooms. Our various backgrounds and experiences led us to decide to investigate the potential positive impact that electronic feedback devices (such as clickers) could have. We were motivated in part by the literature surrounding the so-called Chinese Learner, or Confucian Heritage Culture (CHC) learners, but mostly from a desire to see more engagement in our classes.

To conduct this investigation, we identified several technologies to deploy and monitor in our classes, and designed a research project aimed to rigorously assess the impact. Unfortunately, our research efforts almost immediately faced challenges that almost ended the study before it began. The obstacles encountered were at the global level (such as import restrictions), at the study level (losing access to data), personal level (deficits in time, skills, and training), the professional level (limited institutional support for the attempted innovation), and even at the implementation level (losing access to the tool under study). While some of the challenges may be commonly encountered (such as the time constraints for academics to perform action and other research), many of our experiences were unique to our SfHEI context.

This paper describes the background, context, and current status of our investigation. It lists some of the challenges faced to conduct the research, offering reflections and potential strategies for other researchers facing similar difficulties.

**Design/methodology/approach** – Our core investigation centres around examination and comparison of different tools and devices to facilitate student responsiveness, interaction, and engagement. Literature reviews, action research, and comparative study (involving deployment of the technologies in our various classroom settings) form the main tools, supplemented by reflective practice and autoethnography.

**Findings** – In addition to reporting on our preliminary findings from the core investigation, this paper lists some of the major challenges encountered to the

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research. Both of these should be of interest to researchers planning similar studies, regardless of their institutional context.

**Originality/value/implications** – As the first SfHEI, our setting is original, and, we believe, our paper is the first to enumerate the challenges faced in our context to researching and delivering student engagement innovation.

**Keywords:** education innovation; classroom interaction; student feedback mechanisms; Sino-foreign higher education; reflective practice; obstacles.

## 1 Introduction

Higher education (HE) has been evolving in many ways (Fitzgerald, Gunter and White, 2012; Scott, 2015) and HE in the People's Republic of China (PRC) has seen particularly exciting changes over the past few decades (Feng, 2013; Wang and Liu, 2011). A characteristic of the evolving HE landscape has been a growing emphasis on teaching quality (Devlin and Samarawickrema, 2010) including innovation in both the classroom and support for teaching skills development (Bennett, Lockyer, and Agostinho, 2018; Goodyear, 2015).

University of Nottingham Ningbo China (UNNC) was the first Sino-foreign HE institution (SfHEI), established in 2004 in Ningbo, PRC. Its creation was in response to the identified need to expand PRC's HE provision, both in terms of quantity and quality. UNNC has grown over its 15-year history, and has seen many innovations and developments (Feng, 2013). One such development has been the deliberate formation of a professional learning community forum (DuFour, 2004; Stoll et al., 2006), through which UNNC faculty and staff have been able to exchange ideas about teaching related challenges. The project described in this paper grew out of this forum: facing a reported difficulty to engage students in activities, especially those requiring interactivity, we wanted to identify ways to enhance engagement and interaction. Our various backgrounds and experiences led us to decide to investigate the potential positive impact that electronic feedback devices (Caldwell, 2007) could have on this.

Unfortunately, our research almost immediately faced challenges and obstacles, almost causing the study to be abandoned. These challenges and obstacles were at many different levels, and came from many sources. While some of these may be relatively common issues, many of our experiences were unique to our SfHEI context. This paper describes the background, context, and current status of our investigation. It explains our motivation and research plans, and lists some of the challenges faced so far, offering reflections and potential strategies for other researchers facing similar difficulties.

The paper is laid out as follows: Section 2 presents the background, including a brief explanation of HE evolution, both in the PRC, and generally. It also includes an introduction to the research team, the location of the research (UNNC), and the project beginnings. Section 3 examines the project in more detail, including explaining its background and motivation. It also describes the initial plan, the challenges and obstacles encountered, the current status, and the identified remaining work. Finally, Section 4 concludes the paper.

## **2 Background**

### **2.1 Recent HE Evolution**

As noted elsewhere (Towey, Walker, & Ng, 2018; 2019) innovations in teaching and learning (T&L) have impacted on the perception and delivery of education. Some of the new technologies and approaches, such as more open and flexible technology-enhanced T&L options including massive open online courses (MOOCs), have been anticipated to revolutionise HE delivery (Trowler, Fanghanel, & Wareham, 2005; Zhang, 2018). Other open educational resources (OERs) have also been expected to offer solutions to the ever-increasing cost of education, and provide the flexibility required for life-long learning (Mishra, 2017; Wang & Towey, 2017). This shift in catering for a variety of needs from universities displays the recognition of the role of technology in today's HE context.

