



BUCKINGHAMSHIRE NEW UNIVERSITY

EST. 1891

Downloaded from: <https://bnu.repository.guildhe.ac.uk/>

This document is made available with permission. Copyright remains with the author(s).

Use of items from Buckinghamshire New University's institutional repository must comply with the usage guidelines.

This work is made available under a **Creative Commons Attribution-4.0 International Licence (CC BY 4.0)**: <https://creativecommons.org/licenses/by/4.0/>

Under this licence, you may:

- Share — copy and redistribute the material in any medium or format
- Adapt — remix, transform, and build upon the material for any purpose, even commercially.

You must:

- cite the authors, title, and full bibliographic details of the item
- include a hyperlink/URL to the repository record in any citation
- keep all files required for use of the item together
- Indicate of changes were made.

You may not:

- sell any part of an item
- refer to any part of an item without citation
- use or adapt the work in a way that misrepresents the author or impugns their reputation
- remove or alter the copyright statement on an item
- You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.

If you need further guidance contact the Library and Learning Services at Library@bnu.ac.uk



BUCKINGHAMSHIRE
NEW UNIVERSITY
EST. 1891

Society of British Neurological Surgeons/British Association of Neuroscience
Nurses Annual Conference October 2026

Designing and Evaluating a Multimodal Anatomy Intervention for Post-Registration Nursing and Allied Healthcare Professionals

Perceived Impact on Learning, Clinical Reasoning and Practice

Ruth Trout

Senior Lecturer in Acute Care and Continuing Professional Development

INSPIRED.
EMPOWERED.
EMPLOYED.

Background: Why does anatomy knowledge matter for healthcare professionals?

Anatomy underpins:

- Clinical assessment
- Procedural skills
- Clinical reasoning
- Patient/family education
- Rehabilitation
- Evidence-based practice

• However:

- Most anatomy education research focuses on undergraduate medical students or student nurses (McVicar et al., 2015).
- Limited opportunities for hands on anatomy teaching with human specimens for post-registration nurses and allied healthcare professionals (Molesworth and Lewitt, 2016, Wheeldon 2025)
- Little evidence regarding the value anatomy education for continuing professional development (CPD) students

High quality anatomy CPD for BNU students

- Modules run at University Hospitals Birmingham (UHB) - Trauma and Neuroscience specialist nurses, physios, dieticians, occupational therapists
- Goal was to deliver applied, practice relevant anatomy and physiology
- Collaboration: Partnership between BNU, NHS Trust, Human Anatomy Unit of University of Birmingham
- Inclusion: Post registration nurses and allied health professionals - often underrepresented in anatomy education research
- Integration: Cadaveric + digital + clinical/case study learning
- Interdisciplinary teaching & learning: Educators and learners from multiple professional backgrounds

The session

- **Pre-session** - Guided reading covering the anatomy and clinical conditions we will cover in the lab

- **Anatomy Laboratory Session**

Rotating stations:

- Cadaveric specimens
- Human donor material
- Skeletal models
- Anatomage table
- Clinical case studies at each station with guided learning
- Facilitated discussions with lecturers/anatomists moving from workstation to workstation

Focussed on trauma and neuroscience anatomy – brains, cranial nerves, joints, complex structures: brachial plexus, spinal cord and peripheral nerves, abdominal cavity

Method

Design: Qualitative descriptive study (Mixed methods data collection)

Participants: Post-registration nurses and allied healthcare professionals

Data Collection: Open-ended evaluation questionnaires

Analysis: Reflexive thematic analysis (Braun & Clarke, 2006)

Ethics: Approved by University of Birmingham Research Ethics Committee

Findings

- Theme 1: Embodied engagement with real anatomy enhanced understanding
- Theme 2: Authentic anatomical visualisation supported spatial and clinical understanding
- Theme 3: Integrating multiple learning modalities enhanced understanding
- Theme 4: Clinical contextualisation strengthened clinical reasoning and practice relevance
- Theme 5: Collaborative and facilitative learning promoted shared understanding

Theme 1: Embodied engagement with real anatomy enhanced understanding

Participants valued:

- Handling specimens
- Touching bones
- Examining real anatomy

Interpretation Anatomy became:

- Tangible
- Meaningful
- Clinically relevant
- **Experiential Learning & Embodied Cognition**

Quotes:

- *"Palpating real bones and models helped me visualise."*
- *"donors helped (me) see real anatomy"*
- *"the anatomy of the body, being able to touch it"*
- *I can touch it*

Theme 2 & 3: Seeing and integrating anatomy

What helped learners?

