NIE
NATIONAL INSTITUTE OF EDUCATION
SINGAPORE

Future-Ready Teachers for Future-Ready Learners

CJ Koh Professorial Lecture Series No. 9
Series Editor: Associate Professor Chang Chew Hung

Writing & Editorial Team:
Dennis Kwek
Pamela Onishi
Shyam Anand Singh
Wi Chee Yong Andy
Norazleena Binte Sha'hri
Nur Haryanti Binti Sazali



Future-Ready Teachers for Future-Ready Learners
CJ Koh Professorial Lecture Series No. 9
A publication of NIE/NTU, Singapore © 2019
www.nie.edu.sg

TABLE OF CONTENTS

FOREWORD BY SERIES EDITOR

ASSOCIATE PROFESSOR CHANG CHEW HUNG

ON BEHALF OF the CJ Koh Professorship secretariat and the publication team, it is my pleasure to present to you the ninth issue of the *CJ Koh Professorial Lecture Series*—"Future-Ready Teachers for Future-Ready Learners". This is a consolidated report of the National Institute of Education (NIE) Faculty and Students Seminar and the Professorial Public Lecture delivered by Professor Pam Grossman, who was appointed the 13th CJ Koh Professor from 24 to 28 September 2018. The main objective of this report is to ensure that the rich and insightful discussions arising from Professor Grossman's appointment reach out to key stakeholders within the NIE, the Ministry of Education (MOE) and the wider local and global educational fraternity.

The CJ Koh Professorship has been made possible through the generous donation of S$1.5 million to the Nanyang Technological University Endowment Fund by the late Mr Ong Tiong Tat, executor of the late lawyer Mr Koh Choon Joo's (CJ Koh) estate. Mr Tan Hsuan Heng, the nephew of the late Mr and Mrs Ong Tiong Tat, is the current executor of the CJ Koh estate.

In the Seminar entitled "Future-Ready Teacher Education for Future-Ready Teachers: An International Perspective" held at NIE, Professor Grossman highlighted the importance and benefits of practice-based teacher education in preparing teachers with the kind of adaptive expertise in dealing with the educational challenges in an ever-changing future. Professor Grossman also discussed some of the desired outcomes of practice-based teacher education in terms of the common knowledge, skills and perspectives that teachers should develop to exercise such adaptive expertise.

In the Public Lecture titled "Future-Ready Teachers for Future-Ready Learners: An International Perspective", held at NTU@one-north, Professor Grossman spoke about the importance of better preparing both teachers and learners for education in the future. Referencing Joi Ito's book, *Whiplash*, Professor Grossman emphasised eight core principles in preparing our students for a faster future: i) Emergence over Authority; ii) Pull over Push; iii) Compasses over Maps; iv) Risk over Safety; v) Practice over Theory; vi) Diversity over Ability; vii) Resilience over Strength; and viii) Systems over Objects. In so doing, Professor Grossman touted the importance of a more progressive and student-centred version of education that engages students in active learning. Drawing from several examples in the United States of America, she also spoke of the utility of project-based learning and addressed some of its key benefits and challenges vis-à-vis traditional classroom learning.

I would like to take this opportunity to thank all who have contributed to this report in one way or another. Special thanks go to our NIE Director Professor Christine Goh for her support of the *CJ Koh Professorial Lecture Series* and to Professor Pam Grossman for sharing valuable insights with us during her appointment as the 13th CJ Koh Professor.

This consolidated report would not have been possible without the excellent secretariat support

from Mr Joseph Lim and the publications team which supported the writing from the first drafts to the final product. In this respect, our thanks go to (in alphabetical order) Dr Dennis Kwek, Dr Pamela Onishi, Mr Shyam Anand Singh, Dr Wi Chee Yong Andy and also to our wonderful colleagues from the Office of Education Research (Research Engagement & Publications Unit) for their typesetting, copyediting and careful proofreading work.

We present to you the ninth issue of the *CJ Koh Professorial Lecture Series*—"Future-Ready Teachers for Future-Ready Learners".

Associate Professor Chang Chew Hung
Chief Planning Officer, National Institute of Education, Singapore
Nanyang Technological University, Singapore
October 2018
Singapore

PREFACE BY NIE DIRECTOR

PROFESSOR CHRISTINE GOH

THE 21ST CENTURY heralds the advent of a technological revolution that will alter, at an unprecedented scale and speed, the way we live, learn, work, relate and interact with fellow humans. Dubbed the Industrial Revolution 4.0, it is characterised by technologies that will blur the lines between the physical, biological and digital spheres. Fundamental to this revolution is the rapidly changing nature of work and economy, with schools and education systems being challenged in unprecedented ways to adapt to this very fluid future. How do we ensure our learners are ready for the future? How do we ensure our teachers are ready to prepare these learners, and subsequently, how do teacher educators prepare teachers to be ready for this very uncertain future? How must teacher education change to become future-ready?

