CURRICULUM VITAE

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I have been an artificial intelligence researcher since 1993, initially focussed on knowledge acquisition and reuse and knowledge based systems and in 2003 moving to agent-based systems with a current focus on intelligent virtual agents and intelligent virtual worlds. The ethical use of these technologies has been a primary concern for over a decade. I see technology as a tool that can aid learning when used appropriately as informed by the learning sciences and educational psychology literature. I personally draw on literature from these fields and also work with specialists from these fields. With 20 years in industry prior to joining academia, I have a focus on the application of technology to improve current shortcomings and overcome barriers faced by stakeholders in education, training, health and well-being.

EDUCATION

2010	Macquarie University, Sydney, Australia	Postgraduate Certificate in Higher Education (Leadership and Management)
1999	University of New South Wales, Australia	PhD (Artificial Intelligence, Knowledge Based Systems)
1995	Charles Sturt University, Bathurst, Australia	M. Applied Science (Info. Stud.)
1990	Charles Sturt University, Bathurst, Australia	B. Business (Comp and MIS)

EMPLOYMENT HISTORY

July 2011 – current	Professor and Industry and External Relations Director, Director Virtual Reality Laboratory, Macquarie University
Jan 2006- July 2011	Associate Professor, Macquarie University
Jan 2003- Dec 2005	Senior Lecturer, Macquarie University
Feb 1999- Dec 2002	Lecturer, Macquarie University
1986 –Feb 1999	Company Director and Computer Consultant, Benowie Business Systems (IT for retail and warehousing)
Feb 1993- Nov 1994	Part-time Computing Teacher, Charles Sturt University / TAFE Outreach

PUBLICATIONS

I have over 350 publications since 1995. My Google Scholar Citation count (20-3-2022) total= 4563, 2049 since 2017, h-index=34. See my Google Scholar or homepage (http://www.comp.mq.edu.au/~richards) for a full list of, and links to, my publications. Selected recent publications appear below:

Abdulrahman, A. and D. Richards (2019). Modelling Therapeutic Alliance using a User-aware Explainable Embodied Conversational Agent to Promote Treatment Adherence. Proceedings of the 19th ACM International Conference on Intelligent Virtual Agents.

Amal Abdulrahman, Deborah Richards, and Ayse Aysin Bilgin. 2021. Reason Explanation for Encouraging Behaviour Change Intention. In Proceedings of the 20th International Conference on Autonomous Agents and MultiAgent Systems). International Foundation for Autonomous Agents and Multiagent Systems, Richland, SC, 68–77.

Abdulrahman, A., D. Richards, H. Ranjbartabar and S. Mascarenhas (2019). Belief-based Agent Explanations to Encourage Behaviour Change. Proceedings of the 19th ACM International Conference on Intelligent Virtual Agents.

Atif, A., D. Richards, D. Liu and A. A. Bilgin (2020). "Perceived benefits and barriers of a prototype early alert system to detect engagement and support 'at-risk'students: The teacher perspective." Computers & Education **156**: 103954.

Bankins, S., P. Formosa, Y. Griep and D. Richards (2022). "AI Decision Making with Dignity? Contrasting Workers' Justice Perceptions of Human and AI Decision Making in a Human Resource Management Context." Information Systems Frontiers: 1-19.

Blumenstein, M., D. Y. Liu, D. Richards, S. Leichtweis and J. M. Stephens (2018). "Data-informed nudges for student engagement and success." Learning analytics in the classroom: Translating learning analytics research for teachers: Abingdon, UK: Routledge.

Bruijnes, M., S. Fitrianie, D. Richards, A. Abdulrahman and W.-P. Brinkman (2019). What are we Measuring Anyway? A Literature Survey of Questionnaires Used in Studies Reported in the Intelligent Virtual Agent Conferences. BNAIC/BENELEARN.

Fitrianie, S., M. Bruijnes, D. Richards, A. Bönsch and W.-P. Brinkman (2020). The 19 Unifying Questionnaire Constructs of Artificial Social Agents: An IVA Community Analysis. Proceedings of the 20th ACM International Conference on Intelligent Virtual Agents.

Formosa, P., M. Wilson and D. Richards (2021). "A principlist framework for cybersecurity ethics." Computers & Security 109: 102382.

Ginige, T., D. Richards, A. Ginige and M. Hitchens (2020). "Design for Empowerment: Empowering Sri Lankan Farmers through Mobile-based Information System." Communications of the Association for Information Systems 46(1): 19.

