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Australian
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# GCDE EXPLORATORY RESEARCH: INTERIM QUALITATIVE FINDINGS

**ANU**
**JANUARY 2021**

# BACKGROUND & METHODOLOGY

+ The purpose of this research was to explore the needs and expectations of potential future GCDE students, including interest in the course, content and delivery format preferences, and how the course can be best positioned to prospective students.

+ View of students from the initial cohort in 2020 were also canvassed to explore their experiences and aspects of the course (across content & delivery) that could be improved into the future.

+ Five online groups were conducted between 12-14 January as follows:

| Group No. | Cohort | Date | Time |
| --- | --- | --- | --- |
| 1 | Software engineers | 12 January | 6.00pm – 7.30pm |
| 2 | Software engineers | 12 January | 8.00pm – 9.30pm |
| 3 | Data analysts/data scientists without a university level data analytics degree (but with a degree in one of the cognate fields as per ANU website) | 13 January | 6.00pm – 7.30pm |
| 4 | Those with a university bachelors level degree, some tertiary level maths and/or statistics, and some prior exposure to programming | 13 January | 8.00pm – 9.30pm |
| 5 | 2020 CDCE Course participants (ANU to recruit directly) | 14 January | 6.00pm – 7.30pm |

+ A series of six in-depth interviews were also conducted via phone with GDCE students who failed to complete the course in 2020 to explore why they withdrew and what ANU could have potentially done differently to prevent this occurring.

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# 'DATA ENGINEERING' UNDERSTANDING AND APPEAL
## POTENTIAL FUTURE STUDENTS

### Software Engineers and Data Analysts

+ Most have a good understanding that data engineering focuses on data management and manipulation techniques applied to make data available for subsequent analysis.

+ Some saw the term 'data engineering' as something quite broad and a set of skills or knowledge that could be applied across many different contexts, whereas 'data analytics' was perceived as more narrow and focussed more on how the outputs of data engineering would be used in an applied problem-solving context.

+ Strong interest in studying in this field given perceived high demand for this skill set among employers – a growing view that a degree of 'data literacy' is vital in our increasingly data-driven world.

+ View that this type of course would draw people from a wide range of backgrounds – both those already working with data and wanting to improve and deepen their knowledge through to those who want to improve their data literacy and be able to better understand and engage with discussions around data as a compliment to their main role/speciality.

### Bachelor Degree, working in unrelated field

+ Not as clear a delineation between the two fields or 'data engineering' and 'data analytics', but sound appreciation that both used in tandem to extract value from data to drive informed decision making.

+ This group similarly recognises the importance of data across almost all fields and the need to be able to meaningfully engage with data and understand data and its potential applications.

+ Engineering more broadly was identified by some as a positive & respected profession – so linking this with data was likely to be viewed favourably by most.

"Designing algorithms / backend cloud infrastructure that automates the process of analysing data for a specific purpose"

"My husband topped up his skills from developer to a Data Engineer and his demand in market is crazy at the moment"

"Its appealing as i hear the term being used a lot more at our stand up meetings and thus would be good to be able to say I was more qualified in the field"

"The world is being driven more and more by data, on persons, commercial processes, govt etc. To continue to execute in my career, understanding better at a high level data engineering is essential.."

"Data Engineering is an appealing term. i guess any field which has a term 'engineering' associated has a good positive thing attached to it. Engineers are looked upon highly in the professional world"

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# WHAT WILL A 'DATA ENGINEERING' QUALIFICATION LEAD TO?
## POTENTIAL FUTURE STUDENTS

**Software engineers and Data Analysts**

+ Nearly all felt this type of qualification would open up career opportunities either within their current role or in complementary roles.

+ Given that this is such a rapidly developing field, some even felt the skills being learned may end up being deployed in completely new roles or functions also.

+ A perceived strength of a 'data engineering' offer was its assumed breadth – more so than data analytics – which meant future job opportunities were potentially wider.

+ Key motivations to engage with this type of course were career & salary progression, boosting career security/making themselves more valuable to employers, and engaging in what's viewed as a dynamic and exciting field.

**Bachelor Degree, working in unrelated field**

+ Perhaps not surprisingly, this group tended to see the GCDE as equipping people with some foundational data skills that would help them as part of their current role as opposed to pivoting to new roles.

+ Tended to take a broader, less technical view of how the course would support career progression.

+ A solid appreciation that leveraging data to drive strategic decision making is important across all sectors.

*"Potentially looking into areas around machine learning or artificial intelligence, due to the data it is working with".*

*"I think it would open more opportunities to work in data science/analytics fields…or even be placed on new projects that require different skill set in my current position."*

*"I'm note sure what jobs it would open up, but further understanding of data engineering will only do me well in my organisation. Not enough data minds in a very data driven world I feel".*

*"New research and development roles within all sectors aimed at analysing previous data for current use."*

*"It would definitely help to play a role in strategic side of business. Data engineers are learning more about how to analyse and create better pipelines."*

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# KEY BARRIERS TO ENGAGING WITH THE GCDE
## POTENTIAL FUTURE STUDENTS

**Software Engineers and Data Analysts**

+   Time, cost and need for flexibility around existing work & family commitments the most common barriers identified.