Professor Pam Grossman has spent a significant part of her life focused on issues of teacher preparation, teacher education and teacher learning. As the 13th CJ Koh Professor, she has engaged the Singaporean fraternity in thinking about the leading edge of teacher education in terms of practice-based teacher education and developing a suite of core teaching practices that can prepare teachers to be future-ready.

In her research, Professor Grossman has deliberately crossed disciplinary boundaries to understand what being a professional, and what professional practice, means. These disciplinary transgressions have allowed Professor Grossman to understand deeply the nature of professional practice and identity, and develop better understandings of how teachers can develop their sense of professional identity, and most importantly, acquire a suite of core teaching practices that expands their pedagogical repertoire.

As part of NIE's vision and mission, Professor Grossman's future orientation lends well to NIE's own drive to lead the future of education and continuously transform the nature of teaching. Her advocation of a teacher education curriculum that places the development of teachers' professional practices at the forefront seeks to prepare our teachers to face a future where the role of teaching is being increasingly challenged by technologies such as artificial intelligence. Despite pundits that predict the future of schooling and education to be one that will be severely disrupted, even eradicated, by technologies, Professor Grossman's talks drive home the importance of schools and universities that serve as sites for practice-based teacher learning.

Professor Grossman's discussions on the core practices of teaching also signals an alignment with the renewed focus in Singapore on our own teachers' core practices. The Singapore Teaching Practice (STP) represents a way of thinking, talking and improving effective teaching and learning in Singapore schools. Supported by the Singapore Curriculum Philosophy which reflects the teaching fraternity's beliefs about teaching and learning, the STP builds on teachers' understandings of subject matter, goals, students, learning and teaching to drive pedagogical practices in classrooms. Like Professor Grossman's talk of core practices, the STP represents what she terms "a grammar of practice that provides a common professional language for describing teaching as professional practice". Many of these pedagogical practices seek to create a classroom environment

PREFACE

PROFESSOR CHRISTINE GOH

where active and student-centred learning can occur, resulting in important 21st century competency outcomes that will prepare Singaporean students to be future-ready.

In line with Professor Grossman's CJ Koh Professorial Lectures, NIE's own teacher education programmes are preparing our teachers to be: future-ready by developing our teachers to be life-long learners so that they can continue to learn and refine their pedagogical craft throughout their productive career; life-deep learners who can wield a range of pedagogical repertoires and orchestrate deftly between practice and expertise; life-wide learners who adaptively learn from multiple learning environments and contexts; and life-wise persons who hold on to fundamental moral and ethical wisdoms that help navigate themselves, and their students, into the future. A future-ready teacher must have all these attributes, and teacher education institutes, such as NIE, play a critical role in ensuring that our teachers are given the opportunities to learn and practice these important learning dispositions, and become teachers that inspire and transform our students for the future.

Professor Christine Goh
Director, National Institute of Education, Singapore
Nanyang Technological University, Singapore
October 2018
Singapore

ABOUT THE CJ KOH PROFESSOR PAM GROSSMAN

PROFESSOR PAM GROSSMAN is the Dean of the Graduate School of Education and the George and Diane Weiss Professor of Education at the University of Pennsylvania. A distinguished scholar, she came to Penn from Stanford University's School of Education, where she was the Nomellini-Olivier Professor of Education. At Stanford, she founded and led the Center to Support Excellence in Teaching and established the Hollyhock Fellowship for early career teachers in underserved schools. Before joining Stanford, she was the Boeing Professor of Teacher Education at the University of Washington.

Professor Grossman's research focuses on the preparation of teachers and other professionals and issues of instructional quality, particularly in English Language Arts. Her most recent work focuses on practice-based teacher education and the role of core practices of teaching in teacher preparation and professional development. She co-directs the Core Practice Consortium, a consortium of faculty from 11 different institutions that has been investigating pedagogies useful for helping novices learn to teach. She was elected to the National Academy of Education in 2009 and to the American Academy of Arts and Sciences in 2017. In addition to chairing the Board for the Spencer Foundation, she currently serves on the Board of the Carnegie Foundation for the Advancement of Teaching.

Professor Grossman's widely cited articles have appeared in *Teachers College Record*, *American Educational Research Journal*, *Educational Researcher,* and *Educational Evaluation and Policy Analysis*, among others. In one highly regarded study, she investigated how clergy, teachers, and clinical psychologists are

ABOUT THE CJ KOH PROFESSOR PAM GROSSMAN

prepared for the demands of professions that require establishing quality relationships with the people they serve. She also served as co-principal investigator of a five-year study of pathways into teaching in New York City schools, focusing on the features of preparation that affect student achievement.

Professor Grossman's research has been funded by the National Science Foundation, the Institute of Education Sciences, the William T. Grant Foundation, the Spencer Foundation, and the Carnegie Corporation. In addition to her research on teacher education, Professor Grossman is a committed teacher educator and, across her career, has prepared prospective teachers for the many demands of their profession.

