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The Research Grants Council of Hong Kong
Prestigious Fellowship Scheme under the Humanities and Social Sciences Panel
Completion Report
(for completed projects only)

Part A: Project and Award Holder

1. Project Title

Towards a new paradigm of education evaluation: diagnosing educational reform as assessment of learning at multiple levels of the system

2. Award Holder and Academic Department/Unit Involved

Name/Post	Unit/Department/Institution	Contact Information
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Part B: The Report

5. Workplan

5.2 Revised workplan

Change involved: Added participation in the UNESCO supported EDUsummit 2015 to the travel commitments and research workplan in my HSSPFS

Date of approval from the RGC: 4 January 2016

Reasons for the change: _____

The title of my HSSPFS research project is "Towards a new paradigm of education evaluation: diagnosing educational reform as assessment of learning at multiple levels of the system". The nature of this project, as indicated in the proposal, is related to Education Evaluation and Measurement Research to inform Policy and Administration. The primary goal of this proposal is to develop an evaluation framework that recognizes education reform primarily as a complex, multilevel learning process involving interdependent interactions among myriads of actors from classrooms to system level bureaucracies and the general public. The reason for travelling to different countries for this study is to take account of the different contextual factors in order to construct a more robust model that is useful in different educational systems.

The EDUsummit 2015 Conference <http://www.curtin.edu.au/edusummit/index.cfm> is co-hosted by UNESCO and Curtin University in Bangkok. This Conference is very different from the general academic conferences that invite papers and presentations. Instead, it is an invitation only conference during which identified experts from around the world work in groups on focused themes that research advancement can contribute much to policy and practice in education. The theme of EDUsummit 2015 is "Technology Enhanced Quality Learning for All" and engages policy makers, researchers, educators and representatives from the corporate sector from across the world in an active dialogue on nine themes. I was invited to lead the Thematic Working Group 7 (TWG7): Indicators of quality technology-enhanced teaching and learning. The focus of this working group falls squarely within the topic of my HSSPFS fellowship project, directly engaging a wide group of experts from different continents to thrash out ideas that I have been developing for this research, and to refine them. Furthermore, this work would then be able to have almost immediate dissemination through academic publications as well the UNESCO network to reach different stakeholders. Hence I decided to accept this invitation as a starting activity of my HSSPFS research program. I had also clarified with the organizers of EDUsummit 2015 the nature of the research I planned to carry out in TWG7 (<http://www.curtin.edu.au/edusummit/theme/twg7.cfm>), and confirmed its connection to my HSSPFS project, before I accepted the invitation.

5.3 Realisation of the workplan

(maximum 2 pages; please state how and to what extent the work as stated in the workplan has been achieved; give reasons for under-achievements and outline attempts to overcome problems, if any)

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Phase 1 Identification and design of indicators to construct the preliminary evaluation model (Jul-Oct 2015)

It was really opportune that the EDUsummIT 2015 was held in the early phase of my fellowship (12-15 September). I used the summer months to formulate the first draft of the document “*Indicators of Quality Technology-Enhanced Learning and Teaching*”, which was sent to all Thematic Working Group 7 (TWG7) members in mid-August. This document then served as the focus for members’ preparation as well as the discussions during the Bangkok meeting. A preliminary model of four types of indicators—conditions for learning, learning interactions, e-learning use and outcomes—for actors at each level in a hierarchically nested multilevel system (classroom, school/institution, system) was proposed as a framework for the discussion. The TWG7 members contributed materials before the Summit. There were two rounds of group work: (1) members work in four subgroups, each focusing on what would be important indicators at four levels: students, teachers, schools, and system level policy; (2) members were regrouped so that each new subgroup had members from each of the previous subgroups, to identify the connections between the indicators found at the different levels, and to discuss the strengths and utility of this multilevel framework as well as the challenges in its implementation. A summary of the discussion was then published in the *EDUsummIT 2015 Summary Report* in November:

Law, N., Niederhauser, D. S., Shear, L., & Christensen, R. W. (2015). Thematic Working Group 7: Indicators of Quality Technology-Enhanced Learning and Teaching. In K. W. Lai (Ed.), *Technology Advanced Quality Learning For All: EDUsummIT 2015 Summary Report* (pp. 47-53); EDUsummIT 2015.

