

# Learning Analytics-powered Learner Profiles?

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# Assessing & Tracking General Capabilities/ Graduate Attributes

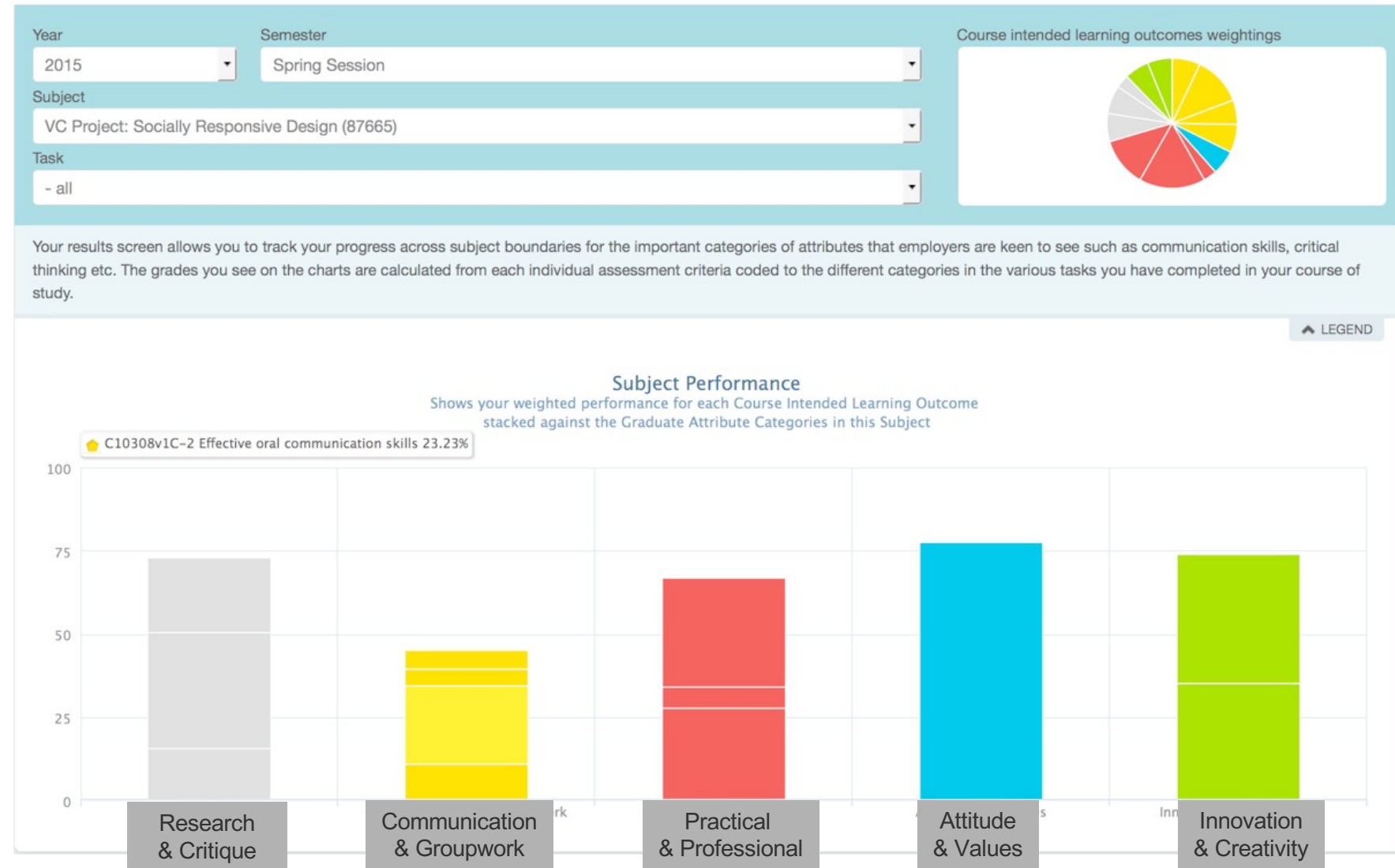
ReView platform scaffolds rigorous assessment design and  
development of student evaluative judgement

UTS R&D → SaaS <http://academ.com.au/review>

Illustrated powerfully by Liverpool Boys High School

# ReView platform

Helping students see how they're developing transferable **Graduate Attributes**, mapped against a Subject's Learning Outcomes

