

Stakeholder Summary

Digital planetariums: Despite the “wow factor,” more evaluation of effectiveness needed

Digital planetariums – in which the night’s sky is projected on domed ceilings – have a decided wow factor and today’s interactive versions can bring to life academic studies in astronomy. But more research is needed into their potential effectiveness as a learning tool, according to a new study from the Higher Education Quality Council of Ontario (HEQCO).

Given that direct observation of planets, stars and galaxies is difficult to achieve in a regular class setting, digital planetariums are increasingly being used to teach astronomy, providing an interactive and immersive experience as the user can control the projected image via touch screen or video game controller. *The Role of Planetariums in Promoting Engagement and Learning* evaluated the role of interactive digital planetariums in enhancing student learning of astronomy concepts as well as in improving student attitudes toward astronomy relative to non-interactive planetarium shows and traditional teaching methods.

Project Description

For the study, approximately 1,000 students were recruited from a first-year astronomy course at the University of Toronto in the fall 2012 semester. Over the course of the semester, three iterations of the study took place in which groups of students were assigned to one of three intervention types: a traditional discussion-based tutorial led by a teaching assistant, a planetarium show led by a teaching assistant or a self-guided planetarium show led by the students.

Prior to the start of the tutorial or planetarium shows and immediately following each, students were asked to use their iClickers to respond to three multiple-choice, content-based questions. The pre- and post-test questions addressed the same concept(s) but used different wording in order to measure students’ learning from the various interventions. In addition, a subset of students participated in focus groups to assess student engagement.

Findings

The researchers found that the self-guided planetarium intervention was no more effective at increasing student knowledge relative to the planetarium show led by a teaching assistant or to the traditional discussion-based tutorial. In fact, the latter two interventions occasionally resulted in small but superior knowledge gains. Gender, group size, or the identity of the teaching assistant had no effect on the outcomes.

The focus group discussions revealed that students generally found the planetarium shows to be interesting and enjoyable, but they struggled with the self-directed learning experience and said they would prefer to receive a more traditional style of instruction from a teaching assistant.

Students reported that the self-guided planetarium shows provided a poorer learning experience compared to the other two interventions even though they felt that the experience was engaging. Students believed that providing greater structure and more time (interventions were only 30 minutes long) in the planetarium setting with smaller groups of familiar peers would enhance their learning experience.

Overall, the authors recommend further exploration into the potential effectiveness of interactive planetarium shows. They also suggest more rigorous pedagogical training for teaching assistants as the students noted that the teaching assistants were often underprepared.

Authors of *The Role of Planetariums in Promoting Engagement and Learning* are Michael Reid, Michael Williams, John Percy, Darren Hoeg, Kelly Lepo, Joanne Nazir and Gregory Paciga, University of Toronto.