Further work in collaboration with the TWG7 co-leaders, culminating in a journal publication:

Law, N., Niederhauser, D. S., Christensen, R., & Shear, L. (2016). A Multilevel System of Quality Technology-Enhanced Learning and Teaching Indicators. *Journal of Educational Technology & Society*, 19(3), 72-83.

Because my fellowship period started with the EDUsummIT, the focus of this period of my work was actually what was designated in the original proposal for the second period: Identification and design of indicators to construct the preliminary evaluation model.

Phase 2 Development of a complex system model of multilevel learning (Nov '15 – Feb '16)

In this phase, the focus was to develop a complex system model of multilevel learning, as in Phase 1 of the originally proposal. A visit was made to the University of Oslo (15 – 20 November 2015). Prof Ola Erstad organized for me to deliver a seminar on *Evaluating Educational Change for Digital Citizenship as Multilevel Learning* was given at the Department of Education. The seminar presented how the model of change underpinning the multilevel indicator framework can be applied to the design of evaluation on technology-enhanced pedagogical innovations, and how the data collected can be analyzed and interpreted. The talk highlighted the intrinsic pitfalls in prevalent models of evaluation, and put forward an alternative model of evaluation as a design for multilevel, multiscale learning by drawing on a number of design-based as well as evaluation studies of technology-enhanced learning innovations. I paid a visit to the ICT in education section of the Oslo Ministry of Education and was introduced to the report from the committee appointed by Royal Resolution and submitted to the Norwegian Ministry of Education and Research on 15 June 2015: *The School of the Future: Renewal of subjects and competences*. I had stimulating discussions with colleagues there on how such a comprehensive program of change could be evaluated.

As scheduled earlier, I visited Professor Therese Laferriere (University of Laval, 31-Jan to 5-Feb, 2016) to work on refining the model of learning at the teacher, school and system levels associated with technology-enhanced pedagogical innovations, drawing specifically on her decades of experience leading the implementation of knowledge building in the Remote Schools Network in Quebec as a successful TEL innovation that has scaled across the province. This part of the work was very fruitful, but also took much longer before the first deliverables were published, for two key reasons: (1) I wanted to apply the model to the evaluation of actual innovation projects, which inevitably took much longer to complete, and (2) my right eye suffered a retinal detachment during my trip to Quebec City. I ultimately had to undergo emergency eye surgery at the Quebec eye hospital, CHU de Quebec. The retinal

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detachment surgery was successful, but it took months for my vision to recover as the re-adjustment to the changed eyesight conditions took much time even after the physical wound has healed. In order to reduce the stress of air travel on my eyes, I decided to not schedule the visit to the UChicago CCSR since the original goal for phase 2 has already been accomplished in the first 4 months.

My first piece of publication for this phase was to develop a change model using the data I have collected in the evaluation of the Hong Kong e-learning pilot scheme (2012-2015):

Law, N., Liang, L., & Lee, Y. (2016). *What Happens to the Innovation when Project Funding Ends? Learning Architecture Matters!* Paper presented at the International Conference on the Learning Sciences, Singapore.

I then undertook further analysis of a design-based technology-enhanced pedagogical innovation network (SDLS) which I led, to connect the multilevel learning model to the evaluation indicator model articulated in the EDUsummIT work:

Law, N., Lee, Y., & Wong-Loke, C. (2018). *Determinants of School Level Success in Design-Based Innovation Networks*. Paper presented at the 13th international Conference of the Learning Sciences (ICLS), London, June 23-27, 2018.

On the international front, I was subsequently invited by colleagues at the Nanyang Technological University of Singapore to give a keynote on applying this model to knowledge building, which is a pedagogical innovation promoted by the Singapore MOE:

Law, N. (2016). *A socio-technical infrastructure to support multilevel agency for knowledge creation in Hong Kong schools*. Invited keynote presented at the Knowledge Building Symposium, (Nov 11-12), National Institute of Education, National Technological University of Singapore.

