Innovation: Innovation for social service improvement: a case study on improving science education at Bangkok Metropolitan Administration (BMA) schools

- Typical BMA school facility and surrounding background
- Establishment of BMA schools as an extension of educational opportunity for migrated workers who move to Bangkok to look for work

Innovation's Framework

Standardized curriculum with strict guideline and instruction on teaching and experimentation

Waste and pollution (water and soil) surrounding schools

Lack of laboratory readiness

Focus on homework, examination, and long classroom hours

Lack of motivation (stemming from uncertainty in students' future career)

Poor behavior such as cyber bullying (stemming from lack of academic interests and fatigue from shift work for extra income)

Science education for BMA secondary schools



Stereotype on underprivileged students

Use of product development as the reflection of students' understanding of science subjects

Design and improvement on science experiments

Students' skills and employability

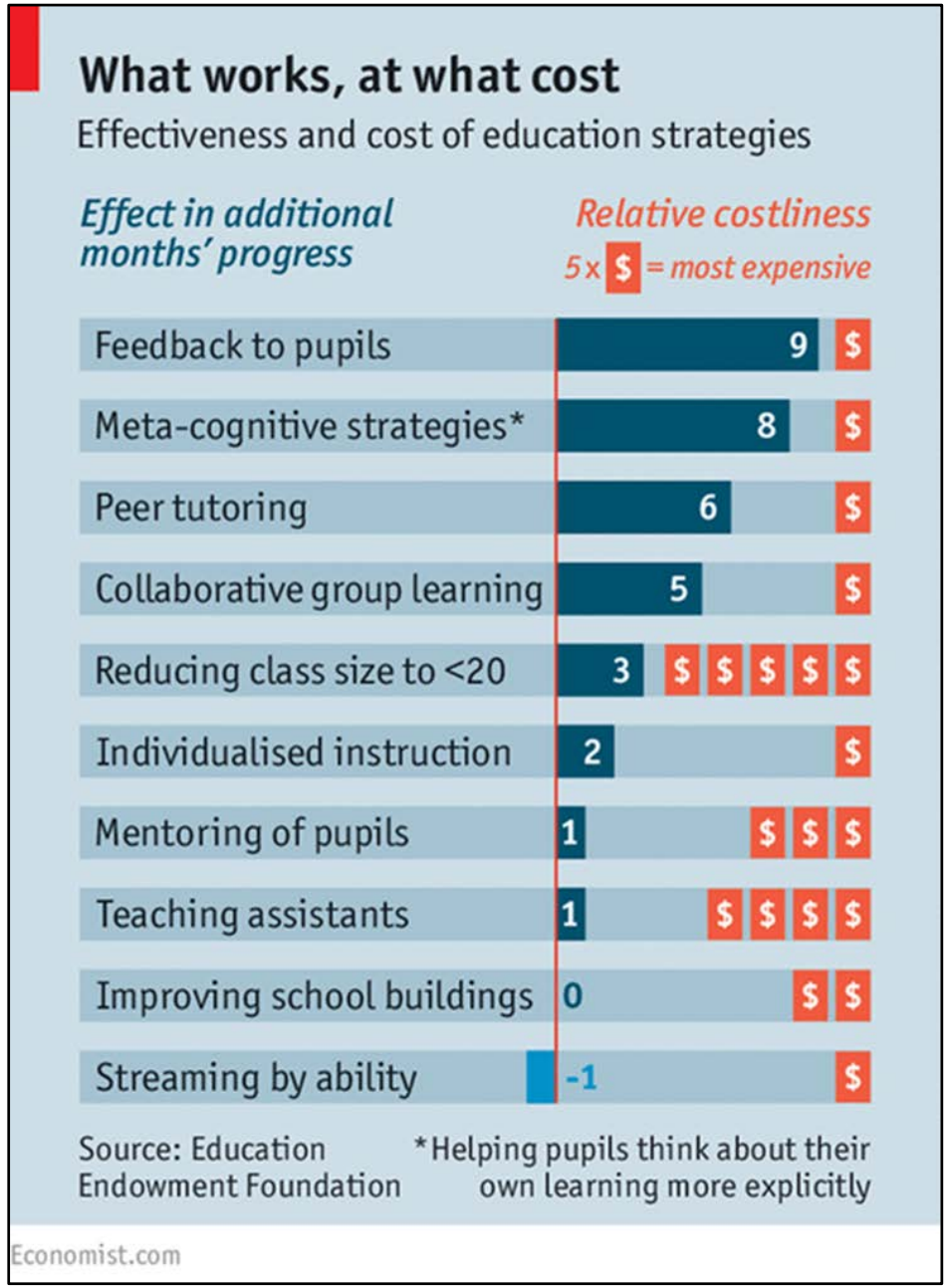
Effective use of team teaching

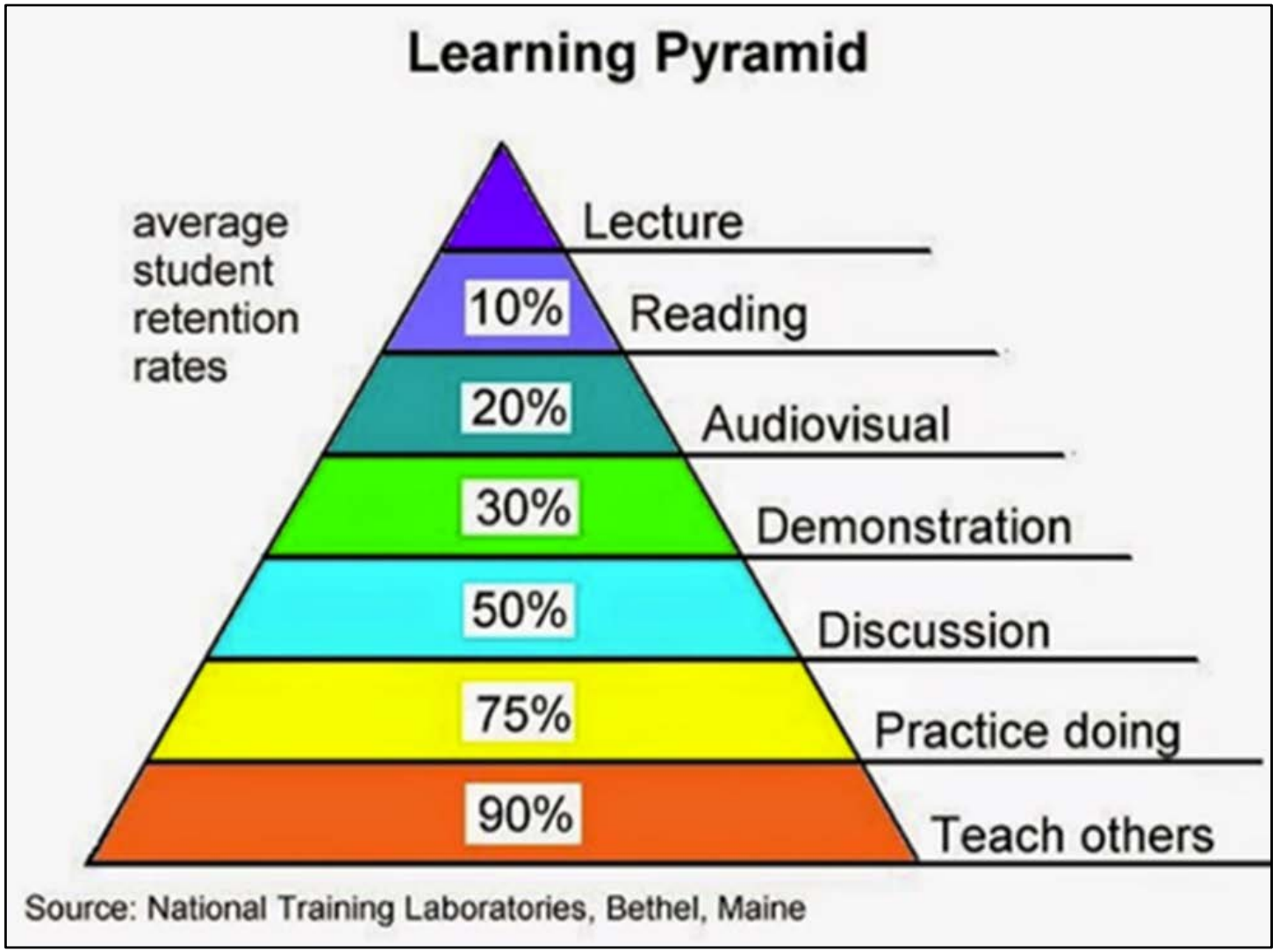
Contemporary concepts and practices with the focus on empathy, psychology, engagement, open-loop learning, joy of learning, team teaching, etc.