In addition to these developments, the concept of making delivery more student-centered and engaging has led to multiple bodies of research and informed changes in practice for faculty (Ertmer, 1999; 2005; Dismore, Turner, & Huang, 2019). It is claimed that “the pressure to review and revise the curriculum is unceasing” (Bajada, Kandambinder, & Trayler, 2019, p. 465) and measurable interaction within courses, particularly through technological and perceived innovative methods, is frequently found in institutional goals and staff development initiatives (Abbad & Jaber, 2014; Englund, Olofsson, & Price, 2017). These initiatives have been further promoted with an increase in accredited teacher development schemes that aim to show higher standards of T&L (Fry, 2006). In the rapidly expanding Sino-foreign HE context, large numbers of English language classes are often conducted to support the undergraduate degrees; many of these often seem based on a more communicative teaching approach which has also impacted on how many academics view T&L strategies and pedagogy.

### **2.2 University of Nottingham Ningbo China (UNNC)**

Education in the PRC, arguably in response to the unprecedented PRC economic development and growth, has expanded and changed considerably since the 1980s (Towey, 2014; Mok & Jiang, 2017; Wenli & Qiang, 2013). The PRC HE landscape in its current form is very different from that of four decades ago, and includes a number of SfHEIs, the first of which, UNNC (Feng, 2013; Li et al., 2012; Towey, 2016), being the workplace of the authors, and the context for this study.

UNNC resembles a traditional British HEI, but is an SfHEI that started its life in the year 2000, admitting its first cohort of students in 2004. UNNC delivers undifferentiated British degrees to mainland Chinese and international students through the faculties of Science and Engineering, Humanities and Social Science, and the Business School. Since its inception, it has grown rapidly and currently has 7,800 students. Furthermore, UNNC has a history of innovating in teaching, with examples involving authors of the current paper including an investigation into the use of electronic example sheets for the mass teaching of mathematics (Walker, 2016); using virtual reality to teach civil engineering (Towey et al., 2018; Walker et al., N.D.);

enhancing in-class interaction through the use of technology (Lamb et al., N.D.); and attempting a flipped classroom in an Asian computer science context (Towey, 2015).

The university has an important structure that facilitates cross faculty T&L research: the professional learning community (PLC) (DuFour, 2004; Stoll et al., 2006). UNNC's PLC was developed after recognising that the institution had talented staff engaged in high-quality and relevant T&L research, but who were often working in isolated areas. For good ideas to be sustained within an institution they need to grow; otherwise, they tend to evaporate when staff members move on. Hence, by creating a learning community, like-minded people were brought together to share, discuss and collaborate on research projects. This was achieved by creating an institution wide meeting once a month where every member of staff was invited; including the vice-provost of T&L who endorsed the venture. This initiative was not aimed at managers, but engaged with staff members who collectively attempted to implement improvements to current practice and demonstrate that their ideas are better than the accepted practice. Within the last year, this initiative precipitated twelve cross-faculty T&L research projects, including the one described in this paper.

### **2.3 Teaching Experiences in the PRC**

The research team is an interdisciplinary group of five international staff, from Ireland, Thailand, and the United Kingdom (UK), collectively representing 54 years of teaching experience, 31 of which have been in China (both mainland and Greater China). The team came together initially through the UNNC PLC, and through various discussions about in-class engagement. We have each reported teaching experiences, at UNNC and elsewhere (Huang & Towey, 2010; Towey et al., 2016), that include identification of a perceived lack of engagement or interactivity amongst the students (Lamb et al., N.D.). Many of these reports mirror the literature on the so-called Confucian Heritage Culture (CHC) or Chinese Learner (Watkins & Biggs, 1996; Jin & Cortazzi, 2011), notably the apparent difficulty creating learning environments where the CHC students appear comfortable speaking in front of peers, or even just asking questions during class time (Chuah, 2010). Some of these observations have led to previous attempts at UNNC to overcome these challenges (e.g., Towey, 2015).

### **2.4 A Proposed Study of Student Feedback Devices**

Our backgrounds, including both student and professional experiences of Western university T&L, and our UNNC observations, led us to hypothesise that the use of a (digital) proxy may help us achieve more interaction and engagement in our classrooms. We therefore identified several such proxies (including digital feedback devices such as clickers) (Caldwell, 2007; Kay & LeSage, 2009; White, Syncox, & Alters, 2011), and prepared a research plan that we anticipated would take us on a year-long study. This study, we expected, would result in an ability to create an enhanced learning environment, where students could be more actively engaged with the teaching materials.

