Learning biotechnological methods using interactive animations: Students' comprehension and conceptual status

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The importance of biotechnology education at the high school level has been recognized in a number of international curriculum frameworks around the world. In Israel, biotechnology as a subject matter in high schools appears in the syllabus for high school biology majors, as well as for biotechnology majors. One of the most problematic issues in learning biotechnology was found to be the biotechnological methods, since they are remote from students' everyday experiences, and students lack practical laboratory experience that is suited to the biotechnological content. Recent studies point that animations can serve as powerful visualization tools of scientific phenomena and abstract information. One of the most unique advantages of animation is that in some situations it can provide a virtual alternative to practical work. When an animation simulates real processes, it allows learners to execute “virtual experiments” that would be dangerous, costly, or otherwise not feasible in a school laboratory. The purpose of my study is to explore the use of animations as visualization tools in promoting high school biology and biotechnology students' comprehension of biotechnological methods. My intention is to be able to identify the distinct components of animations, and the terms of using them, under which the use of animations is most effective. Teachers' challenges, as well as and the role of the teacher in enacting the animations in class are interests of this study as well. Both quantitative as well as qualitative research tools are used in the course of my study. According to results I have obtained so far, a significant advantage to the use of animation, compared to still images, was found while learning about the Polymerase Chain Reaction (PCR). Students' prior content knowledge was found to be an important factor to students who learned PCR using still images. However, the animation has supported learning of PCR even among students who did not have sufficient prior content knowledge. Through analyzing students' discourse, in the framework of the conceptual status analysis, I observed that using the animation gave the students an advantage in understanding mechanistic aspects of the PCR.