+   There was also the potential opportunity cost and some queried how quickly they would recoup the time and cost needed in terms of career progression/advancement.

+   A view among some that low cost or free courses can be taken at own pace and may deliver the same practical skills as this type of qualification (if not in a recognised qualification).

+   Confidence/skills generally far less of a barrier to engagement for this cohort.

**Bachelor Degree, working in unrelated field**

+   Same as above, but also lack of confidence in maths/stats and a fear of looking foolish – this was especially the case if undergraduate degree had been undertaken some time ago.

+   Online, self-paced delivery viewed as ideal for the majority in terms of addressing the time commitment barrier.

> "Hard to find time. Nowadays upskill myself by going though Pluralsight and Udemy courses."

> "I have considered part time but then it would take twice as long to finish the course so it would take twice as long to reap the benefits of my study and doesn't seem worth the time".

> "1. Family commitment 2. Full time work 3. Mortgage 4. Cost."

> "Time!! having recently finished a post grad while working full time its is very stressful with a young family".

# PREFERRED DELIVERY FORMATS
## POTENTIAL FUTURE STUDENTS

+ With a few exceptions, existing work & family commitments meant the vast majority of participants envisioned studying on a part-time basis.

+ When presented with a range of possible delivery formats, most preferred a model whereby they could *access pre-recorded lectures and then also connect through an after-hours real-time tutorial weekly session.*

+ Above all, people wanted a significant degree of flexibility – ideally being able to choose the delivery format that suited them (e.g. some felt their employer may support participation in online sessions during work hours, where others said everything would need to be after hours/in their own time).

+ While online bulletin boards are good (and better when actively managed), most felt there was still value in an ability to have real time dialogue such that answers can be posed and answered in real time. Some felt once per fortnight might be sufficient to engage with lecturers, tutors and other students online in real time.

+ Need to limit online tutorial numbers – no more than 10 was considered ideal so everyone has a chance to engage and contribute.

+ There was some interest in self-paced course delivery with an intensive component, but most would not be able to travel to attend given costs & other commitments - so online was clearly preferred.

*"I can't do business hours study due to hectic work hours. Also I prefer to learn at my own pace and in my own time rather then following a schedule."*

*"I won't have to go anywhere waste my time travelling."*

*"I think mix of both would be good. But flexibility to do exercises and go through content on my own would be useful."*

*"Has to be part time for me, as I still need to manage and do my current full-time role plus spend some time with my family. I know it can be stressful completing any course while working and maintaining family life. the courses needed to be done in after hours for me."*

*"Recorded sessions are fine. as it gives me the opportunity to get it at my own time or we can go back to listen to anything that we may have missed or need to hear again for clarification."*

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# COURSE LENGTH, STUDY COMMITMENT & LONGER TERM
## POTENTIAL FUTURE STUDENTS

+ Most felt a traditional part-time study load – 2 units per semester or completing the course part-time over 12 months was a reasonable expectation.

+ However, some wanted greater flexibility and the scope to take additional courses to shorten the course length if they want to.

+ Expectations of anticipated weekly hourly study load varied from 12 – 40 hours – perhaps reflecting varying aptitudes and commitment levels to the study process.

+ Minority of participants felt employers would provide time for study, very few indicated their employer would be likely to support financially. Some noted their employers have invested in internal training pathways or programs that may take priority in terms of development of additional skills or capabilities through external providers.

+ In terms of interest in progressing to the full Masters, many were open to this but saw the Graduate Certificate as a more manageable entry point that allowed them to see if they enjoyed it/had an aptitude for it – and indeed whether it was manageable along with work & family commitments – before committing to a higher-level qualification.

*"12-month part time is a great option by the sounds of it."*

*"I am co-parent and work full time. I would only do full time if I became unemployed or work allowed me a day off to do it with no drop in pay."*

*"[In terms of progressing beyond the Graduate Certificate] I would have to reassess after 12 months to see how I managed to balance it around life."*

*""I'm open to progressing with this further as long as I can make it fit into my current life situation without too much impact on my current job and family".*

# IDEAL COURSE CONTENT & OUTCOMES
## POTENTIAL FUTURE STUDENTS

*Participants were shown a brief description of the two main learning outcomes from studying the ANU's GCDE, as follows:*

1. *Apply basic technical expertise in computer programming and databases to solve data engineering problems;*
2. *Contribute as an effective member to the performance of a data focused workplace.*

### Software engineers and Data Analysts

+ After reading these learning outcomes, participants felt the course was primarily designed to provide an introduction to this field. There were concerns the course content would be too 'general' or 'basic' (particularly for a postgraduate level) given their technical experience in this field already.

