

# ASSESSMENT HIGHLIGHTS 2022



**QCAA**  
Queensland Curriculum  
& Assessment Authority



*For all Queensland schools*

ISBN

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Contact Assessment highlights:

[assessmenthighlights@qcaa.qld.edu.au](mailto:assessmenthighlights@qcaa.qld.edu.au)

Queensland Curriculum & Assessment Authority  
PO Box 307, Spring Hill QLD 4004 Australia  
Level 7, 154 Melbourne Street, South Brisbane

Phone: +61 7 3864 0299

Email: [office@qcaa.qld.edu.au](mailto:office@qcaa.qld.edu.au)

Website: [www.qcaa.qld.edu.au](http://www.qcaa.qld.edu.au)

# ASSESSMENT EVIDENCE



# Acknowledgments

<b>Hanna Jones</b> .....	West Moreton Anglican College
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<b>Charlotte Dawson</b> .....	Palm Beach Currumbin State High School
<b>Charlie Adams-McMahon</b> .....	Kelvin Grove State College
<b>Olivia Folland</b> .....	St Peters Lutheran College, Indooroopilly
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<b>Braden Simm</b> .....	Nambour Christian College
<b>Matthew Schoutrop</b> .....	St Joseph's College, Gregory Terrace

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# Introduction

Following a COVID-19-induced hiatus last year, I'm pleased to announce that the QCAA's annual publication *Assessment highlights* is back. Since 2016, we've distributed it via principals to showcase outstanding Year 12 student work from across Queensland in a range of subjects.

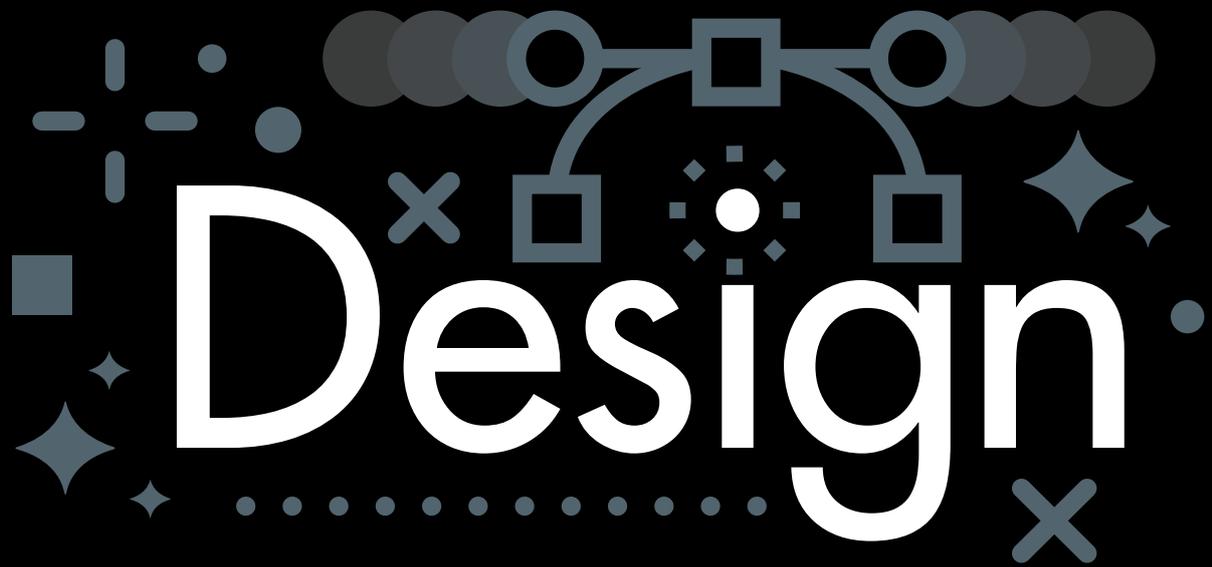
But *Assessment highlights* is also a practical resource. Teachers and students can use it to gain insights into how assessments were developed and marked, and benchmark against the very best of responses.

While external examinations are a significant part of the new Queensland Certificate of Education (QCE) system, our state continues to be a leader in school-devised assessment and an advocate for its benefits. Selected during confirmation processes in 2020, the student responses brought together here show how internal assessment enables students to explore a topic in detail in a way that sparks curiosity and encourages skills such as critical thinking and creativity. They also make it clear that our system is based on a unique partnership between the QCAA, classroom teachers, teacher-assessors and schools.

The QCAA has now launched an online version of *Assessment highlights* to also showcase excellence in General subjects in performance assessments such as The Arts subjects. This is a resource we will update regularly and expand to include subjects from all learning areas. Like the QCE system, *Assessment highlights* is poised to go from strength to strength.

*Jacqueline Wilton*

**Executive Director, Curriculum Services**



# Design

# Design

## Internal assessment 1

Examination — design challenge

### Hanna Jones

West Moreton Anglican College

#### Task

Visually document the develop phase of the design process in response to the design brief and stimulus.

#### Stimulus

**Seen visual stimulus:** Two A4 sheets of visual stimulus

**Unseen written stimulus:** Design brief

Athletes and sportspeople often use technology to monitor and track data of their progress to ensure that their goals are being met. This is no different for high adrenaline sports like alpine skiing, rock climbing and abseiling, downhill mountain biking, and waterfall kayaking. Depending on the sport, different athletes will want to track different data; the needs and wants of one sport will differ to another. There is a broad range of data that competitors want to monitor, and different ways that this can be captured.

Wearable technology is a rapidly evolving area of design that involves the combination of technology with clothing. Clothing and devices that respond to biophysical changes are the focus of current developments.

Wearable technology enables objects to track and exchange data without requiring human intervention. This data can be related to a physical output of the human body, among other things.

There is a need for a non-invasive wearable device for sportspeople who compete professionally in various competitions around the world. This device needs to be flexible enough to capture all available data while competing or training. Based on the stimulus provided, choose at least two of the sports identified to design for. Determine what data might be available to capture, opportunities to incorporate wearable technology, and how it might help inform the user.

#### Design criteria:

- Solution must consider ergonomic requirements of an athlete.
- Must not be worn around the wrist or neck (can cause injury if caught).
- Allow users to receive some feedback during the activity.
- Include the ability to access comprehensive feedback after activity is complete.