- Traditional classroom layout for BMA schools which prevents active learning
- Learning primarily based on intensive lecturing and audiovisual
- Lack of students' interaction
- Lack of students' participation and engagement in lesson plan developments

- Traditional laboratory at BMA schools for science education which is inadequate for rigid compliance with standardized curriculum and guidelines, and experiments
- Learning through memorization (i.e., rote learning) still prevalent due to a lack of laboratory readiness
- Need to shift a paradigm that learning outside a laboratory can also be effective

Using some of the following frameworks to help design and improve pedagogical practices for BMA schools





Use of Team Teaching on re-designing and developing a lesson and experimental plan for students

Emphasis on Peer-learning Community for students during experimental learning to help overcome psychological safety and school bullying

Demonstration on outdoor science experiment on treating polluted water- due to a lack of instrument to measure an oxygen level after an experiment, teachers and students agreed to use marigold flowers as an indicator on the quality of water (note that marigold flowers could be sold in a market for students' extra income)

- Importance of engaging with students and knowing their needs by teachers
- Flexibility to allow students to experiment various ways to treat water- trial and error based on how well marigold flowers were growing

Main benefits based on the examples of outdoor science experiment on water and soil: helping students understand the interrelationships among Physics, Chemistry, Biology, and Mathematics; building soft skills into learning and development; overcoming psychological safety and school bullying; developing a sense of belongingness, and providing an opportunity to students with an extra income







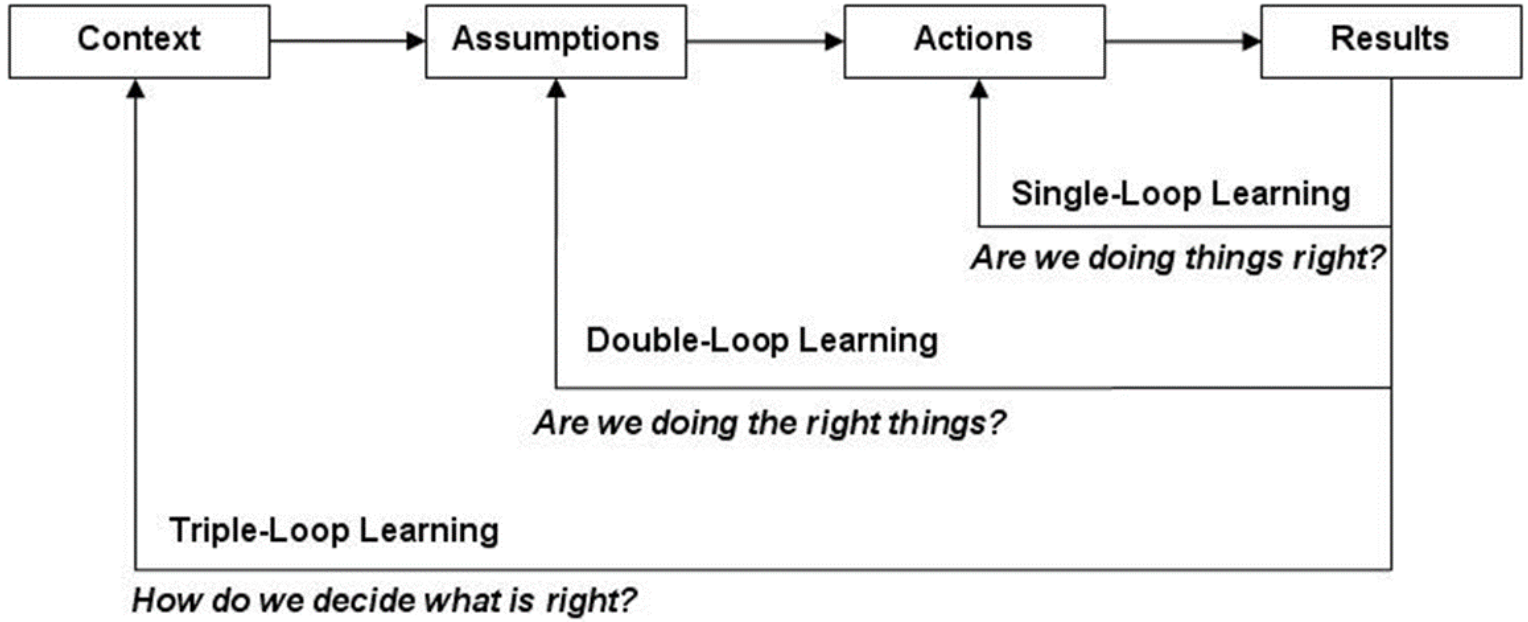
Use of food waste from and dry leaves nearby the schools to develop fertilizer and vermicompost products