+ There was greater interest in learning advanced techniques that would enhance their ability to convert data into more meaningful and useful information for their business; demonstrating their focus on building their value to current employer needs.

### Bachelor Degree, working in unrelated field

+ This cohort found the above learning outcomes provided a high-level overview somewhat vague. Although this piqued interest for some, others felt more tangible and specific examples of the learning outcomes would give them (and other people relatively new to this area) a better understanding of how this course and area of study can help solve real-world problems.

+ This cohort hoped the GCDE course would cover a generally broad spread of fundamental data skills, which included (but was not limited to): gathering data from different sources and cleaning it appropriately, analysing data for different purposes, and making automated reports.

*"I would want to know if it will push me forward in my career or knowledge, not update me."*

*"I would really be after how this course would equip me with providing the necessary skills to consult and advise institutions on how to best manage, handle data and structure it in the right way (etc. reliable, accessible, trustworthy) etc. It's the question so many organisations are faced with today and struggling with."*

*"Gather data from different sources and be able to develop solutions to improve business efficiency - use data in an intelligible fashion rather than be overwhelmed by it."*

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# POSITIVES FROM 2020 GCDE STUDENT EXPERIENCE
## PREVIOUS STUDENTS

+ Using a 0-10 scale (with '10' being very satisfied), students provided an average score of 6.6/10 to rate how satisfied they were with their overall experience of studying the GCDE course; a respectable score but with clear room to improve.

+ Most found the application process to be easy, quick and straightforward. One student received their placement offer just one day after submission – however this experience wasn't consistent with another student left waiting for two weeks.

+ Students felt the course content was comprehensive and provided an overall picture of data science. Although students felt they learnt a lot, there was a sense of frustration that some units were too theoretical (Introduction to Database Concepts was highlighted) and would benefit more from having applied examples (i.e. solving real-world problems).

+ Students were receptive to practical exercises (involving Python and SQL) and felt they had a better grasp of these programming techniques after the course.

+ The discussion forum was seen to be the main channel used for contacting lecturers and worked reasonably well with active and responsive participation from teachers (including after-hours and weekends) and from students.

+ Students were open to recommending this course to those who are interested in being introduced to data science – however they were less inclined to recommend it to more experienced individuals already in this field. For some, recommendations would depend on whether the time duration of the course would be increased and whether fees would remain the same.

> "Content was broad and was really good for a short course like this, it gives a good overall picture of how data science works, gave me a firm grasp of the concept, taking an overall picture, looking back we learnt a lot."

> "I am very confident that I can [apply new skills in a practical work context]. Not brilliantly, we only got a crash course. But enough for me to know how to apply the knowledge and Google my way through how to specifically do it."

> "I have not found the material taught in the course to be of much practical value as a data analyst and I would not recommend the course to my colleagues. It may be useful for a person who wants to get into data analyst work."

# NEGATIVES FROM 2020 GCDE STUDENT EXPERIENCE
## PREVIOUS STUDENTS

+ Most students described the 6-week period for units as being too short, compressed and tight. Students felt that the course load was not manageable in this timeframe and their grades suffered as a result. The lack of a mid-semester break to catch-up on assignment work was sorely missed, and some would have appreciated more time to get better grades (which are considered more important than at an undergraduate study level).

+ The application process raised complaints about the confusing ISIS interface and difficulties in finding information about the course – including HECS information being described as "unintuitive". There were also complaints about the difficulty in providing support materials, including having to invest in an English recognition certificate (to prove their English skills), and providing a copy of their Bachelor degree (an academic transcript was not deemed suitable).

+ There was an overwhelming feeling that student needs were not put first in regards to the COMP8410 Data Mining course. This included a significant amount of negative feedback on the assignment component which did not promote practical skill development nor improve learning, plus an unreasonable timeline for a large amount of work required (including pre-reading). Students also noted that requests for practice exam questions and sample solutions for assignments were rejected.

+ Rattle was not viewed favourably and students considered this to be an impractical and odd inclusion compared to better alternatives such as 'R' or solely using Python.

+ Students were frustrated that not all recordings from lectures and tutorials were made available online - creating an obvious challenge for those to attend in-person if they also have work responsibilities. The quality of recordings (i.e. voice clarity, presentations appearing old/not up-to-date) also attracted negative feedback from some.

+ Students felt their tutorials did not translate well to the online format as they lacked a 'tight focus' (i.e. did not seem to follow any agenda) and also felt they missed out on interacting with the tutor if they could only watch recordings.

> "This was very clearly just chopped out of the masters course and lecturers who deliver in person suddenly had to do it online. I caused a lot of problems and some lecturers were inflexible about their delivery."

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# AREAS FOR IMPROVEMENT
## PREVIOUS STUDENTS

+ All students had some experience of programming (e.g. Python, SQL) prior to commencing and in most cases this was self-taught. Some felt that an optional pre-semester bridging course may be useful for those without any existing programming skills or knowledge.