FUTURE-READY TEACHER EDUCATION FOR FUTURE-READY TEACHERS: AN INTERNATIONAL PERSPECTIVE

PROFESSOR PAM GROSSMAN

26 SEPTEMBER 2018, LUNCH SEMINAR, NIE, SINGAPORE

Synopsis

IN THIS LECTURE entitled "Future-Ready Teacher Education for Future-Ready Teachers: An International Perspective", Professor Pam Grossman focused on practice-based teacher education in which teachers are prepared with the knowledge, skills and perspectives that will enable them to develop and exercise such adaptive expertise.

Introduction

Preparing future ready teachers will require preparing teachers for an ever-changing future, in which the only constant is change. It will require preparing teachers with the kind of adaptive expertise that allows them to exercise professional judgment in adapting their practice for different kinds of learners and new learning technologies and environments, so teachers, in turn, can prepare their students to thrive in the future. My focus today is on practice-based teacher education, in which teachers are prepared with the knowledge, skills and perspectives that enable them to develop and exercise such adaptive expertise.

Practice-based Teacher Education

In defining practice-based teacher education, I rely on several definitions of practice. The first meaning entails the broad view of professional practice. Entering a practice is more than getting a job as a teacher, lawyer, doctor or other professional. It means entering a professional community in which you speak a common language, receive intensive preparation for the specific knowledge and skills required by the profession, have agreed upon ways of identifying and solving problems of practice. One of the features of a profession is that individuals are not expected to develop their craft from scratch. Instead, they're expected to become a part of a broader professional community that has developed knowledge, tools and practices that individuals can use. As members of a profession, professionals are also expected to give back, to contribute to that larger body

of professional knowledge and craft. In this sense, entering practice is most decidedly a communal affair.

Another definition of practice includes what it is that people do as part of professional work. I take a socio-cultural definition of practice that focuses not just on the skills professionals develop, but also the knowledge and beliefs that undergird their work, as well as the identity they take on and continue to shape when they enter a profession. In this socio-cultural definition, professional practice is always being developed in relationship to the history of a profession, as well as in relation to the specific contexts in which the work is done.

A Focus on Core Practices

A third meaning of practice, in my definition of practice-based teacher education, has to do with the role of professional education in cultivating foundational, or core, practices. As I have written elsewhere, core practices of teaching include the foundational components of professional work that are central to the daily work of teaching, are central to supporting student learning. These practices are often fundamental to developing other, more complex practices, and may underlie many different curricula or approaches to teaching. Targeting such practices, in tandem with the knowledge of content and students, provides a foundation both for continued development and adaptive expertise.

These core practices can be both generic, such as learning to facilitate a classroom discussion or providing instructional explanations, or subject-specific, such as selecting and adapting primary source documents for history teachers or modelling metacognitive strategies for reading or writing in language arts classes. Core practices represent a grammar of practice that provides a common professional language for describing teaching as professional practice. Teachers will also continue to develop these practices over their career, even as they develop more complex and sophisticated forms of teaching.

Core Practices

- Are central to the daily work of teaching
- Are central to supporting student learning
- Are fundamental to developing other, more complex practice
- Underlie many different curricula or approaches to teaching

The Role of Deliberate Practice

Two final definitions of practice have to do with the meaning defined in the Oxford English Dictionary as "Repeated exercise in or performance of an activity or skill so as to acquire or maintain proficiency in it," and the definition of deliberate practice, by Anders Ericcson and his colleagues: "Deliberate practice includes activities that have been specially designed to improve the current level of performance." This definition of practice highlights the importance of providing pedagogical opportunities for teachers to "practice" teaching during professional education in ways that build their knowledge, skill, professional identity and professional judgment. This includes both more routine opportunities to practice, including practice afforded by student teaching, as well as opportunities for more targeted or deliberate practice which provide possibility for feedback and revision.

Given these various definitions of practice, I define practice-based teacher education as teacher education that places professional practice, defined broadly, at the centre of the curriculum; and provides multiple and extended opportunities to develop professional practice, including the development of knowledge, judgement, professional identity and adaptive expertise. Such rich practice-based teacher education

FUTURE-READY TEACHER EDUCATION FOR FUTURE-READY TEACHERS: AN INTERNATIONAL PERSPECTIVE

PROFESSOR PAM GROSSMAN

26 SEPTEMBER 2018, LUNCH SEMINAR, NIE, SINGAPORE

features strong connections to schools, with shared vision of high quality teaching. In this definition, both schools and universities serve as sites for teacher learning about practice, and both university-based teacher educators and K-12 teachers play important roles in supporting novices as they learn to teach.

To implement such a vision of practice-based teacher education will require that teachers and teacher educators work to develop a shared vision of high quality teaching and a set of core practices they agree that novices will be developing in professional education. Part of this will also require developing tools and assessments that are associated with these core practices to track novice development over time. Finally, enacting the pedagogies of approximation and deliberate practice will require the development of teacher educators and opportunities for teacher educator learning in the context of practice.