## **3 The Project**

### **3.1 Motivation**

As noted in Section 2.4, we were fundamentally motivated to find ways of enhancing our classrooms. A belief that an increase in interaction and engagement would help realise such an enhancement led to the goal of exploring digital devices (such as audience feedback systems, AFSs) as a means to get the increased interaction and engagement. Beyond this main goal, however, some other motives were revealed by the team in an initial reflective exercise to identify the team members' hopes and expectations for the project. These other motives included: exploring whether the feedback devices or platform would “as a replacement or an addition to more traditional engagement and interaction methods”; potential eventual use of the devices to seek student input on the teacher's class, and as a possible mechanism to record attendance; seeing if the devices would be “just a substitute for teachers with a lack of skills in creating an engaging and interactive classroom environment”; and even just as an opportunity to collaborate on something related to T&L.

### **3.2 Research Plan**

The original study was planned to commence in August 2018, with six project team members from UNNC faculty, soon to be augmented with student representatives. The research would be conducted over an academic year, with several technologies already having been identified for deployment and examination within the first few months (October to December 2018). These in-class experiences would then be the subject of surveys, interviews, and focus groups, involving both students and staff, to explore the perceived usefulness and impact they could have. Comparison and analysis of these technologies and the solicited feedback would lead to compilation of conclusions and potential identification of best practice—if perceived as useful, how should the technologies be selected and used to best benefit the stakeholders? Eventually, this would finally lead to dissemination of the findings: in the form of training for other UNNC staff and students, and presentations and publications at conferences or symposia.

### **3.3 Challenges and Obstacles Encountered**

Almost immediately, the project team encountered challenges that almost ended the study before it began.

The first major obstacle we faced was two-fold, and was essentially about not having access to the target feedback technology. Advanced Learning Platform (ALP) is an online interaction system offered by Echo 360, and had been identified as a target for our study because of an institutional decision to deploy it at the campus level (several related Echo 360 technologies and tools were already available). We intended to compare ALP with more traditional electronic feedback devices, the QT2 “clicker” from Turning Point. At the start of the first semester of the study, partly due to our

geographical location being in mainland China, we discovered almost insurmountable import restrictions against getting the physical clickers to UNNC, and, in a situation familiar to most people in PRC (Huang & Towey, 2010; Towey 2016), we also lost access to the Echo server and functionality. Both of these things severely impeded the project, and are very much related to the specific situation of a PRC-based SfHEI. Although there is no obvious way by which these challenges could have been avoided, had we known in advance of the restrictions and likelihood of losing access, we would certainly have identified third and fourth target technologies to deploy instead. A silver lining to this challenge and delay, however, was that it did force the research team to think outside of the box, and try, for example, to break down the actual contribution such digital technologies could make to see if an analogue replacement could be tried—arming students with rocks and paper, and encouraging the flinging of anonymous feedback (wrapped around the rock) towards the lectern was one brainstorming session product that did not eventually get trialled.

Engagement and turnover of project team members was a second challenge, with one of the original faculty members initially not being able to contribute much due to other commitments, and then eventually leaving the project. This tension of trying to reconcile project responsibilities with other duties (teaching, administrative, and research) and some kind work-life balance is a common challenge for researchers (Greenhaus & Beutell, 1985; Brigitte et al., 2007), and our team has been no different. In addition to the departure of one member, we have all faced difficulties (and guilt) completing aspects of this project in timely manners. With the benefit of hindsight, we can of course now say that we should have expected scheduling and workload challenges, and moving forward it is something that we can be more mindful of. For prospective researchers, our advice is simply to not underestimate how important this aspect of project management is.

Based on discussions and reflections around the time management issues, some possible avenues to alleviate the tensions were discussed in terms of how an institution (in our case UNNC) could provide stronger support for teaching innovation initiatives. Although there is consensus that UNNC is indeed doing a lot to support T&L development, especially in terms of training, infrastructure, and even financial support, time was the resource most often craved. This, again, is an issue that perhaps goes beyond UNNC and SfHEIs in general, but is perhaps of special importance in our context since SfHEIs are often reported to be both innovations and centres of innovation (Towey, 2014).