+ To support student preparation for this course, it was suggested that course content materials should be made available at the start of the session (e.g. in week 'zero'), as opposed to its current release at week one; this would give students more time to pre-read, prepare and  hit the ground running'.

+ The preferred course delivery for most students would involve being able to access pre-recorded weekly lectures online (which they can access at any time convenient to them), with a live online weekly tutorial after business hours. At an absolute minimum, all recordings for lectures and tutorials need to be online to cater for those with working commitments during business hours.

+ There was a popular suggestion that tutorials should be replaced with a 'code-along' session where they can follow the instructor step-by-step through solving a real world project example. Ideally, these sessions would be outside of business hours (i.e. after 5pm) on weekdays and recorded. There was also interest in providing student access to Data Camp which would allow students to practice their programming/real-world skills further.

+ In addition to the online discussion forum, students felt other support mechanisms should be introduced or improved. This includes offering better consultation hour opportunities (e.g. after hours time to contact a tutor), plus receiving more timely feedback on assignments.

+ In terms of naming the course, most students felt that the 'Graduate Certificate of Data Science' would be a more appropriate name given the breadth of current course content, plus a view that the term 'data science' is more universally understood by both prospective students and employers (who may be relied on for support in engaging with the course).

*"If they had made course content available before day 1 it would have been way better. We had 2 weeks between semesters, if they made content available to us in that time we would probably have all had an easier time of it."*

*"Is the plan to be online again? If so. Get rid of labs. Have code along sessions. Then have sessions available to ask questions about issues during the 'code along' sessions. This would make the whole process far more efficient."*

*"I'm perfectly happy for pre-recorded exclusively. The most useful live thing for me would be set time to dial in and ask questions of a tutor from the pre-recorded content."*

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**FOR ANY QUESTIONS,
PLEASE CONTACT:**

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THANK YOU!

# Graduate Certificate of Data Engineering Student Interview Feedback

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## Executive Summary

In response to the negative feedback received during the delivery of the Graduate Certificate in Data Engineering, the CECS Student Services in conjunction with SII Admin Office contacted current students to gather feedback, hear their concerns and identify areas of improvement. Additional invitations were also sent to non-completing and discontinued students, and students located in outer regional or remote locations to seek to hear those perspectives. In total, nine students were interviewed over a two-week period for a period of 45-60min discussing their professional background, their expectations and motivations, their student experience and issues during the program. Others enquired but didn't participate. Participation was also hindered by timing over the exam period.

### Types of issues

The student commentary on the GCDE program was broadly consolidated around three types of core issues:

1.  **Teaching delivery** - largely around reducing the intensity of content delivery
2.  **Accessibility** - making the content and engagement more accessible, flexible, and designed to suit the target audience
3.  **Teaching content** - students expected content to be peer reviewed, relevant, with sufficient material for online delivery.

The high student numbers and short course length provided smaller scope than usual for handling of issues as they arose. The good news is that the issues experienced by students are largely fixable. The nature, degree and consistency of issues was concerning. Experienced students with significant

prior postgraduate learning reported similar issues to other students who were less equipped to find solutions.

Broadly, the issues experienced in the GCDE program are in line with student experience feedback in the TEQSA '_Foundations for good practice: The student experience of online learning in Australian higher education during the COVID-19 pandemic_' report (30 November 2020).[1] The TEQSA report identified 15 issues which appeared frequently in feedback from students across Australia this year. Of these, the most critical were: IT related issues, academic interaction, examinations, staff expertise with using the IT applications, and academic issues associated with a particular discipline or type of study.

## Risk

Two of the nine students mentioned that they had been actively discouraging prospective students on social media. Inspection of Whirlpool Forum (mentioned by 1 student) has found a post where 3 self-described ANU GCDE students are writing negatively about their experience in the program.[2] This feedback highlights that we have lessons to learn in order to improve online computer science teaching at this level.

## Suggested next steps

It is a priority to improve GCDE student outcomes, as the program has many students and is a potential key entry point to graduate level education for early-mid career learners. This is especially important if we continue to offer the program to large numbers of students, and aim to attract diverse high quality students.

We suggest exploring approaches to learn from students (even at high volume), develop standards, and actively seek to attract and support quality students from enquiry to graduation.

1. **Better managing and learning from student experience and outcomes** to compile evidence of best practice and inform development of the program. We should monitor student progress and engage to support follow through to graduation. This will support experiments with different teaching techniques, processes and tools.
2. **Development of standards** for service level, quality and relevance of program content, and delivery and accessibility of our online graduate certificate programs with respect to whole-of-program learning outcomes and student experience. This could also consider the GCDE against the critical issues identified by the TEQSA _Foundations for good practice report._
3. **Better describing the program, expectations, outcomes and eligibility** to target high quality applicants, and assist students to understand the value and challenges of the course. Clearly defining the intended audience and designing the program for that audience would enable handling of difference prior knowledge, and contribute to better managing student expectations and outcomes.
4. **Creating a longer term plan** for developing the GCDE program to meet student learning needs and provide integrated educational pathways to higher learning for students.

