



Southern Cross UNIVERSITY

Vertical integration of critical thinking and research skills in an Australian osteopathic programme

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AIMS OF PRESENTATION

- Describe Critical Thinking and research skills
 - Relationship between them
- What makes a critical thinker?
- Describe Vertical Integration
 - What is it good for?
- Example of SCU programme
 - What has worked and what hasn't?

BACKGROUND CONTEXT

- Osteopathy in Australia
- Southern Cross University
- Accreditation policy

My background

My training
EBM era
Masters by research
Now PhD
VicUni Masters
SCU Masters

Just thinking?

- Thinking?
- Reasoning
- Thinking about thinking
- Reflecting

Reasoning

"You can lead a man up to university, but you cant make him think"
Finley Peter Dunn



What is critical thinking?

"....the intellectually disciplined process of actively and skillfully **conceptualising, applying, analysing, synthesising and/or evaluating** information gathered from, or generated by, **observation, experience, reflection, reasoning or communication**, as a guide to belief and action."

Scriven and Paul (2004) Defining Critical Thinking. Foundation for Critical Thinking. <http://www.criticalthinking.org/pages/defining-critical-thinking/766>

What is the relationship between Critical Thinking and Research Skills?

A successful researcher should have:

Careers Research and Advisory Centre, Research Councils UK. <http://www.vitae.ac.uk/>

- the ability to recognise and validate **problems**
- original, independent **critical thinking**
- the ability to develop theoretical concepts
- an understanding of relevant research methodologies
- a knowledge of recent advances within one's field
- the ability to **critically analyse and evaluate** findings
- an ability to summarise, document, report and reflect on progress

Is doing research necessary to develop CT?

- Overlapping skill set
 - Identify problem
 - Critically investigate
 - Systematically analyse, test and report
 - Ethical practice
- CT not fully covered in an independent research project
 - Single problem
 - Non – experiential
 - Structured – less chaos than clinical reasoning

Drivers of curriculum

The drivers for the programmes objectives and content come from four sources:

- Australian Qualifications Framework
- Southern Cross University generic Graduate Attributes (Strategic Plan 2010-15),
- Osteopaths Board of Australia accreditation guidelines (Australian and New Zealand Osteopathic Council, Accreditation Policy, 2011)
- Educational aims and philosophy of the course development team.

Australian Qualifications Framework

Level 7 Bachelors

- cognitive and creative skills to exercise critical thinking and judgement in identifying and solving problems with intellectual independence

Level 9 Masters course work

- cognitive skills to demonstrate mastery of theoretical knowledge and to reflect critically on theory and professional practice or scholarship
- cognitive, technical and creative skills to investigate, analyse and synthesise complex information, problems, concepts and theories and to apply established theories to different bodies of knowledge or practice
- cognitive, technical and creative skills to generate and evaluate complex ideas and concepts at an abstract level
- communication and technical research skills to justify and interpret theoretical propositions, methodologies, conclusions and professional decisions to specialist and non-specialist audiences
- to plan and execute a substantial research-based project, capstone experience and/or piece of scholarship

Accreditors

Course standards:

- Standard 2 The course is taught in the context of sustained scholarship which informs teaching and learning in osteopathy and ensures that students understand **the process of research and the importance of evidence to inform theory and practice and are able to critique and evaluate new and established ideas and concepts.**
- Standard 9(d) **Curriculum should contain: critical analysis, problem solving, research methodology and biomedical statistics**

Osteopaths – entry level capabilities

- 1.1.1 **Critically** uses a variety of information retrieval mechanisms
- 1.2.5 **Critically** selects and adapts appropriate clinical examination techniques during their patient evaluation,
- 3.8.2 **Critically evaluates** evidence by applying a knowledge of research methodologies and statistical analysis
- 5.5.1 **Critically reflects** on the relationship between osteopathic practice and other healthcare systems, and the impact this has for overall patient care

University Graduate Attributes

1. **Intellectual rigor** - A commitment to excellence in all scholarly and intellectual activities, including critical judgement.
5. **Lifelong learning** - The ability to be responsive to change, to be inquiring and reflective in practice, through information literacy and autonomous, self-managed learning.

