Novel Study Guides for Biochemistry Meaningful Learning
in Biology: a Design-Based Research

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INTRODUCTION: One of the difficulties for biochemistry learning is the persistence of traditional teaching methods, based on transmission and memorization of abstract and detailed information, usually in a decontextualized way. Such scenario results in surface learning and content reproduction. In order to address these problems, three interventions in a discipline (Metabolism) for Biology majors were applied, in the form of innovative teaching tools (study guides). **OBJECTIVES:** The main goal is to evaluate the impact of these interventions on interest, motivation, and learning of the metabolic pathways. **MATERIALS AND METHODS:** We describe the development, application, and evaluation of two study guides – one created from a problem used as a contextual connection for glycogen metabolism study and another embedding an integrative view based on glutamate metabolism. Both materials were guided by broad themes like evolution, metabolic adaptation, and comparative biochemistry. The development of the study guides combined submicroscopic (molecular) and macroscopic (body, environment) levels, aiming to motivate reading and discussion. A design-based research with cycles of application and assessment was carried out, by means of classroom observation, grade analysis in written exams, and students' interviews. **RESULTS AND DISCUSSION:** In general, based on in-class student feedback to professors and to the researcher in the interviews, the study guides arouse curiosity and fostered peer discussion. Final average grades indicate a good global performance in all proposed activities. Whole data from study guides' application in classroom evidenced their impact on interest, motivation, and learning. The strategy of developing problem or integrative situation linking molecular (micro) and contextual (macro) levels were helpful to foster critical thinking and to value topics of scientific literacy. **CONCLUSIONS:** Analysis and interpretation of the results point to benefits for teaching and learning, with helpful information to guide elaboration and refinement of new teaching materials and to make active learning more meaningful. **KEYWORDS:** study guide, biochemistry, active learning, design-based research, biology undergraduation. **ACKNOWLEDGEMENTS:** We thank CAPES for financial support.