
Title	Learning spaces for incubating innovations: Cases in Singapore secondary schools
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Learning Spaces for Incubating Innovations: Cases in Singapore Secondary Schools

By Wu Longkai



THE IMMEDIATE ENGAGEMENT that is conceived from the interaction between the learner and the learning environment is a significant factor in a student's motivation to learn. The nature of learning arises from the reciprocity between students and their environment, especially if supported within authentic contexts. In meaningful forms of learning engagement, students experience heightened levels

of concentration and sustained motivation especially in the continuation of tasks outside of school.

This talk describes observations from a study that was conducted in various learning spaces, detailing and investigating the experiences of the students while they interacted within these learning spaces. The study also investigates how a learning space can help to promote innovativeness in student learning and as a form of engagement for students to create, build and invent. These observations were made in three Secondary schools in Singapore.

Hence, we elaborate on three types of learning spaces (Figure 1) that are typically found in secondary schools within Singapore, supported by case studies.

Type I Learning Space in a Singapore School

Learning Space Example A—Nature High School

The following observations were collected during the students' Design and Technology (D&T) classes. The students attending these lessons are around 13–14

years old and have just transitioned from primary to secondary school. As part of their D&T curriculum, all students have to build a car using a standard kit pack provided for by the school at the end of the school term. The school organises a race at the end of the term for the students to compete in with their cars.

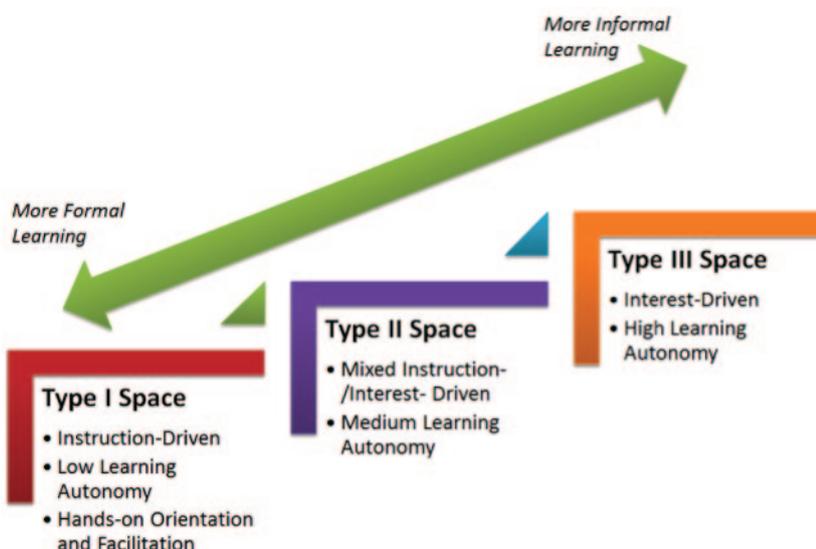


Figure 1. Three Types of Learning Spaces Incubating Innovations in Secondary Schools

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The lessons are highly structured—objectives of the lessons are stated at the start of the year, and the structured sequence of the lessons for the semester maintains a sense of purpose. The delivery of the lessons is highly instructive. Detailed step-by-step instructions are given, and all students have to follow closely the hands-on task-orientation and facilitation by the teacher. Although they are allowed room for creativity in terms of the artifact's design, all students have to produce the same artifact at the end of the term due to the standardisation of tasks. The students have no freedom to experiment on their own as all goals and methods of doing things are fixed. There is hardly any room for autonomy or improvisation because of the standardisation.

Type II Learning space in a Singapore School

Learning Space Example B—Spring High School

The following observations were collected during the students' Science, Technology, Engineering and Mathematics (STEM) classes. The students attending these lessons are around 13–14 years old, and there is a teacher and a STEM facilitator present at every lesson. These STEM lessons have just been introduced in the Singapore curriculum, and are meant to encourage the acquisition of STEM knowledge and skills to solve real-world problems. The Ministry of Education in Singapore is also looking for opportunities to link schools up with industry partners, as these partnerships will serve to involve the industry by providing mentors or role models for students and to create awareness of

STEM skills needed for the 21st century workforce.

Delivery of lessons is still quite instructive, but a more autonomy-supportive style is adopted. The facilitators and teachers allow time for self-paced learning to occur and when students encounter doubts, the facilitators and teachers do not provide answers immediately. Instead, they try to ask questions to elicit thinking in the students.

Students are still required to complete a number of tasks, but they are given some options in the tasks they can do and are given the liberty to look for resources online. Lessons are still pretty structured and students have limited freedom to experiment as most goals and methods of doing things are fixed.

Type III Learning space in a Singapore School

Learning Space Example C—Summer High School

This learning environment is largely informal and the students who are present in this space are aged 12–17 years old. Peer-to-peer teaching and learning is encouraged and widely prevalent. Some goals are set (i.e., competitions) but students are fairly free to suggest what they intend to learn and innovate.

In an interview, two students involved suggest that their motivation to learn and innovate is not from formal lessons, but rather from their own life experiences and interests. They are fairly free to choose what they need to learn, as well as tinkering and experimenting with their own ideas.

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[Student A]: Last time, my neighbor introduced me to the raspberry pi. It uses a programming language like python, basically a full-fledged computer that is credit card sized. So I just learned python online, through an online course.

[Student B]: ... And I didn't take the course (in that subject area), because there is no such course online. I look at articles, find out and look at examples, other

people that wrote the programs, just look at how they did it.

Overall, this space presents the most autonomy to the students. However, as this space is not typically part of the formal school curriculum, insufficient school support has been given to the students who demonstrated high degrees of interest and innovation.

About the Speaker

Wu Longkai is a Research Scientist in the Office of Education Research at the National Institute of Education, Singapore. His research interests include scaling and diffusion of innovations, ICT in Education, and informal learning studies.