- Cadaveric specimens
- Anatomage
- Models
- Diagrams

Key finding:

- The value was not cadavers or technology alone
- Value was integration of multiple modalities
- **Visuospatial understanding & Multimodal learning**

Quotes

- *"Seeing structures of brain + spinal cord"*
- *"Identifying blood vessels & Circle of Willis"*
- *"Spinal vertebrae + where they're located in real life"*
- *"Identifying real life structures"*
- *"Visualising structures all together"*
- *"Palpating real bones and models helped me visualise"*
- *"Viewing the samples on Anatomage"*
- **I can see how it fits together. I can learn it through multiple complementary methods.**

Theme 4: Clinical contextualisation strengthened clinical reasoning and practice relevance

Learners valued:

- Trauma scenarios
- Pathology
- Case studies
- Procedure-related anatomy

Interpretation Anatomy supported:

- Clinical reasoning
- Decision-making
- Evidence-based practice

Situated Learning

Quotes

- *"Case studies because it links with theory and real life injuries"*
- *"Subdural hematoma"*
- *"Spinal vertebrae + where they're located in real life"*
- *"Helpful for evidence based practice"*
- **I can apply it to patient care**

Theme 5: Collaborative and facilitative learning promoted shared understanding

Quote

Learners highlighted:

- Group discussion
- Facilitator support
- Shared interpretation
- Learning was co-constructed

Social Constructivism

- *"Interacting and explaining the specimens."*
- *"Group work and discussion"*
- *"(illegible) session & group discussion"*
- *"The instructors, group discussion, the structures"*
- *"Session facilitators"*
- *"The teaching + real organs"*

Recommendations for practice

Anatomy CPD should:

- Be clinically contextualised
- Incorporate authentic human anatomy
- Combine digital and traditional approaches
- Promote collaborative learning
- Support interdisciplinary healthcare education

Strengths and limitations

- Novel focus on post-registration nurses and allied healthcare professionals, an under-researched population in anatomy education
- Collaborative partnership between BNU, UHB & University of Birmingham
- Interdisciplinary learning environment reflecting contemporary healthcare practice
- Findings aligned with established educational theories (Experiential Learning, Embodied Cognition, Situated Learning, Social Constructivism)
- Qualitative data collected through open-ended questionnaires, limiting opportunities for probing and clarification
- Single intervention with a relatively small cohort (**n = XX**) from trauma and neuroscience modules
- Findings may not be transferable to other healthcare professions, specialties, or educational contexts
- Potential self-selection and response bias
- Explored perceptions rather than objective measures of knowledge retention, behaviour change, or patient outcomes

Conclusions

Key Message

- Participants did not value: Cadavers alone, technology alone
- They valued: Authentic anatomy, clinical relevance, collaborative discussion, integrated learning experiences

Take-home message

- *Anatomy was experienced not as a subject to be revisited, but as a foundation for clinical reasoning, interdisciplinary collaboration, and patient-centred care.*