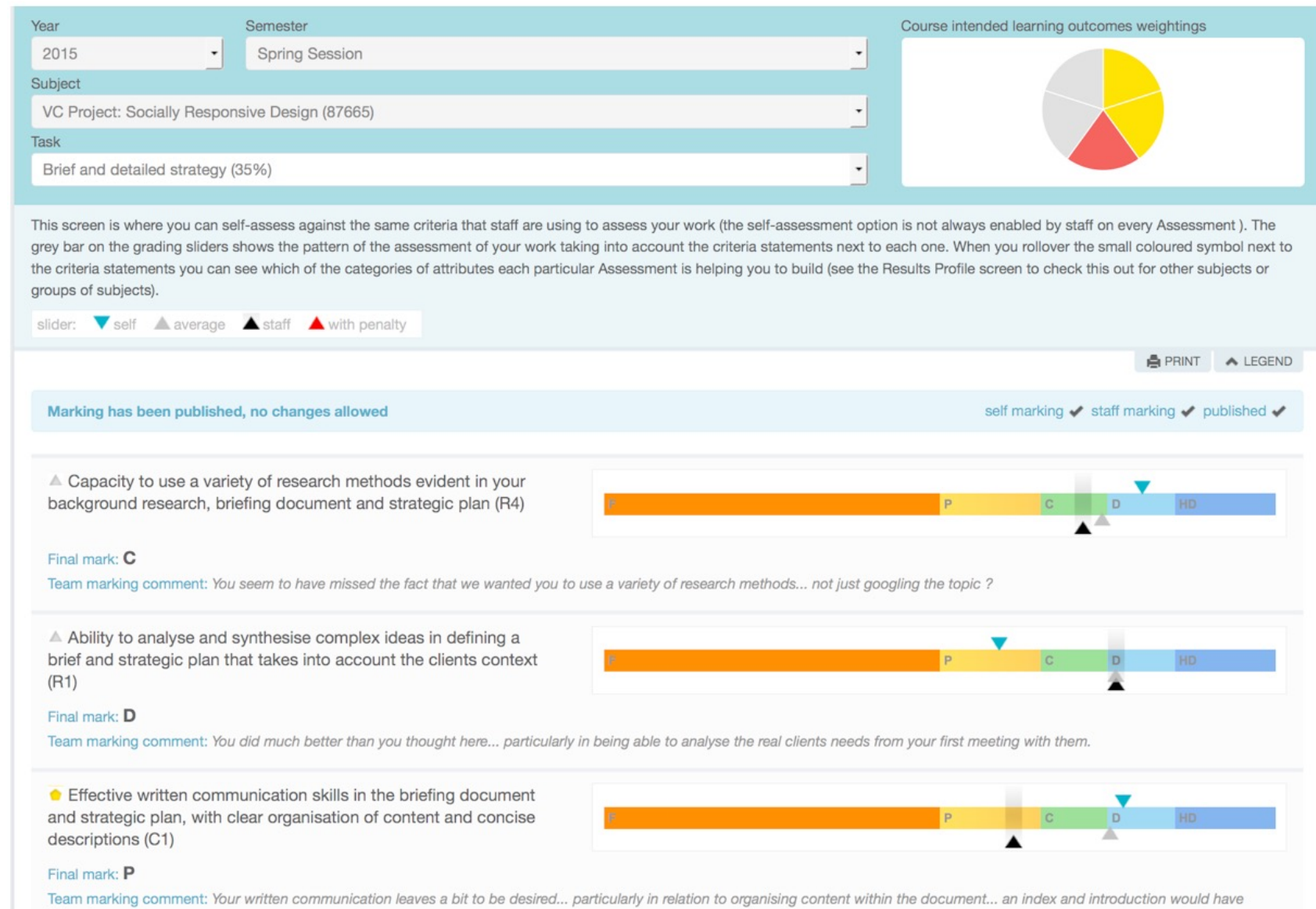


**Figure 5: Student screen showing their assessment results in the five CAPRI attribute categories in one subject or unit of study**



# ReView platform

Visual interface for **self-assessment**, enabling **benchmarking** against cohort average, and the tutor's assessment



**Figure 4: Student view of the marking screen for a task after a staff member has marked and published their own gradings and comments**

# Learning Journeys

**Learner self-report: scaffolding for a personal inquiry project,  
including personalised formative feedback on learning  
dispositions → peer/mentor coaching conversations**

Student/staff orientation site: <https://LearningJourneys.uts.edu.au>

CIC Homepage: <https://cic.uts.edu.au/tools/learning-power>

# Learning Power Survey

STEP 1 / 13



No, not at all like me	Not very much like me	A little like me	Quite like me	Quite a lot like me	Yes, very much like me
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I like to find my own ways of doing things



I have at least one person close to me who I can turn to for guidance in my learning



