

The design and the delivery of biochemistry and molecular biology courses: increasing the effectiveness in the classroom and in the laboratory

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Abstract

The teaching of the Molecular Life Sciences in most Universities still remains teacher-centered [1–3]. Instructors impart knowledge (terms, facts, concepts) in a didactic fashion and then complement these with “laboratories” or exercises to provide practice opportunities and develop skills. In such environments, students play predominantly passive roles [3, 4].

Teachers should move progressively toward the application of interactive educational approaches in their classrooms [5]. However, changing one’s approach to teaching requires a careful consideration of different methods. Currently there are many choices (see [6-8] for examples) and these keep expanding as newer methodologies are being developed.

The literature shows that “What works” for students to learn the topics and perform better in their courses, is apparently “interactive engagement” approaches [6-7] which are described by the author of the study as “methods as those designed at least in part to promote conceptual understanding through interactive engagement of students in heads-on (always) and hands-on (usually) activities which yield immediate feedback through discussion with peers and/or instructors, all as judged by their literature descriptions.” One paper that compares various teaching approaches delivered in introductory physics courses to over 6000 students, demonstrates that students who were taught through the methods that qualified as interactively engaging were consistently stronger taking the same concept test than students who were instructed in the traditional way [8].

Not all laboratory sessions are as interactive as they could/should be. Laboratory exercises are essential to develop student technical expertise on techniques of Biochemistry and Molecular biology. Nowadays, many introductory biochemistry and molecular biology courses include laboratory classes. However, it is often the case that students may focus more on performing the technical manipulations correctly than on understanding the principles and processes underlying the laboratory experiments [9]. Because traditional laboratories normally are assessed on a report which is done after class, student intellectual engagement appears a bit too late. Complementary approaches that would hone in student attention to the principles during class would be valuable [10].

The idea for this workshop is the following: develop teacher potential to design more opportunities for interactive teaching in their classes. That takes into consideration the specific context – the quality of facilities, the academic level of students, etc - in which they teach. Rather than focusing excessively on choosing ONE particular method, or telling the teachers exactly what to do, the workshop will provide tested ideas and examples.

The workshop will then be an interactive session, in which the participants will hear ideas to increase the level of interactivity of their classes – lectures, computer assisted classes or laboratory experiments – in ways that are progressive and thus lower the level of challenge for both teachers and students alike.

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