A final reflection on our challenges includes the skills and training needed to be best able to deploy the technologies. Even after sufficient preparation to enable starting, we encountered problems traceable to our lack of expertise with the tools. This impeded our development of class materials and lesson plans, and also resulted in the loss of generated data (when the file storing the data for student responses was inexplicably lost). As we have been gaining experience with the different technologies, our problems are diminishing, but this is a well-known barrier to change (Ertmer 1999; 2005; Wang, Jong, & Towey, 2015; Wang & Towey, 2012).

### **3.4 Progress and Initial Findings**

Through the use of ALP and the clickers in our various teaching contexts, we have already noticed patterns emerging in our findings. These mostly echo the findings of previous research into using technology to increase engagement (Kay & LeSage, 2009). Firstly, technological issues were observed and experienced by all teachers and students, and these were compounded by our location in the PRC, with the associated Internet access challenges (Section 3.3). Other findings that parallel previous studies include: not all students were able to use the technology; substantial class time was wasted through distribution and collection of devices; additional preparation was required to create and insert questions into the class materials; and more class time was taken up waiting and monitoring as students answered the polls. This use of class time was apparently unpopular with students, who were reported to visibly dislike this aspect of the technology. This negative reaction also did not seem counteracted through the use of countdown timers.

However, some positive aspects have also been noted, including that students did report that use of the technology allowed them to not “lose face” in front of their peers. All tutors also expressed appreciation for the opportunity to obtain greater student feedback. Some of this feedback that tutors received made it clear that elements of the class had not been understood: the tutors were then able to adapt and (re-)explain key concepts. Such an opportunity would not have been possible without the technology, and could indeed be expanded to impact and improve teaching pedagogy for individual teachers and whole departments. This possibility for interaction between students and teachers within the class would probably not have occurred without the technology: students in China, and at UNNC in particular, have reported a preference for communicating through technology (Brown & O’Brien, N.D.). This finding was further supported by the student response rate being significantly higher for both technologies, across all contexts investigated, when there were no technological problems.

### **3.5 Remaining Work**

We are now coming to the end of our first year working on this project. Over the course of a year, QT2 clickers have eventually been imported successfully, relevant teaching materials (i.e. with the integration of feedback mechanisms) have been prepared, and researchers themselves have gained hands-on experience in using these materials in class. Our current two-step plan is: (1) to repeat the deliveries of these teaching materials in the next academic year in order to collect more data for further analyses; and (2) to present the findings over the course of two academic years to the institution as a business case to seek additional institutional support.

By drawing from this year’s experience and feedback from the students, materials will be modified and improved prior to the next academic year. We anticipate fewer surprise elements from the unforeseen obstacles (e.g. backups of institutional level data), and therefore the fear of class disruptions will be better handled. This will allow the researchers to better the experimental design, and to better the control of the experimental variables with minimum impact on the delivery of the actual classes. At the end of the next academic year, by comparing different cohorts of students, it may

be possible to draw some conclusions on which area the institutional investment should yield the most impact, e.g. technologies, infrastructure, trainings of staff, or combinations of all of these.

## 4 Conclusion

Motivated by a desire to enhance our classrooms through the deployment of digital feedback technology, we developed a research team at the first Sino-foreign higher educational institution, UNNC, to explore and contrast different tools and options. Our research was hampered by a number of factors, but we have nonetheless made progress and identified several findings that may be of interest to the community. Many of our initial findings echo those of previous studies, but in some cases our location in the PRC seems to have compounded some of the minor challenges we have encountered.

Our future work will include further deployment and analysis of the impact and perceived desirability of using digital feedback devices. We will also aim to produce a guide for best practices for their use, which we hope will also be of service to the community.

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## References

- Abbad, M. M., & Jaber, F. N. (2014). "Evaluating E-Learning Systems: An Empirical Investigation on Students' Perception in Higher Education Area", *International Journal of Emerging Technologies in Learning*, 9(4), pp. 27–34.
- Bajada, C., Kandlbinder, P., & Trayler, R. (2019). "A general framework for cultivating innovations in higher education curriculum", *Higher Education Research & Development*, 38(3), pp. 465–478.
- Bennett, S., Lockyer, L., & Agostinho, S. (2018). "Towards sustainable technology-enhanced innovation in higher education: Advancing learning design by understanding and supporting teacher design practice", *British Journal of Educational Technology*, 49(6), pp. 1014–1026.
- Brigitte J. C., Claessens, B. J. C., van Eerde, W., Rutte, C. G., & Roe, R. A. (2007). "A review of the time management literature", *Personnel Review*, 36(2), pp. 255–276.
- Brown, M.S. & O'Brien, D. (N.D.). "The Significance of Silence: variations in perceptions and experiences of 'silence' in international classroom settings". [Submitted for publication]

