Building capacity to discover and creating knowledge-building community through technology

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Outline

- Discovery-embedded assessment (3 courses across two years)
- Learners’ experiences on using technologies
- Extending knowledge-building community
The 3As of Discovery @ CityU

- Attitude
- Ability
- Accomplishments
Attitude

Develop an attitude of discovery/innovation/creativity

- Student-centred learning whereby students
  - develop a strong sense of curiosity,
  - ask questions actively,
  - challenge assumptions, and
  - engage in inquiry together with teachers.

These are habits of mind that prepare students to discover/innovate/create.
**Ability**

Develop the ability/skill needed to discover/innovate/create

- Development of critical thinking skills to assess ideas
- Acquisition of research skills
- Synthesis of knowledge across disciplines
- Application of academic knowledge to real-life problem
Accomplishments
Demonstrate accomplishments of discovery/innovation/creativity

- Demonstration of evidence of original discovery/innovation/creativity through producing/constructing
  - creative works/new artefacts
  - effective solutions to real-life problems
  - new processes

- These accomplishments may include insightful reflections on the discovery learning process.

- Evidence may be collected from student work including essays, exhibits, oral/media presentations, performances, portfolios, projects, reports and research papers.
Design of assignments in courses at different levels encouraging “Discovery”

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Introduction to Microbiology (Year 1)

**Background**

+ Exploring mould encountered in daily life
+ Students have little prior knowledge of subject matter
+ Students posted their examples to a blog site (Blackboard)

**Technology**

+ > 90% students without smart phones (2010)
+ Mobile learning project launched by University enabled students’ loan of iPods to facilitate learning
Assignment intended learning outcomes

1. **Identify** activities or observations from surroundings in their daily lives which are connected with microbiology.

2. **Describe** the connection between the identified activities or observations with the activity of microbes in comprehensive English language.

3. **Evaluate** the positive or negative effects of the activities or observations in relation to the microbes.
Pre-assignment Contributions

+ Ad-hoc recognitions

+ Food items encountered in daily life
  - Mushrooms, cheese

+ Home environments
  - Mouldy walls, contaminated food
Contributions for Assignment

Items which do not exhibit obvious connections with micro-organisms

+ Food items not encountered daily life
  - E.g. caterpillar fungus, Japanese beans

+ Home environment
  - E.g. bathroom door, denture cleansing solution, tooth brush holder

+ Beyond home environment
  - E.g. restaurant menu, carpets in lecture theatres, alcohol cleansing gel
Using of mobile phone or device for making inquiry [1] \[ N=43 \]

Using mobile phone or device before course

Taking photos or videos for academic learning

- Did you have experience in using a mobile phone/device before starting the course?
  - NO: 28%
  - YES: 72%

- Have you taken photos/videos for academic learning when studying in the university before?
  - NO: 53.5%
  - YES: 46.5%
Using of i-pod touch for making inquiry [2]

Beyond coverage in the classroom

Discover learning

Survey items in 5-point Likert scale: 1=strongly disagree and 5=strongly agree
Using of i-pod touch [1]

Survey items in 5-point Likert scale: 1=strongly disagree and 5=strongly agree
Using of i-pod touch [2]

Survey items in 5-point Likert scale: 1=strongly disagree and 5=strongly agree

Using i-pod touch allows me to build critical thinking when making explanation/claims/justification

- 21% for rating 3
- 44% for rating 4
- 35% for rating 5
Using iPod touch: Focus group discussion [1]

I originally have an iPod touch but usually I wouldn’t use it for academic purposes but because of this course right?..... and also Professor Vrijmoed also gave us an iPod touch and therefore I used that one to do work that is related to the academic. It’s because iPod touch is more convenient and if you have WiFi, you can surf the Internet to access the Blackboard site to see the announcements which is very convenient and also we can easily see the latest information. However if we always bring the notebook computer when going out, it will be too heavy.

