

Gelbart, H. and Yarden, A. (2001). Bioinformatics: Decipher the Secrets of the Genome (<http://stwww1.weizmann.ac.il/bioinformatics/>, The Amos de-Shalit Israeli Center for Science Teaching, grades 11-12).

Short summary of the main features

Current strategies, which are employed by molecular biologists, include the intensive use of bioinformatics-related techniques. We have adopted some of these strategies in order to teach high-school biology majors (11th and 12th grades) basic ideas in genetics. For this purpose, we have developed novel web-based learning materials (which can be operated using the Hebrew version of Explorer). These include interactive problem-solving activities that are based on the human-genome databases and search engines. The students are re-introduced to some of the fundamental facts and concepts in genetics, which they have previously encountered during their basic genetics studies, and which are required for solving the problems presented in the working material. At the core of this learning unit are problems, which we developed on the basis of a research paper, in which one of the genes causing deafness was discovered, in an Israeli family. The students follow the scientists' footsteps and use the database to discover the gene involved, and the possible reasons for the deafness phenotype due to its mutation, while learning about the structure of genomic DNA, complementary mRNA, conserved sequences and regulation of gene expression. The environment uses a Hebrew-translated version of the BLAST program, which we have programmed in a way that enables the students to use it easily, as well as a genome database, which we have downloaded onto our server. The specific downloaded database (the December 2001 NCBI update), which is used for solving the problems in this learning environment, enables the teachers to predict the results in advance (as they are dealing with a specific update), thus increasing their self-confidence while teaching the material, as well as reducing the time required for searching on-line databases. We hope that this environment will give high-school biology students a feel for how scientists work in the field today, as it exposes them to some of the tools and resources available in current experimental molecular biology. To the best of our knowledge, this is a pioneering effort, since such a learning environment is not currently available elsewhere.