- Caldwell, J. E. (2007). "Clickers in the large classroom: Current research and best-practice tips", *CBE-Life Sciences Education*, 6(1), pp. 9-20.
- Chuah, S.-H. (2010). "Teaching East-Asian students: Some observations", *Higher Education Academy Economics Network*, vol. 2010.
- Devlin, M. & Samarawickrema, G. (2010). "The criteria of effective teaching in a changing higher education context", *Higher Education Research & Development*, 29(2), pp. 111–124.
- Dismore, H., Turner, R., & Huang, R. (2019). "Let me edutain you! Practices of student engagement employed by new lecturers", *Higher Education Research & Development*, 38(2), pp. 235–249.
- DuFour, R. (2004). "What is a 'Professional Learning Community?'", *Education Leadership*, 61(8), pp. 6–11.
- Englund, C., Olofsson, A. & Price, L. (2017). "Teaching with technology in higher education: understanding conceptual change and development in practice", *Higher Education Research & Development*, 36(1), pp. 73–87.
- Ertmer, P. (1999). "Addressing first- and second-order barriers to change: Strategies for technology integration", *Educational Technology Research and Development*, 47(4), pp. 47–61.
- Ertmer, P. (2005). "Teacher pedagogical beliefs: The final frontier in our quest for technology integration?", *Educational Technology Research and Development*, 53(4), pp. 25–39.
- Feng, Y. (2013). "University of Nottingham Ningbo China and Xi'an Jiaotong-Liverpool University: Globalization of Higher Education in China", *Higher Education: The International Journal of Higher Education and Educational Planning*, 65(4), pp. 471–485.
- Fitzgerald, T., Gunter, H., & White, J. (2012). *Hard Labour? Academic Work and the Changing Landscape of Higher Education*, Emerald Publishing Limited, Bingley. Available from: ProQuest Ebook Central. (Accessed: 10 April 2019)
- Fry, H. (2006). "Professional Development for Teaching in Higher Education: A Brief Account of the Evolution of Accredited Programmes in the UK", *Zeitschrift für Hochschulentwicklung*, 1(2), pp. 95–108.
- Goodyear, P. (2015). "Teaching as design", *HERDSA Review of Higher Education*, 2, pp. 27–50.
- Greenhaus, J. H. & Beutell N. J. (1985). "Sources of Conflict Between Work and Family Roles", *Academy of Management Review*, 10(1), pp. 76–88.
- Huang, H. & Towey, D. (2010). "Teaching Introductory Information Technology Through English in China: Innovative Approaches to Information Technology Education", in *Proceedings of the 2010 International Conference on Educational and Information Technology ICEIT 2010*, Chongqing, China. September 17-19, IEEE, pp. V2-29–V2-33.
- Jin, L. and Cortazzi, M (Eds) (2011). *Researching Chinese Learners: Skills, Perceptions and Cultural Adaptations*. Basingstoke: Palgrave MacMillan.
- Kay, R. H. & LeSage, A. (2009). "Examining the benefits and challenges of using audience response systems: A review of the literature", *Computers & Education*, 53(3), pp. 819–827.
- Lamb, D., Knowles, L., Rattadilok, P., Towey, D., & Walker, J. (N.D.). "Can Clicker Technology and the latest Online Response Systems enhance Student