Importance of external knowledge providers (e.g., Kasetsart University and Joint Foreign Chambers of Commerce in Thailand or JFFCT) on motivation, recognition of students' hard work, and value-added ideas for product improvement

Students staying after class or school hours to work on making products based on science experiment such as chemical-free soap and detergent (in addition to fertilizer and other products shown previously)

Kasetsart University and JFCCT's training with teachers and students on improving products from science experiments such as packaging (2016- present)

Importance of external entities (in addition to Kasetsart University and JFCCT) such as Spouses of Head of Mission or SHOM and foreign embassies into students' activities- part of international recognition on students' work, creating hope and pride, enhancing employability, and providing open-loop learning for teachers and students



Source: https://educationtechnologysolutions.com/2017/03/triple-loop-learning/

Teachers and Students' participation in the 24-hours of Reality: Truth in Action with Climate reality leader, together with JFCCT and Embassy of Finland (November 2019)

Visit by SHOM delegates in May 2019 (from Bhutan, Finland, Italy, Luxembourg, Mongolia, Poland, and Switzerland) to observe and purchase students' products from science experiments

Participation in a national conference with the support from Embassy of Finland in 2015 and 2016

Product display and sales at Embassy of Indonesia during Indonesian National Day Celebration (August 2019)

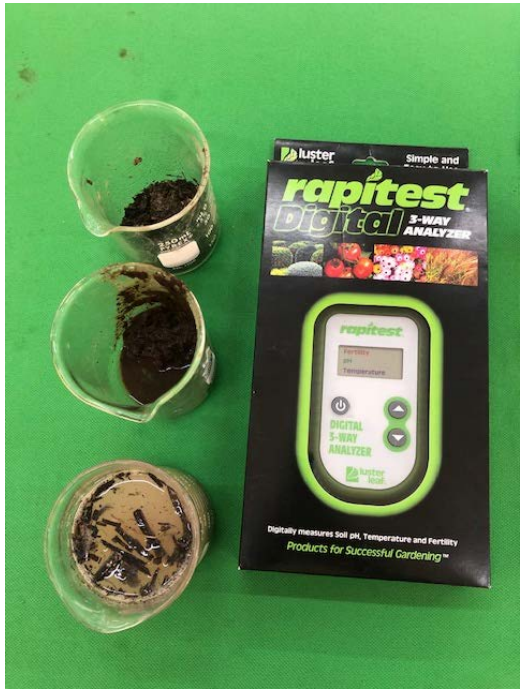
Continuation of the work from past students which highlights peer-learning community: extending fertilizer by developing various formulas to experiment with mushroom, vegetables/fruits

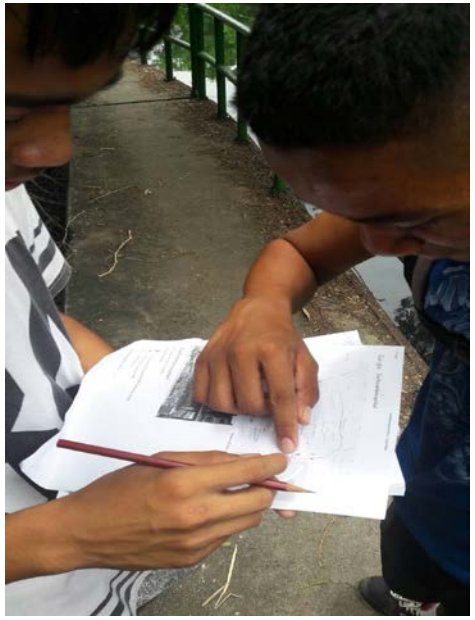
Water hyacinth, food waste, and polluted water

Facility financially sponsored by Embassy of Luxembourg to store dry/ crushed water hyacinth

Testing different formulas of fertilizer to grow mushroom for local communities, and vegetables/ fruits

Outdoor learning with the instruments donated by Kasetsart University and JFCCT members to assist water and soil experiments





Examples of recognition and awards for teachers and students through various dignitaries, especially from the member of Thailand's Royal Family and an entity under the Royal Patronage of H.M. The King

Students' initiatives for upcoming science experiments in 2020 with the similar focus on environment and ecology highlighting the importance of student engagement for creativity

Students' invention on an instrument to make a cup/bowl with leaves to be used during school's lunch and break

Students' ideas on reuse of plastic waste (straws) for product development