Course team

3. The development of higher order skills in critical analysis and understanding of research methodology

Why is CT needed in osteopathic training?

- The osteopathic approach to differential diagnosis is complex and requires both deductive and inductive reasoning skills
- conceptual framework of diagnostic models
 - biomedical model
 - osteopathic model
 - (e.g. the postural/structural, neurological, respiratory/circulatory, nutritional, behavioural, and energy expenditure and exchange models)

Critical thinking

BOTH

a cognitive skill

AND

a disposition

CRITICAL THINKERS

Facione:

(in Fryer, G. (2008) Teaching critical thinking in osteopathy - Integrating craft knowledge and evidence-informed approaches. International Journal of Osteopathic Medicine 11;56-61.

Seven aspects of the overall character disposition toward critical thinking

- truth- seeking,
- open-mindedness,
- analyticity,
- systematicity,
- critical thinking confidence,
- inquisitiveness,
- cognitive maturity

Critical Thinkers

Four attributes

- Reflection
 - **Why** – reason for the way we do things
- Context
 - Given **moment**
- Dialogue
 - Evaluating **perspectives** and assumptions
 - **Conversation** with self, patients, peers, mentors
- Time
 - **Past** learning recall
 - **Time** to reflect on patterns and meaning

Kahane H, Cavender N. Logic and Contemporary Rhetoric (9th Ed). Wadsworth, 2002.

Critical thinking

The concept of Meta-cognition

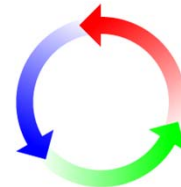
Self monitoring to detect links or inconsistencies between previous experience and current situation

Higgs et al (Eds). Clinical Reasoning in the Health Professions (3rd Ed). Elsevier, 2008.

Critical thinkers summary

(Internally driven iterative process)

- Observe
- Question
- Gather information
- Analyse
- Reflect
- Contextualise
- Reflect
- Communicate



Critical thinking teaching strategies

- Case studies
- Algorithms
- Simulations
- Role playing
- PBL significantly increases CT

Tiwari et al (2006) California Critical Thinking Disposition Inventory (CCTDI) - A comparison of the effects of problem-based learning and lecturing on the development of students' critical thinking. *Medical Education*, 40:6;547-554.

Critical thinking teaching strategies

Fryer:

- Evidence presented and discussed
- Case studies PBL
- Resources available
- Staff with CT skills – train them
- Assess CT (on entry?)

Fryer, G. (2008) Teaching critical thinking in osteopathy - Integrating craft knowledge and evidence-informed approaches. *International Journal of Osteopathic Medicine* 11;56-61.

Assessing CT

Validity <http://www.criticalthinking.org/pages/critical-thinking-testing-and-assessment/594>

Cognitive skill

- Written case reports
- Problem based scenarios

Anderson, K., Peterson, R., Tonkin, A., & Cleary, E. (2008). The assessment of student reasoning in the context of a clinically oriented PBL program. *Medical Teacher*, 30(8), 787-794.

- OSCE
- Peer review
- Viva voce
- Long case?
- Script Concordance
- Key Features

Assessing CT

Disposition

- Difficult to measure – psychometry?
- Entry level (+ masters interview)
- Clinical mentoring
- Viva
- Formative
- Long case?

Vertical integration/alignment

Vertical integration (VI) has been defined by the General Practice Education and Training (GPET) Commonwealth of Australia as

“the coordinated, purposeful, planned system of linkages and activities in the delivery of education and training throughout the continuum of the learner's stages”

Dick ML, King DB, Mitchell GK, Kelly GD, Buckley JF, Garside SJ. Vertical integration in teaching and learning (VITAL): an approach to medical education in general practice. *Med J Aust.* 2007;187(2):133–35.

Evidence for Vertical Integration

VI succeeds in linking basic science to clinical practicum

Dahle et al. (2002). Pros and cons of vertical integration between clinical medicine and basic science within a problem-based undergraduate medical curriculum: examples and experiences from Linköping, Sweden. *Med Teach* 2002;24 (3):280–5.