Teacher educators across the globe, from Chile to the Netherlands, are experimenting with this vision of practice-based teacher education, working with colleagues and teachers to identify and cultivate practices teachers need to engage all learners in ambitious instruction and to prepare them for the challenges of the future. As they do so, they are also experimenting with pedagogies that support opportunities for novices to try out new practices and to get feedback, including rehearsals, role plays and simulations (Grossman, 2018). More and more programmes are also having student teachers upload videos of their classrooms and providing online coaching around a set of practices.

Given the accelerated rate of change, teachers will need to be prepared to continue to learn and grow once they leave their teacher education programmes. Equipping teachers with the skills of inquiry and with tools to use to continue to innovate will be an essential part of preparing future-ready teachers.

Question-and-Answer Session

Dr Dennis Kwek served as the moderator in the Question-and-Answer session that followed the seminar. Below is a summary of the session.

Audience member: Is the teacher-student relationship necessarily a one-to-one situation? If not, how do you build relationships with a group of students?

Professor Grossman: In teaching, it is particularly complex because teachers need to learn how to do both. They need to learn how to develop one-to-one relationships with students, understand particular students, learn what motivates them and provide them the kind of feedback that would support that individual student. They also have to develop a relationship with the group and contend with a lot of group dynamics. After I did a study, I thought that we do not actually prepare teachers sufficiently around group dynamics and what happens in groups. I think it is possible to learn to do both even though they are not the same thing. Developing relationships in a group setting will be different from one-to-one relationships.

Audience member: What are the key things we should know in the practice of teacher education in order for us to prepare them to be future-ready?

Professor Grossman: One of the things I see shifting in the practice of teacher education is the shift towards more student-centred, active learning. This is very complex because it is harder to do than just standing in front of the class. It is harder than a more teacher-centred classroom which may rely on an Initiate-Response-Evaluate (IRE) model of discourse. It involves a lot of complex group work. It is actually

very hard to do, which is one of the reasons why this particular innovation does not take root.

One of the projects we are engaged in at the University of Pennsylvania is to think of how to better prepare teachers to engage in project-based learning and in other forms of student-centred, active learning so that they can be more successful and to realise the potential of that pedagogy. I think it has an enormous promise but it has not been enacted well because of difficulties. Teachers do not always feel they are prepared to do it and if they are new to it, they might try aspects of it and then back away. I think it is important to ask how to prepare not only pre-service teachers but also career teachers to be more skilful in this area and to develop mind-sets and professional judgment related to this form of pedagogy if we are to prepare future-ready students.

Audience member: First, how do we prepare student teachers to make judgments or decisions in their teaching? To what extent can they develop independent thinking and criticality in their thinking rather than just enacting simulations of what experts might do? Second, can these core practices be used for in-service teacher professional development because it requires teachers to learn new skills and can we incorporate these core practices in research?

Professor Grossman: I want to go back to that initial definition of practice which absolutely incorporates judgment. As people are learning how to do things, they are also learning when to use them and why to use them.

As part of these rehearsals, what you will hear are real questions that concern professional judgment: Should I go in this or that direction? How should I respond in that moment? That judgment first of all requires knowledge and the use of that knowledge in practice when teachers are enacting some of these core practices. They always have to rely on professional judgment. It is making those elements of judgment visible, which is part of the role of teacher educators. These experiences offer learning opportunities – not just about the how, but the why, and the theory that would help you develop that adaptive expertise.

The second question of "Can this lead to professional development?" Absolutely! We did a study with middle school English teachers where we targeted some of these core practices. We observed them using the observation tools we have developed, gave them collective feedback and had them identify the practices they wanted to work on. We wanted the teachers to have full agency and ownership in what they are working on.

The teachers identified facilitating classroom discussion where students were not talking much and the accompanying teaching strategies to manage this type of situation. We were working with experienced teachers but were doing similar things in terms of getting them to see different representations of practice and trying out a few different things in the classroom.

One of my favourite stories from that study is about a teacher who had about 37 years of experience and was a very good teacher in many ways. After watching videos of classroom discussion and trying out new teaching strategies in her own classrooms, she started to become more excited and implemented numerous changes in her classroom.

Audience member: In the online world these days, there are a lot of things in the Internet that can take away students' attention. What are two or three actions that we can do as teachers to make sure that student learning is relevant?

FUTURE-READY TEACHER EDUCATION FOR FUTURE-READY TEACHERS: AN INTERNATIONAL PERSPECTIVE

PROFESSOR PAM GROSSMAN

26 SEPTEMBER 2018, LUNCH SEMINAR, NIE, SINGAPORE

Professor Grossman: There are many things that teachers can do to make things relevant. One is to connect to the student's personal and cultural knowledge. When you think about introducing something new to students, first think about what they already know about it. Second, how is it relevant to them in a number of ways? When students ask "why are we learning this?" I tell my student teachers that if they do not have a good answer to that question then they should not be teaching it. Teachers should know why they are teaching a topic and how that topic would interest and benefit the students, not only in the short term, but in the long term.

