Haptico-visual observation and drawing (HVOD): A multi-sensory observation method emphasising touch as an important sensory modality in anatomy education

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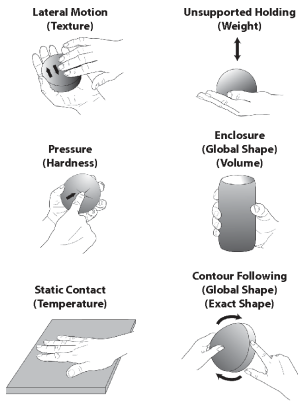
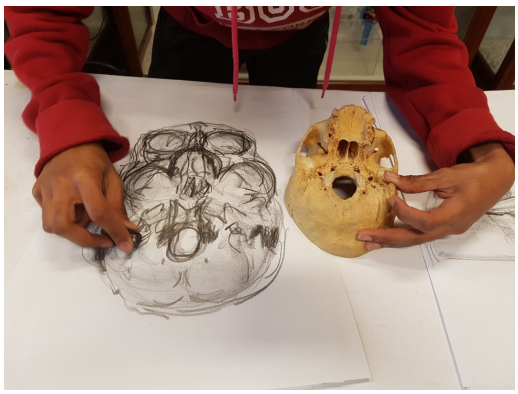
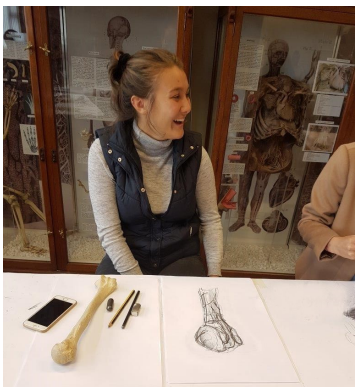
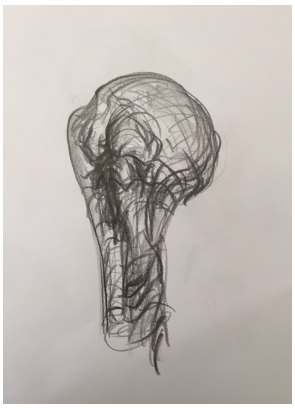
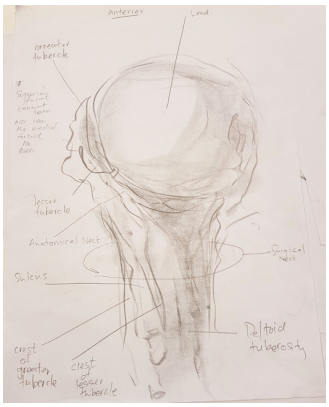
"Even with an object in plain sight and in close proximity, there is a lot more in front of us than meets our eye. By observing an object using our sense of touch, we are able to gather an entirely different set of observable data about the object - in particular, the 3D form and detail of the object that would be entirely unavailable to sight-only observation" -- @leonard_shapiro











RESEARCH REPORT

ASE

How Haptics and Drawing Enhance the Learning of Anatomy

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Background

Roberta Klatzky and Susan Lederman[1] described a set of specialized patterns of manual exploration which they called 'exploratory procedures' (EPs) or stereotypical patterns of hand movements. These exploratory patterns are linked to the sensing and acquisition of specific object properties.

The Haptico-visual observation and drawing (HVOD) method

Leonard Shapiro developed the Haptico-visual observation and drawing (HVOD) method for the enhanced observation of 3D objects, including anatomical parts. The EPs and drawing have hand gestures in common; while an object is explored with one hand, gestural marks are made in graphite on paper with the other hand. These gestural marks re-present those EPs on a 2D surface.

The HVOD method is taught in three sequential steps

Step 1: Overcoming repetitive, predictable upper-limb and hand movements by introducing spontaneous and fluid, mark-making gestures. This is achieved with pencil on paper.
Step 2: Using touch (and sight) to explore a 3D object. Applying purposive EPs to observe an object using touch. This is achieved using a 200-gram ball-peen hammer.
Step 3: Feeling the 3D object and making drawing marks that re-present that object on a 2D surface. This is achieved by exploring an object using touch with one hand and simultaneously re-presenting those exploratory gestures in marks on paper with the other hand.

Special Studies Modules (SSMs) are run annually at the University of Cape Town (UCT) for 3rd year medical students who choose to study the HVOD method. UCT certificated CPD courses in HVOD are offered to health-care professionals.

Benefits in Anatomy Education

In our qualitative study[2], the benefits of exploring using the senses of touch, vision and drawing includes i) enhanced observation of the 3D form of anatomical parts, ii) the cognitive memorization of anatomical parts as a 3D 'mental picture' iii) improved spatial orientation within the volume of anatomical parts, iv) an ability to draw.

Clinical Applications of HVOD

i) Improved radiation oncology planning through improved spatial orientation within the volume of the anatomy, ii) improved MRI and CT interpretation through internalisation of the anatomical part as a mental picture, iii) improved instrument dexterity and instrument awareness in laparoscopic surgery, iv) improved spatial orientation in laparoscopic surgery.

References

1. Klatzky R.L., Lederman S.J. 1992. Stages of manual exploration in haptic object identification. Percept Psychophysics 52:661-670.
2. Reid, S., Shapiro, L. and Louw, G. 2018. How Haptics and Drawing Enhance the Learning of Anatomy. Anatomical Sciences Education 12:164-172

Ethical approval was granted the UCT Human Research Ethics Committee (ref 582/2015).