

BRIEF CURRICULUM VITAE: Trevor R. Anderson



1. Name and Contact Details:

Professor Trevor R. Anderson
Ph.D., Biochemistry, University of Natal, Pietermaritzburg, South Africa

Head, Science Education Research Group (SERG)
School of Biochemistry, Genetics, Microbiology & Plant Pathology
University of KwaZulu-Natal (Pietermaritzburg)
P/Bag X01 Scottsville 3209
South Africa

Tel. +27-33-260-5464/29
Fax. +27-33-260 6127
Email anderson@ukzn.ac.za
Skype address: trevor.anderson7

2. Present Position and Role in Education:

Head, Science Education Research Group (SERG); and,
Associate Professor in Biochemistry, Science Education, Ethics

Selected Professional and Editorial Positions:

- Member: Educational Sub-Committee of the International Union of Biochemistry & Molecular Biology (IUBMB) (Since July 1998)
- Member: Editorial Board of "Biochemistry & Molecular Biology Education" (Since May 1998)
- Invited to write a regular column for Biochemistry & Molecular Biology Education, commencing September 2007, entitled 'Bridging the Gap between science education research and its application in teaching practice'.
- Chairperson: Educational Committee of the Federation of African Societies of Biochemistry and Molecular Biology (FASBMB) (Sept 1998 – 2003)
- Editor: SA Society of Biochemistry & Molecular Biology (SASBMB) Newsletter (1988-1996)

3. Accomplishments in Education:

a) Selected Invited (Sponsored) International Conference Presentations and Workshops:

- The IUBMB Concept Inventory Project: A Research Perspective, 19th FAOBMB Conference, Seoul, Korea, May 27-30, 2007

- The IUBMB Concept Inventory Project: A Research Perspective, 36th SBBq and 10th IUBMB Conference, Salvador, Bahia, Brazil, May 21-25, 2007
- Bridging the educational research- teaching practice gap: barriers and strategies. FontD meeting of the Scientific Committee, Halmstad University College, Hotel Tylösand, Sweden, May 14-16, 2007
- The importance and assessment of visual literacy in molecular science, Tecnologias de Informação e Comunicação (TIC) e o ensino de ciências: diálogos entre as literacias digital e científica, Braga, Portugal, 16 Dec., 2006
- Convenor and presenter: The importance of visual literacy and its assessment in biochemistry, IUBMB Symposium on Visual Literacy in Biochemistry at the 30th FEBS Congress and 9th IUBMB Conference, Budapest, Hungary, 2-7 July 2005,
- Assessing and researching for conceptual understanding in biochemistry, 8th IUBMB and ASBMB Conference, Boston, USA, 12-16 June, 2004
- Do Students Really Understand Metabolism the Way We Think They Do? 18th IUBMB conference, Birmingham, UK, 16-20 July, 2000
- Convenor and presenter of:
 - 3rd IUBMB/FASBMB/SASBMB Biochemistry Education Workshop, Cape Town, (17 – 19 Nov., 2001)
 - 2nd FASBMB/IUBMB Biochemistry Education Workshop, Cairo, Egypt, Using Research Results to Improve Teaching and Learning of Biochemistry (15 Nov., 2000)
 - 1st FASBMB/IUBMB Biochemistry Education Workshop, Potchefstroom, Improving the teaching & learning of biochemistry (29 Sept. – 3 Oct., 1998)

b) Educational Research and Innovations:

Over the past 15 years he has built up arguably one of the world's first science education research groups (SERG) that is specifically located within a Biochemistry and Genetics Department and which graduates students with the same Doctoral and Masters Degrees as other research areas within the discipline. His group currently has 12 postgraduate students, focusing on the assessment of student conceptual understanding and visual literacy in science, including the identification and remediation of conceptual and visualization difficulties among students studying biochemistry, molecular biology, genetics, biology, chemistry and mathematics. He is particularly interested in symbolic language and how one can improve the design and use of models such as diagrams, computer images and animations so that they enhance, rather than hinder, the development of the conceptual knowledge and visualization skills that are so essential for all bioscientists. He has designed and developed a resource of student's conceptual and reasoning difficulties (CARD) in science (See <http://www.card.unp.ac.za>), which is aimed at developing research capacity in the area of student difficulties and teacher competence at tertiary and secondary levels. This resource has a strong focus on chemistry but is currently being expanded into biology and molecular science.

c) Teaching Experience:

He has 33 years of teaching experience in biochemistry, science education and ethics and strongly believes in the 'power' of cross-disciplinary interaction in the enhancement of teaching and research.