One of my colleagues founded an organisation called Educurious (https://educurious.org/) that engages children with experts to talk about what they do in their everyday work. It helps children to see how and what they are learning might transfer into what they might be doing in the future or things they are passionate about. As an English teacher, I encourage my students to read in finding out more about their passions. For one student, after a lot of listening to that student's thinking and building a relationship with him, I figured what he was passionate about was horse racing. So, I actually tried to find books that were relevant to this topic so he would read something he was passionate about. Again, getting to know the students is one of the most important elements in designing responsive curriculum.

Audience member: All these experiences (from other professions such as medical practice and sports) are far removed from the real practice of teaching. The translation of these practices to teaching has a big gap (for example, an inanimate child in medical emergency practice versus live children in the classrooms). What do you think about the issue of this gap?

Professor Grossman: One of the reasons why I study other professions in addition to teaching is because it is hard to study what we do not do. Studying other professions increases my pedagogical imagination in what may be possible in professional education. However, there are always limits to any analogy and I have tried to make that clear. I am focused on some points of connection but we would have to develop pedagogies that would be most useful for children.

What I am hoping to illustrate is that one of the underlying principles in most professional education, including teacher education, is that we build a variety of approximations in practice which are always somewhat removed from the real classrooms. Yes, that is not a real baby in the medical simulation, but two years from that day, or even the next day depending on their year of medical practice, they will be working on real children. It is a practice with very real consequences. I think that always contextualising to the particularities of teaching is important. That is why I was emphasising that the difference between building relationships both with individuals and groups is something teachers might do. But we can also learn from other professions.

I am very lucky because my research is in teacher education and I am a teacher educator, so there really is no gap between research and practice for me. When I see something, I am able to try that out in the context of teacher education. For example, when I saw the teaching of how to respond to resistance in a Clinical Psychology class, I adapted some of the scripts they used in clinical psychology for my English methods class. I asked my students first to talk about what they would do when experiencing resistant behaviours, ranging from the quiet resistance of putting your head down on the desk or just simply not writing when asked to write, to more vocal forms of resistance where students might be acting out in class. After discussing what they would do in response, I then turned to role plays. When I made that shift, my students who all

FUTURE-READY TEACHER EDUCATION FOR FUTURE-READY TEACHERS: AN INTERNATIONAL PERSPECTIVE

PROFESSOR PAM GROSSMAN

26 SEPTEMBER 2018, LUNCH SEMINAR, NIE, SINGAPORE

had good ideas started responding in roles or ways they never would have expected, including losing their tempers and engaging in behaviours they had identified as ineffective just minutes before. They were surprised at themselves. Again, it gave them that opportunity to find out what it was like to respond to resistance, in their role as teachers, to debrief the experience, and then to try again. Again, the nature of resistance in settings of clinical psychology and in the classroom might be different but there are underlying principles and approaches that could be very useful for students to try out before they encounter resistance in the classroom.

Audience member: I was wondering about this concept of future-ready teachers because our students are now very tech savvy. They Google a lot and they may know what teachers do not even know. How do you get teachers to accept that sometimes students can actually know more? Knowledge is not from the teachers anymore. How do teachers help students to be future-ready?

Professor Grossman: That is part of the reality in the classroom and teachers must be prepared for that. It argues for a different kind of pedagogy: to use whatever is now in the classroom rather than shut it down. This is one of the reasons why I think the student-centred learning approaches have a lot of promise because students have so much access to a variety of resources.

At the same time, a part of the role of teachers is to teach students how to learn from these different resources. There is a lot of misinformation that students encounter on the Internet. One of the things that teachers must take great responsibility for is how to help children become critical consumers of the information they get from all these Internet resources.

For example, my colleagues at Stanford discovered that we are not really very good in discerning the biases in various websites. Students particularly do not know how to do that. How can teachers help students develop the ability to become more critical consumers? Knowing that they are already using the Internet for information, how can we bring that into the classroom and help them use that critically? They should be learning, in the classroom, how to assess and use the knowledge gained from those various sources in productive ways. The only way teachers can do that is for them to have opportunities to practice and to try it out to see how it would look like.

I think that teachers coming into teacher education are much more tech savvy compared to a generation ago, but professional preparation is not so much about using the technology but in how to use technology for teaching and learning. How do we use technology in ways that would give opportunities for students to do something that might simulate reality? They can try out things in virtual reality and receive feedback in that setting. How can we create situations that are virtual rather than actual when we think about experiential learning?