VI supports PBL and stimulates deep and lifelong learning.

Vermet et al. (2010) Degree of vertical integration between the undergraduate program and clinical internship with respect to lumbopelvic diagnostic and therapeutic procedures taught at the Canadian Memorial Chiropractic College. *J Chiropr Educ.* 2010 Spring;24(1):46–56.

Strategies to embed CT

- Teachers from each year level do advancement/reminder in year above – ie don't year lock teachers;
- Progression of depth and complexity
- Link to PBL
- Individual pacing
- Time
 - Between patients
 - For assessment
 - Self direction?

Critical reflection

- Module based
- students are required to keep a reflective journal throughout their study of osteopathy.
- introduced at the beginning of the undergraduate degree (B.Cl.Sc.) as part of osteopathic studies units.
- Year 1-2 aims to reflect on their learning process to identify personal and professional goals
- Year 2-3 aims to reflect on their practice within osteopathic practical workshops
- Years 4-5 aims to reflect on clinical placements.

	Unit 1	Unit 2	Unit 3	Unit 4
Yr1 Sem1	Human Anatomy	Mechanics for Movement	Psychology and Social Science	Osteopathic Studies 1
Yr1Sem2	Human Physiology	Biomechanics and Kinesiology	Histology and Embryology	Osteopathic Studies 2
Yr2Sem1	Physiological Pathology 1	Visceral Anatomy	Neuroscience	Osteopathic Studies 3
Yr2Sem2	Physiological Pathology 2	Biochemistry	Food and Nutrition	Osteopathic Studies 4
Yr3Sem1	Clinical Diagnosis 1	Clinical Studies 1	Pharmacology	Osteopathic Studies 5
Yr3Sem2	Clinical Diagnosis 2	Clinical Studies 1	Research and Analysis	Osteopathic Studies 6
Yr4Sem1	Osteopathic Medicine 1	Osteopathic Clinical Practice and Research 1		Osteopathic Studies 7
Yr4Sem2	Osteopathic Medicine 2	Osteopathic Clinical Practice and Research 2		Osteopathic Studies 8
Yr5Sem1	Osteopathic Medicine 3	Osteopathic Clinical Practice and Research 3		Osteopathic Studies 9
Yr5Sem2	Osteopathic Medicine 4	Osteopathic Clinical Practice and Research 4		Osteopathic Studies 10

Year 1

- Information literacy
- Introduction to reasoning
 - Essays in Osteopathic Studies I and II require **basic referencing**, and a **critique of the osteopathic concept** of health, and the osteopathic principles.
 - Assignment in Psychology and Social Sciences – tutorial paper requires **literature searching** to explore health concepts
 - Endnote tutorials available centrally (Library) to students throughout programme

	Unit 1	Unit 2	Unit 3	Unit 4
Yr1 Sem1	Human Anatomy	Mechanics for Movement	Psychology and Social Science	Osteopathic Studies 1
Yr1Sem2	Human Physiology	Biomechanics and Kinesiology	Histology and Embryology	Osteopathic Studies 2
Yr2Sem1	Physiological Pathology 1	Visceral Anatomy	Neuroscience	Osteopathic Studies 3
Yr2Sem2	Physiological Pathology 2	Biochemistry	Food and Nutrition	Osteopathic Studies 4
Yr3Sem1	Clinical Diagnosis 1	Clinical Studies 1	Pharmacology	Osteopathic Studies 5
Yr3Sem2	Clinical Diagnosis 2	Clinical Studies 1	Research and Analysis	Osteopathic Studies 6
Yr4Sem1	Osteopathic Medicine 1	Osteopathic Clinical Practice and Research 1		Osteopathic Studies 7
Yr4Sem2	Osteopathic Medicine 2	Osteopathic Clinical Practice and Research 2		Osteopathic Studies 8
Yr5Sem1	Osteopathic Medicine 3	Osteopathic Clinical Practice and Research 3		Osteopathic Studies 9
Yr5Sem2	Osteopathic Medicine 4	Osteopathic Clinical Practice and Research 4		Osteopathic Studies 10