This led to further international collaboration among researchers in three systems: Hong Kong, Singapore and Quebec, culminating in the following paper to be presented in AERA 2018:

Law, N., Toh, Y., Laferriere, T., Hung, D., Lee, Y., Hamel, C., . . . Raveendaran, S. (2018). *Refining Design Principles for Scalable Innovation Networks through International Comparative Analysis of Innovation Learning Architectures*. Paper presented at the American Educational Research Association, New York.

Phase 3 Dissemination and preliminary testing of the evaluation model (Mar – Dec 2016)

Because of my retinal detachment, I was granted an extension to complete the planned work of the fellowship without additional funding. I visited Patrick Griffin at the University of Melbourne (22 – 25 March 2016) and consulted him on the application of the indicators model to data already collected in past international comparative studies in education. While recognizing that the design of past studies did not cater for such a model of analysis, we also discussed possibilities with regard to data collected within one education system. This led to the work that I and my postdoc have done in trying to identify whether there is evidence of system level and school level impacts on students' reading literacy based on the data collected from PIRLS 2001, 2006 and 2011, focusing on the system level policy to encourage home reading practices in Hong Kong primary schools. The paper we submitted is currently under review:

Reichert, F., & Law, N. (under review). Effects of Home Reading Practices and Reading-related Pedagogies on Reading Literacy. *Reading and Writing*.

My work on developing a model for scaling and evaluating technology-enhanced learning innovations attracted further international attention. I was invited as an expert by OECD-CERI to contribute to their project on Innovative Pedagogy for Powerful Learning (IPPL) (<http://www.oecd.org/education/ceri/innovative-pedagogies-for-powerful-learning.htm>) to participate in two workshops, in 2016 and 2017 respectively, and to contribute a chapter to a book on the outcomes of the IPPL project. The book chapter is now accepted and in press:

Law, N. (in press). Technology-Enhanced Innovative Pedagogy: the Challenge. In OECD (Ed.), *Innovative Pedagogies for Powerful Learning*. Paris: OECD.

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6. Dissemination plan

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6.3 Realisation of the dissemination plan

(maximum 2 pages; please state how and to what extent the output as stated in the dissemination plan has been achieved; give reasons for under-achievements and outline attempts to overcome problems, if any)

As reported in the previous section, research outputs were produced in each of the three phases as indicated in the original dissemination plan. These are:

Journal papers:

1. Law, N., Niederhauser, D. S., Christensen, R., & Shear, L. (2016). A Multilevel System of Quality Technology-Enhanced Learning and Teaching Indicators. *Journal of Educational Technology & Society*, 19(3), 72-83.
2. Reichert, F., & Law, N. (under review). Effects of Home Reading Practices and Reading-related Pedagogies on Reading Literacy. *Reading and Writing*.

Peer-reviewed conference papers:

3. Law, N., Liang, L., & Lee, Y. (2016). *What Happens to the Innovation when Project Funding Ends? Learning Architecture Matters!* Paper presented at the International Conference on the Learning Sciences, Singapore.
4. Law, N., Toh, Y., Laferriere, T., Hung, D., Lee, Y., Hamel, C., . . . Raveendaran, S. (2018). *Refining Design Principles for Scalable Innovation Networks through International Comparative Analysis of Innovation Learning Architectures*. Paper presented at the American Educational Research Association, New York.
5. Law, N., Lee, Y., & Wong-Loke, C. (2018). *Determinants of School Level Success in Design-Based Innovation Networks*. Paper presented at the 13th international Conference of the Learning Sciences (ICLS), London, June 23-27, 2018.

Invited book chapter:

6. Law, N. (in press). Technology-Enhanced Innovative Pedagogy: the Challenge. In OECD (Ed.), *Innovative Pedagogies for Powerful Learning*. Paris: OECD.

Workshop papers:

7. Law, N., Niederhauser, D. S., Shear, L., & Christensen, R. W. (2015). Thematic Working Group 7: Indicators of Quality Technology-Enhanced Learning and Teaching. In K. W. Lai (Ed.), *Technology Advanced Quality Learning For All: EDUsumMIT 2015 Summary Report* (pp. 47-53): EDUsumMIT 2015.

Invited conference keynote:

8. Law, N. (2016). *A socio-technical infrastructure to support multilevel agency for knowledge creation in Hong Kong schools*. Invited keynote presented at the Knowledge Building Symposium, (Nov 11-12), National Institute of Education, National Technological University of Singapore.