I like to try out new learning in different ways



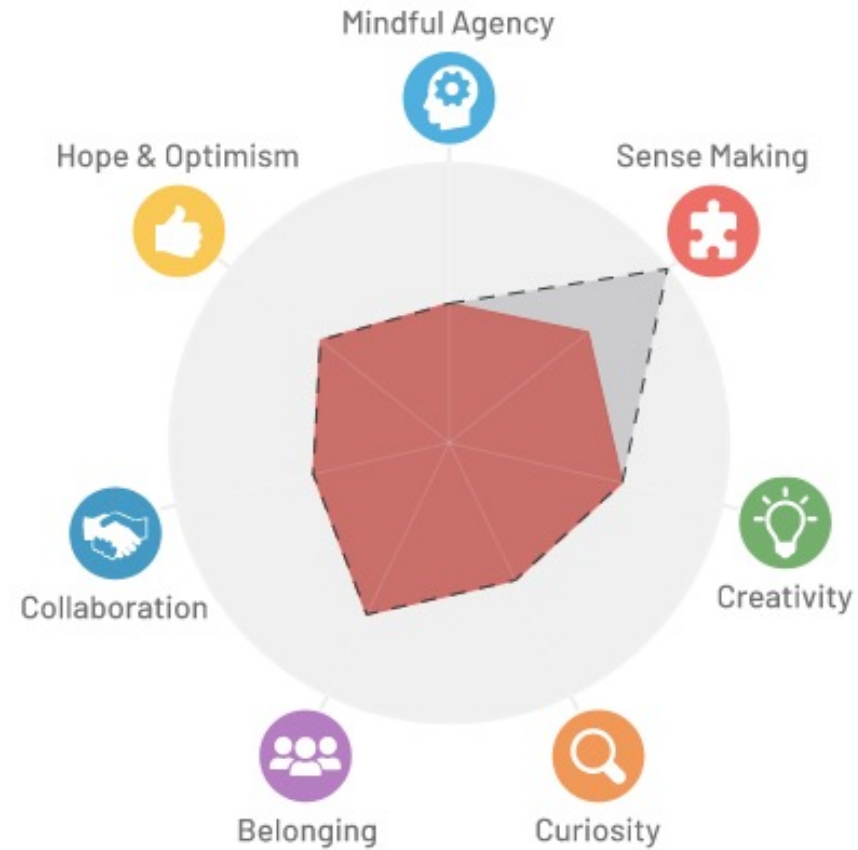
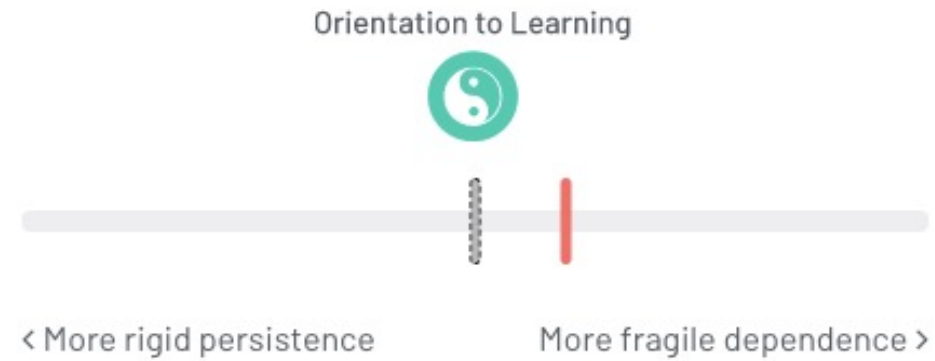
I make connections between what I am learning and what I have

## Learning Power

~20min 65 item survey

Validated through 20 years' research

## Setting a **stretch target** on your Learning Power profile

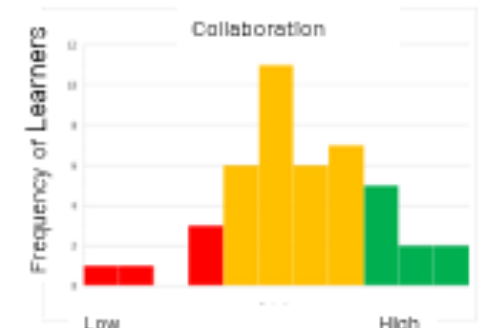
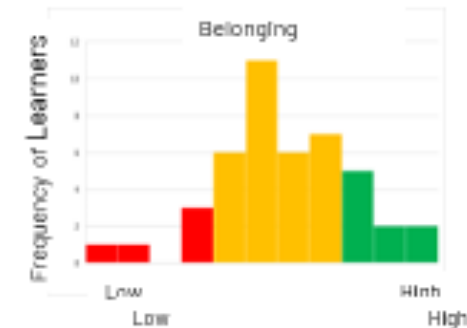
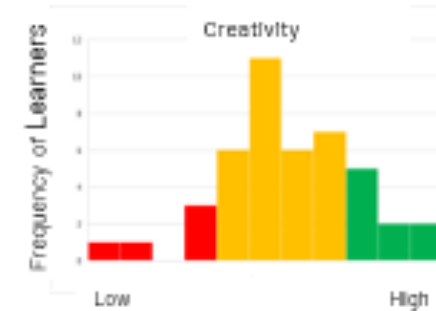
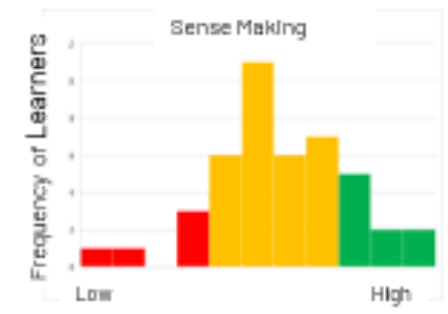
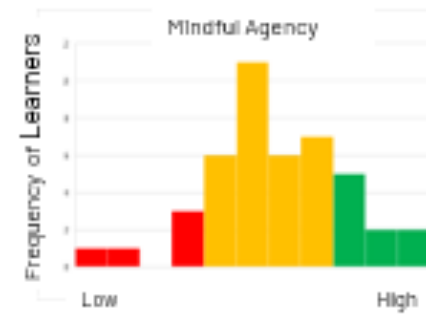


# Anonymised cohort analytics for the subject coordinator

Distribution across each LP dimension for the cohort

A heads-up on how the cohort sees themselves...

