Innovations in Teaching Undergraduate Parasitology

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Why Parasitology and Active Learning?

> Parasitology is concerned with prokaryotic life forms and eukaryotic groups, in addition to the vast array of metazoan parasites. A general understanding of parasitology must involve the complexities of evolutionary biology (e.g., host–parasite relationship), biochemistry (e.g., alterations in glycolysis and the Krebs cycle), physiology (e.g., infective transmission and pathology), ecology (e.g., host biogeography), clinical features and laboratory diagnosis (e.g., microscopic and molecular). Furthermore, parasites are etiological agents of some of the greatest public health problems in human history and therefore, future disease experts and medical professionals must have a strong foundation in this field (1,2).
> Active learning strategies are potential for developing critical and higher order thinking skills among students (3). In addition, students can apply the scientific method to broad questions, improve their problem-solving skills and encourage more broad-scale scientific concepts. Furthermore, students have more freedom to develop alternative ways of solutions to real-life situations that are in line with these scientific methods.

Objectives

> To actively engage undergraduates and foster critical thinking at an early stage in their parasitology education.
> To encourage more a student-centered approach and achieve the best indicator of a successful curriculum.
> To implement active learning strategies.

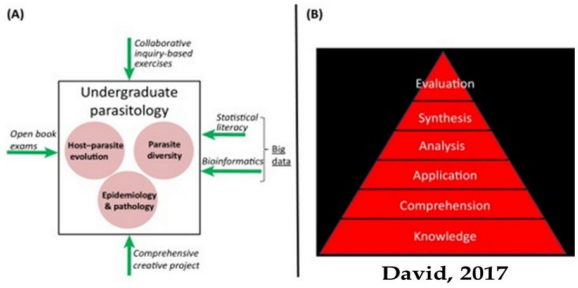

Figure 1: Student-Centered Framework.

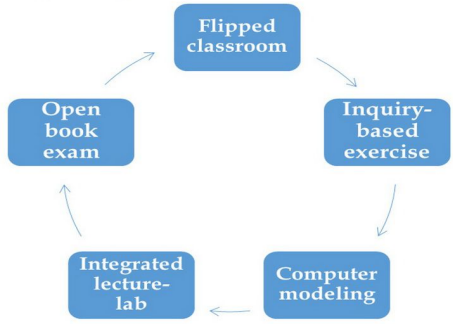

Figure 2: Pedagogical Approaches of Active Learning.

Impact

> This course was created to catering for **large lecture classes** with modifications. Students' participation points in **pre-and post- tests** also accounted for the student's cumulative grade, thereby providing an incentive for engagement.
> Since these students will be medical technologists in the future, the major advantage is the **presence of distinct laboratory sections**, which was the major advantage of this course offered to undergraduate students. Students are satisfy with all the facilities provided for the learning process.

> By adopting a student-centered framework teaching, this method provided the feasibility in **implementing a robust parasitology course** to undergraduate students with all the supports from the faculty expertise. Hence, there was no issue of cost effectiveness.

> This method is a **win-win situation** whereby student learned an up to date technologies and foods for thoughts. While, the instructor also learned new techniques to combat with the traditional methods used.
> At the end of the course, teaching strategies offer both **engaging students' interest** and **stimulating higher level thinking** in the field of parasitology.

Outcome

> Students' **attitude and perception are positive** in the overall course.
> Collectively, students have the opportunities to be **engaged with different learning types**.
> These activities are **open-ended**, and grading was purely based on merit of participation.
> More on **cross-classroom discussions** with other groups and lecturer (myself)

Future Development of Project

> Students will be able to create one's own final project that more focuses on **real-world experiences** on parasitology.
> Through this process, undergraduate students will be more broaden their horizons on what they **listen, see, think (analyze) and act (respond)** with confident and in a pragmatic solution. This will also allow students to be involved for **in-depth discussion** of principles and concepts on the subject (e.g., parasitology).
> A class test will be all **"open book/open note"** which will allow students design questions that probe **higher level thinking (critical thinking)** as opposed to traditional and habitual repetition of memory. This will be a challenge trend at the tertiary undergraduate level of education in this new era.

Reference

1. Andrew A. David. A Student-Centered Framework for Teaching Undergraduate Parasitology. *Trend in Parasitology* 2017; 33(6): P420-423.
2. Melendez RD. Trends in teaching parasitology: where to complain?. *Trends Parasitol* 2016; 19: 387.
3. M.A. Ruiz-Primo, *et al.* Impact of undergraduate science course innovations on learning. *Science* 2011; 331: 1269-1270.