A Physics class in motion

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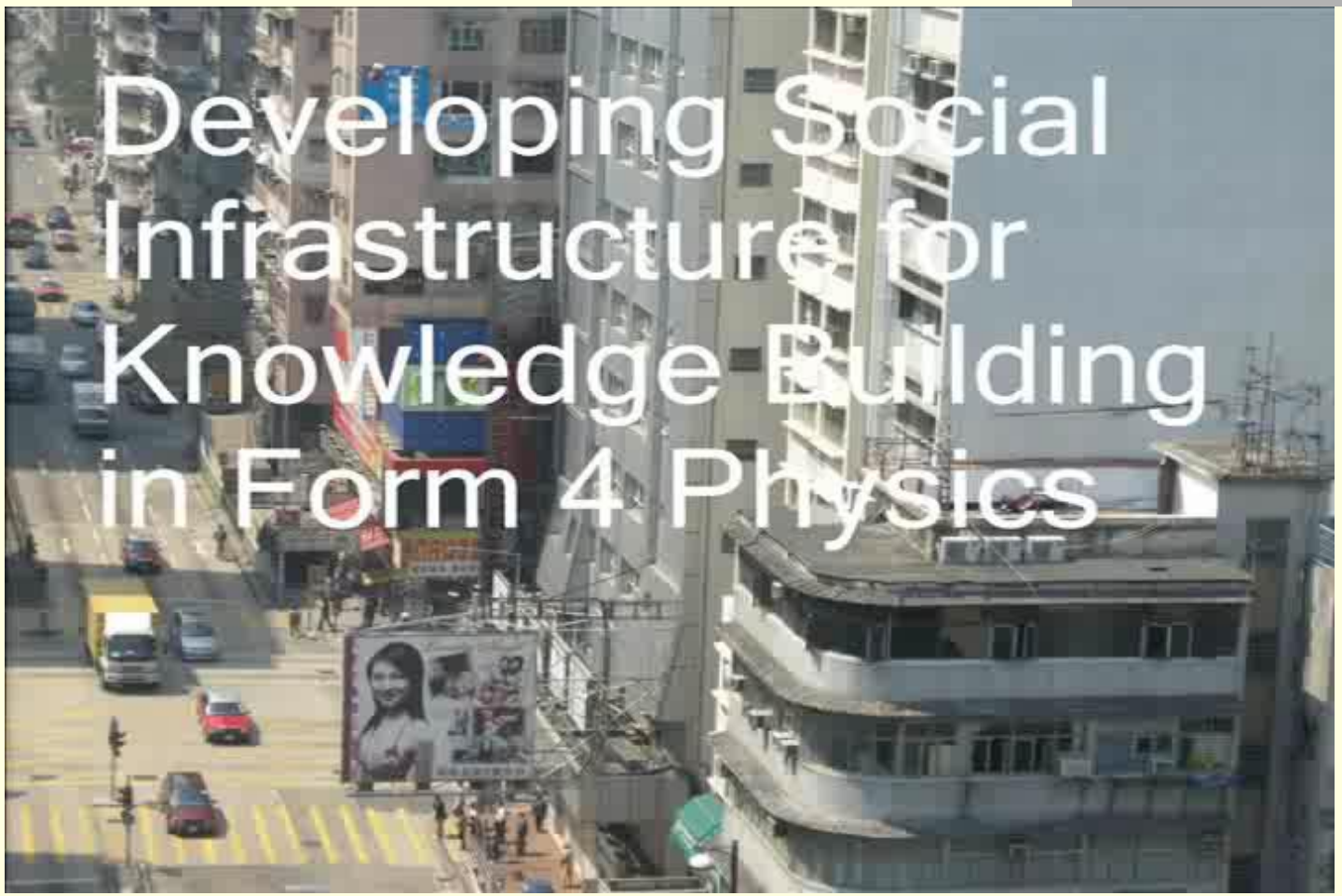
A physics lab somewhere in HK



Context --- engaged

- Use expt from textbooks, but consider full expts too tedious to keep Ss to *engaged* and interested
- Different groups complete different parts ➔ 2 members from each group are called upon to share their findings and explanations with the class at the blackboard (E.g. Newton's 2nd law, $F = m\,a$; Motion graph, $s - t$, $v - t$, $a - t$)

Context --- engaged

- Mini expts are useful for providing a *context* for thinking about phenomena and developing explanations. ('self-explanation', e.g. Bielaczyc, Pirolli, & Brown, 1995)

Students agency---community knowledge

- When some students are not satisfied with an explanation there may be laughter but it is never demeaning.
- "*For example, after two students had explained how a sea breeze arises at a beach, one student asked whether this application applied for daytime or night. When the students said "I don't know" there was laughter, but other students, (and eventually the teacher) then helped to develop a more satisfying explanation."* [e.g. process of energy transfer]

Students agency---community knowledge

- Allowed time to provide their explanation (from 2 minutes to 10 minutes)
- Allow students to think through the problems
- Many ideas are proposed and the progress is slow, the teacher does recap and teach the correct explanation, but is it an *explanation that has at least partly been articulated by the students*.

Students agency---community knowledge

- The main purpose of doing this is
  - to facilitate that students remember *their best explanation by community* rather than a minor point that was made along the way.
  - to provide a power learning environment, should be students are *in* rather than just something that structures their activity for a certain period of time.

Emergent goals---improvable idea

- Ts usually provides a very brief introduction to a short activity and gives students something to think about during their experiments.
- *"For example, in a quick "exploding carts" experiment that all the groups did with data logging equipment, I asked students, "Where does the kinetic energy come from?" A question then arose after the experiment in which one student recalled that in an earlier (free fall) experiment the velocity was independent of the mass, but in the current experiment it was not."*
- Such situations are examples of *emergent problems* that are allowed adequate time during class."

Emergent goals---improvable idea

- Ss are encouraged to put forth their own ideas early at class when student arose.
- From, that moment, then on their task is to work together on *improving those ideas*.

Social infrastructure of class

- Ts has to get students to share their ideas publicly and developed the practice over approximately one month in quite a structured way.
  - students develop their ideas in the relative privacy of their groups
  - two students were then called to present their ideas within two minutes, using a timer visible to all to monitor the time
  - Over time, it has become a more dialogic process in which Ts has eyes open for opportunities for students to come to the blackboard

Social infrastructure of class

- Ts evaluates the situation to see whether some students seem to think that more work is needed on a question,
- and watches for students who are on the brink of getting out of their seats.
- Over a few months the students have become very comfortable with this practice, accept it as normal, and even expect it.
- The lab is not just a place for activities but has become *one for discourse about ideas*.

A knowledge-building pedagogy in HK

21st century learning skills (collaboration, agency, creative work, etc.)

4 features assumed to be key

- Develop a sense of community
- Allow emergent learning goals
- Make students agents of their own learning
- Focus on deep learning

Thank You!