



Biology

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Preface

If asked of the question "How do you feel about learning Biology?", students in the 80's and early 90's will no doubt complain of the information-laden and monotonous nature of the subject, confronted with lots of text. This is to be changed with the launch of the NSS Biology Curriculum. Not that the new curriculum relinquishes the classical body of knowledge, what is changed is the pedagogy of presenting the knowledge chunks and guiding learner navigation.

The NSS Biology curriculum implementation has set forth a favourable, inviting, and yet challenging arena for educators to experiment with innovative or re-vitalized pedagogical strategies.

Objectives

As part of the science curriculum, this subject aims to contribute to Science Education in LKKC by

1. promoting among our students the interest, fun and challenges in studying science in general, and with emphases in the Biological arena in particular,
2. providing multi-sensory learning experiences through which students may acquire a balanced scientific literacy,
3. creating appropriate, engaging, and interactive learning settings that prescribe scientific investigations and problem-solving activities, and an open atmosphere that stimulates student discussion and participation in higher-order thinking processes,
4. nurturing interest in science, emphasizing scientific thinking, and stimulating a concern towards technological applications in daily life and the society,
5. guiding students to evaluate the usefulness and limitations of applying science in solving our daily problems.

Learning and Teaching Strategies to cope with Changes

Triggering learner motivation is a key strategy to promote learning in any subject domain. Motivation is largely born of "personal experiences". One of our pedagogical emphases emerging from the LKKC Biology education is to link students' studies with their intimate daily life experiences.

The following list depicts a synopsis of the variety of classroom strategies applicable for Biology learning and teaching. Diverse in nature as they are, their mode of delivery is amazingly simple, being elegantly unified under a consistent context (as suggested by the authority), namely, "Experiencing".



"Hard work in the steaming heat, but the mangrove field experiences are COOL!"

Some useful strategies and activities adapted for the learning and teaching of Biology in our school:

- *Contextual approach of teaching*
- *Historical Biology stories to demonstrate the Nature of Science (NOS)*
- *Practical work and scientific investigation*
- *Issue-based learning, Problem-based learning*
- *Project-based learning*
- *Learning in life-wide contexts and from reading*
- *Constructing concept maps*
- *Searching for and organising information*
- *Group discussion/role-play/debate/issues of bio-ethics*
- *IT-mediated interactive learning*



(A) Do-It-Yourself

Learning is an experiential process. The best knowledge acquisition experience is prescribed by the DIY (Do-It-Yourself) paradigm. Our S4 students are asked to carry out group projects to design experimental methodology for calorific-value measurements in common foods of their favour. All along they sift through online resources, conceive their experimental hypothesis and figure out the investigation methodologies. On their own they assemble the desired apparatus and try out the proposed experiment.

This project assignment, long been a routine senior form Biology learning activity before NSS implementation, will be consolidated under the NSS setting. Meeting the NSS Biology SBA requirements, students will be assigned to carry out on individual basis experimental investigations during lesson time. This is a pose-a-problem style investigation work, during which the student goes through the complete process of the standard scientific investigation, to solve a problem or explain an observation in the Biology domain.

(B) First-hand Experiences

"Seeing and Touching" are believing. Such is the intention behind including rat dissection and ecological field study in the curriculum. These two have been long-time practical work items in the past Advanced Level Course. They are to be continued in the NSS Biology prescription, with some logistical adaptations geared to larger class size. We embrace these learning events, as impressed by the great enthusiasm and interest shown by students during the activities.

As for real life experiences in studying the topic of Biodiversity, students are encouraged to visit seafood stalls at local market places where they would discover an amazingly broad diversity of marine and fresh-water animals ---- animal species so diversified and yet so familiar with at the dinner table. Exploring the beautiful flora (plant species) at nearby housing estates playgrounds and hillside walks were also favourite out-of-the-classroom events during our students' lesson hours.



Students deeply absorbed in the encounters" with the rat

(C) Local Context is essential to foster Learning

Not many will appreciate the fact that Hong Kong indeed plays a part in the development of biological sciences, notably in areas of medical advancements. Recent research achievements on liver diseases and in Chinese medicinal therapies may well be reported by the press. Yet even few would realize that the transmission mechanism of Bubonic Plague (black death) was elucidated by scientists amidst a major outbreak in Hong Kong around 1900s. To impress our Biology students with this historical page, we actually organized for the F.6 group a visit to the heritage --- HK Museum of Medicine, in which the exhibits totally speak for the whole episode.



Visit to museum - The visit, in a broader perspective of general education, additionally adds fun by giving a vivid experience of "collective memory" of old HK in colonial days.

Catering for Learner Differences

The Biology Laboratory provides an ideal setting to arrange students in group seating, so that they can conduct group discussions about certain biology topics. The less able students thus benefit academically in such co-operative learning process. From time to time, the biology subject teachers also hold booster tutorials for the weaker students.

The Road Ahead

Economy Class Syndrome, Lifestyle, GM Food, ... , there is an endless list of daily-life-related topics extensively embedded in the curriculum. And many of them involve critical thinking about the much-emphasized ethical-legal-social-implications (ELSI) values. While some of these can be encountered in daily life as students' first-hand experiences, many are depicted and reported as community-concerned issues in the media, and have become areas of awareness for the students. Examples for the latter are "embryonic stem cell debate", "genome applications", "artificial insemination", and "biofuels". Of all these, special occasions are reserved for their exploration during regular class discussions and at times class debates.