In a larger cohort comparisons may be statistically meaningful






# Making Learning Power profiles focal objects for learning


UTS Engineering (Anne Gardner)

## Learning Power personas







16



17




18



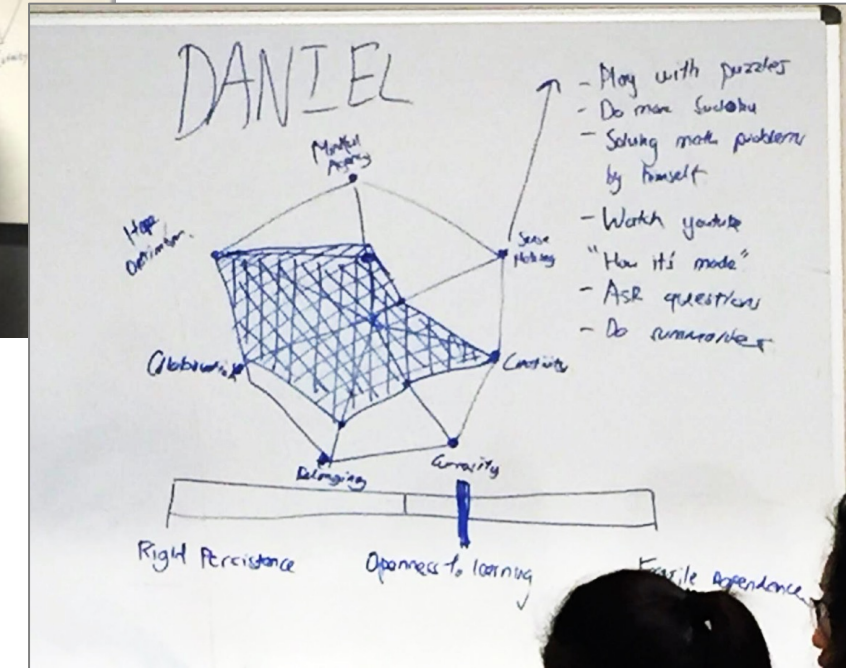
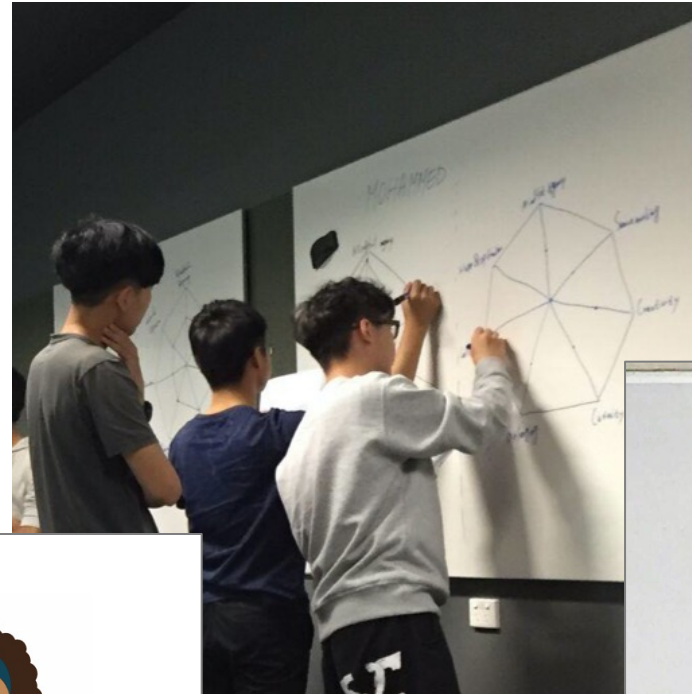
19

**Merindah**



Merindah lives with her parents and younger siblings in Waterloo. She hadn't really thought of studying engineering but one of her teachers at school put her forward to go to the indigenous Australian engineering summer school because she was good at science. She is the first in her family to go to university and most of her friends from school are not going to university either. There is a lot of pressure from her friends to join them on weekends. Being the eldest child, her parents expect her to help out a lot with the younger kids, and this means that she sometimes has to miss lectures or tutorials to take them to school or pick them up afterwards.

When she is able to come to class regularly, Merindah is really good at putting concepts together from lectures and readings, and she has little problem in making sense of the material. She doesn't accept things at face value and wants to understand things in more depth. However, she's not comfortable learning in groups because she doesn't feel confident in putting her ideas forward and hasn't really made any friends in her classes. She had some contact with Jumbana before uni. started, but is too busy to visit them now.



Workshop: <http://aeee-scholar.pbworks.com/w/page/117254061/Adelaide%20workshop%202021st%20April>

AAEE 2017 paper: [https://www.researchgate.net/publication/322244152\\_Characterising\\_the\\_learning\\_dispositions\\_of\\_first\\_year\\_engineering\\_students](https://www.researchgate.net/publication/322244152_Characterising_the_learning_dispositions_of_first_year_engineering_students)

# TRACK Skills Analytics

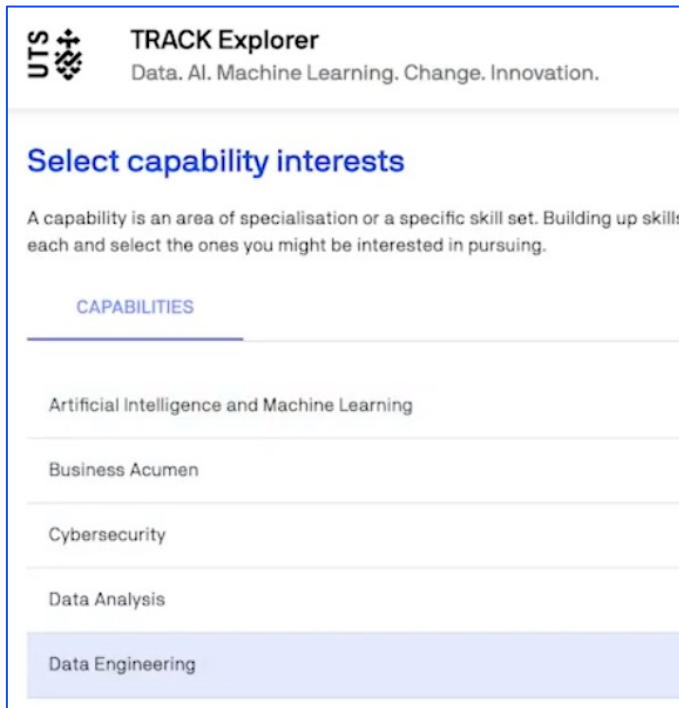
**Scaffolding for personal skills diagnosis, including  
personalised feedback on learning/career pathways**

