

**An examination of the prevalence, impact,
experiences and perceptions of learning and health
technologies on students, academics and
educational leaders in complementary medicine
education institutions: A mixed method study of
two institutions, one in Australia and one in the US.**

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under the supervision of
Distinguished Professor Jon Adams and Doctor Amie Steel

University of Technology Sydney
Faculty of Health
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Medicine

March 2022

Certificate of Original Authorship

I, Alastair Gray declare that this thesis, is submitted in fulfilment of the requirements for the award of PhD, in the Faculty of Health at the University of Technology Sydney. This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis. This document has not been submitted for qualifications at any other academic institution. This research is supported by the Australian Government Research Training Program.

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Format of this thesis

This thesis is structured according to the conventions of a Thesis by Compilation. It presents a single, cohesive body of work comprising a combination of traditional thesis chapters and published/publishable articles. In keeping with the format of Thesis by Compilation, content from articles resulting from the project which have been published or submitted for publication are contained within the relevant chapters of this thesis in their entirety. Where this applies, a chapter preamble and relevant notes are included to indicate publication details. For published articles, journal-formatted copies of each work are included in the Appendices. A list of these articles and details on authorship contributions are provided below.

Published Works by the Author Incorporated into the Thesis

Of the manuscripts contained in this thesis all have been submitted for publication of which 2 are under review, and 3 are published. The list of manuscripts contained in this thesis are as follows:

1. Gray A. C, Steel A, Adams J. (2019). A critical integrative review of complementary medicine education research: Key issues and empirical gaps. *BMC Complementary and Alternative Medicine* 2019 Mar 20;19(1):73. <https://doi.org/10.1186/s12906-019-2466-z>
2. Gray A. C, Steel A, Adams J. (2021). An examination of technologies in complementary medicine education and clinical practice: The perceptions and experiences of naturopathy students, faculty and educational leaders. *Complementary Therapies in Medicine*, Vol 63, pp102793. <https://doi.org/10.1016/j.ctim.2021.102793>
3. Gray A. C, Steel A, Adams J. (2020). Attitudes to and Uptake of Learning Technologies in Complementary Medicine Education: Results of an International Faculty Survey. *The Journal of Alternative and Complementary Medicine*, Vol. 26, No. 4 pp. 335–345 DOI: 10.1089/acm.2019.0319
4. Gray, A. C., Steel, A., & Adams, J. (2021). Complementary medicine students' perceptions, perspectives and experiences of learning technologies. A survey conducted in the US and Australia. *European Journal of Integrative Medicine*, Vol. 42 (2021) pp. 101304 <https://doi.org/10.1016/j.eujim.2021.101304>
5. Gray A. C, Steel A, Adams J. (2021). Student and academic perceptions of the incompatibility of telehealth, learning technologies and practice enhancing technologies in clinical Complementary Medicine work and education; a quantitative study in Australia and the US. *Advances in Integrative Medicine*. <https://doi.org/10.1016/j.aimed.2021.10.001>

Relevant Published Works by the Author Not Forming Part of the Thesis

This document only includes works relevant to this thesis. However, during candidature, the candidate has published and contributed to 3 peer-reviewed articles, 9 new editions of current textbooks, delivered 13 conference presentations with published abstracts, and presented at 3 invited seminars.

Journal Articles

1. Gray A, Diezel H, Steel A, (2019) The use of learning technologies in complementary medicine education: Results of a student technology survey. *Advances in Integrative Medicine* Volume 6, Issue 4, December 2019, Pages 174-180 <https://doi.org/10.1016/j.aimed.2019.04.001>.
2. Steel A, Peng W, Gray A, Adams J, (2019) The role and influence of traditional and scientific knowledge in naturopathic education: a qualitative study: Tradition, science and naturopathic education. *The Journal of Alternative and Complementary Medicine* 2019 Feb;25(2):196-201. doi: 10.1089/acm.2018.0293.
3. Salatino, S. & Gray, A. (2016). Integrative management of pediatric tonsillopharyngitis: An international survey. *Complementary Therapies in Clinical Practice*, 22, 29-32. <https://doi.org/10.1016/j.ctcp.2015.11.003>.

Published Conference Abstracts

2020

- Gray A, (2020) The Future of Homeopathy Education. Online Conference 2020 <https://www.naturopathicce.com/homeosummit/>

2019

- Gray A, (2019) ICCMR Conference, A critical integrative review of complementary medicine education research: Key issues and empirical gaps. Brisbane 2019

- Gray A, (2019) ICCMR Conference, Luddites and digital natives in Complementary Medicine education: Results of a student technology survey at a Complementary Medicine education institution. Brisbane 2019
- Gray A, (2019) ICCMR Conference, The development and implementation of an integrative medicine diploma – the National Centre for Integrative Medicine (NCIM) UK. Brisbane 2019
- Gray A, (2019) ICCMR Conference, Unsupported in a changing landscape: Learning Technologies in Integrative and Complementary Medicine Education Provision: Results of an International Survey of Faculty. Brisbane 2019

2018

- Gray A, (2018) ICCMR Conference, Unsupported and Marginalised: Attitudes and uptake of learning technologies in Complementary and Integrative Medicine Education at two leading providers - Results of an international faculty survey. Baltimore 2018
- Gray A, (2018) ICCMR Conference, Birthing the elephant. The development and implementation of an integrative medicine diploma the Portland Centre of Integrative Medicine. Baltimore 2018

2017

- Gray A, (2017) JAHC Conference, Autoimmune Disease in Homeopathic Medicine, Atlanta, US

2016

- Gray A, (2016) JAHC Conference, Luddites Evidence and Tradition in Homeopathic Medicine, Denver, US

2015

- Gray A, (2015) Rome HRI Conference Results of a Student Technology Survey, Rome, Italy.
- Gray A, (2015) NHAA Educational Challenges Facing Herbal Medicine, Sydney, Australia
- Gray A, (2015) NHAA Results of a Student Technology Survey, Sydney, Australia

- Gray A, (2015) ICCMR Educational Challenges for Integrative Medicine, Conference Proceedings, Jeju, Korea.