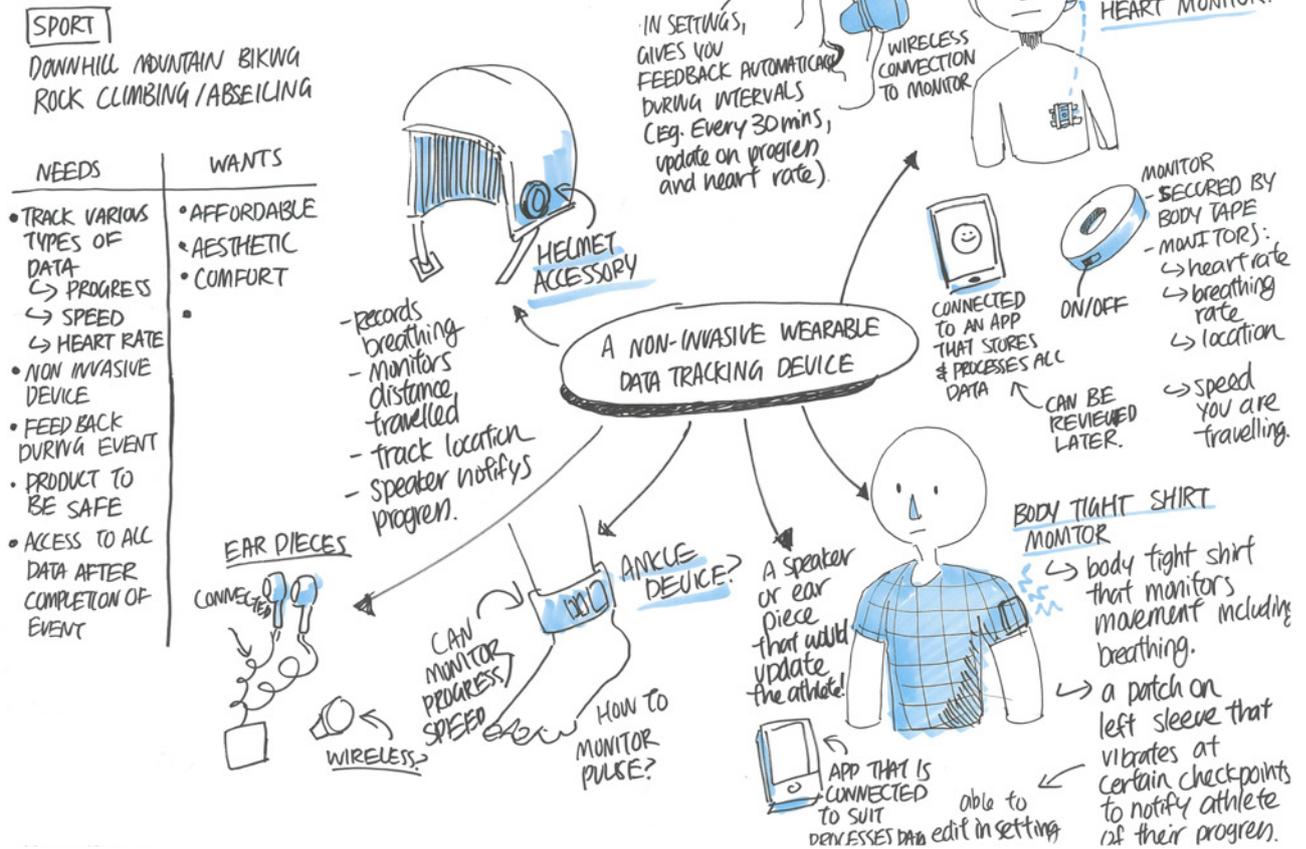
*Excerpt from West Moreton Anglican College's Design IA1, 2020.*

# Hanna Jones

West Moreton Anglican College

## Design challenge — non-invasive data capture device for professional sportspeople

### ① DEVELOPING IDEAS + IDEATION SKETCHING

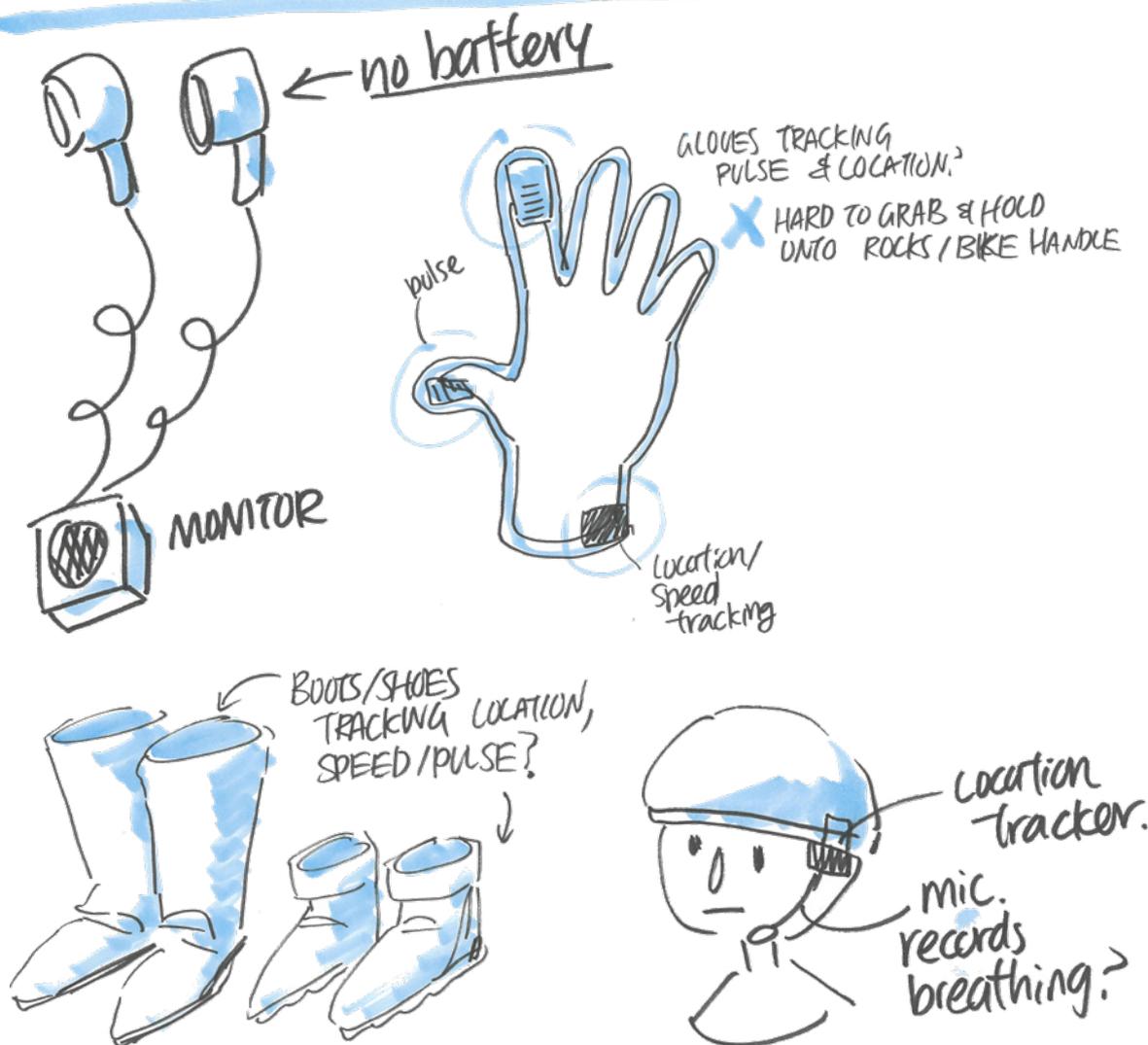


This human-centred design task encourages students to consider the needs and wants of people who most likely have different interests to them. Designers in industry must consider the range of needs and wants of a variety of stakeholders, so West Moreton Anglican College’s Senior Design program provides a range of opportunities for students to empathise with other people. To design a relevant and sufficient solution, students need to first understand the point of view of the identified stakeholder.

