Simulation for undergraduates: is there a worthy return on investment?

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TO THE EDITOR: in the September 2016 issue of Advances in Physiology Education, Chen et al. (1) describe a study in which high-fidelity patient simulators (HFPS) are used in a human pathophysiology course with undergraduate science students. Survey data were very positive, supporting the use of HFPS, and students perceived that they leaned pathophysiology better. Additionally, the authors presented data showing fewer students failing and an upward shift in marks in the years 2011–2013, when HFPS was utilized in the course. Although HFPS is intriguing and well-liked by undergraduate students, the question I pose is whether there is evidence that the benefits outweigh the efforts associated with HFPS. In the business world, this would be considered return on investment (ROI).

The ROI formula is (gain of investment – cost of investment)/cost of investment. HFPS have a high cost of investment in that they require the purchase and maintenance of expensive high-tech manikins, hours of faculty and staff time for training and implementation, and a list of supplies such as IV bags or syringes. Therefore, in order for the ROI to be higher and more successful, the gain of investment needs to be very large. The gain of investment has been tough to document or identify in the early studies of HFPS with undergraduates. Our research study showed a 34% increase in a posttest score in undergraduate biomedical students following HFPS as well as a greater appreciation for teamwork and communication skills (2). Oriol et al. (3) have published data consistent with the current study by Chen et al. (1) showing that HFPS is well-received by students. To determine whether longer-term retention of knowledge is improved, an appropriate control group with no exposure to HFPS would be needed. However, this is difficult for most studies because of the need for comparable learner experiences, the student popularity of HFPS, and the multitude of uncontrolled variables that occur in the time frame between tests. In concordance with the current study, perhaps it is the “soft skills” that could be developed during HFPS that may provide a larger gain of investment? If the outcome sought is a behavior change, such as improved communication with a patient, a study could be designed that allowed assessment of these skills at a later time point after the HFPS. A different scenario with a standardized patient, a cheaper alternative to HFPS, could be utilized to determine whether students can transfer these skills. But could the same behavioral outcomes be achieved by using only standardized patients, which would lower the cost of investment?

There is no doubt that HFPS activities are well-liked by students and most likely increase student engagement, which is difficult to measure. However, there have not been any studies to my knowledge to suggest that learning is improved long term or whether behavior changes in undergraduate students have occurred due to HFPS. Is the upward shift in marks shown by Chen et al. (1) simply the consequence of transitioning from passive, lecture-based learning to active learning? Could the same outcomes be achieved at less of a cost in resources? Does this limited exposure to HFPS lead to better learning or skills acquisition? Are there learning benefits for the nursing students who were the voices of the patients? Studies also present student perceptions as outcomes, but is this a large enough gain due to the fact that much of the educational psychology literature illustrates that most learners have skewed beliefs about learning? Educators who use simulation as a learning tool need to consider these and other questions to determine whether gain of investment is large enough for the high cost of investment.

DISCLOSURES

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AUTHOR CONTRIBUTIONS

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REFERENCES