Learning as a multilevel challenge for the 21st century

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The potential of computers to transform learning and teaching was anticipated as early as the 1960s. But, while information and communication technology (ICT) has transformed much of our everyday work and social life, it has barely made a dent on learning and teaching, Twenty-five years of exploration into designing and promoting learning technology has led me and others to realize that changing learning in classrooms requires interdependent learning at teacher, school and system levels, and that we need new theories to connect learning at multiple levels. My research has focussed on this quest for a multilevel theory of learning that can guide educational policy and practice and ultimately prepare our younger generation for the knowledge society.

Research shows that adopting technology such as a simulation tool for student exploration of scientific principles or a discussion forum to scaffold learning through collaborative discourse requires fundamental changes in beliefs about how learning happens and the roles of learners and teachers. Identifying models of effective teacher learning has become an important research agenda.

Around the turn of the millennium, many countries, including Hong Kong, launched comprehensive education reform efforts that often include the use of ICT to support learning. This sparked much international interest in research on ICT-based pedagogical innovations. My investigations as a member of the International Steering Committee in the three Second Information Technology in Education Study modules (SITES M1, M2 and 2006) found that successful pedagogical innovations are often those which emerge as a result of concerted efforts from collaborative teacher teams in supportive school ecologies.

These findings challenge the traditional wisdom that innovations spread through the process of diffusion. There is much empirical evidence that innovations that sustain and scale are those supported by architectures for learning to foster behavioural change and learning across classroom, teacher and school levels interdependently. Architectures for learning are organizational structures and mechanisms for interaction and decision-making that scaffold communication, collaboration and alignment within and across different levels of the educational system that the innovation unit is involved.

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Environments that support learning innovations and conditions that are conducive to their scalability have become an important research agenda for governments and supranational organizations such as OECD and the European Commission (EC). I was a co-investigator on the EC's Upscaling Creative Classrooms in Europe and Asia (SCALE CCR) Study, the goal of which was to identify the conditions for scalability of ICT-enabled learning innovations. Our study found further evidence that the scaling-up process of a learning innovation is an evolutionary process involving the entire multilevel education ecosystem. The exact starting point or the "level of innovativeness" is not important, as long as there are structures and mechanisms in place to support progressive and aligned learning and development at the various levels. We found parallels between learning at individual, organizational and system levels – change takes place progressively and there needs to be intentional efforts to support the learning as an evolutionary process to build multiple, interdependent capacities.

My current research on sustainable learning innovations is two-pronged. One strand is to develop indicators for assessing the level of change and scalability of an innovation through measures of organizational structures and interaction/decision-making mechanisms at different levels of the education ecosystem during the process of innovation implementation. This work is currently supported by a General Research Fund award and a Humanities and Social Sciences Prestigious Fellowship award from the RGC. The second strand is to develop (1) socio-technical designs for sustainable cross-school learning communities of teachers and school leadership teams to drive pedagogical innovations in classrooms, and (2) technology tools for learning design and learning analytics to support teachers and learners. This work is currently supported by a School-University Partnership grant from the Education Bureau of the Hong Kong SAR.