By devising her ideas side-by-side with the user’s needs and wants, Hanna’s response starts off on a strong foot. She shows a range of evaluation and synthesis skills in her response; her strong ability to communicate visually in this task assists the clarity of these higher order thinking skills. Hanna’s highly proficient communication abilities, coupled with the evaluation of her concepts against the design criteria, allow her to propose a clear, developed solution that clearly meets the brief requirements.

Michael Bickerton, teacher

# EXTRA IDEATION SKETCHING (1.5)



Fluent sequences of ideation sketches show the progression of understanding using techniques such as line, tone and colour to differentiate between critical and non-critical elements. These sophisticated visualisation skills have also been used to show evidence of evaluation and subsequent refinements.

**QCAA Principal Education Officer**

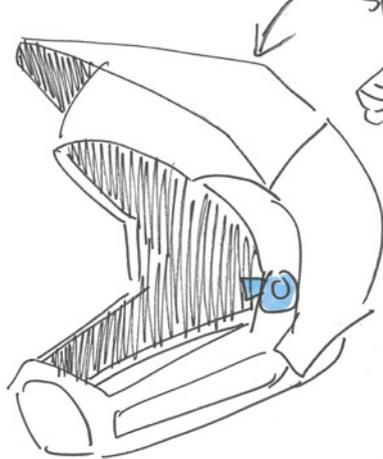
To prepare for this assessment task, I focused on clear communication the most as it was important to show the marker what thoughts and ideas I had for the task. In Design exams, it is very important to have a clear understanding of the design process and all the different ways you can communicate and connect your ideas. As long as you understand how to concisely put your ideas onto paper, an unseen prompt will be much less daunting.

**Hanna Jones, student**



## ② 2 CONCEPTS

BIKES MAY DROWN OUT THE SPEAKER



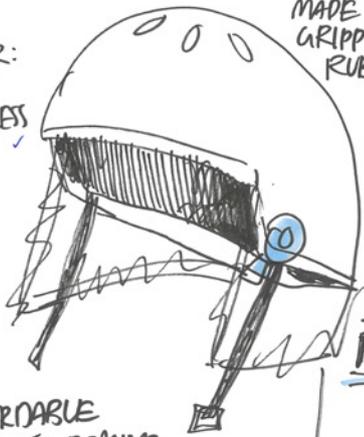
CLIP-ON HELMET ACCESSORY

STRONG GRIP  
↳ INNER SIDE MADE OF GRIPPY RUBBER

SPEAKER:  
UPDATES ON PROGRESS

TRACKS LOCATION & SPEED

MICROPHONE MONITORING BREATHING RATE



\* AFFORDABLE  
\* ABLE TO REMOVE & REUSE

## EAR PIECE & CHEST MONITOR

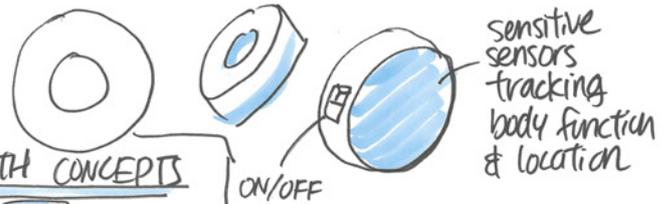


WIRELESS CONNECTION

EAR PIECE  
↳ Gives updates of progress of checkpoint

CHEST MONITOR  
↳ Attached by body tape  
↳ TRACKS  
↳ heart rate  
↳ breathing  
↳ location  
↳ progress

TO BE WORN ON LEFT SIDE CLOSEST TO HEART



sensitive sensors tracking body function & location

FOR BOTH CONCEPTS



CONNECTED TO APP THAT STORES & PROCESSES ALL DATA.

West Moreton Anglican College Design students are taught visualisation techniques in conjunction with higher order thinking skills to ensure that their visual documentation of the design process is clear, efficient and meets the requirements.

In the lead-up to the examination, my teaching emphasised the importance of being guided by the design

criteria identified in the brief. Reviewing rapid visualisation techniques for ideation and schematic sketching prepared students to quickly and efficiently lay out their devising of initial ideas, process their development, and propose a final solution that met the brief. Students received feedback on their design processes by completing 'mini design challenges' in class, which

focused on developing their synthesis and evaluation skills.

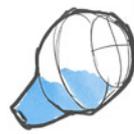
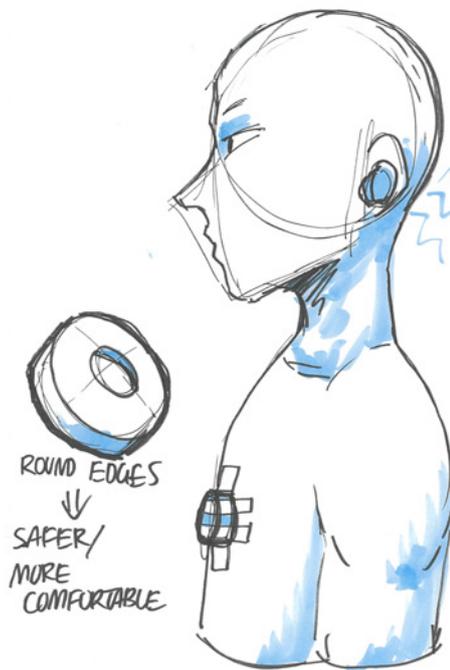
**Michael Bickerton, teacher**

I chose to use two colours (black and blue) to write clear, short notes and I highlighted important areas in blue to make my assessment easier to understand and read.

**Hanna Jones, student**

### ③ DESIGN PROPOSAL

### EAR PIECE & CHEST MONITOR



#### ONE SINGLE EAR PIECE (RIGHT OR LEFT OPTIONAL)

- ↳ wireless connection to chest monitor
- ↳ gives progress updates to athlete ~~at~~ intervals (eg. settings: every 30mins)
- ↳ no wires ⇒ comfort & easy to put in.



#### CHEST MONITOR

- ↳ TO BE PLACED CLOSEST TO HEART
- ↳ RECORDS & MONITORS:
  - ↳ heart rate
  - ↳ location → height
  - ↳ breathing
  - ↳ travelling speed
- ↳ Secured using body tape
- ↳ small size ⇒ comfort
- ↳ WATERPROOF ⇒ DURABLE & SAFE

How long you have been exercising for.

• Climbers are able to be notified of their progress such as current height & heart rate.

• Riders are able to know distance travelled between certain times.



APP IS CONNECTED TO THE MONITOR AND ALL DATA COLLECTED CAN BE REVIEWED LATER.

↳ APP PROCESSES DATA & GRAPHS THEM / CREATES VISUALS OF DATA.

On pages 1 and 2, the response shows a preparedness to think divergently and flexibly about different possible ways to solve the problem. Page 3 shows a period of convergent thought, where Hanna uses evaluation skills to seek insight into how her range of ideas could inform a design concept. On the final page Hanna has made a clear decision about the final design concept that best meets the requirements of the design problem.