Audience member: As with many places in the world, the national curriculum and assessment influences practices in schools. How can practice-based professional development help teachers to reflect or navigate school-based practices that may have been created or developed to help students perform well in national assessments? How can teachers creatively and thoughtfully examine documents and develop their own practice that not only help students prepare for examinations but also to think critically? How do we help teachers reflect and improve what they are doing?

Professor Grossman: This is a big issue in the United States as we have adopted a regimen of testing. Teachers have started adapting their teaching methods to help students pass tests. In our large project that

looks at teaching across the country, we discovered that in some districts, teaching became exactly what you have described. Teachers were no longer teaching reading; they were teaching test preparation.

The most upsetting thing to me was that teachers were telling students in reading instruction, "Don't read the text! Read the questions, skim the text, and then look for the answers!" That is a good strategy for test taking but a very bad strategy for reading. There are also positive adaptations where teachers, who were teaching expository writing that was being tested, developed good new teaching strategies for helping students master expository writing.

One of the things you can do in professional development is to bring teachers together around particular elements of student learning, encourage them to share how they are addressing those in a variety of ways and then help them brainstorm about the ways they are productive or less productive. It is important to create environments where teachers can see a variety of ways in which they are teaching towards the same goals and expanding the pedagogical repertoires in how they might be applied. Teachers are constrained by what they see and what they have access to, so you can create opportunities for them to learn from their colleagues.

Dennis Kwek: In your definition of practice, the first word you talked about was orchestration. I think that gets to the heart of what teachers have to do in the classrooms at any one time. Teachers have to be agile, they have to be adaptive, they have to exercise judgment in real-time, they have to be wise and to some extent they have to be funny as well. The task of any teacher is really not simple. In a way, teachers are training to be conductors in the classroom. I think the work that you are doing helps us to think through a lot of these things. Thank you very much.

Reference

Grossman, P. (Ed.). 2018. *Teaching Core Practices in Teacher Education*. Cambridge, MA: Harvard Education Press.

FUTURE-READY TEACHERS FOR FUTURE-READY LEARNERS: AN INTERNATIONAL PERSPECTIVE

PROFESSOR PAM GROSSMAN

27 SEPTEMBER 2018, PUBLIC LECTURE, NTU@ONE-NORTH, SINGAPORE

Synopsis

HOW CAN STUDENTS better prepare for a future with an increasingly accelerating pace of change? Professor Pam Grossman envisions student-centred learning to be necessary in cultivating essential 21st century skills to prepare students for a faster future. In particular, the benefits and challenges of deep learning and project-based learning are discussed. Featuring the success of project-based schools in Philadelphia, Professor Grossman also addresses some of the possibilities and concerns of such an application to the Singaporean context. Overall, she notes that in order for project-based learning to be effective, other factors such as teachers' mind-sets, assessment methods and technology should be adapted to complement student-centred learning.

Preparing for a Faster Future

In his book *Whiplash*, Joi Ito talks about how best to prepare for a faster future, a future in which the pace of change will only accelerate. He articulates eight core principles that should guide us as we prepare. These principles include: Emergence over Authority; Pull over Push; Compasses over Maps; Risk over Safety; Practice over Theory; Diversity over Ability; Resilience over Strength; and Systems over Objects. Although he is not writing about education per se, each one of these principles has implications for how we educate our students to be ready for a faster future.

Part of what he argues for is giving individuals more agency and freedom to experiment, to work together

to find solutions to increasingly complex problems, and to prototype and iterate more quickly rather than engaging in lengthy planning processes. He describes the need for more problem-based collaborations, in which there is a very real problem to be solved and people have to work together, bringing their diverse expertise and different perspectives, to create a solution. What he describes sounds a lot like a form of education that has come in and out of popularity—project-based learning.

In many parts of the world, education seems to be on a perpetual pendulum swing between more traditional, didactic forms of education, and a more progressive, student-centred version of education that engages students in active learning. In the United States, the pendulum swing is relatively short—unlike Singapore which generally has a consistent approach towards teaching and learning. For the past two decades, the United States has been committed to an emphasis on more traditional teaching to the test, motivated in large part by the *No Child Left Behind* policy. This national policy instituted yearly testing and held teachers and schools accountable for gains in student test scores. Given this kind of accountability measure, it is not surprising that teachers began to teach to the test.

Two decades into this policy, a large-scale study of teaching in the United States—the Measures of Effective Teaching study—painted a rather dismal view of what is happening in classrooms in the United States, with low levels of intellectual challenge, few opportunities for student talk or engagement and a lot of emphasis on test-prep activities in lieu of teaching. For those of us who value progressive education, the good news is that that there are signs that the pendulum is now shifting to more active and engaged forms of learning. These go by different names—deeper learning, project-based learning, personalised learning, but the approaches all share some common features. First, they put students at the centre and emphasise active engagement with the content, material or project as part of learning. This is particularly good news as this approach aligns with the most current scientific knowledge of how we learn, building on the Science of Learning. Second, they prioritise depth over breadth in learning. Finally, they focus on the importance of student choice and collaboration as an integral part of the learning process.