Year 2

- Information literacy
- Logic
- Numeracy
 - Assignment (Food Intake study) in Food and Nutrition in Health requires **numeracy and literature referencing**
 - **Critical reflection** stream in Osteopathic Studies III and IV units

	Unit 1	Unit 2	Unit 3	Unit 4
Yr1 Sem1	Human Anatomy	Mechanics for Movement	Psychology and Social Science	Osteopathic Studies 1
Yr1Sem2	Human Physiology	Biomechanics and Kinesiology	Histology and Embryology	Osteopathic Studies 2
Yr2Sem1	Physiological Pathology 1	Visceral Anatomy	Neuroscience	Osteopathic Studies 3
Yr2Sem2	Physiological Pathology 2	Biochemistry	Food and Nutrition	Osteopathic Studies 4
Yr3Sem1	Clinical Diagnosis 1	Clinical Studies 1	Pharmacology	Osteopathic Studies 5
Yr3Sem2	Clinical Diagnosis 2	Clinical Studies 1	Research and Analysis	Osteopathic Studies 6
Yr4Sem1	Osteopathic Medicine 1	Osteopathic Clinical Practice and Research 1		Osteopathic Studies 7
Yr4Sem2	Osteopathic Medicine 2	Osteopathic Clinical Practice and Research 2		Osteopathic Studies 8
Yr5Sem1	Osteopathic Medicine 3	Osteopathic Clinical Practice and Research 3		Osteopathic Studies 9
Yr5Sem2	Osteopathic Medicine 4	Osteopathic Clinical Practice and Research 4		Osteopathic Studies 10

Year 3

- Critical reading of literature
- Analysis
- Reporting
 - **Critical Appraisal** assignment in Osteopathic Studies V
 - Research and Analysis in Health core objectives of **knowledge of research methods, evidence gathering and data analysis**.

	Unit 1	Unit 2	Unit 3	Unit 4
Yr1 Sem1	Human Anatomy	Mechanics for Movement	Psychology and Social Science	Osteopathic Studies 1
Yr1Sem2	Human Physiology	Biomechanics and Kinesiology	Histology and Embryology	Osteopathic Studies 2
Yr2Sem1	Physiological Pathology 1	Visceral Anatomy	Neuroscience	Osteopathic Studies 3
Yr2Sem2	Physiological Pathology 2	Biochemistry	Food and Nutrition	Osteopathic Studies 4
Yr3Sem1	Clinical Diagnosis 1	Clinical Studies 1	Pharmacology	Osteopathic Studies 5
Yr3Sem2	Clinical Diagnosis 2	Clinical Studies 1	Research and Analysis	Osteopathic Studies 6
Yr4Sem1	Osteopathic Medicine 1	Osteopathic Clinical Practice and Research 1		Osteopathic Studies 7
Yr4Sem2	Osteopathic Medicine 2	Osteopathic Clinical Practice and Research 2		Osteopathic Studies 8
Yr5Sem1	Osteopathic Medicine 3	Osteopathic Clinical Practice and Research 3		Osteopathic Studies 9
Yr5Sem2	Osteopathic Medicine 4	Osteopathic Clinical Practice and Research 4		Osteopathic Studies 10

Year 4

- Systematic enquiry
- Literacy/numeracy
- Research question and ethical issues
- Critical review of literature
 - Osteopathic Clinical Practice and Research 1 and 2 – construction of **research question, annotated bibliography, literature review, ethics application**.
 - Viva Voce and Record of Progress in clinical units require logical use of knowledge to demonstrate safety and **evidence informed decisions in diagnosis and management**
 - **Search of literature/databases for evidence of clinical management** in Osteopathic Medicine 1 and 2 Problem Based Learning cases, tutorial discussion and **critique of evidence** to support rational management
 - Assignment dealing with a **critical review of an historical osteopathic paper** and reflecting on **current evidence** in Osteopathic Studies VIII