Hanna's response demonstrates sophisticated representations of ideas and a coherent and logical design concept. Ideas have been perceptively devised, incorporating unique, credible and detailed attributes. The evaluation of the ideas has resulted in discerning refinements.

QCAA Principal Education Officer



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# Digital Solutions

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# Digital Solutions

## Internal assessment 1

Investigation — technical proposal

### Taylor Thorne

Somerville House

#### Context

The Under the Clock Café (<http://undertheclock.com.au/>) would like to expand its current operations with a new innovative digital solution that would enable customers to order their coffee and other café products online rather than only in person as is currently the case.

It wishes to make it easy for people to browse the menu, create customised orders, and add them to a shopping cart. They have suggested a mobile phone app or online booking system with features like:

- Jump the queue and download the app: an easy and convenient way to order and pay for food, drinks and coffees
- Secure ordering and payment, browsing the product menu, notifications when an order is ready to be picked up, updates on specials and reward points for purchases.

#### Task

Prepare and present a technical proposal for the Under the Clock Café for a new innovative digital solution that uses their existing product and sales data.

*Excerpt from Somerville House's Digital Solutions IA1, 2020.*



# Taylor Thorne

Somerville House

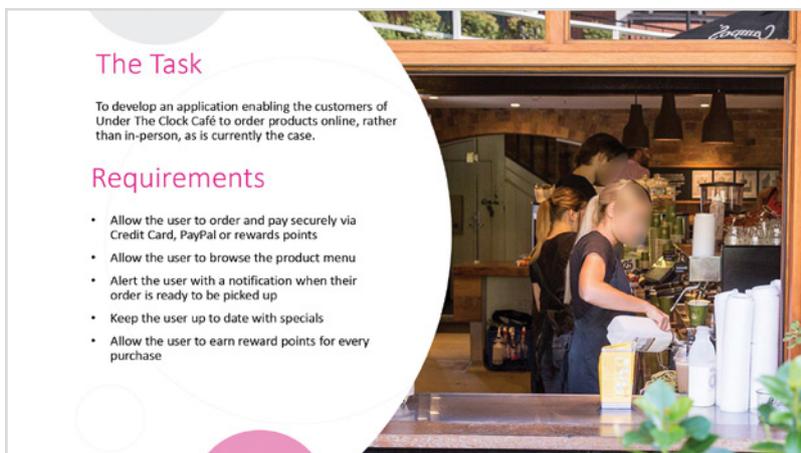
## Under the Clock Café — proposal for a digital solution

The script and a selection of slides from Taylor’s multimodal presentation have been reproduced.



Images from Under the clock café used with permission.

This project aimed to develop a digital solution to enable the customers of Under the Clock to order products online rather than in-person, as is currently the case.



The café has specified some anticipated key features of the solution as listed on screen. It is essential that users can browse the menu, create customised orders, and add orders to a shopping cart. Due to the increase of mobile phone usage in this modern-day society, the solution will be a phone application rather than an online booking system.

*Digital Solutions broadened my abilities in UX (user experience) design as well as understanding the fundamental principles of databases and coding (which are both so much more relevant to everyday life*

*than I once thought). The subject allowed me to constantly ‘think outside the square’ by approaching problems in many different ways.*

**Taylor Thorne, student**

*Taylor's response demonstrates coherent and purposeful application of the Digital Solutions problem-solving process. It consistently applies computational,*

*design and systems thinking processes to develop ideas and solve the problem.*

**QCAA Principal Education Officer**

For this solution, the target audience is identified as anyone over the age of 12 interested in using the café's services. As younger users may not have credit cards, an option to pay with cash will be included. The stakeholders primarily affected by this endeavour are the café staff, owners and customers.



### Target Audience and Stakeholders

**Target Audience**  
Anyone over the age of approximately 12 who has online access and is interested in using the café's services  
(Generally, users are likely to be older than 12, however, in this technology driven society people are accessing online at earlier ages, so must be considered)

**Stakeholders**  
Café staff  
Café owners  
Customers (students, teachers, members of the public)

The following prescribed and self-determined criteria have been set and will be used to evaluate the success of the final solution.

### Prescribed Criteria & Self-determined Criteria

**Prescribed criteria**

- Personal, social and economic impacts and considerations to identify risks
- Present a user-interface prototype
- Present both a low and high fidelity non-coded prototype digital solution

**Self-determined criteria**

- Ease of use for target audience
- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Aesthetic and minimalist design
- Appropriation design

The customers' needs and wants were explored to further unpack the problem.

### Human Needs and Wants

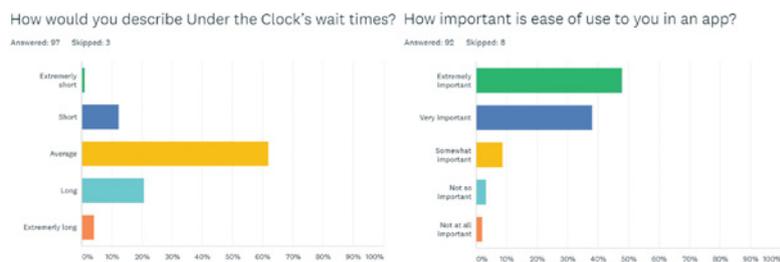
- People want to use the services provided by the Under The Clock Café
- People want an easy and convenient online platform to order café products
- People lead busy lives, thus, do not want to waste time waiting in-line to order and then waiting for their order to be ready
- People want/need a secure payment method
- People want to know café specials
- People want more affordable products, thus, a rewards system will add appeal to the café and attract business

## Interview with Manager, *Under the Clock Café*

- Main customer groups:
  - Somerville House students
  - Somerville House staff
  - Somerville House parents
  - Doctors, nurses, patients from the hospital
  - Members of the public
- Most popular orders are takeaway coffees - flat white, cappuccinos, long black
- Rewards/specials is not something that the café would consider using as they already have a staff and student discount for the school and hospital
  - School students and staff get 15% discount
  - Hospital staff get 10% discount
- Having a keep cup option would not be ideal for the cafes operations (environmental issue)
- Current Issue:
  - Customers are required to stand in a line to order – takes time.

As part of the exploration process, an interview with the café's manager was conducted. The main points covered in the interview are listed on screen. It was discovered that the café would not be interested in a rewards system, as discounts are already given to school students, school staff and hospital staff. Therefore, a rewards system will not be implemented.

## Survey of Somerville House Senior Students



To gather market and consumer research, the Senior School students of Somerville House were surveyed. While the café's lines do not appear to be an immense issue, this application should help to make them more efficient. Ease of use is either somewhat, very or extremely important to the majority of users. Thus, the application's design was carefully constructed to allow for easy navigation.

*The school's coffee shop (Under the Clock), which is a separate business operated by the school, appealed both in terms of the real-world aspect as well as having ready access to the business and to the managers. Creating a mobile app rather than web-based application added a contemporary aspect that really engaged the students despite the added complexities. The school's students are*

*generally very much interested in UX design and related design aspects. We selected React Native as the development platform because of its currency and its support from many leading IT companies. Having a development environment like Expo Snack (<https://snack.expo.io>) was also very helpful.*

**Paul Herring, teacher**

The risk of this application is that it will allow many people to order online at the same time, which may result in an overall longer waiting time if there is an influx of orders.