Statement of Contributions to Jointly Authored Works Contained in the Thesis

The results from this thesis have been submitted for publication in peer-reviewed journals through five manuscripts that are presented in Chapters 2, 5, 7, 8 and 9. For each of these papers, I have been primarily and fully responsible for determining the research question, undertaking the analysis and drafting the manuscript. Support in all of these areas has been provided by supervisors Distinguished Professor Jon Adams, and Dr Amie Steel. I take full responsibility in the accuracy of the findings presented in these publications and this thesis.

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Abbreviations

ACHENA: Accreditation Commission for Homeopathy Education in North America

ACNM: Australian College of Natural Medicine

ACNT: Australasian College of Natural Therapies

APD: Accredited Practicing Dietitian

AHPRA: Australian Health Practitioners Regulation Agency

ANC: Australian Naturopathic Council

AND: Academy of Nutrition and Dietetics

ANTA: Australian Natural Therapies Association

AOM: Acupuncture and Oriental Medicine

ATMS: Australian Traditional Medicine Society

CAA: Computer Aided Assessment

CAI: Computer Aided Instruction

CAL: Computer Aided Learning

CAM: Complementary and Alternative Medicine

CBL: Computer Based Learning

CBT: Computer Based Training

CFO: Chief Financial Officer

CM: Complementary Medicine

CMC, Computer Mediated Communications

CMRB: Chinese Medicine Registration Board

CMS: Content Management System

CNME: Council on Naturopathic Medical Education

CPD: Continuing Professional Development

CPE: Continuing Professional Education

DAA: Dietitians Association of Australia

DI: Diffusion of Innovations theory (of Everett Rogers)

DOHA: Federal Department of Health and Aging

DSHEA: Dietary Supplements Health Education Act

DTR: Dietetic Technician, Registered

EB-IM: Evidence-Based Integrative Medicine

EBM: Evidence-Based Medicine

EBP: Evidence-Based Practice

ET: Educational Technology

FDA: U.S. Food and Drug Administration

FT: Full-Time

FTE: Full-time Equivalent

HREC: Human Research Ethics Committee

HSR: Health Services Research

HTs: Health Care Technologies
IM: Integrative Medicine
IT: Information Technology
LMS: Learning Management System
MMR: Mixed Methods Research
MOOCs: Massive Open Online Courses
NIH: National Center for Complementary and Integrative Health
NSA: Nutrition Society of Australia
NUNM: National University of Natural Medicine
PBRN: Practice Based Research Networks
PH: Public Health
PIS: Participant Information Sheet
PT: Part-Time
RD: Registered Dietitian
SC: Subject Coordinator
SD: Standard deviation
SSNT: Southern School of Natural Therapies
TCIM: Traditional Complementary Integrative Medicine
TCM: Traditional Chinese Medicine
TEQSA: Tertiary Education Quality and Standards Agency
TGA: Therapeutic Goods Administration
TM: Traditional Medicine
US: United States
USED: U.S. Education Department
UTS: University of Technology Sydney
WHO: World Health Organisation
WNF: World Naturopathic Federation

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Abstract

Background: The global healthcare and higher education sectors are experiencing unprecedented changes due, in part, to technology adoption. Meanwhile, complementary medicine (CM) continues to thrive across many countries with increased CM education enrolments. Despite these circumstances, there has been limited and sporadic research examining CM education. In direct response to this important gap, this thesis reports on an examination of the prevalence, experiences and perceptions of learning and health technologies on students, academics and educational leaders in CM education institutions. **Methods:** Following a critical integrative literature review, fieldwork design involved a three-phase approach adopting health services and mixed methods research methodology. Academics, students and educational leaders at two sample institutions in the US and Australia were interviewed, two key institutions were audited, and stakeholders surveyed on their perspectives of practice and learning technologies. **Results:** A literature review of educational research in CM from the last 12 years found an uneven range of empirical research. Initial Phase One fieldwork identified CM students as critical of the deployment of classroom learning technology, possessing lower levels of digital literacy and the existence of a digital divide between subsets of students. Academics were noted to have lower levels of health and learning technology uptake. In Phase Two, the institutional audits identified a difference in the approach, policy and strategic planning for technology use between the two institutions. Subsequent cross-sectional surveys in Phase Three revealed that CM academics perceive technologies as having a detrimental impact on their students' future workplace skills, knowledge and attributes and the learning technology training offered by CM educational institutions to academics is perceived to be ineffectual. CM academics place the responsibility for any personal and professional digital shortcomings with their institution rather than themselves. Students also have technology challenges with evidence of digital literacy divisions within the student body, and a perception that there is a lack of institutional support. Generally, students appear more open than academics to clinical practice enhancing technologies. An urgent need has emerged for educational leaders to address digital literacy inequalities through further training. **Conclusion:** Despite the high levels of CM use in the community, and the thriving nature of CM educational institutions globally, the current evidence evaluating the procedures, effectiveness and safety of CM education remains limited.

There is an urgent need to establish a strategic research agenda around this important aspect of health care education to ensure a safe and effective health care workforce.

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