CIC Homepage: <https://cic.uts.edu.au/tools/track-skills-analytics>

# Skills Analytics:

## Tailored feedback on learning/career path choices

*Upload your CV, and build your skills profile. Then...*



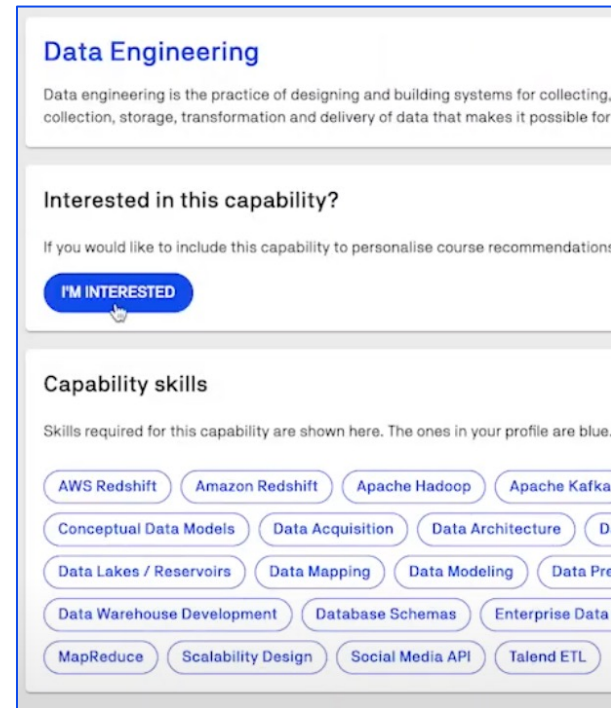
**UTS TRACK Explorer**  
Data. AI. Machine Learning. Change. Innovation.

### Select capability interests

A capability is an area of specialisation or a specific skill set. Building up skills each and select the ones you might be interested in pursuing.

**CAPABILITIES**

- Artificial Intelligence and Machine Learning
- Business Acumen
- Cybersecurity
- Data Analysis
- Data Engineering**



### Data Engineering

Data engineering is the practice of designing and building systems for collecting, collection, storage, transformation and delivery of data that makes it possible for

**Interested in this capability?**

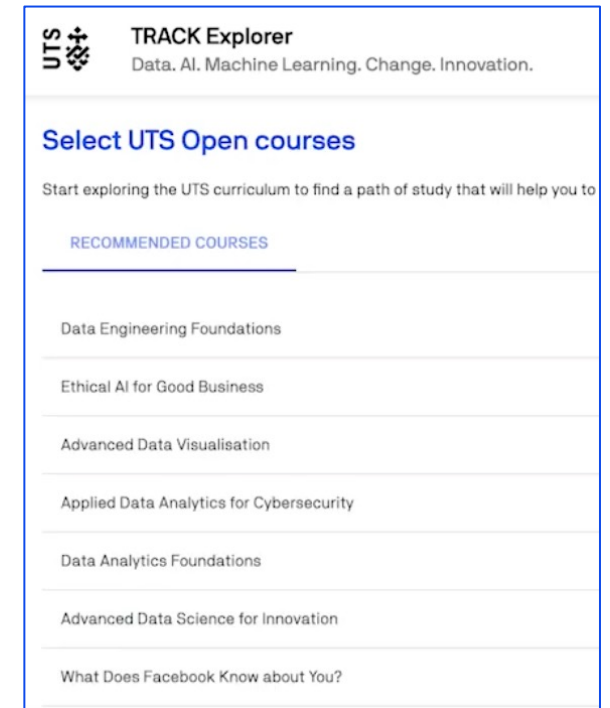
If you would like to include this capability to personalise course recommendations

**I'M INTERESTED**

**Capability skills**

Skills required for this capability are shown here. The ones in your profile are blue.

- AWS Redshift
- Amazon Redshift
- Apache Hadoop
- Apache Kafka
- Conceptual Data Models
- Data Acquisition
- Data Architecture
- Data Lakes / Reservoirs
- Data Mapping
- Data Modeling
- Data Pre
- Data Warehouse Development
- Database Schemas
- Enterprise Data
- MapReduce
- Scalability Design
- Social Media API
- Talend ETL



**UTS TRACK Explorer**  
Data. AI. Machine Learning. Change. Innovation.

### Select UTS Open courses

Start exploring the UTS curriculum to find a path of study that will help you to

**RECOMMENDED COURSES**

- Data Engineering Foundations
- Ethical AI for Good Business
- Advanced Data Visualisation
- Applied Data Analytics for Cybersecurity
- Data Analytics Foundations
- Advanced Data Science for Innovation
- What Does Facebook Know about You?