Currently, there are online platforms such as Uber Eats and Deliveroo which allow users to order food and have those orders delivered to them. However, these are both delivery services and do not allow the user to personally pick up

their order. Chain restaurants such as Grill'd have online systems allowing users to order their food and select a time for pick up. Recently, McDonald's has implemented an application to order products online. The mymacca's application provides a successful solution to a similar problem, thus, will inspire the proposed solution for Under the Clock. Currently, there are no applications existing for independent retailers such as Under the Clock.



## User Personas and Stories

5 vastly different user personas and stories were made to represent main customer groups (school students, school staff members, members of the public, hospital patients, and hospital staff).

Five user personas were created to represent the café's main customer groups. Each of the personas will live in Brisbane and have vastly different lifestyles, ensuring the application is appealing and suitable to a range of customers. The created personas and stories were made to represent main customer groups — school students, school staff members, members of

the public, hospital patients, and hospital staff. They include Zaylee, a Somerville House student; Ryan, a full-time working father; Desley, an elderly patient at the Mater Hospital; Liam, a Somerville House teacher, and Chace, a doctor at the Mater Hospital. To ensure the application is suitable for all ages, each persona is within a different age range.

## Zaylee Tatum

age: 16 - 18  
residence: Brisbane  
education: Currently attending Somerville House  
occupation: Student with a part time job at MacDonald's  
marital status: Single

*As a school student with many co-curricular commitments, I find some mornings are very busy. A mobile phone application which allows me to order food from Under The Clock would be very convenient as it would reduce the time I spend waiting to order.*

To stay fit I do cross-country, pilates, and play netball. I also have a part-time job at MacDonald's to earn extra money.

### Comfort With Technology

#### INTERNET



#### SOFTWARE



#### Needs

- Fast service

#### MOBILE APPS



#### SOCIAL NETWORK



#### Wants

- A mobile phone application to make Under The Clock orders
- Cash to be acceptable for payment

### Zaylee's User Story

I am currently in Year 11 and attending Somerville House. I love staying active through netball, Pilates and cross-country. I have a part-time job at MacDonald's to earn extra money and gain work experience. As a student attending Somerville House, I love visiting Under The Clock Café, particularly before school to purchase breakfast after cross-country. However, cross-country mornings can be quite rushed and sometimes I will not have enough time to visit the café and buy breakfast. If I do manage to get to the café, I run the risk of arriving to class late, much to my teacher's dismay. A mobile phone application which allows me to pre-order my food will save me time waiting in line and ensure I always get breakfast and get to class on time.

## Ryan Schoeffling

age: 40 - 50  
residence: Brisbane  
education: Bachelor's degree in Finance, Commerce and Law  
occupation: Stock broker  
marital status: Married with 3 children

*As a full-time working father, I find myself with limited time. Under The Clock is such a convenient cafe to purchase my morning coffee after dropping my 3 children to school.*

I enjoy playing golf, travelling, watching the tennis with my friends and visiting our beach house at Noosa.

### Comfort With Technology

#### INTERNET



#### SOFTWARE



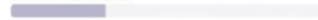
#### Needs

- Quick service
- Easy to use mobile phone application

#### MOBILE APPS



#### SOCIAL NETWORK



#### Wants

- The ability to favourite certain orders to make future ordering easier

### Ryan's User Story

I am a full-time working father of three children, two boys and one girl. I work as a stockbroker for Morgan's Financial Limited. In my spare time, I enjoy playing golf with my wife, watching the tennis with friends and visiting our Noosa beach house. I frequently visit Under The Clock Café after dropping my daughter off at school. An application where I can pre-order my coffee so that I do not have to wait in-line to order would be very beneficial to my busy work schedule. I would be able to order my coffee before I leave the house in the mornings.

## Desley Westwick

age: 70 - 80  
residence: Brisbane  
education: High school diploma  
occupation: Retired  
marital status: Widow

*I frequently visit the Mater Hospital for my scoliosis and like to treat myself to a tea at Under The Clock Cafe after my appointments. However, afternoons at the cafe can be quite busy and I struggle to stand in line for long periods of time.*

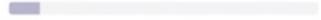
I enjoy spending my time volunteering at The Salvation Army, having tea with my grandchildren and looking after my 3 British Shorthairs and 2 English budgies.

### Comfort With Technology

#### INTERNET



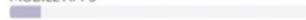
#### SOFTWARE



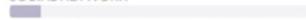
#### Needs

- An application suitable for someone with very low technological experience

#### MOBILE APPS



#### SOCIAL NETWORK



#### Wants

- An alternative to standing in line for long periods of time when ordering

### Desley's User Story

As a retired widow, I enjoy spending my time walking, reading, volunteering and having tea with my grandchildren. I have 3 British Shorthairs, named Penelope, Agatha and Queen Elizabeth II and 2 English budgies, named Butterscotch and Pepperane, which I absolutely adore. Unfortunately, I'm not as young as I used to be so I frequently visit the Mater Hospital for my scoliosis. After my visits, I enjoy going for tea at Under The Clock Café, however, when the café is busy, I struggle to stand in line long periods of time. An application which allows me to order without having to stand would be absolutely superb. Although, I must admit I have limited experience with technology so I am a tad concerned whether an old girl like me would be able to navigate the application.

## Liam Bloom

age: 30 - 35  
residence: Brisbane  
education: Bachelor of Teaching  
occupation: History Teacher at Somerville House  
marital status: Engaged

*As a history teacher at Somerville House, I frequently visit Under The Clock Cafe during my lunch breaks and free periods. Fortunately, as a school staff member I get a discount, however, it would be nice to know the total cost of my purchase before I order.*

In my spare time I enjoy teaching Flamenco dancing to underprivileged teenagers, coaching my son's football team and going for hikes at Mount Coot-tha with my fiancé.

### Comfort With Technology

#### INTERNET

#### SOFTWARE

#### MOBILE APPS

#### SOCIAL NETWORK

#### Needs

- To know his staff discount and therefore the total cost of his order

#### Wants

- An application which is easy to use

### Liam's User Story

I am currently working as a high school history teacher at Somerville House. I love teaching as I feel I am educating the next generation of thinkers. On the weekends, I teach Flamenco dancing to underprivileged teenagers at my local community centre. I also coach my five-year-old son's football team and stay fit by hiking with my fiancé. During my breaks at school, I visit Under The Clock Café. As a staff member at the school, I get a discount, so I would love to know the total cost of my purchase before I order. An application which allows me to see this would be very beneficial.

## Chace Eastwood

age: 60 - 65  
residence: Brisbane  
education: Doctorate of Medicine  
occupation: Cardiologist  
marital status: Married

*As a cardiologist at the Mater Hospital, I frequently visit the Under The Clock Cafe during my breaks. However, my breaks can be quite short depending on the day so I need quick service.*

I enjoy boating and fishing at my holiday house on Hamilton Island.

