Title of presentation:
Using computer simulations to teach and assess critical thinking skills in health-related programs

Content and Format Description:
One of the main challenges facing health educators today is how to improve students’ decision making skills and critical thinking strategies. Several studies have shown that students with strong critical thinking skills make better clinical decisions. Assessment of critical thinking and decision making proficiencies could be used to evaluate students’ performance in health-related programs.

This study investigated the use of simulation-based training and assessment as a means of delivering clinical decision making education and determining its impact on student critical thinking strategies in the clinical scenario. Computer-assisted training utilized clinical simulations and case study modeling to stimulate critical thinking.

Simulation based testing involves an open architecture which has an inherent set of heterogeneous rules which allows for more dynamic and interactive assessments of learning. Delivering real-world problems in a simulated environment allows the student to apply their knowledge in an environment that is closer to the real situation. Too often, students are able to cram and memorize material to pass knowledge-based multiple choice exams. But, do they truly understand the material enough to apply it to a real-life situation? This is an extremely difficult question to ask and to answer. A more accurate technique utilizes simulation-based assessment technologies and job task standards to quantify the student’s decision making skills when applied to problem-based scenarios. Simulation allows the educator to assess the relevant skills of the student rather than just knowledge. This mode of learning is a better measure of their skills and provides a more enjoyable testing experience that resembles the work environment. These exams are much more secure than typical multiple choice exams since the questions can not be memorized and repeated easily.

Simulation performance was measured by proficiency score in correctly diagnosing the patient disorder (comparison with expert performance) and correlated with the amount of history needed to make the proper diagnosis and treatment modality. Each student was rated in their ability to identify a problem and provide appropriate diagnosis and interventions with rationale for each condition. This was compared with the scores obtained from conventional knowledge-based curriculum education in the same courses. Mean proficiency scores showed a significant improvement of 31% (p<0.01) for simulated versus conventional training. Less patient history findings were needed to achieve similar students’ proficiencies in simulation scenarios. Computer simulations are an efficient method of teaching students clinical content and critical thinking skills.

The results obtained from this study will provide further insight into developing better learning models for allied health students. The use of this simulation tool is only one of many interactive developments that can be employed to engage our students in subject areas that require analytical reasoning skills. It is imperative that we better understand the use of innovative learning tools and student success, especially in online classes where there is no direct instructor contact. The use of such dynamic “push” technologies means that the information displayed to the students is
more unique providing them with a more enjoyable experience yet challenging learning experience. The most immediate uses of this instructional innovation lends itself well to the sciences, ie. allied health, nursing, microbiology and molecular biology, chemistry, engineering, physics, and biomedicine. Critical thinking strategies with case scenarios has wide appeal in pedagogical teaching methods of today so it is our hope that the information gained from this study will assist others in the utilization of such technologies in their coursework.

Brief biographical sketch:
The author has conducted research on gene expression and receptor pharmacology in HIV neuropathogenesis and transmission, cocaine abuse, and cytokine expression in human brain. He is also the founder/president of NetSoft Creations Inc, an IT Systems Integration and Development company, where he has many years of professional experience as a certified network engineer, database administrator, and software programmer for LAN, WAN, Internet, and Wireless platforms. His current research interest has focused on the development of web based tools for online learning and the Scholarship of Teaching and Learning assessment of these novel techniques in the classroom. Presently, the author is assistant professor in Health Professions at the University of Central Florida where he teaches pathophysiology, biochemistry, and medical pharmacology courses.

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