Invited talks:

9. *Evaluating Educational Change for Digital Citizenship as Multilevel Learning* was given at the Department of Education, University of Oslo 18 November 2015.
10. *Learning environments and teaching innovation initiatives: Enablers and impediments*. Invited presentation at International Symposium on Innovative Pedagogies for Powerful Learning, 28 April 2016, at Sant Pau Art Nouveau Site, Barcelona, jointly organized by OECD, Barcelona Centre for International Affairs and Fundacio Jaume Bofill.

Funded R&D project on a multilevel innovation school network that apply the model developed in this HSSPFS project

- Multilevel Leadership Network for Self-Directed Learning Innovation to Advance STEM Development (<http://sdls-mln.cite.hku.hk>) funded by the Education Bureau of the HKSAR government.

In terms of dissemination, I have accomplished more than was indicated in the proposal in terms of impact. While I did not organize a standalone workshop or forum, I have been publicizing it through the training

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workshops I organized in conjunction with the CITE Research Symposiums (2016 & 2017), as well as invited presentations by different schools and teacher networks. The dissemination has also extended beyond the local community as evidenced by the invited keynote at the Knowledge Building Symposium, (11-12 Nov 2016) organized by the National Institute of Education, National Technological University of Singapore, and by OECD at the International Symposium on Innovative Pedagogies for Powerful Learning on 28 April 2016.

Given the opportunity to develop the multilevel model, I was keen to put this to the test in real authentic situations. Based on the model I developed, there needs to be buy-in and support from all levels from policy makers to school leaders and teachers. Hence, I focused on applying the model to design a multilevel innovation program as a funding proposal to the Education Bureau (EDB): Multilevel Leadership Network for Self-Directed Learning Innovation to Advance STEM Development (<http://sdls-mln.cite.hku.hk>). The conceptual framework of this project (<http://sdls-mln.cite.hku.hk/en/conceptual-framework/>) was entirely based on the outcomes of my HSSPFS work. This project was successfully funded and commenced in August 2017, involving the participation of principals, STEM teachers and other senior teachers in 20 primary and 12 secondary schools. The project received very positive feedback both from the EDB colleagues, school leaders and teachers. The most positive outcome I have observed so far is the positive impact on building a culture of collaboration through attention to designing the architecture for learning within and across schools.

The original dissemination plan included a book proposal. However, as I undertook analysis of the data from different completed projects, I have realized that the conceptualization and the depth of analysis I conducted and reported in the three peer-reviewed conference papers could be further developed. Hence, I have decided to re-prioritize and work on extending the conference papers to full length journal papers first. These outputs would then help to provide a stronger basis for a good book proposal.

7. Other impact (e.g. award of patents or prizes, collaboration with other research institutions, knowledge transfer, etc.)

Key impacts arising from the work resulting from the HSSPFS beyond academic publications include:

1. The successful award of a University-School Support Programme funded by Education Bureau, Multilevel Leadership Network for Self-Directed Learning Innovation to Advance STEM Development, following the design principles arising from the multilevel model of learning for change. I expect that this project will be able to generate data that will further refine the evaluation model that is the focus of this fellowship.
2. One of my EdD students whose thesis was on evaluating the implementation of gifted education programs in three purposively selected schools in Hong Kong applied my evaluation model and had very insightful findings. He has submitted his thesis at the end of January. I expect some good publications as well as some further dissemination activity based on this thesis.
3. An informal international “consortium” comprising researchers at HKU-CITE (<http://www.cite.hku.hk>), the National Institute of Education, National Technological University of Singapore, and the Remote Schools Network researchers based at the University of Laval. There will be further plans for collaboration beyond the joint paper that will be presented at the AERA 2018 conference.
4. The inclusion of my chapter on *Technology-Enhanced Innovative Pedagogy: the Challenge* as one of the compendium chapters in the book that OECD will publish in 2018 for their project on *Innovative Pedagogies for Powerful Learning* is a positive recognition of the need for the design and evaluation of such pedagogical innovation projects to take account of the multilevel learning that needs to accompany classroom level learning innovation for alignment. I hope this work will attract further international attention after the book is published.