

Gilat Brill, Pazit Ziv and Anat Yarden

Virtual experiments in cell biology: a web-based learning environment about the cell nucleus and the cytoskeleton

<https://stwww1.weizmann.ac.il/cell/>

Short summary of the main features

In order to demonstrate to high-school biology majors (11th and 12th grades) processes which occur inside the living cell, we have used microscopic images and short video films of sub-cellular compartments. The web-based learning environment is built in the format of inquiry school laboratories, which are built of 2 main parts, within the high-school biology program. In the first part the students observe a phenomenon, ask questions and suggest experiments which can be carried out in the second part of the laboratory. Similarly, in the web-based environment, students initially observe a phenomenon, using authentic images or video films which were taken in the course of experiments which were carried out in cell biology research laboratories. Subsequently, the students ask questions and suggest experiments for further investigation. In the subsequent parts, the students continue to virtually participate in experiments which were carried out in cell biology laboratories as they analyze results of authentic experiments which are presented to them in the environment.. In addition to the authentic results, the web-based learning environment includes the scientific background which is required, based on the students' prior knowledge, descriptions of the scientific methods involved and numerous activities and problem solving assignments. The topics which are included in the environment focus on the cell nucleus and the cytoskeleton. With regards to the cell nucleus the activities focus on meiosis, mitosis, and the movement of materials through the nuclear membrane. With regards to the cytoskeleton the activities focus on cell motility, organelles' dynamics within cells and cell structure. In the environment the students follow the scientists' footsteps and are requested to integrate their prior knowledge with the new knowledge presented in the environment. We hope that students will be able to improve their understanding of cellular processes, using modern biological research which is presented to them in the environment. We hope that this environment will give high-school

biology students a feel for the complex sub-cellular processes and the means that are currently used to explore them.