Gonzalez, D. A. Z., D. Richards and A. A. Bilgin (2020). "Making it Real: A Study of Augmented Virtuality on Presence and Enhanced Benefits of Study Stress Reduction Sessions." International Journal of Human-Computer Studies: 102579.

Hanna, N. and D. Richards (2018). "The Impact of Multimodal Communication on a Shared Mental Model, Trust, and Commitment in Human–Intelligent Virtual Agent Teams." Multimodal Technologies and Interaction **2**(3): 48.

Hanna, N. and D. Richards (2019). "Speech Act Theory as an Evaluation Tool for Human–Agent Communication." Algorithms **12**(4): 79.

Khan, S. K. S. B. N., D. Richards, P. Formosa and S. Bankins (2020). The ethical responses of students to university ICT codes of conduct. Conference of the Australasian Institute of Computer Ethics (9th: 2020), Australasian Institute of Computer Ethics (AiCE).

Liu, D. Y.-T., A. Atif, J.-C. Froissard and D. Richards (2019). An enhanced learning analytics plugin for Moodle: student engagement and personalised intervention. ASCILITE 2015-Australasian Society for Computers in Learning and Tertiary Education, Conference Proceedings.

Liu, D. Y., D. Richards, P. Dawson, J.-C. Froissard and A. Atif (2016). Knowledge acquisition for learning analytics: comparing teacher-derived, algorithm-derived, and hybrid models in the moodle engagement analytics plugin. Pacific Rim Knowledge Acquisition Workshop, Springer, Cham.

Makhija, A., D. Richards, J. de Haan, F. Dignum and M. J. Jacobson (2018). The influence of gender, personality, cognitive and affective student engagement on academic engagement in educational virtual worlds. International Conference on Artificial Intelligence in Education, Springer, Cham.

Nelekar, S., A. Abdulrahman, M. Gupta and D. Richards (2021). "Effectiveness of embodied conversational agents for managing academic stress at an Indian University (ARU) during COVID-19." British Journal of Educational Technology.

Nezami, O. M., M. Dras, L. Hamey, D. Richards, S. Wan and C. Paris (2019). Automatic recognition of student engagement using deep learning and facial expression. Joint European Conference on Machine Learning and Knowledge Discovery in Databases, Springer, Cham.

Nezami, O. M., L. Hamey, D. Richards and M. Dras (2018). "Deep learning for domain adaption: Engagement recognition." CoRR.

Nezami, O. M., D. Richards and L. Hamey (2017). Semi-Supervised Detection of Student Engagement. PACIS.
Ranjbartabar, H. and D. Richards (2019). Understanding Individual Differences in Users' Preferences and Responses to an Intelligent Virtual Advisor for Reducing Study Stress. Advances in Information Systems Development, Springer, Cham**:** 227-245.
Ranjbartabar, H., D. Richards, A. Bilgin and C. Kutay (2019). "First Impressions Count! The Role of the Human's Emotional State on Rapport Established with an Empathic versus Neutral Virtual Therapist." IEEE Transactions on Affective Computing.
Ranjbartabar, H., D. Richards, A. A. Bilgin and C. Kutay (2021). Personalising the Dialogue of Relational Agents for First-Time Users. Proceedings of the 20th International Conference on Autonomous Agents and MultiAgent Systems.
Ranjbartabar, H., D. Richards, A. A. Bilgin, C. Kutay and S. Mascarenhas (2020). "Adapting a virtual advisor's verbal conversation based on predicted user preferences: A study of neutral, empathic and tailored dialogue." Multimodal Technologies and Interaction **4**(3): 55.
Richards, D., B. Alsharbi and A. Abdulrahman (2020). Can I help you? Preferences of young adults for the age, gender and ethnicity of a Virtual Support Person based on individual differences including personality and psychological state. Proceedings of the Australasian Computer Science Week Multiconference.
Richards, D., A. A. Bilgin and H. Ranjbartabar (2018). Users' perceptions of empathic dialogue cues: A data-driven approach to provide tailored empathy. Proceedings of the 18th International Conference on Intelligent Virtual Agents.
Richards, D. and P. Caldwell (2017). "Improving health outcomes sooner rather than later via an interactive website and virtual specialist." IEEE journal of biomedical and health informatics **22**(5): 1699-1706.
Richards, D. and P. H. Caldwell (2017). Gamification to improve adherence to clinical treatment advice: improving adherence to clinical treatment. Health Literacy: Breakthroughs in Research and Practice, IGI Global**:** 80-111.
Richards, D. and V. Dignum (2019). "Supporting and challenging learners through pedagogical agents: Addressing ethical issues through designing for values." British Journal of Educational Technology **50**(6): 2885-2901.
Richards, D., V. Dignum, M. Ryan and M. Hitchens (2018). Incremental acquisition of values to deal with cybersecurity ethical dilemmas. Pacific Rim Knowledge Acquisition Workshop, Springer, Cham.
Richards, D., P. Formosa, M. Ryan, M. Hitchens and M. McEwan (2020). A proposed AI-enhanced serious game for cybersecurity ethics training. Conference of the Australasian Institute of Computer Ethics (9th: 2020), Australasian Institute of Computer Ethics (AiCE).
Vythilingam, R., D. Richards and P. Formosa The relationship between human values and the ethical design and acceptability of relational agents, Australasian Institute of Computer Ethics (AiCE).