### Comfort With Technology

#### INTERNET

#### SOFTWARE

#### MOBILE APPS

#### SOCIAL NETWORK

#### Needs

- Quick service

#### Wants

- To enjoy the limited time he has during his breaks

### Chace's User Story

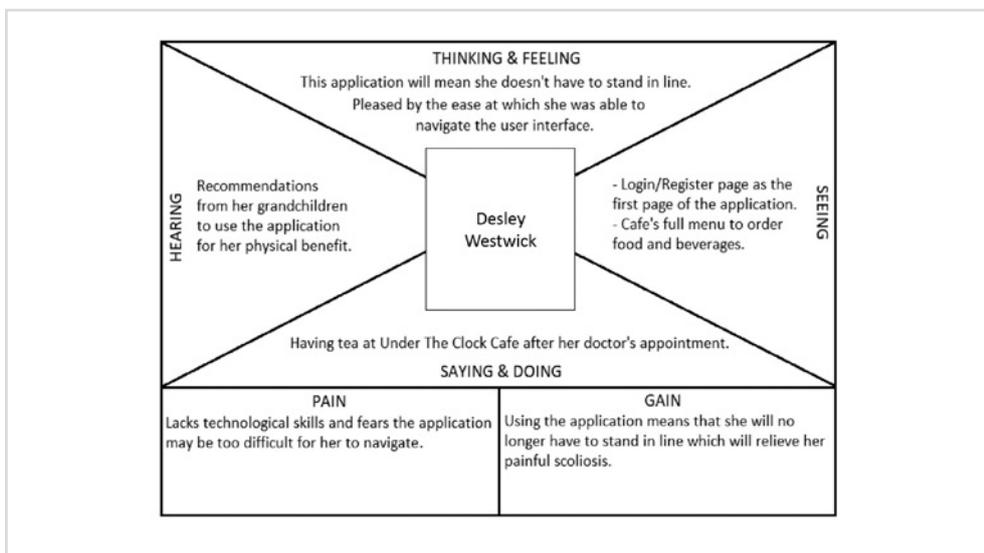
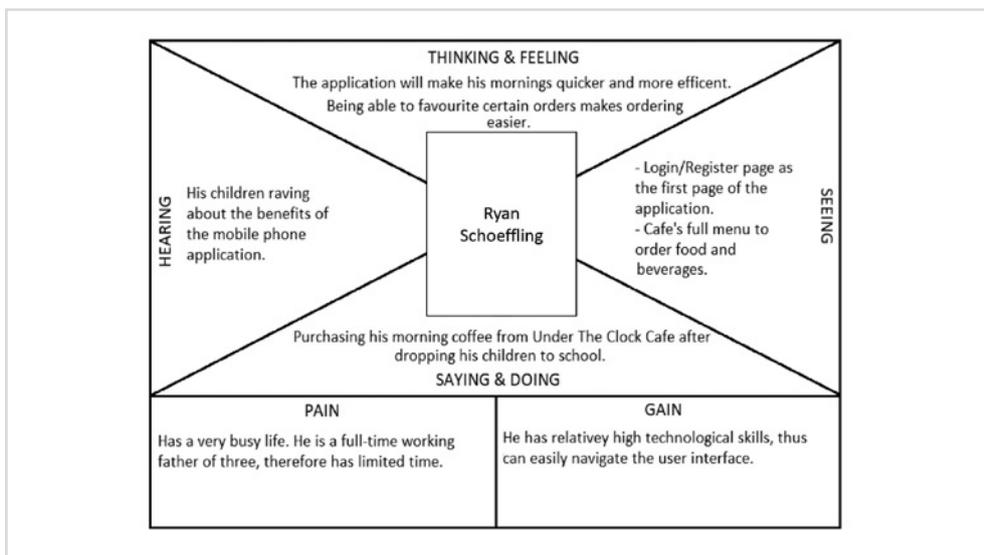
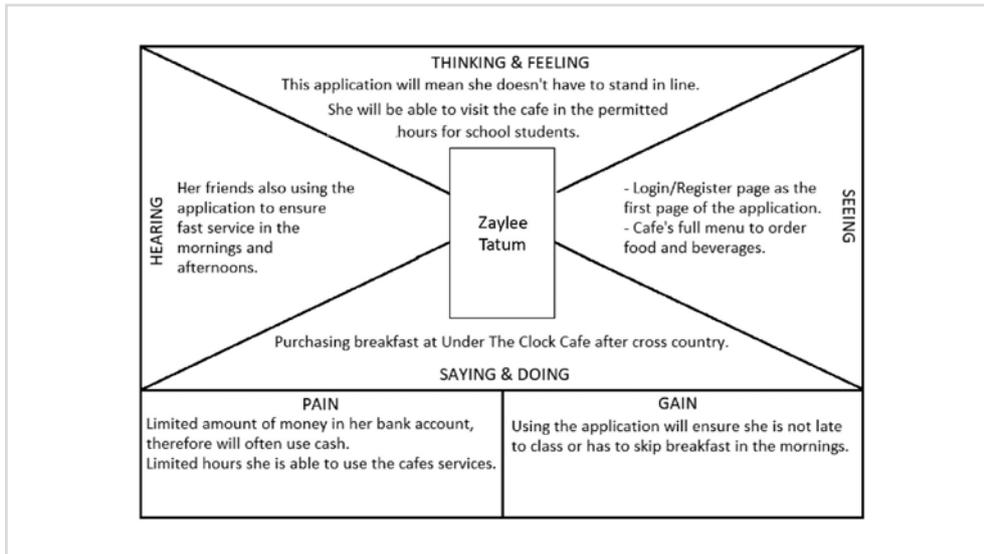
I am a cardiologist at the Mater Hospital and often visit Under The Clock during my breaks. Although, my breaks tend to be quite short so an application which allows me to pre-order products would be very valuable. My job is very rewarding as I constantly help to improve the lives of my patients. On my holidays, I enjoy boating and fishing at my holiday house on Hamilton Island. I have been married to my wife for 35 years who is also a doctor at the Mater Hospital.

