Where's the baby…?

Use of a novel spatial reasoning activity in obstetric sonographer skills development

Heather Venables[1], Gillian Coleman[1,2],

[1.] Lecturer in Diagnostic Imaging, University of Derby, College of Health and Social Care
[2.] Nottingham University Hospitals NHS Trust
email: h.venables@derby.ac.uk phone: 01332 593075

Ultrasound looks easy when performed by an expert practitioner. However, the hand eye coordination and spatial awareness required to complete a scan often come as ***'a bit of a shock'*** to novice sonographers. This is particularly true in obstetrics where we are imaging a moving target.

This can result in a rapid drop in confidence, significant anxiety and may result in students questioning their decision to undertake ultrasound training.

There is evidence that students cope by **mimicking** expert behaviours. This may include transducer positions, patient position and **'image grabbing'.** At this stage, students may find it difficult to articulate what they don't understand.

The fine motor skills needed to produce diagnostic views of the baby must be coupled with the ability to 'picture' how the baby is positioned and understanding of the concept of how the image is formed.

For an expert practitioner, these skills are intuitive and can be challenging to explain. **Assumed understanding** can become a barrier to learning and skills development.

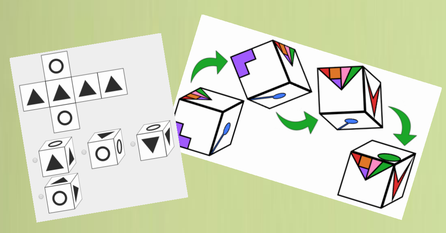
However, for students who are unable to grasp these **threshold concepts**, it is almost impossible to make sense of how to achieve the correct anatomical images and how to adapt scan technique between patients.

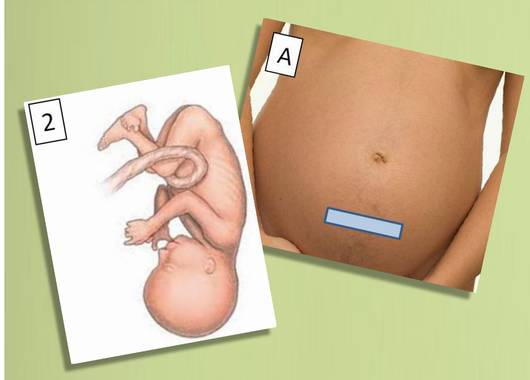
This may result in feedback from mentors that the student ***'just doesn't get it …'***

We use **simulation** activities to 'unpick' student understanding of image acquisition. This helps students move from 'image grabbing' to a logical and systematic approach that builds on good 3D spatial awareness rather than mimicking of observed behaviours.

Both students and mentors report rapid improvement in scan technique and confidence once these essential **threshold concepts** are grasped. This is frequently described by students and their trainers as a '*penny drop*' moment.

In addition to use of 'high-tech' simulation systems, a novel 'low tech' **game activity** has been developed to build spatial reasoning skills and identify struggling students in obstetrics.

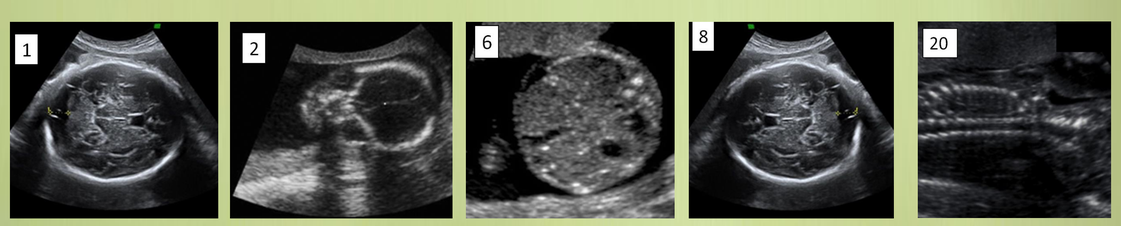




Based on the principles of validated tests of spatial reasoning, the "Where's the baby…?" game uses numbered images of fetal lie, transducer position and observed ultrasound image. The game tests student ability to match these images through a series of directed activities.

In the initial stage of the game, using the throw of a pair of dice, students are asked to select transducer position and fetal lie cards. From these they are asked to deduce what they would expect to see on the scan and select the corresponding image from a pack of 24 fetal anatomy sections.

As the game progresses, the activity shifts to focus on selection of transducer position and ultrasound sectional anatomy. From these, the student needs to identify fetal position and consider how situs may be determined.



Dolls are used to help visualise fetal lie, situs and scan planes.

Game play is observed by obstetric sonographers/facilitators. Using a minimally directive 'coaching' approach, students are encouraged to find their own solutions. Peer-to-peer learning is facilitated by group support as each player takes their turn. Typically, students will identify and correct each others errors.

Common problems identified by the game include poor rotational reasoning skills and misidentification of fetal anatomical planes. In struggling students, misunderstandings may be very basic 'assumed' knowledge. (e.g. The top of the image is not correctly identified as the point of transducer/patient contact.)

References:
Barradell, S. and T. Peseta (2017). "Putting threshold concepts to work in health sciences: insights for curriculum design from a qualitative research synthesis." Teaching in Higher Education **22(3): 349-372.**
Clouder, L. (2005). "Caring as a 'threshold concept': Transforming students in higher education into health (care) professionals." Teaching in Higher Education **10(4): 505-517.**
Levett-Jones, T., L. Bowen, et al. (2015). "Enhancing nursing students' understanding of threshold concepts through the use of digital stories and a virtual community called 'Wiimali'." Nurse Education in Practice **15(2): 91-96.**
Ma, C., N. Tabarsi, et al. (2017). "Clinical Reasoning and Threshold Concepts." Academic Medicine **92(4): 426-426.**
Meyer, J. H. F. and R. Land (2005). "Threshold concepts and troublesome knowledge (2): Epistemological considerations and a conceptual framework for teaching and learning." Higher Education **49(3): 373-388.**

UNIVERSITY of DERBY