Additional outcome

- Added evidence to an understudied area of practice/education

References

- Anatomage Inc. (2024) Anatomage Table: The world's most advanced 3D anatomy visualization system. Available at: <https://www.anatomage.com> (Accessed: 3 June 2026)
- Aziz, M.A., McKenzie, J.C., Wilson, J.S., Cowie, R.J., Ayeni, S.A. and Dunn, B.K. (2002) 'The human cadaver in the age of biomedical informatics', *The Anatomical Record*, 269(1), pp. 20–32.
- Braun, V. and Clarke, V. (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, 3(2), pp. 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Hall, S. and Ellis, H. (2020) 'The current status of anatomy as a foundation for the surgical profession', *Bulletin of the Royal College of Surgeons of England*, 102(5), pp. 192–194
- Kolb, D.A. (1984) *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice Hall.
- Knowles, M.S. (1984) *The adult learner: A neglected species*. 3rd edn. Houston, TX: Gulf Publishing.
- Lave, J. and Wenger, E. (1991) *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.
- McVicar, A., Andrew, S. and Kemble, R. (2015) 'The “bioscience problem” for nursing students: An integrative review of published evaluations of Year 1 bioscience, and proposed directions for curriculum development', *Nurse Education Today*, 35(3), pp. 500–509.
- Molesworth M & Lewitt M (2016) Pre-registration nursing students' perspectives on the learning, teaching and application of bioscience knowledge within practice. *Journal of Clinical Nursing*, 25, 725–732. <https://doi.org/10.1111/jocn.13020>
- Moreno, R. and Mayer, R.E. (2007) 'Interactive multimodal learning environments', *Educational Psychology Review*, 19(3), pp. 309–326.
- Vygotsky, L.S. (1978) *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Wilson, M. (2002) 'Six views of embodied cognition', *Psychonomic Bulletin & Review*, 9(4), pp. 625–636.
- Wheeldon R (2025) *Student nurses' experiences of and perspectives on their learning of bioscience on a contemporary nursing degree programme*. University of Hertfordshire EdD

References

- Anatomage Inc. (2024) Anatomage Table: The world's most advanced 3D anatomy visualization system. Available at: <https://www.anatomage.com> (Accessed: 3 June 2026)
- Aziz, M.A., McKenzie, J.C., Wilson, J.S., Cowie, R.J., Ayeni, S.A. and Dunn, B.K. (2002) 'The human cadaver in the age of biomedical informatics', *The Anatomical Record*, 269(1), pp. 20–32.
- Braun, V. and Clarke, V. (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, 3(2), pp. 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Hall, S. and Ellis, H. (2020) 'The current status of anatomy as a foundation for the surgical profession', *Bulletin of the Royal College of Surgeons of England*, 102(5), pp. 192–194
- Kolb, D.A. (1984) *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice Hall.
- Knowles, M.S. (1984) *The adult learner: A neglected species*. 3rd edn. Houston, TX: Gulf Publishing.
- Lave, J. and Wenger, E. (1991) *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.
- McVicar, A., Andrew, S. and Kemble, R. (2015) 'The “bioscience problem” for nursing students: An integrative review of published evaluations of Year 1 bioscience, and proposed directions for curriculum development', *Nurse Education Today*, 35(3), pp. 500–509.
- Molesworth M & Lewitt M (2016) Pre-registration nursing students' perspectives on the learning, teaching and application of bioscience knowledge within practice. *Journal of Clinical Nursing*, 25, 725–732. <https://doi.org/10.1111/jocn.13020>
- Moreno, R. and Mayer, R.E. (2007) 'Interactive multimodal learning environments', *Educational Psychology Review*, 19(3), pp. 309–326.
- Vygotsky, L.S. (1978) *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Wilson, M. (2002) 'Six views of embodied cognition', *Psychonomic Bulletin & Review*, 9(4), pp. 625–636.
- Wheeldon R (2025) *Student nurses' experiences of and perspectives on their learning of bioscience on a contemporary nursing degree programme*. University of Hertfordshire EdD

Thank you!

BuckinghamshireNewUniversity



@BNUni



@_BNUni



_BNUni



High Wycombe Campus

Queen Alexandra Road
High Wycombe
Buckinghamshire HP11 2JZ

Aylesbury Campus

Walton Street
Aylesbury
Buckinghamshire HP21 7QG

Uxbridge Campus

106 Oxford Road
Uxbridge
Middlesex UB8 1NA

**BNU based at
Pinewood Studios**

Pinewood Studios
Pinewood Road
Iver Heath
Buckinghamshire
SL0 0NH

Missenden Abbey

London Road
Great Missenden
Buckinghamshire
HP16 0BD

Telephone: 0330 123 2023

Fax: 01494 524 392

International: +44 1494 605 259

Email: advice@bnu.ac.uk