# Skills profile matching from NLP and jobs data:

## → tailored feedback on learning/career path choices

### 3 Explore training options

It is time to start exploring the UTS curriculum to find a path of study that will help you to pick up the skills that you need to excel at the jobs you are interested in.

TRACK  
Explorer

#### Best match courses

Journey through Data	✓
Engage with data systematically and strategically and learn how to tell a data story.	
Data Literacy: Telling Data Stories	+
Learn how to craft a compelling data story using statistical analysis and data visualisation. [8 ...	
Applied Data Visualisation	+
Take your data visualisation to the next level and focus on data-driven storytelling. [10 wks, av...	
Advanced Data Science for Innovation	+
Take the next step in solving complex business problems with innovative solutions using adv...	
Applied Data Analytics	+
Experience this highly application-focused, deployment-driven capstone to our data analytic...	
Data Literacy: Data Informed Decision Making	+
Level up your decision making with practical data science tools and techniques. [8 wks, avg 6...	
Ethical AI for Good Business	+
Set the ethical technology agenda for your organisation grounded in AI literacy, knowledge a...	
Advanced Data Analytics	✓
Build your foundational data background to develop a skillset to run data mining and analysi...	

Selected capabilities (1) Update

Updating selected capabilities will change the best match order.

☒ Data Literacy and Thinking Scientifically about Data

Skills you have Skills you'll gain

Hide capability skills ^

Skills you have

- Data Munging
- Decision Making
- Microsoft Excel

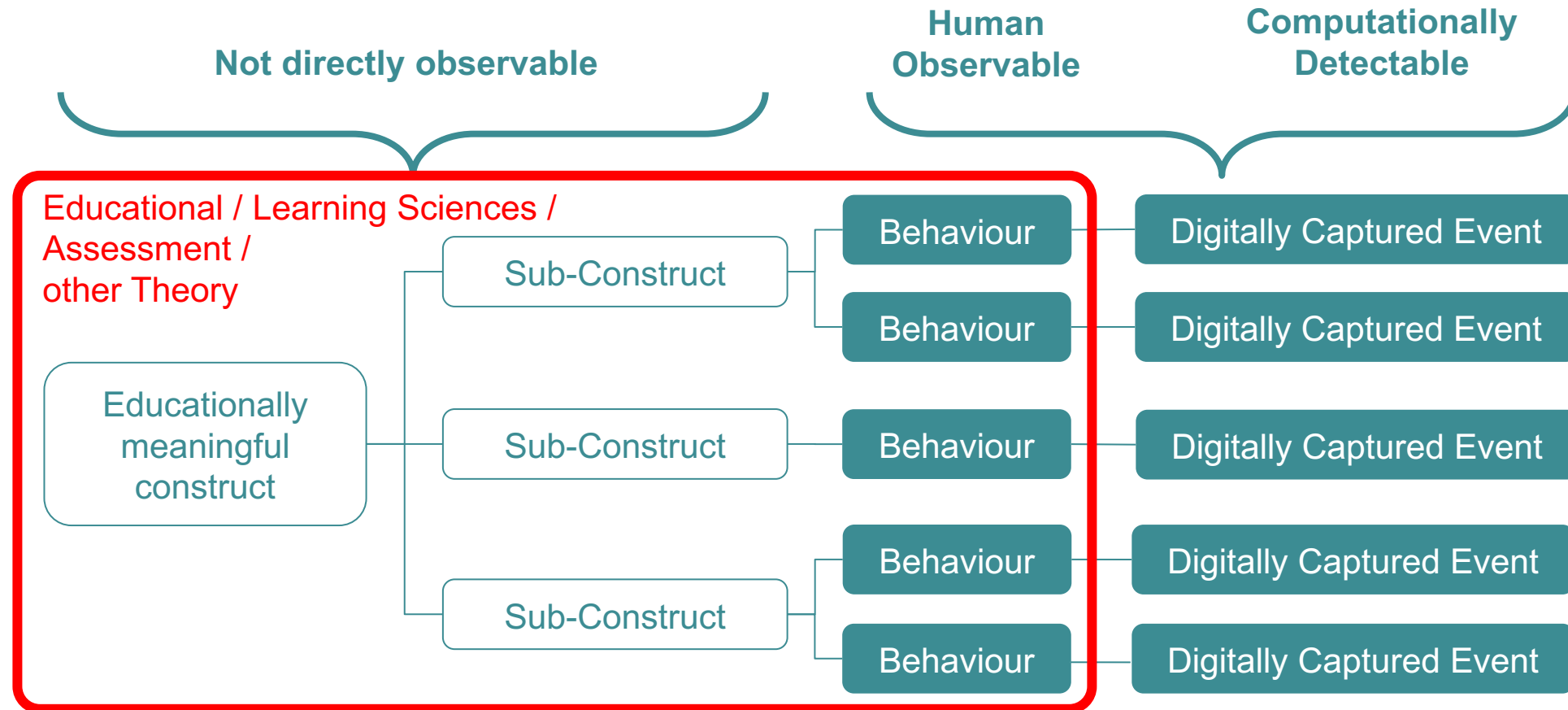
Skills from the selected courses

- Data Munging
- Decision Making
- Microsoft Excel
- Columnar Databases
- Critical Thinking
- Framing
- Information gathering
- Problem Identification
- Problem Solving
- Spreadsheets
- Troubleshooting

