



## ***The History of Biology*<sup>TM</sup>: Examining a Digital Game for Improving Students' Nature of Science Conceptions and Promoting Student Engagement in Biology**

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Educational digital games allow learners to immerse themselves in highly interactive and engaging experiences, which can lead to contextual learning of complex activities and the development of 21<sup>st</sup> Century Skills identified as being crucial for success. In the field of science education, there is a worldwide call for schools to improve students' scientific and technological literacy, including improvements in students' understanding of science and technology content, socio-scientific issues, the nature of science, and scientific and technological problem-solving. The rapid advances in information communication technology are reshaping the learning styles of students; hence, it is imperative that teachers adapt their teaching styles accordingly. Recently, many studies have evaluated the effectiveness of computer-based games for learning purposes in core subject areas including science, mathematics, language arts, and engineering, to name a few. Results of these studies include: enhanced learner experiences; development of positive experiences toward subject area; increased student motivation; enhanced learning; improved cognitive outcomes from basic recall to higher level thinking; and improved performance on problem solving tasks. Furthermore, researchers have found that computer-based games have significant educational value and may help students learn elements of the nature of science (NOS), including the principles, laws, and theories of science.

Despite today's students' emerging learning styles and the educational value of computer-based games, very few educators use digital games in any substantive way in teaching and learning. The *History of Biology*, an online digital game designed to guide high school science students through concepts about the history of biology, including the lives of scientists and their discoveries, is the basis for this mixed-methods study which explored teacher candidates' a) demonstration of learning about NOS as a result of playing the *History of Biology* game; b) views on the role of the *History of Biology* game in teaching and learning NOS; and c) views on effective instructional practices for addressing the NOS components of the science curricula in Ontario, Canada. Results indicate that participants made substantial gains in their understandings of the target aspects of NOS, which can be attributed to a number of factors including explicit-reflective NOS instruction, playing the *History of Biology* game, and practicum teaching experiences. The findings of this project has the potential to make significant contributions to our understanding of how teachers can use, organize, and integrate digital games into their science programs to their students' advantage. Additionally, the provision and use of digital games may assist teachers in helping students develop 21st Century Skills, enhance teachers' and students' scientific and technological literacy, and improve attitudes toward teaching and learning science through digital technologies in the classroom.



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