Using the iPod touch is more convenient when surfing the Internet to go online. The device is lighter and easier to carry....The model that the University gave us is even newer than mine. And this device has a camera which can be used when doing Professor Vrijmoed’s blog exercise in which we need to take videos... there are those supplementary notes which you are not sure whether you need it or not, so if we had an iPod touch we can just scan those notes and refer to it anytime.
when she asks me to do like this, I will seriously search what topics I need to find and also find out how to explain other things......At the end, I'm like "ohh", actually the knowledge I have learnt before, I can find the topics like this. Also I will be more serious when recording a video.

When doing Professor Vrijmoed's homework, we were required to record some videos or take pictures of the fungi and because for the iPod touch, we are able to bring it anywhere we want so when I’m travelling and I see a place where there are fungi, I can immediately use the iPod touch
When you have to record the videos, you will feel that you have to be more aware of the surroundings, such as how we can relate the fungi to our everyday life... However when using the iPod touch to take a video, and then after taking the videos, we also have to write a description about it for our classmates to understand. So this will make us to learn more deeply.
When I was going to MAI PO, I saw some white colour spots of fungi and for this I haven't find any information beforehand, but just saw it and then I just recorded it down and then later I went searching what species was it or other information about it afterwards.

I had to do a CCIV project in which I had to go to a Walled Village in Fanling, ...and that atmosphere was quite good. I saw on the surface of the outside of the wall in the Walled Village, there were lots of white spots but I was not sure what they were. I suspect it to either be mosses or fungi. Then after I took some pictures of it, I went back home to search some information to see whether they were fungi or mosses.
Using iPod touch: Focus group discussion [5]

+ because of this homework, actually it's not really a homework but it’s kind of like a mission...When you find the information, you are already able to learn something and then after you upload it to the blog, the rest of the students are able to see it. Sometimes we would see that, that particular thing actually concerns us but we never noticed it. It may be because it's like an everyday thing, just like bread which makes use of yeast and therefore it’s related to this course. Then even after finishing this homework, we realized that a lot of things are actually related to this course. It’s already deeply stuck into my brain......being continuously reminded of those things.
What do we learn from the student feedback?

+ iPod touch
  - offers **high flexibility and convenience** - easy to carry around, **wifi connection** easily achieved, can be used anytime, anywhere
  - enables real-time documentation and recording
  - **enhances learning / discovery** beyond the classroom

+ Process helps
  - to **enhance awareness** of relation between microbes and daily life, even when engaged in other non-assignment related activities
    .......**default behaviour!!** [Attitude]
  - to engage in **deep learning** when describing connections [Ability]
## Design of assignments in courses at different levels encouraging “Discovery” attitude

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Microbiology (Year 2)

**Background**

- **Identifying** trees that are potentially dangerous due to attack by wood-rotting fungi
- Expecting to conduct **scientific investigations** and report in **scientific language**
- Each group posted their findings to a wiki site (Blackboard)

**Technology**

- Most students had smart phones (2011)
- Students can choose to use their own devices to capture records of fungi
Assignment
Intended learning outcomes

- **Identify** trees that are infected by wood-rotting fungi.

- **Document and describe** the fungi and the condition of the infected tree.

- **Predict** the probable risk of the infected tree being hazardous to its neighborhood.
Where to discover (1)
What was discovered (1)
What was discovered (2)
# A Record of Trees Infected with Fungus