Skills not covered by selected training

- Computer Literacy
- Correlation Analysis
- Creative Problem Solving
- Design of experiments (DOE)
- Experimental Design
- Independent Thinking
- Research
- Risk Modeling
- Social Data
- Social Media

# “From clicks to constructs”





# Validating LA behavioural indicators as evidence for learner capability

*In addition to the work of  
University of Melbourne  
Assessment Research  
Centre...*

<https://education.unimelb.edu.au/arc>



Towards Strengthening Links between  
Learning Analytics and Assessment:  
Challenges and Potentials of a Promising  
New Bond

# Metrics for spatial and inductive ability in Minecraft correlated with other validated measures

## Construction and validation of a game-based intelligence assessment in minecraft

Heinrich Peters <sup>a</sup> , Andrew Kyngdon <sup>b</sup> , David Stillwell <sup>c, d</sup> 

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<https://doi.org/10.1016/j.chb.2021.106701>

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### Abstract

Video games are a promising tool for the psychometric assessment of cognitive abilities. They can present novel task types and answer formats, they can record process data, and they can be highly motivating for test takers. This paper introduces the first game-based intelligence assessment implemented in Minecraft, an exceptionally popular video game with more than 200 m copies sold. A matrix-based pattern completion task (PC), a mental rotation task (MR) and a spatial construction task (SC) were implemented in the three-dimensional, immersive environment of the game. PC was intended as a measure of inductive reasoning, whereas MR and SC were measures of spatial ability. We tested 129 children aged 10–12 years old on the *Minecraft*-based tests as well as equivalent pen-and-paper tests. All three scales fit the Rasch model and were moderately reliable. Factorial validity was good with regard to the distinction between PC and SC, but no distinct factor was found for MR. Convergent validity was good as abilities measured with *Minecraft* and conventional tests were highly correlated at the latent level ( $r = 0.72$ ). Subtest-level correlations were in the moderate range. Furthermore, we found that behavioral log-data collected from the game environment was highly predictive of performance in the *Minecraft* test and, to a lesser extent, also predicted scores in conventional tests. We identify a number of behavioral features associated with spatial reasoning ability, demonstrating the utility of analyzing granular



# Metrics for **creativity** in a game correlated with other validated measures of creativity



## Stealth assessment of creativity in a physics video game

Valerie J. Shute , Seyedahmad Rahimi

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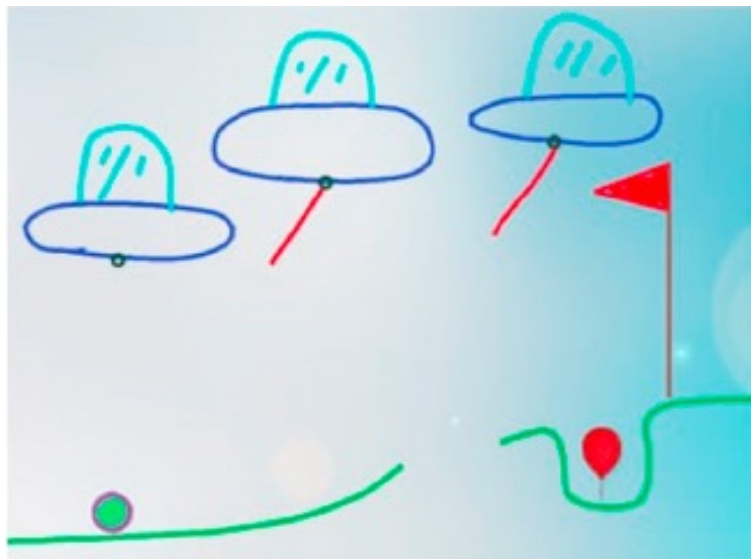
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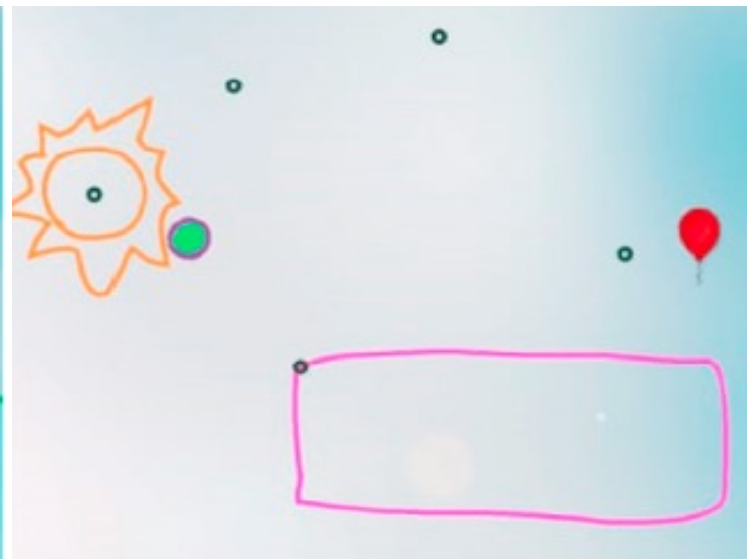
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### Abstract

