

Characterizing the enactment of adapted-primary-literature based high-school biotechnology curriculum

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Schwab (1962) previously suggested that studying using primary literature can promote "enquiry into enquiry" and recommended the adaptation of articles for science learning in high school. In spite of this recommendation, only very few such educational interventions were reported. Adapted-primary-literature (APL) refers to an educational genre specifically designed by us in order to enable the use of primary literature for learning biology in high-school. The process of adaptation is maintaining the canonical structure and genre of the research article, while matching its content and complexity with student's prior knowledge and assumed cognitive capabilities. Learning through APL has been incorporated as an elective topic into the new syllabus for high-school biology majors in Israel. Our group has developed a biotechnology curriculum based on APL including three adapted research articles, from leading peer-reviewed professional literature. My research aims to characterize teachers' strategies, student's benefits and challenges and the characteristics of the class discourse during enactment of this curriculum. Using a constructivist qualitative approach, I analyzed the instructional strategies used by four teachers during the enactment of the curriculum, as well as the outcomes of the enactment as perceived by the teachers and their students, and as reflected in the class observations. I found that the instructional strategies applied for the adapted articles were associated with cognitive and affective engagement, active learning, inquiry thinking, and understanding of the nature of science (NOS). Suitable teacher PCK promoted learning by inquiry in addition to learning on inquiry. Students' challenges were mainly linked to the comprehension of complex, multi-stage, biotechnological processes and methods. In a case study, in which the enactment of the Results and Discussion sections of an article was examined, I revealed that students performed numerous coordination practices. Within the Results section, most such practices were research-oriented, dealing with the connection between the stages of the research described, the data obtained and their biological theoretical explanation. These coordination practices are an important tool in the students' meaning-making of the data, in a similar way to their role in authentic inquiry. Within the Discussion section, about half of the coordination practices were text-oriented, dealing with the connection between the text of the Discussion and information provided within other parts of the article, and between the text and the research stages. These coordination practices exposed the students to science as inquiry, which may promote better NOS understanding. Overall, the coordination practices applied allowed students to perform both learning by inquiry and on inquiry, i.e. "inquiry into inquiry".