CONTRIBUTIONS TO SCIENCE

Contributions to IT and Society

I am active in outreach activities, particularly to encourage high school students to study STEM/IT. The 2005 Science fellowship with the ABC and Science Academy is evidence of my passion in this area. As examples:

- In 2016 and 2017, I organized and ran a two-day professional development workshop at Macquarie University with IT high school teachers covering topics including games development, artificial intelligence, machine learning, networking and other IT subject areas. In 2018 and 2019 the workshop was extended to include primary school teachers with workshops on computational thinking to align to the new national curriculum.
- I have been an ambassador for girls and women in IT and also for ethics in artificial intelligence research and deployment. An example includes two "Big History" modules recorded in 2015 related to ethics and the role of artificial intelligence for our society.
- The 2017 Award from the Sydney Children's Hospital Network "Quality and Innovation Award" for "Transformations using eHealth, and the awarding of $493K via a Translational Research Grant (see more below), recognises the significant results of our pilot with Westmead Children's Hospital to improve adherence to treatment advice and health outcomes for patients on the waiting list.

Evidence of leadership and innovation in agents and virtual world technology

Since 2005 I have taken a leading role in the embodied agents area considering emotions, immersive environments, interactivity, training and education. This is evidenced by:

- The organisation of six directly related workshops at AAMAS, the leading agent conference;
- Relevant publications, presentations and grant funding; and
- The supervision of 20+ research students in this area.

I have developed major serious games/training simulations including:

- Risk Management Module (RMM) for the desktop and Border Security System (BOSS) for use in an immersive, life-size cave virtual reality environment (outputs from DP0558852 Richards, Kavakli and Dras Risk Management using Agent-Based Virtual Environments (2005-2007). These training simulation prototypes have supported numerous experimental studies involving up to 200 participants in a single study. The study contributed to understanding concerning: implementation and architecture issues in building agent-based training simulations; VR based training for cybercrime forensics, firefighting and border security; the application of cognitive theory of multimedia learning to design multimedia instructional messages; advances in language technology and deceptive language.
- In education, I developed and evaluated Omosa Virtual World (VW) to foster science inquiry in Australian High Schools (funded via ARC DP150102144 and DP1093170). This project involves ongoing collaboration with researchers in the Departments of Education and Biology at Sydney University and secondary science school teachers. Omosa VW was a finalist in 2013 SimTechT Serious Games Competition.
- In health, Intelligent Virtual Agents as relational agents to encourage adherence to treatment plans and overcome health literacy barriers is currently the focus collaborations with the Children's Hospital Westmead. Pilot trials demonstrated a significant improvement in adherence and health outcomes for patients on the waiting list. These outstanding results led to the successful award of a Translational Research Grant of $493K funded by NSW Health to run a random controlled trial and make the approach generalizable to other medical conditions.

RESEARCH GRANTS

Research grants (past 15 years)

ARC DP20010213 "Cybersecurity ethics training simulations for values-based decision-making", D. **Richards**, M. Ryan, P. Formosa, M. Hitchens. PIs V. Dignum. $375K. 2020-2022

Digital Health CRC "Can digital technologies provide opportunities to support people's mental health following a traumatic event?" **Richards**, D., Norberg, M., Hopmann, K., Partner Investigator-Insurance Australia Group Limited (IAG), AUD190K, 23/10/20 → 31/10/24

Digital Health CRC, "Data science process for rule generation/ Using data science to detect claims leakage", Dras, M., **Richards**, D., Yang, J., Zhang, X., Arunasalam, B., Partner Investigator, Lorica Health Pty Ltd AUD538.8K, 1/08/20 → 1/08/22