Creativity has been of research interest to psychologists dating back many decades, and is currently recognized as one of the essential skills needed to succeed in our complex, interconnected world. One medium that has affordances to assess and support creativity in young people is video games. In this paper, we briefly discuss the literature on video games and creativity and provide an example of current work being done relative to measuring creativity in the context of a game called *Physics Playground* using stealth assessment. To validate the stealth assessment of creativity, we conducted a one-group pretest-posttest study with 167 8th and 9th graders from a K-12 school in Florida. Results suggest that our stealth assessment of creativity is valid (i.e., our stealth assessment estimate significantly correlated with our external performance-based measures of creativity). Additional analyses revealed that creativity (i.e., estimated using our stealth assessment of creativity) significantly predicts in-game performance (e.g., number of levels solved), game enjoyment, and learning of physics content. We conclude with a discussion of future directions in this line of creativity research.



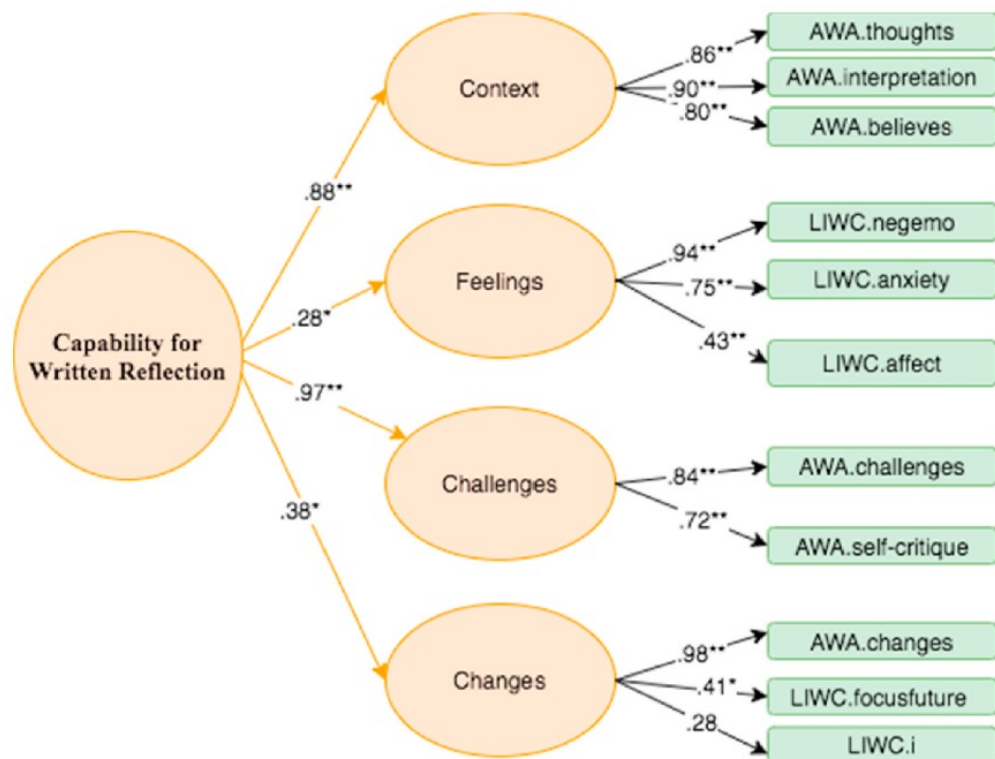
“Derp Invasion” (9/11)



“Sunny” (3/11)



# A model of reflective writing ability validated against graded student writing



Liu, M., Kitto, K., & Buckingham Shum, S. (2021). Combining factor analysis with writing analytics for the formative assessment of written reflection. *Computers in Human Behavior*, 120, 106733. <https://doi.org/10.1016/j.chb.2021.106733>

Full length article

## Combining factor analysis with writing analytics for the formative assessment of written reflection

Ming Liu <sup>a, b</sup>, Kirsty Kitto <sup>b</sup>, Simon Buckingham Shum <sup>b</sup>

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<https://doi.org/10.1016/j.chb.2021.106733>

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### Abstract

The formative assessment of written reflection provides opportunities for students to improve their practice in an iterative manner using reflective writing. However, manual formative assessment of written reflection is time consuming and subjective. While progress has been made in deploying writing analytics tools to provide automated, formative feedback, few approaches to automated assessment are grounded in a validated, theory-based, formative assessment model. To address this, we propose a five-factor model of the *Capability for Written Reflection (CWRef)*, grounded in the scholarship of reflective writing pedagogy. This paper uses Confirmatory Factor Analysis to validate the CWRef model by examining the relative contributions of textual features, derived from writing analytics, to each factor in the model, and their contributions to CWRef. The model was evaluated with two reflective writing corpora, showing which textual features, derived using Academic Writing Analytics and Linguistic Inquiry & Word Count, were significant indicators of factors in both corpora. In addition, it was found that the reflective writing context was an important factor influencing the validity of the CWRef model. Finally, we consider how this new analytical assessment model could enable improved tracking of progression in reflective writing, providing the basis for improved formative feedback.

# Summary

Learner Profiles can be derived from theoretically-grounded analytics applied to digital traces from learner activity.

They're beginning to be validated in the research labs, opening new possibilities for sustainable, rigorous profiles.

They should be combined with current indicators derived from rigorous assessment, teacher observation, and learner self-report.