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[1] TEQSA, ' Foundations for good practice: The student experience of online learning in Australian higher education during the COVID-19 pandemic ', 27 Nov 2020. https://www.teqsa.gov.au/latest-news/publications/foundations-good-practice-student-experience-online-learning-australian, accessed as at 3 Dec 2020

[2] Whirlpool Forum, https://forums.whirlpool.net.au/archive/9rpk8w29. Accessed as at 3 Dec 2020.

## Student Profile

These characteristics describe the students that we interviewed.

**Industry sector:**

- The students interviewed were from a wide range of industries, where they have encountered datasets:

    - Tech
    - Mining
    - Airline Industry
    - Construction
    - Higher Education
    - Public Service
    - Management Consulting
    - Health

**Time availability:**

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- COVID-19 social distance lock down and primary school closures made it particularly challenging for students. Students were largely in mid 30s age group.[3] Two of the nine interviewed students also had young children at home.

**Location:**

- The student cohort was comprised of enrolments from all states and territories, but the major east coast population centres would account for the majority of students. [3]

**Prior knowledge:**

- Most people were familiar with, or working with data in some way and looking to formalise their skills in the shape of a recognised qualification. All students interviewed had existing tertiary education qualifications, many at the postgraduate level, though usually in a field related to their current or recent employment rather than in data specific fields.

**Motivations/desired outcomes:**

- Many of these people were looking to reposition their careers into a more technical specialist space. One of the students was looking to broaden their understanding of this field to assist in project management and leadership positions in the future.
- Online delivery allowed more employed students and students from across Australia to access ANU expertise.
- While online was a required factor for many, the reputation of ANU was a deciding factor, along with the attractive price.

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[3] Analysis based on GCDE enrolment data from CECS Student Services.

It was noted that students with some sort of postgraduate education/workplace learning and development familiarity seemed more likely to offer feedback as they have some way of benchmarking the content and delivery.

## Key issues identified in GCDE Student Exit Interviews

### Teaching delivery

- **Course length and intensity** - The compressed timeframe in which the courses were delivered were extremely restrictive and made it difficult for students to keep pace. In some courses the workload and delivery of content was described as 'lumpy', impacting full time workers. Students remaining in the program believed the workload overwhelmed some students and contributed to withdrawal rates from courses and from the program.

  *'The 6-week timeframe was impossible and compromised the delivery of the content.'*

  *'Increase the duration of the teaching period to 9 weeks' (from a student* s 22 ⬛ *experience]*

  *'Even 40 hours a week is not enough to cover both courses. [referring to Data Wrangling and Data Mining]'*

  *'The time pressure is preventing us from going deep into the content. [I'm] Forced to study rapidly to get past the exam.'*

  *[The problem] ' was the lumpiness of the content. With an assignment in the first week (each assignment takes 5 days work), I was falling behind in learning content. I was in a constant cycle of catching up on content when doing assignments. This meant I didn't have time for quizzes which were only open for a fixed time period.'*

- **Engagement** - mixed experiences. There was a noted lack of student interaction and peer assisted learning that students desired. The breakout rooms did not facilitate interaction. Engagement/communication skills and English language skills of some tutors was also raised as an issue.

  *' There were good intentions, but poor execution [due to 6-week course length].'*

  *'Generally satisfied. Missed the peer-based interaction and peer-based learning'*

  *' Recommend improvement of interaction between the students. Unfortunately the forum is quite limited. And everyone is too scared to post anything against the rules.'*

  *' Seen students told off for asking questions, students bullying others for asking questions'*

  *'[I] Was struggling a lot in the programming course. Being put in a small group by the tutor really helped. Invited them to Discord with 8 people on the program, with free talk, interaction much richer, trusted. This kind of interaction makes such a difference. Just by reading on discord their thinking and their approaches, their sharing of different tools, was*

*super rich and helpful.'*

*'Formalising peer feedback may help generate more discussion between colleagues and foster peer based learning.'*

*' In postgrad, the best teachers can be your classmates.'*

*'I am not sure if ANU has delivered a course in this fully online manner at high volume of students, transitional students. There were a lot of things that didn't work.'*

*'Notice that it has been taught the same way that it would be taught for students on an academic track'*

*[Overall experience of program was] ' Mixed but positive. Data mining was sub-optimal.'*

*' Interactions with the teaching staff failed to value–add to the learning experience'*

- **Assignment feedback** - Students found feedback on some assignments to be unspecific, lacking explanation of the mark or direction on how to improve. On some occasions, it came too late to inform follow on assignments.

  *' The problem with the assignments was we were not given a worked assignment result'*

  *' I don't know what I should have done to get a better grade. I'm not sure how they graded the essay* s 22 ████████████████████████████

- **Academic Integrity/Invigilation** - The emphasis placed on cheating in the final exam was considered excessive for a mature student cohort.