Current courses: Signal transduction and Metabolism, Protein Structure and Function, Science Education, Using modeling and visualization techniques to understand and research biochemistry (Hons), Written and Oral presentation of science, Ethics: The nature and integrity of science and scientists (History and Philosophy of Science)

4. Potential Educational Development Activities at Monash:

a) Possible workshops

- Assessment: why, what and how?
- Easy ways to do rigorous (publishable) educational research on your teaching practice (as a means of evaluating the quality of your teaching practice)
- Educational research methods for investigating students' conceptual understanding and identifying alternative conceptions (misconceptions) and visualization difficulties
- Techniques for the writing and oral presentation of science (for students)

b) Possible seminars

- The importance of bridging the gap between science education research and its application in biochemistry teaching and learning: barriers and strategies
- Bridging the Educational Research-Teaching Practice Gap: The power of assessment
- A model of the factors affecting students' ability to interpret diagrams, and other representations, used in teaching and learning
- The nature and assessment of conceptual understanding and related cognitive skills
- Assessing your students' visual literacy
- The Conceptual and Reasoning Difficulties (CARD) teaching and learning resource
- Tools for evaluating the quality of your assessment tasks
- Identification and remediation of student difficulties with metabolism
- The multifaceted nature of conceptual understanding
- The Importance of Visual Literacy in the Education of Biochemists
- Biochemistry students' difficulties with the symbolic and visual language used to represent conceptual knowledge in Molecular and Cellular Bioscience
- Presentation and interpretation of arrow symbolism in biology diagrams
- A Concept Inventory for Molecular Life Sciences
- Constructivist-based teaching, learning and assessment

c) Other possible educational activities

One- on-one, or group, discussions with colleagues (and perhaps students) on, for example:

- Curriculum and curriculum change
- My experiences of introducing continuous assessment in our School
- Evaluating the quality of your teaching
- Pedagogical Content Knowledge (PCK) and general teaching and learning approaches
- Teaching metabolism
- Teaching protein structure/function
- Educational research
- Ethics, integrity and public understanding of science

5. Selected Publications of possible interest to Monash colleagues:

1. Schönborn, K.J. and Anderson, T.R. Development of a Model of Factors Determining Students' Ability to Interpret External Representations in Biochemistry. **International Journal of Science Education (In Press)**
2. Grayson, D.J., Anderson, T.R., & Crossley, L. G. (2001) A Four-Level Framework for Identifying and Classifying Student Conceptual and Reasoning Difficulties. **International Journal of Science Education**, 23 (6), 611-622.

3. Schönborn, K.J. and Anderson, T.R. (2006) The Importance of Visual Literacy in the Education of Biochemists. **Biochemistry and Molecular Biology Education**, 34 (2), 94-102
4. Schönborn, K. J., Anderson, T.R. and Grayson, D.J. (2002) Student difficulties with the interpretation of a textbook diagram of immunoglobulin G (IgG). **Biochemistry & Molecular Biology Education**, 30 (2), 93-97.
5. Anderson, T.R. (2007) The importance of bridging the gap between science education research and its application in biochemistry teaching and learning: barriers and strategies, **Biochemistry and Molecular Biology Education Vol 35 (In Press)**
6. Anderson, T.R. (2007) Bridging the Educational Research-Teaching Practice Gap: The power of assessment, **Biochemistry and Molecular Biology Education Vol 35 (In Press)**
7. Schönborn, K. J., Anderson T.R. and Mnguni, L.E. Methods to determine the role of external representations in developing understanding in biology, In Doris Lemmermöhle, Martin Rothgangel, Susanne Bögeholz, Marcus Hasselhorn & Rainer Watermann (Eds), Professionell Lehren - Erfolgreich Lernen, Publishers: Waxman Verlag Münster. **(In Press)**
8. Halstead, SE, Anderson, TR and Spankie, S (2003) Formulation of statements of propositional knowledge and corresponding student difficulties for the Brønsted-Lowry acid-base model: A reciprocal matching and honing process, In: D. Fisher & T. Marsh (Eds), Making Science, Mathematics and Technology Education Accessible to All. **Perth: Key Centre for School Science and Mathematics (Pub)**, pp. 377-388 (ISBN 1 74067 303 4)
9. Du Plessis, L., Anderson, T.R. and Grayson, D. J. (2003) Student Difficulties With The Use Of Arrow Symbolism In Biological Diagrams, In: J. Lewis, A. Magro & L. Simonneaux (Eds), Biology Education for the Real World: Student, Teacher, Citizen, **Ecole Nationale de Formation Agronomique (Pub.)**, pp. 89-103.
10. Anderson, TR (2005) The effective practice of agricultural science. In: Ethics in Agriculture- An African Perspective (Edit: A van Niekerk), Springer, The Netherlands, Ch. 8, pp 143-163.