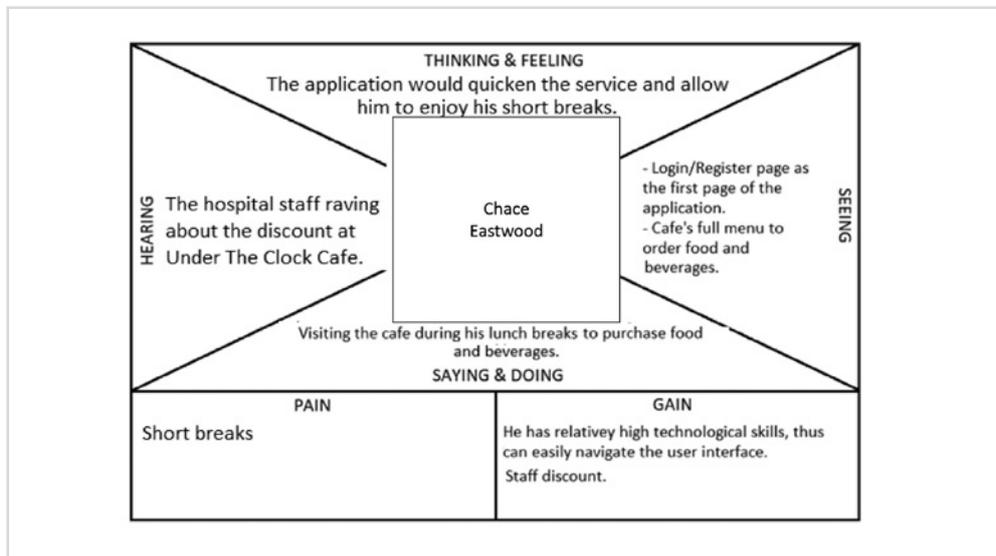
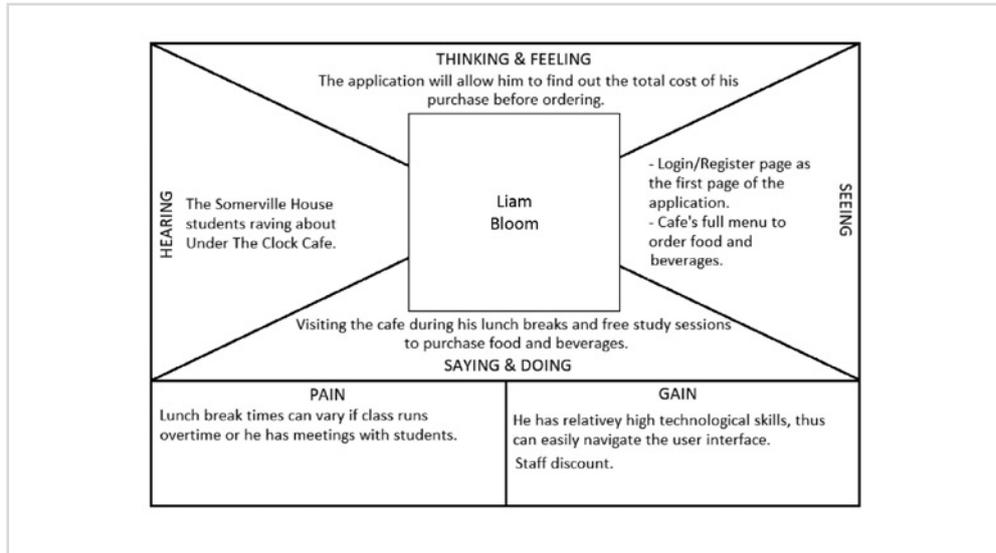
*Taylor has displayed an outstanding ability to correctly interpret every aspect of the ISMG criteria and to then successfully produce work that met and even exceeded these*

*criteria. Every aspect of her response was of the highest standard as well as displaying great competence in all the higher order thinking skills.*

**Paul Herring, teacher**

Empathy maps were constructed to provide insight to the different reactions each user persona may have while using the application. This will ensure that the design considers the feelings and emotions of each individual.





*To prepare students for this this assessment, we had studied other mobile development environments in Year 11 and the students also worked on some basic 'templated' solutions developed with React Native.*  
**Paul Herring, teacher**

## Data Sources and Programming Requirements

Data for the mobile phone application will be sourced from the 'Café Moch Product Sales' excel spreadsheet.

The user must also input their own personal data into the application to use its functions.

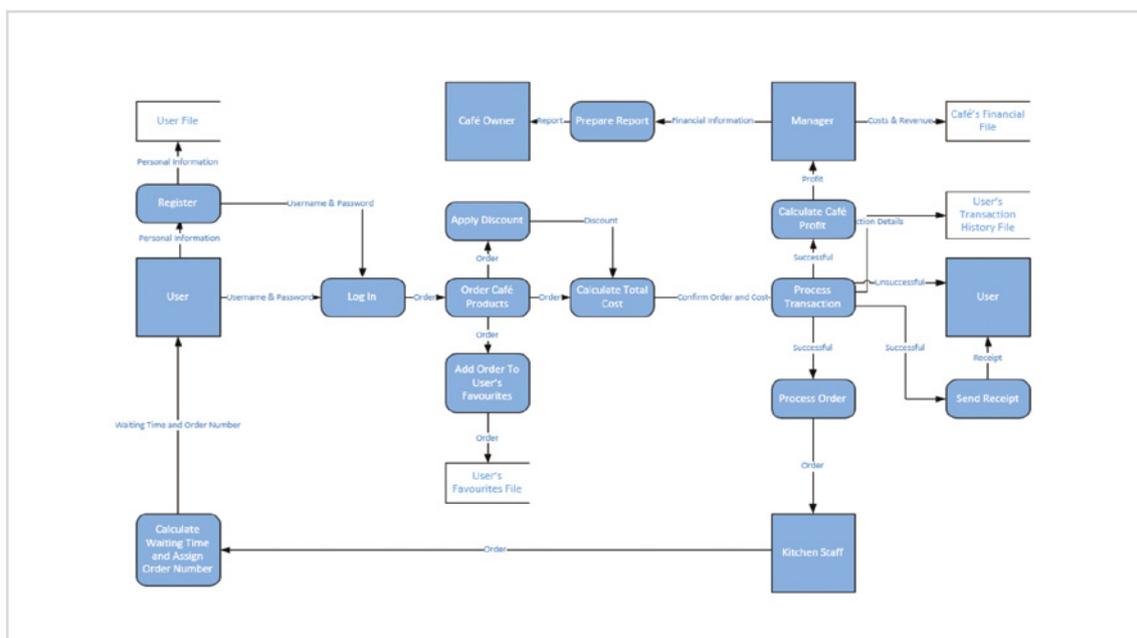
PRODUCT SALES REPORT						
DEPARTMENT	CODE	ITEM	QTY	UNIT COST	NET SALES	TAX TOTAL SALES
Drinks		Espresso	25.00	3.20	\$80.00	
		Flat White	425.00	3.50	\$1,487.50	
		Cappuccino	250.00	3.50	\$875.00	
		Latte	147.00	3.50	\$514.50	
		Long Black	87.00	2.50	\$217.50	
		Mocha	20.00	2.50	\$50.00	
		Mocha	45.00	2.50	\$112.50	
		Hot Chocolate	85.00	2.60	\$220.50	
		Smoothie - Hot/Chocolate	1.00	4.50	\$4.50	
		Smoothie - Banana	35.00	6.50	\$227.50	
		Triple Mocha Frappe	38.00	6.50	\$247.00	
		Café's Best Frappe	13.00	4.50	\$58.50	
		Local Tea	12.00	4.20	\$50.40	
		Softdrink Green	120.00	2.80	\$336.00	
		Mt. Franklin	100.00	2.50	\$250.00	
		Powanda	11.00	4.50	\$49.50	
		Sporting Water	21.00	2.80	\$58.80	

Data for the mobile phone application will be sourced from the 'Café Moch Product Sales' Excel spreadsheet. The user must also input their own personal data into the application to use its functions.