  *' On the exam, so many rules to prevent cheating* s 22 ████████████████ ████████ *This is not scalable.'*

  *'Draconian exam requirements in one of the courses. There are a number of points of failure or issue which are not related to the assessment of the course content.'*

  *' Data wrangling has some of the best [content].* s 22 *has solutions to prevent cheating using ID keys to generate unique datasets which is very smart and demonstrates the power of what you can do in data.'*

  *' In previous 2 courses, I had the embarrassing situation where found some people cheating. I think unis have to balance between the trade-off of trust and monitoring cheating. Try to setup very clear rules, but adapt program to facilitate interaction between students without fear of being penalised.'*

## Teaching content

- **Teaching material** - There was a level of disappointment expressed about some of the teaching materials, and a mismatch with their expectations. Students were concerned that the concepts and methods were explained better online, and that some material appeared to not be peer reviewed, complaining of errors, and exercises and datasets that were dull, not on par with expectations from a university with leading reputation and research

  *'As Australia's leading university, ANU has a chance to deliver something excellent and I feel as if this was lost.'*

  *'I was using the ANU course as an [syllabus] index, and then looking for course material elsewhere'*

  *'I started to hate the course... In the end, Youtube has been a much better teacher for me in that course.'*

  *'Worked examples was staggeringly missing from this course'*

  *'More worked examples would help, especially for mathematical concepts, which can seem foreign when presented. It happened at times, but we needed more of it. Lead with a simpler version.'*

  *'It was noticeable that some of the content in the structure of the masters were missing and this impacted on the ability to learn at the pace required.'*

  *'The price paid made the course acceptable, but at full price this would not be the case.'*

  *'Fundamental trivial errors throughout the course. There appeared to be a lack of oversight in the delivery of these programs.'*

  *'The teaching materials need significant updating and quality assurance oversight.'*

- **Teaching material (exercises and datasets) -** There was an expectation of more relevant exercises and datasets in some courses.

  *'Disappointed that the data examples are not representative of the messy data you get in industry.'*

  *'The material did not relate or refer to real world problems, and as such lost its relevance to students.'*

  *'I was hoping to have a big dataset that I can derive meaningful insights from. The dataset we had was a data governance survey dataset. I haven't found anything interesting. I've asked other people if they've found anything interesting, and nobody has.'*

  *'Look at the material, datasets, tools - for ways to improve the course.'*

*'Using more widely utilised tools and better datasets would greatly improve the student experience. The program could be themed around a particularly complex dataset that students' progress through and interrogate in different way to achieve outcomes. The assignments could be based around these outputs and this linear journey would improve the student experience significantly as they can see the different uses of datasets.'*

- **Assumed Knowledge** - The general feedback was that there was too much assumed knowledge in the introductory courses. However, students also believed they would have been better equipped with a list of preparatory material and with more written course material and exercises. Students described the target group of the GCDE as unclear. It was pitched between those trying to retrain and those with industry experience looking to upskill. They believed the difficulty of the course would be better pitched at an upskilling cohort rather than training of students transitioning from elsewhere and new to this field.

*'Without background knowledge, the 6-week intensive intro to programming would be difficult to complete.'*

*'The lack of prerequisites have caught a lot of people off guard. Pre-requisites would reduce the shock factor for students unfamiliar in this area.'*

*' For me it was the right level. I had expected more emphasis on traditional bayesian techniques, but also glad it wasn't there.'*

*' We had a 2 -weeks break between the courses, which we could have used to prepare well for the course [if guidance or review material given]'*

*'The content is not enough to enable entry into the field'.*

*' Provide a guide or self-learning package'*

*' I used a Youtube channel crash course in statistics 15mins each, from very basics to advanced topics.'*

*'For me [the difficulty was] ok, but for others who don't have prior background on data science, this jumped the basics and went straight into the maths.'*

*'I can't imagine how much [people retraining from another field] they would have struggled with this. We had some students coming from an Arts background, who thought this was a good entry for it. I imagine they were shocked. This wasn't pleasant'*

*'8000 level subjects in the graduate certificate are not the right level'*

*'The delivery of the content seems to have been pitched to those out of work with full-time availability, rather than those looking to upskill.'*

*'I would have failed an up-front assessment of prior knowledge, because I forget everything I don't use. But glad I did the course because all the knowledge comes back to me.'*

*'Barriers to continuing in the program include large and daunting assignments too early in a course [reference to Data Mining essay].'*

- **Syllabus** - Mixed response. Some students felt the program did not have an overall structure outlining how the courses provided a coherent set of learning outcomes. They believed the program had not been tailored and reviewed prior to the beginning of the GCDE. Some students also felt that they should not be learning data wrangling and data mining at the same time, because they believed one followed the other. Others felt the syllabus was largely good, however problems with material and delivery. It appears syllabus coverage was not the main issue. Instead it appears to be they had issues with the suitability of the amount of material and method of delivery for students learning online.

