
Technical and Educational Guidelines for Personalising Assessments through Assessment-as-Learning in Cybersecurity

An Interim Report for an ADICT Small Grants Project

**Amin Sakzad (Monash), Judithe Sheard (Monash), David Paul (UNE),
Ljiljana Brankovic (UNE), Matthew P. Skerritt (RMIT), Nan Li (UoW),
William Billingsley (UNE), Simon (unaffiliated)**

Technical and Educational Guidelines for Assessment-as-Learning in Cybersecurity through Diverging Assessments

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Motivation

- Authentic Assessment
- Assessments should create learning opportunities (assessment-as-learning)
- Online end-of-semester exams during pandemic worked poorly
 - Open or closed
 - Invigilated or not
- Academic Integrity Issues

Institutions and Subjects

- Monash
 - FIT9137 - Introduction to Computer Architecture, Networks
 - FIT3168/FIT5223 - Security and IT Forensics
- University of New England
 - COSC240 - Operating Systems
 - COSC220 - Software Development Studio 2
- RMIT University
 - INTE2102 - Ethical Hacking for Cyber Security
- University of Wollongong
(transferred from University of Newcastle)
 - SENG2250 - System and Network Security (UoN)

Cybersecurity & Networking context

- Type of assessments:
 - Apply software and technical tools
 - Conduct penetration testing,
 - Conduct ethical hacking, and
 - Writing moderately-technical codes (in various programming languages).
- Input to assessments:
 - Virtual machines (VMs),
 - pre-captured network traffic (PCAPs),
 - Websites, and
 - parameters, and/or data sets as input.
- What students are assessed on
 - Apply acquired technical skills with appropriate tools and software to arrive at solutions.

Aims

- Move to more authentic assessment
- Design, create, and integrate assessment-as-learning
- Achieved by personalisation/randomisation/individualisation
- **Developing educational and technical guidelines**

Expected Benefits

- Closer alignment of assessments with learning outcomes
- Increase peer learning and peer feedback
- Increase student engagement
- Reduce reliance on online invigilated final exams
- Reduce marking hassles and exam preparations
- Reduce academic integrity issues

Plan

- **Task 1:** Internal guideline generation (Apr-Jul 2022, Monash, UNE, Newcastle, RMIT)
- **Task 2:** Semester 2 specific implementation across four Australian universities (Jul-Nov 2022, Monash, UNE, Newcastle, RMIT):
- **Task 3:** Evaluate the internal guidelines (Dec 2022 - Feb 2023, Monash, UNE, Newcastle, RMIT)
- **Task 4:** Generate the final guideline and publish the results (Mar 2023 - Jun 2023, Monash, UNE, Newcastle, RMIT)

Where we are?

- Ethics approvals - Monash, UNE
- Introduction to Computer Architecture, Networks, Security and IT Forensics - Monash
- Ethical Hacking - RMIT
- Operating Systems - UNE

What has Been Done?

- Ethics approvals
- Surveys
- One RA employed - helped assessment creation & maintenance
- Multiple assessments created.
- Surveyed on multiple points
 - Impact on student learning
 - Authenticity
 - Academic integrity
 - Exam stress reduction (assessments replaced the final exams)

What has Been Done?




COSC240 - Operating Systems




COSC220 - Software Development Studio 2

- Payment distributed
- Ethics approvals
- Surveys
 - COSC240 only
- One RA employed - helped assessment creation & maintenance
- Multiple assessments created.

What has Been Done?

- Payment distributed
- Ethics approvals
-  Surveys
- One RA employed - helped assessment creation
 - Writes CTF challenges for Hacker Conferences.
- Two assessments created.
 - Each assessment has a corresponding practice assessment.

What has Been Done?

-  Payment distribution stalled by change of institution.
-  Ethics approvals
 - Not done at Newcastle.
 - Wollongong approval requires project to be ported to UoW.
-  Surveys
 - Exploring options to survey students cross-institutionally, or find an alternative.
- One practice assessment created.
- One assessment created.

Ongoing Plan

- Monash to hold university-wide workshop (⌚ waiting on provost approval)
 - What & Why - 1 hour
 - Disseminate “Diverging assessments” at very high level
- Possible follow-up workshop (depending on interest)
 - How - 2 hours
- Submit a paper to ACM SIGCSE TS 2024 (<https://sigcse2024.sigcse.org/>)
 - Writing is in progress.
 - Abstract & Paper deadline in August 2023
- Develop two guidelines
 - Technical (based on the paper)
 - Educational

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