Of course, none of these approaches is really new. It is worth reminding ourselves of the earlier iterations of these ideas in large part because of what we might learn from earlier stumbles in implementation and from the research that was done at the time. As long as we are on a pendulum swing, our goal should be to use what we have learned from earlier orbits to swing even higher.

Deeper Learning

Deeper learning is already a part of the current landscape of education and accompanied the advent of the Common Core Standards that tried to set higher and clearer standards for all United States students. Deeper learning has also taken root here in Singapore and around the world. Deeper learning builds on the notion that less is more and that students need opportunities to dig deeply into content using disciplinary tools and perspectives.

Jerome Bruner was an early advocate of something that looked a lot like what we now call deeper learning. He emphasised the need for intellectually ambitious instruction that represented authentic disciplinary knowledge. Some of you might remember Project Physics, Man a Course of Study and other curricula that were developed as part of the 1960s effort to raise standards, in response to the Russian launch of Sputnik. One thing we have learned from these early efforts is that these curricula were certainly intellectually challenging for both students and

teachers, as well as their parents! This was the era of New Math, which emphasised a more conceptual approach to mathematics, and both parents and teachers struggled to explain the math to their children. In part because the materials were both challenging and unfamiliar to both parents and children, New Math failed, only to re-emerge again several decades later.

Project-based Learning

We are also seeing an upswing of interest in project-based learning, particularly project-based learning that integrates design and engineering into the curriculum. The current interest in project-based learning in some ways parallels the advent of maker spaces, Maker Faires and the rise of design and robotics. As we begin to realise that robots will eventually take over most tasks that can run on algorithms and artificial intelligence, we begin to prize the innately human qualities of creativity, curiosity and generativity. By engaging students in projects of many kinds, project-based learning aspires to nurture these qualities, while also providing opportunities for students to learn the content.

Project-based learning, again, is not a new idea. It has its roots in the progressive era and has come in and out of favour over the past century. Hailed by Dewey and others, project-based learning was seen as a way to engage and motivate students as they put their knowledge to work and learned through doing—whether the project be building a bridge, staging a play, creating a robot or designing an historically accurate monument. The appeal of project-based learning is easy to see but it is notoriously difficult to enact successfully.

At the same time, this form of teaching and learning may be uniquely well suited to preparing students for the faster future Joi Ito describes. It favours emergence over authority and compasses over maps, as students must work to define what they need to know in order to be successful and create their own pathways for learning. At its best, project-based learning favours diversity over ability, allowing students to bring diverse perspectives, strengths and skills to their work. And this form of instruction definitely entails risk. In a future in which students and teachers will increasingly need to adapt to change and continue to learn rather than relying on what they learned in the past, everyone will increasingly need to develop the skills and mind-sets entailed in project-based learning.

However, if this form of teaching and learning is to succeed, we will need to think much more seriously about how to prepare teachers for this complex work. One thing we have learned in an earlier iteration of these ideas is that you cannot teacher-proof a curriculum. Project Physics and other versions of deeper learning and project-based learning from the 1960s tried hard to build curricula that would not require teachers to deeply understand the content—because the designers knew even then that the physics and math went well beyond most teachers' preparation. It did not work. No matter how rich the curriculum, you need a teacher who actually understands the material and teaching/learning well enough to facilitate learning. For these ideas to succeed, we need to invest in teacher development, not just about pedagogical approaches such as creating projects or designing personalised curriculum but about the complex content we want students to learn.

At Penn Graduate School of Education (GSE), we have begun to study the practices and mind-sets that teachers need in order to implement high quality project-based learning, all organised around the key learning goals for students. The domains include: fostering learning of rich academic content; ensuring the authenticity of project-related work and opportunities for students to use their knowledge beyond the classroom;

providing opportunities for students to engage in deep revision with opportunities for feedback and reflection; and supporting student agency and collaboration.

Developing Mind-sets for Project-based Learning

Succeeding at creating these opportunities for students also requires particular mindsets on the part of teachers. Mind-sets have taken off like wildfire: from Carol Dweck's advocacy of a growth mind-set, to Angela Duckworth's work on grit, we are focusing much more on the social-emotional side of learning. In our work on core practices for project-based learning, we also discovered particular mind-sets that experienced teachers of project-based learning all seemed to share—these mind-sets included not just a growth mind-set, as described by Carol Dweck, but also a set of other mind-sets related to the goals of schooling and the nature of learning. These include: a belief that the goal of schooling is to cultivate deep understandings rather than surface level knowledge; a deep belief that students have the competence to make significant contributions to project goals, process and outcomes; and a stance towards teaching that includes inquiry and continual learning.