*[One student said] they did not feel that they had industry relevant skills at the end of the course.'*

s 22

*Found ANU more academic and difficult in the course content. The* s 22 *approach is much more practical. [For E.g.] ANU taught the theoretical underpinnings in the database courses where* s 22 *just taught the practical side*

*' The programming, SQL and data mining have all been directly relevant [to my current role]'*

s 22

*[On databases course:] ' A lot of relational algebra. Felt it was there for the sake of completeness.'*

*[On Intro to Programming course:] 'Well designed and well conducted. No maths, elementary level only.'*

*[On data mining:] ' good, covered everything expected in data mining'*

*' The data mining course was very challenging.'*

*'Stuff that I've learnt I wish I knew years earlier in my career.'*

*'Data Wrangling has been fantastic, I'm using these tools to find other approaches [in their job]'*

## Accessibility

- **Recorded Content** - The lack of recorded material in some courses was an issue highlighted by all interviewed students. In addition to being useful for different types of learners and learners with multiple commitments, the lack of recorded content jarred with their service level expectation for an online course and raised equity concerns for students requiring recorded content for their learning needs.

s 22

s 22

*'I don't even have the opportunity to review the recordings. If there is a privacy concern at play, it's as simple as signing a waiver to agree to recordings'*

- **Flexibility** – Tutorial times were difficult for this working cohort. This was particularly difficult for students with at home children and students in s 22 time zone. This hampered engagement with the content, staff and other students

  *'Given the s 22 time difference this [tutorial] is right in the middle of my work day.'*

  *'Flexibility was not incorporated as would be expected for an online program.'*

  *'No flexibility in not being able to attend scheduled sessions, and lecturers provided a lack of alternatives and viewed this as the student's fault. We were blamed for missing a learning opportunity.'*

- **Diversity -** One student was upset by the use of s 22 in datasets.

s 22

## Masters Pathway

- **Progression to Masters** - The option to progress to Master's level training was an attraction. When asked whether students would consider pursuing options for linked programs through Graduate Diploma or Masters level qualifications, most would consider this option. However with the very firm caveat that the delivery and quality of courses is significantly improved. Almost all also required online or largely online delivery.  One student noted their desire for a leadership element to this type of offering.

  *[One student said] ' Yes, but Data Wrangling doesn't count toward the Graduate Diploma' [of Applied Data Analytics]*

  *[You should] 'Have these courses as a stepping stone to further education.'*

  *'I will be looking for a program that covers streaming data which is highly relevant in the s 22 sector.'*

## Tools/IT

- **Education Tools** - The online learning tools were ill-equipped to facilitate the teaching, and there was a lack of consistency in the tools used (Zoom, Adobe Connect, Wattle, Teams).

  *'The Wattle tool is insufficient to foster interaction. [We should have] a truly useful online learning tool.'*

  *'We used Rattle which I had never heard of before and does not appear to be widely used.'*

R E I

M A G

## GCDE Student
## Interview Feedback

Mid-late Nov 2020

ANU College of Engineering
& Computer Science

I N E

Australian
National
University

# Student Interviews Scope

9 students were interviewed over a two-week period for a period of 45-60min discussing their professional background, their expectations and motivations, their student experience and issues during the program.

Findings broadly aligned with the issues experienced in the GCDE program are in line with student experience feedback in the TEQSA '*Foundations for good practice: The student experience of online learning in Australian higher education during the COVID-19 pandemic*' report (30 November 2020).

# Student Profile

**Industry sector:** Tech, Mining, Airline Industry, Construction, Higher Education, Public Service, Management Consulting, Health

**Age:** largely mid 30s

**Time availability:**

- s 22

- COVID-19 social distance lock down and primary school closures made it particularly challenging. Two of 9 had young children at home.

**Location:** all states and territories, but the major east coast population centres would account for the majority of students. [3]

**Prior knowledge:**

- familiar with, or working with data in some way

- looking to formalise their skills in the shape of a recognised qualification.

- All students interviewed had existing tertiary education qualifications, many at the postgraduate level, though usually in a field related to their current or recent employment rather than in data specific fields.

**Motivations/desired outcomes:**

- Reposition their careers into a more technical specialist space.

- Online delivery provided access to ANU - was a required characteristic of their chosen degree program

- ANU reputation was a deciding factor, along with the attractive price.

# Executive summary

Feedback around three types of core issues:

**Teaching delivery** - largely around reducing the intensity of content delivery

**Accessibility** - making the content and engagement more accessible, flexible, and designed to suit the target audience

**Teaching content** - students expected content to be peer reviewed, relevant, with sufficient material for online delivery.

