TITLE: Visual-Spatial and Psychomotor Skills for Ultrasonography: Evaluation of a Simulator

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FACULTY MENTOR DEPARTMENT

Anesthesiology/Medical Education

RESEARCH PROJECT DESCRIPTION

Our study measures visual-spatial aptitudes of trainees/practitioners and will correlate these assessment scores with the ability to acquire ultrasound images using a unique ultrasound cross sectional task trainer developed by the Center for Safety, Simulation and Advanced Learning Technologies (CSSALT). This simulator is a specialized mixed reality, procedure-agnostic, ultrasonography simulator utilizing a physical, simulated ultrasound probe tracked with a sensor with six degrees of freedom. The simulator adds a psychomotor component to assessing and training visualization of cross sections. Our hypothesis is high performers on assessments of visual-spatial abilities will perform better on the 'hands on part' of the ultrasonography (US) simulator. We also expect that low scoring students can improve their performance by interacting the US simulator.

In Phase 1, we administered the Santa Barbara Solids Test and the Visualization of Views to over 500 health professions and biomedical engineering student to establish the range of scores and the differences among training programs. In Phase 2, we are interested in whether these skills can be learned so we will evaluate whether there is a relationship between participants' written assessments of spatial abilities (cognitive) and their performance during a "hands-on" simulation session (performance assessment). The ultimate goal of our research is to provide validity evidence for our ultrasound simulator as both an educational tool and as an assessment method.

Role of the medical student:

- Assist the Research Coordinator with recruitment/scheduling of participants;
- Administer the simulator sessions;
- Maintain project database;
- Assist with data analysis and manuscript preparation.

Relevant literature:

Clem DW, Donaldson J, Curs B, Anderson S, Hdeib M. Role of spatial ability as a probable ability determinant in skills acquisition for sonographic scanning. J Ultrasound Med. 2013; 32(3):519-528.

Cohen CA, Hegarty M. Inferring cross sections of 3D objects: a new spatial thinking test. Learning and Individual Differences. 2012;22:868–874.

Cohen CA, Hegarty M. Visualizing cross sections: Training spatial thinking using interactive animations and virtual objects. Learning and Individual Differences. 2014; 33: 63–71.

Keehner M, Lippa Y, Montello D, Tendrick F, Hegarty M. Learning a spatial skill for surgery: how the contributions of abilities change with practice. Appl Cogn Psychol 2006; 20:487–503.