Facebook, Inc (US), "AI decision-making with dignity: Algorithmic management and interactional justice" Bankins, S., Formosa, P., **Richards**, D., Griep, Y., Co-Investigator, Radboud University, AUD37,383.00, 1/07/20 → 31/03/21

NSW Health, "eADVICE - Advice while you wait: Empowering families, improving health, reducing waiting times", P. Caldwell; D. **Richards**, C. Seton, K. Waters, A. Deshpande, K. Scott, A. Teixeira-Pinto, M. Howell, L. Griffin, J. Craig, K. Howard, $493K, 2018-2020

Menzies School of Health Research, "HealthLab Evaluation Avatar", **Richards**, D., Smith-Vaughan, H., $11.7K, 2020-1.

Macquarie University, “Dementia Training for Phys iotherapy Students and Practitioners using Artificial Intelligence-Enhanced Virtual Reality Technology”, Brett, L., Jones, T. & **Richards**, D. 1/01/20 → 31/12/21, $19.9K

ARC DP150102144, “Intelligent virtual worlds for inquiry learning”, M. Jacobson; D. **Richards**, C. Taylor, L. Sutherland and M. Kapur $666K, 2015-2017

Australian Bladder Foundation Project Grant, “Using an intelligent agent to improve adherence to eHealth advice using eADVICE (electronic advice and diagnosis via the internet following computerised evaluation) for children with urinary incontinence”, P Caldwell, D **Richards**, A Teixeira-Pinto, A Lau, JC Craig, $20K, 2015

OLT Grant SP12-2296. “Academic integrity in Australia -- understanding and changing culture and practice Institutions”, A. Nayak, D. **Richards**, J. Homewood, L. Cameron, N. McGuigan, R. Vallence, F. White, C. Owens, D. McCabe, I. Solomonides, S. Saddiqui, $227K, 2012-2013

ARC DP1093170, “Multi-user virtual environments and research into the learning and transfer of scientific knowledge and inquiry skills”, M. Jacobson; C. Hu, D. **Richards**, M. Kapur & C. Taylor, $345K, 2010-2012.

ARC DP0558852, “Risk Management using Agent-Based Virtual Environments”, D. **Richards**, M. Kavakli, and M. Dras, $362K, 2005-2007

AWARDS. PRIZES AND FELLOWSHIPS

Highly Commended finalist 2021 Vice-Chancellor's Educational Leader Award.

Vice-Chancellor's Citation for Outstanding Contribution to Student Learning 2017 Innovative learning analytics solution that enhance the learning and teaching student experience - Jean-Christophe Froissard, Professor Deborah Richards, Amara Atif and Dr Danny Liu

Sydney Children’s Hospital Network “Quality and Innovation Award” for “Transformations using eHealth” 2017

Faculty of Arts “Citation for Outstanding Contributions to Student Learning” for Moodle Engagement Analytics Pluggin (MEAP) 2017

Judyth Sachs Professional and Community Engagement (PACE) prize 2016 for Long Activity in iSYS358.

Finalist in Serious Games Challenge at SimTechT’2014, For “Serious Games 2014 - Intelligent Virtual Agents and Personality”, Simulations Australia, September, 2013

Best Reviewer 2013 Award, Australasian Conference on Information Systems.

Finalist in Serious Games Challenge at SimTechT’2013, For “Omosa Virtual World”.

Simulations Australia, September, 2013

Macquarie University Certificate of Appreciation “For exceptional dedication to the work of the University in engaging with the community at large and promoting access to high quality scholarship and services”, Macquarie University, March, 2008

Innovation Award, Honourable mention for “innovation in collaboration”, Macquarie University, 2005

ABC Academy of Science Media Fellowship, Academy of Science & Australian Broadcasting Commission, 2005

Outstanding Teacher Award, Macquarie University, April, 2003

BHERT Award, Honourable mention for “Outstanding achievement in collaboration in teaching and industry” (runner up), Business Higher Education Round Table, 2003

Australian Postgraduate Award PhD scholarship, ARC – via UNSW, 1995

Sidney Myer Charity Trust Prize “For the graduating student who has achieved the best overall results in the Bachelor of Business Degree”, Charles Sturt University, 1990

IBM Prize for Data Processing “For the most meritorious graduate in the Bachelor of Business (Computing and MIS) degree”, Charles Sturt University, 1990