

In silico research as an active learning platform in a molecular biology course.

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### Abstract

Active learning approaches can deepen the students' understanding of major biological and biochemical concepts by engaging cognitive processes such as selecting, organizing and integrating, through practical application of knowledge. Facilitating these cognitive processes can be achieved through problem-solving or guided studies. Using basic multimedia instructional design, a hybrid course format was developed for a 4<sup>th</sup> year class on the Structure and Function of the Human Genome, in order to specifically: 1) teach students how to use online molecular biology analysis software and databases, 2) ask the students to use these *in silico* tools to problem-solve, 3) integrate theory and application of knowledge through inquiry-based questions, 4) stimulate cognitive development by asking students to propose new research analysis and generate new data, 5) develop metacognitive insight into their learning. The students have to maintain a laboratory book, as they would in laboratory research. Their research strategies and results were corrected and guided by the professor and discussed in class, both of which served as feedback mechanisms. Using this blended learning pedagogical strategy allowed the students to put in practice the theoretical knowledge acquired in class in a novel and engaging manner, which better reflect the process of scientific inquiry.