<table>
<thead>
<tr>
<th>Name of Recorder</th>
<th>Date of Recording</th>
<th>Location</th>
<th>Name of Tree</th>
<th>Condition of Tree (add photo)</th>
<th>Location of Fruiting Bodies (add photo)</th>
<th>Description and Name of Fungus</th>
<th>Risk to Pedestrians and other human-made structures</th>
<th>Risk Factor (H) (M) (L)</th>
</tr>
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<tbody>
<tr>
<td>Ip Pan Kit</td>
<td>22-09-2012</td>
<td>Tai Po Kau Nature Reserve, Tai Po (大埔滘)</td>
<td><em>Cassia. Fistula L.</em></td>
<td><img src="image1" alt="Tree Image" /> <img src="image2" alt="Tree Image" /> <img src="image3" alt="Fruiting Body Image" /> <img src="image4" alt="Fruiting Body Image" /></td>
<td><img src="image5" alt="Tree Image" /> <img src="image6" alt="Fruiting Body Images" /> <img src="image7" alt="Fruiting Body Images" /></td>
<td>The height of this tree is about 13m and the diameter of the trunk is about 40cm. The crown is about 5 m.</td>
<td>There is one type of the fructifying body. The suspected species of the fructifying body is <em>Trametes Versicolor</em>. The fructifying body located on the root of the trees, It’s about 1cm wide and reddish brown.</td>
<td>L</td>
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Learner’s experiences on using technologies for discovery

+ Student: *never use ipod touch* because it's not connected to the Internet; *camera* of the iPod touch is not of high resolutions because it is not clear enough.

+ Student: *used i-phone*. The device helps me a lot. I can *check the location through the GPS*. When I saw a fruiting body, I could *take a photo* immediately and sent it to my friend and asked them. Or, I can *searching the Internet* to see if there is some similar information; and describing it and *search in Google*. If the iPod can be used to access the Internet, then the outcome will be the same.
Extending knowledge-building community
Glenealy
Last Updated by sinny 19 hours ago

Near the entrance of Caritas Community Centre
Locations in Google Map

http://maps.google.com/maps/ms?hl=en&ie=UTF8&oe=UTF8&msa=0&msid=2067455045664456430004d655b3c6f9146d070
Outcomes: students’ stories (1)
[rep. from six groups]

Attitude towards discovery:

+ Change mindset:
  - discover first-hand data rather than second-hand data
  - ready to take more risks; prepare to explore beyond the assignment brief

+ Curious about risk levels of trees [assessment related]

Student-centred learning whereby students
✓ develop a strong sense of curiosity,
✓ ask questions actively,
✓ challenge assumptions, and
✓ engage in inquiry together with teachers.

These are habits of mind that prepare students to discover/innovate/create.
Outcomes: students’ stories (2)

**Developed discovery skills - ability [discipline-specific]:**

+ Where:
  - Identify relevant examples of trees infected with fungi in appropriate locations when collecting samples

+ How:
  - Skills in collecting samples: developing professional skills
  - Skills in photo taking [close-up; long shot], variable light conditions etc...

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**Ability**

- Development of critical thinking skills to assess ideas
- Acquisition of research skills
- Synthesis of knowledge across disciplines
- Application of academic knowledge to real-life problem
Outcomes: students’ stories (3)

Accomplishments:
+ Possibility of being the first one to discover
+ A preliminary catalog of trees infected with fungi
+ Working in groups can allow them to collect more cases

Accomplishments

Demonstrate accomplishments of discovery/innovation/creativity

- Demonstration of evidence of original discovery/innovation/creativity through producing/constructing
  ✓ creative works/new artefacts
  ✓ effective solutions to real-life problems
  ✓ new processes

- These accomplishments may include insightful reflections on the discovery learning process.
- Evidence may be collected from student work including essays, exhibits, oral/media presentations, performances, portfolios, projects, reports and research papers.
Impact: individuals

- Heightened motivation
- Nurturing an intuitive habit of discovery: adopting instinctive professional practice
- Linking knowledge with practice: experiencing and going through analysis and making deductions, i.e. no longer as head knowledge
Impact: community

- Becoming a responsible citizen
- Informing local communities, such as Tree Management Section
- Contributing to Tree Failure Database in Development of the Tree Management Information System
- Informing international communities
Conclusion: using technology to facilitate discovery-embedded assessment

- Technologies as learning tools
- Authentic discovery versus information search
  - Head knowledge [cognitive dissonance; professional judgement (HOT)]
  - Hand [generic and professional skills]
  - Heart [emotional engagement; excitement]
- Leading to significant contribution to the discipline/community
Acknowledgements

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Q&A

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