- Engagement? A Comparative Study of two Approaches”. [Submitted for publication].
- Li, Y., Whalley, J., Zhang, S. & Zhao, X. (2012). “The higher educational transformation of China and its global implications”, in Ennew, C. & Greenaway, D. (eds), *The Globalization of Higher Education*, Palgrave Macmillan, chapter 10, pp. 135–162.
- Mishra, S. (2017). “Open Educational Resources: Removing Barriers from Within”, *Distance Education*, 38(3), pp. 369–380.
- Mok, K. H. & Jiang, J. (2017). “Massification of higher education: Challenges for admissions and graduate employment in China”, *Managing international connectivity, diversity of learning and changing labour markets*. pp. 219–243.
- Scott, R. W. (2015). “Higher Education in America: Multiple Field Perspectives” in Stevens, M., & Kirst, MW (eds), *Remaking College: The Changing Ecology of Higher Education*, Stanford University Press, Palo Alto. Available from: ProQuest Ebook Central. (Accessed: 10 April 2019)
- Stoll, L., Bolam, R., McMahon, A., Wallace, M., & Thomas, S. (2006). “Professional learning communities: a review of the literature”, *Journal of Educational Change*, 7(4), pp. 221–258.
- Towey, D. (2014). “Open and flexible learning as an alternative in mainland Chinese higher education”, in Li, K. C. & Yuen K. S. (eds.), *Emerging modes and approaches in open and flexible education*, The Open University of Hong Kong Press, Chapter 2, pp. 12–26.
- Towey, D. (2015). “Lessons from a Failed Flipped Classroom: The Hacked Computer Science Teacher”, in *Proceedings of the IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE) 2015*, pp. 11–15.
- Towey, D. (2016). “Preparing the next Generation of China’s Computer Scientists: A Snapshot of Challenges for Sino-foreign Computer Science Education”, in *Proceedings of the Third International Conference on Open and Flexible Education (ICOFE 2016)*, Hong Kong, China, pp. 224–231.
- Towey, D., Chen, T.Y., Kuo, F.-C., Liu, H., & Zhou, Z.Q. (2016). “Metamorphic Testing: A New Student Engagement Approach for a New Software Testing Paradigm”, in *Proceedings of the IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE 2016)*, pp. 218–225.
- Towey, D., Walker, J., Austin, C., Kwong, C.F. & Wei, S. (2018). “Developing a Virtual Reality Open Educational Resource in a Sino-foreign Higher Education Institution: Challenges and Strategies”, in *Proceedings of the IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE 2018)*, pp. 740–746.
- Towey, D., Walker, J., & Ng, R. Y-k. (2018). “Traditional Higher Education Engineering versus Vocational and Professional Education and Training: What can we Learn from Each Other?”, in *Proceedings of the 2018 International Conference on Open and Innovative Education (ICOIE 2018)*, pp. 474–486.
- Towey, D., Walker, J., & Ng, R. Y-k. (2019). “Embracing Ambiguity: Agile Insights for Sustainability in Engineering in Traditional Higher Education and in Technical and Vocational Education and Training”, *Interactive Technology and Smart Education*. DOI: <https://doi.org/10.1108/ITSE-10-2018-0088>

- Trowler, P., Fanghanel, J., & Wareham, T. (2005). "Freeing the chi of change: The Higher Education Academy and enhancing teaching and learning in higher education", *Studies in Higher Education*, 30(4), pp. 427–444.
- Walker, J. (2016). "E-Learning for Mass Education", in *Proceedings of the IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE 2016)*, pp. 353–360.
- Walker, J., Towey, D., Wei, S., Pike, M., Kapogiannis, G., & Elamin, A. (N.D.). "Incorporating Pedagogical Theory into VR to Teach Civil Engineering". [Submitted for publication].
- Wang, T., Jong, M. S.-y., & Towey, D. (2015). "Challenges to Flipped Classroom Adoption in Hong Kong Secondary Schools: Overcoming the Barriers to Change", in *Proceedings of the IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE) 2015*, pp.108–110.
- Wang, T. & Towey, D. (2012). "A Rethinking of Digital Learning Device Projects", in *Proceedings of IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE) 2012*, pp. 269–273.
- Wang, T. & Towey, D. (2017). "Open Educational Resource (OER) Adoption in Higher Education: Challenges and Strategies", in *Proceedings of the IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE 2017)*, pp. 317–319.
- Wang, X. & Liu, J. (2011). "China's Higher Education Expansion and the Task of Economic Revitalization", *Higher Education: The International Journal of Higher Education and Educational Planning*, 62(2), pp. 213–229.
- Watkins, D. & Biggs, J. (Eds) (1996). *The Chinese Learner: Cultural, Psychological, and Contextual Influences*. CERC.
- Wenli, L. & Qiang, L. (2013). "Chinese Higher Education Finance: Changes over Time and Perspectives to the Future", *Procedia - Social and Behavioral Sciences*, 77, pp. 388–411.
- White, P., Syncox, D., & Alters, B. (2011). "Clicking for grades? Really? Investigating the use of clickers for awarding grade-points in post-secondary education", *Interactive Learning Environments*, 19(5), pp. 551–561.
- Zhang, N. (2018). "Development and Application of an English Network Teaching System Based on MOOC", *International Journal of Emerging Technologies in Learning (iJET)*, 13(7), pp. 149–160.