	Unit 1	Unit 2	Unit 3	Unit 4
Yr1 Sem1	Human Anatomy	Mechanics for Movement	Psychology and Social Science	Osteopathic Studies 1
Yr1 Sem2	Human Physiology	Biomechanics and Kinesiology	Histology and Embryology	Osteopathic Studies 2
Yr2 Sem1	Physiological Pathology 1	Visceral Anatomy	Neuroscience	Osteopathic Studies 3
Yr2 Sem2	Physiological Pathology 2	Biochemistry	Food and Nutrition	Osteopathic Studies 4
Yr3 Sem1	Clinical Diagnosis 1	Clinical Studies 1	Pharmacology	Osteopathic Studies 5
Yr3 Sem2	Clinical Diagnosis 2	Clinical Studies 1	Research and Analysis	Osteopathic Studies 6
Yr4 Sem1	Osteopathic Medicine 1	Osteopathic Clinical Practice and Research 1		Osteopathic Studies 7
Yr4 Sem2	Osteopathic Medicine 2	Osteopathic Clinical Practice and Research 2		Osteopathic Studies 8
Yr5 Sem1	Osteopathic Medicine 3	Osteopathic Clinical Practice and Research 3		Osteopathic Studies 9
Yr5 Sem2	Osteopathic Medicine 4	Osteopathic Clinical Practice and Research 4		Osteopathic Studies 10

Year 5

- Systematic enquiry
- Literacy/numeracy
- Research question and ethical issues
- Critical review of literature
 - Research project in Osteopathic Clinical Practice and Research 3 and 4 – **data gathering, data analysis, further literature review, publication draft.**
 - Viva Voce and Record of Progress in clinical units require logical use of knowledge to demonstrate safety and **evidence informed decisions in diagnosis and management**
 - Search of literature/databases for evidence of clinical management in Osteopathic Medicine 3 and 4 Problem Based Learning cases, tutorial discussion and **critique of evidence** to support rational management

Report on implementation

- Can be a negative experience

Siemens, D. R., Punnen, S., Wong, J., & Kanji, N. (2010). A survey on the attitudes towards research in medical school. *BMC medical education*, 10(1), 4.

- Some appreciation of the importance of research

Gosling, C., Moran, R., & Vogel, S. (2008). Attitudes towards research in Australian and New Zealand osteopaths. *International Journal of Osteopathic Medicine*, 11(4), 154-155.

- Develop skills early in curriculum

Güven, Y., & Uysal, O. (2011). The importance of student research projects in dental education. *European Journal of Dental Education*(15), 90-97.

Prast, A. M., Willingham, K. J., Wagner, M. J., & Laird, S. D. (2010). Importance of Early Exposure to Clinical Research for Osteopathic Medical Students. *JAOA: Journal of the American Osteopathic Association*, 110(8), 422-423.

- Students have to be confident in the skills of research

Licciardone, J., Fulda, K., & Smith-Barbaro, P. (2002). Rating interest in clinical research among osteopathic medical students. *JAOA: Journal of the American Osteopathic Association*, 102(8), 410-410.

Licciardone, J. C. (2008). Educating osteopaths to be researchers - What role should research methods and statistics have in an undergraduate curriculum? *International Journal of Osteopathic Medicine*, 11(2), 62-68.

Report on experience

Research project:

- time constraints,
- funding limitations,
- varying student interest
- a relative lack of experienced supervisors

- **Greater understanding, but does not lead to active participation in research**

- Smith M. Research in residency: do research curricula impact post-residency practice? *Fam Med*. 2005 May;37(5):322-7.
- Seehusen DA, Weaver SP. Resident research in family medicine: where are we now? *Fam Med*. 2009 Oct;41(9):663-8.
- Leahy et al. Family physicians' attitudes toward education in research skills during residency: findings from a national mailed survey. *Can Fam Physician*. 2008 Mar;54(3):413-4.

Report on experience

Critical Thinking:

- Difficult to assess
- Mixed results from observation at clinical assessment
 - Large range of skill
 - A minority resistant
- Clear progression in masters
- Benchmarking project (SCU, VU, Unitec, BSO)

Thanks - all welcome to visit SCU