Less scope to handle issues with high enrolments and short course length

Risk: bad publicity on social media (e.g. Whirlpool forum, Oct 2020)

# Teaching Delivery feedback

**Course length and intensity**
*'The 6-week timeframe was impossible and compromised the delivery of the content.'*

*'Increase the duration of the teaching period to 9 weeks' (from a student with* ▮s 22▮ *experience]*

*'The time pressure is preventing us from going deep into the content*

**Engagement** - mixed experiences

*' There were good intentions, but poor execution [due to 6-week course length].'*

*'Generally satisfied. Missed the peer-based interaction and peer-based learning'*

# Cont'd – delivery feedback

**Assignment feedback** - Students found feedback on some assignments to be unspecific, lacking explanation of the mark or direction on how to improve. On some occasions, it came too late to inform follow on assignments.

*' The problem with the assignments was we were not given a worked assignment result'*

*' I don't know what I should have done to get a better grade. I'm not sure how they graded the essay* [s 22]

**Academic Integrity/Invigilation** - The emphasis placed on cheating in the final exam was considered excessive for a mature student cohort.

*' On the exam, so many rules to prevent cheating* [s 22] *This is not scalable.'*

# Teaching content feedback

**Teaching material** - There was a level of disappointment expressed about some of the teaching materials, and a mismatch with their expectations.

*'As Australia's leading university, ANU has a chance to deliver something excellent and I feel as if this was lost.'*

*' I was using the ANU course as an [syllabus] index, and then looking for course material elsewhere'*

*' I started to hate the course... In the end, Youtube has been a much better teacher for me in that course.'*

*' More worked examples would help, especially for mathematical concepts, which can seem foreign when presented. It happened at times, but we needed more of it. Lead with a simpler version.'*

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# Cont'd - Teaching content

**Teaching material (exercises and datasets) -** There was an expectation of more relevant exercises and datasets in some courses.

' Disappointed that the data examples are not representative of the messy data you get in industry.'

'The dataset we had was a data governance survey dataset.'

'Using more widely utilised tools and better datasets would greatly improve the student experience. The program could be themed around a particularly complex dataset that students' progress through and interrogate in different way to achieve outcomes'

'Data wrangling some of the best. <sup>s 22</sup> ▮▮▮▮ has solutions to prevent cheating using ID keys to generate unique datasets which is very smart and demonstrates the power of what you can do in data.'

# Cont'd – Teaching content

**Assumed Knowledge** - The general feedback was that there was too much assumed knowledge

*'The lack of prerequisites have caught a lot of people off guard. Pre-requisites would reduce the shock factor for students unfamiliar in this area.'*

*' We had a 2 -weeks break between the courses, which we could have used to prepare well for the course [if guidance or review material given]'*

*' Provide a guide or self-learning package'*

*'I can't imagine how much [people retraining from another field] they would have struggled with this. We had some students coming from an Arts background, who thought this was a good entry for it. I imagine they were shocked. This wasn't pleasant'*

*'8000 level subjects in the graduate certificate are not the right level'*

*'The delivery of the content seems to have been pitched to those out of work with full-time availability, rather than those looking to upskill.'*

# Cont'd – Teaching content

**Syllabus** - Mixed with some good positive response.

█████ s 22 ██████████████████████████████████████████████ Found ANU more academic and difficult in the course content. The ███ s 22 ████ approach is much more practical. [For E.g.] ANU taught the theoretical underpinnings in the database courses where ███ s 22 ███ just taught the practical side

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' The data mining course was very challenging.'

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'I wish I'd learnt these skills years earlier in my career.'

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s 22 ███████████████████████████████████████
██████████████████████

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# Masters Pathway

**Progression to Masters** - The option to progress to Master's level training was an attraction. When asked whether students would consider pursuing options for linked programs through Graduate Diploma or Masters level qualifications, most would consider this option. However with the very firm caveat that the delivery and quality of courses is significantly improved. Almost all also required online or largely online delivery.  One student noted their desire for a leadership element to this type of offering.

*[One student said] ' Yes, but Data Wrangling doesn't count toward the Graduate Diploma' [of Applied Data Analytics]*

*[You should] 'Have these courses as a stepping stone to further education.'*

# Suggested next steps

1. **Better managing and learning from student experience and outcomes** to compile evidence of best practice and inform development of the program. We should monitor student progress and engage to support follow through to graduation. This will support experiments with different teaching techniques, processes and tools.

2. **Development of standards** for service level, quality and relevance of program content, and delivery and accessibility of our online graduate certificate programs with respect to whole-of-program learning outcomes and student experience. This could also consider the GCDE against the critical issues identified by the TEQSA *Foundations for good practice report.*

3. **Better describing the program, expectations, outcomes and eligibility** to target high quality applicants, and assist students to understand the value and challenges of the course. Clearly defining the intended audience and designing the program for that audience would enable handling of difference prior knowledge, and contribute to better managing student expectations and outcomes.

4. **Creating a longer term plan** for developing the GCDE program to meet student learning needs and provide integrated educational pathways to higher learning for students.