New Assessments

We will also need new forms of assessment if these approaches to learning are to flourish. The goals of project-based learning go well beyond the kind of content goals that standardised tests are meant to capture. For these approaches to succeed, it will demand that psychometricians, content area specialists, teachers and learning scientists to work together to devise new ways to assess goals like collaboration, conceptual understanding, tenacity and other 21st century skills. Again, if we have learned anything from the past, we have learned the power of assessments to drive the nature of teaching and learning. If we do not assess problem solving, creativity and collaboration, then the message is that we do not value them and soon enough, teachers will stop cultivating them in classrooms.

The future of all of these initiatives depends on new forms of technology. Technology will provide the platform for change, as we carefully examine the role of students, teachers and parents in this new reality. It is less about teaching students to use technology—many of them have picked this up—and more about seamlessly integrating technology into the work of teaching and learning, including platforms for collaboration and technology that enables differentiation.

As we maintain momentum to creating students who are ready for this fast future, let us make sure to keep teachers at the centre. Singapore already recruits some of the most talented people in its society into teaching. The goal of professional education then is to equip them with the skills, mind-sets and knowledge they need to enact these more complex forms of teaching for future-ready learners, to support them in experimenting and iterating with these approaches and to invest in their continued learning and development to prepare for the future of education and of society itself.

Question-and-Answer Session

Associate Professor Ng Pak Tee served as the moderator in the Question-and-Answer session that followed the lecture. Below is a summary of the session.

Audience member: How would you convince governments, parents and society in general that cultivating 21st century skills through student-centred/ project-based learning is the way to move forward?

FUTURE-READY TEACHERS FOR FUTURE-READY LEARNERS: AN INTERNATIONAL PERSPECTIVE

PROFESSOR PAM GROSSMAN

27 SEPTEMBER 2018, PUBLIC LECTURE, NTU@ONE-NORTH, SINGAPORE

Professor Grossman: I would begin by asking if stakeholders believe it is necessary to prepare students for the faster future, for the accelerated pace of change, for working outside of established systems creatively? That is the conversation as a country, as an educational system, you would need to have. If it works, the payoff is that students can master both the academic content and a whole other set of skills that are very useful in 21st century life. It is also a conversation to have with parents, to help them see what this would bring to their children. You would also need to broaden your notion of assessments and what success means, in order to capture deeper learning and all other skills associated with 21st century skills.

Audience member: How do we effectively enact project-based learning at the primary and secondary levels? Also, how situated should project-based learning be in the curriculum? Should we integrate all the subjects into it? In addition, given that the outcomes of project-based learning tend to be emergent, how do we define the content learning outcomes for students? Moreover, how do we ensure that all teachers have the necessary expertise and competency to supervise the broad range of projects? Lastly, if we give students the agency to decide for their topics, how do we ensure that we would have adequately covered all the fundamental learning points in the subject?

Professor Grossman: With regard to the first question on its enactment, I think about ways of embedding project-based learning into the curriculum that makes it more a part of students' experiences in school – this does require grounding it in academic content. It is not true that in all project-based work, the student chooses the project, as the teacher may choose to constrain the project depending on the learning goals of the project. Also, based on the examples of the project-based schools in Philadelphia, I think you can help students learn both content and the skills of collaborative learning. In terms of implementing project-based learning in primary schools, it is often easier because the subjects come together and teachers often have a bit more time to support this. A diversity of teacher-instructed learning, group learning and project learning would be a good thing. It is also important to have project-based learning as a regular part of students' learning experience which will train them to become more independent over time.

Audience member: From my understanding, I think you are saying that in order for educators to promote project-based learning, we have to change the ways we assess students. I would like to understand what the research says about how project-based learning can translate through assessment.

Professor Grossman: The learning around the content of a topic would be the same under project-based learning. However, in many existing forms of assessment, we are not assessing for deep learning but for factual knowledge and, to some extent, problem-solving depending on which assessment you are using. Thus, if we are assessing for 21st century skills, most standardised tests we currently have will not capture that. So we also need additional assessments that show students' growth in their ability to collaborate, that measure creative problem solving, flexibility and resilience.

References

Bill & Melinda Gates Foundation. (2013). Measures of Effective Teaching (MET) Project. Retrieved from http://k12education.gatesfoundation.org/blog/measures-of-effective-teaching-met-project/

Ito, J., & Howe, J. (2016). *Whiplash: How to survive our faster future*. New York, NY: Grand Central Publishing.

About the CJ Koh Professorial Lecture Series

Each year, outstanding professors in the field of education are hosted by the National Institute of Education under the CJ Koh Professorship in Education programme. The CJ Koh Professorship has been made possible through a generous donation by the late Mr Ong Tiong Tat, executor of the late lawyer Mr Koh Choon Joo's (CJ Koh) estate, to the Nanyang Technological University Endowment Fund.

For enquiries, please e-mail the Series Editor, Associate Professor Chang Chew Hung at chewhung.chang@nie.edu.sg.

An Institute of

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

A publication of NIE/NTU, Singapore © 2019
ISSN 2251-3019