All data in the application would be stored in a database. The menu data would be stored in a table called 'cafeMenu'. Each item would be allocated an identification code and this would be the primary key of the table. The fields in this table would be the 'identificationCode', the 'unitCost' of each item, and the 'netSales'. The 'netSales' field would be linked to the user's order table and would be constantly updating as customers order products. There would also be a 'cafeRevenue' table, which includes the café's costs (including ingredients and staff) and the café's revenue (sales). Data inputted by the user would be stored in this database. The user's personal data would need to be encrypted while it is stored, as it includes financial information. The data collected would be stored in three tables, 'userDetails',

'userOrders' (which includes their order history), and 'userFavourites'. To ensure data integrity, one piece of data would be in each field. The 'userOrders' spreadsheet would be a much larger dataset with more attributes and rows, while the 'userDetails' table would be limited in size. Each user would be attributed a 'userID' as the primary key of the three tables to maintain data integrity. The 'userDetails' table would include the following fields; 'userID', 'firstName', 'lastName', 'email', 'phoneNumber', and fields required for financial information. The 'userOrder' table would be linked to the 'cafeMenu' and 'cafeRevenue' tables. As more orders are made, the 'netSales' field in both of these tables would increase.

The following Data Flow Diagram shows the potential flow of data through the application.



An IPO Chart was developed to demonstrate the solution’s potential algorithms.

Input	Process	Output
<b>Setting up account:</b> INPUT username INPUT password	BEGIN setUsername = INPUT("Please enter your username (email address): ") setPassword = INPUT("Please enter your password: ") END	SET username and password
<b>Logging In:</b> INPUT username INPUT password	BEGIN enteredUsername = INPUT("Username: ") enteredPassword = INPUT("Password: ") IF enteredUsername == setUsername AND enteredPassword == setPassword THEN PRINT("Welcome " + setUsername) DISPLAY home screen ELSE PRINT("Incorrect login details entered") ENDIF END	DISPLAY home screen OR PRINT unsuccessful login

The proposed application has been specifically developed for Under the Clock, therefore is geographically limited to Brisbane. As well, the application’s design and functionality is café specific, thus, cannot be used by other businesses. The functionality of the application will not exceed the key anticipated features to

ensure the task is completed within the allocated time. For example, an interactive map allowing users to view directions to Under the Clock from their current location will not be included, due to its complexity. However, this would be a valuable function if the application was to be implemented in the real world.

Input	Output	Process
<b>Order process:</b> SELECT items to order CONFIRM order	BEGIN INPUT items // The user selects items from the menu options ADD items to the user’s order SELECT userID FROM userOrders SELECT financial details of userID FROM userDetails PROCESS transaction IF transaction successful ADD order to userOrders CALCULATE waiting time PRINT waiting time IF user favourites order THEN ADD order to userFavourites ENDIF ELSE PRINT("Unsuccessful transaction") ENDIF END	PRINT user’s order AND waiting time OR PRINT unsuccessful transaction

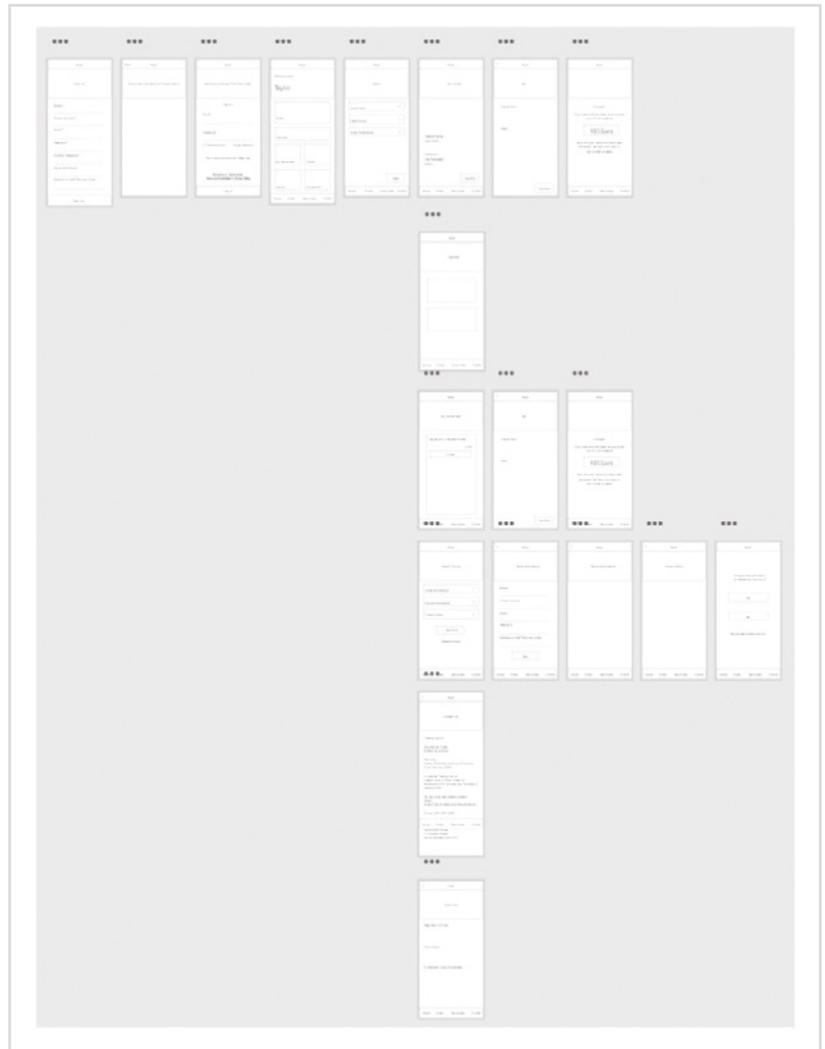
## Low fidelity wireframes

Attention to user experience is vital for success. An effective application should allow the user to accurately and easily complete a task.

Thus, on each page (excluding the login page) there is a tab navigation bar at the bottom of the screen to provide access to all major subpages. This function minimises the number of clicks required to move between pages, allows simple, quick navigation and provides a way for the user to leave any page at any time to prevent unwanted actions.

There is also a back arrow located in the top left corner of most pages.

For consistency, the café's logo will be at the top of each page and the same layout will be used on each page. Buttons will be rectangular to ensure a modern, simplistic design. On the menu page, the hot beverages are listed first, followed by cold beverages, then the menu selection, as the café's most popular takeaway order is coffee.



Sign in/Register Page

The Sign in/Register Page wireframe features a top section with a 'Logo' and a 'Welcome to Under The Clock Cafe' message. Below this is a 'Sign In' section with 'Email' and 'Password' input fields, a 'Remember Me' checkbox, and a 'Forgot Password' link. A 'Sign Up' link is provided for users without an account. At the bottom, there is a 'Log In' button and a footer with 'Home', 'Order', 'Favourites', and 'Profile' tabs.

Home Page

The Home Page wireframe shows a 'Welcome back' message and the user's name 'Taylor'. Below the name is a 'Menu' section with a 'Specials' section. There are four buttons: 'My Favourites', 'Profile', 'About', and 'Contact Us'. At the bottom, there is a 'Next' button and a footer with 'Home', 'Order', 'Favourites', and 'Profile' tabs.

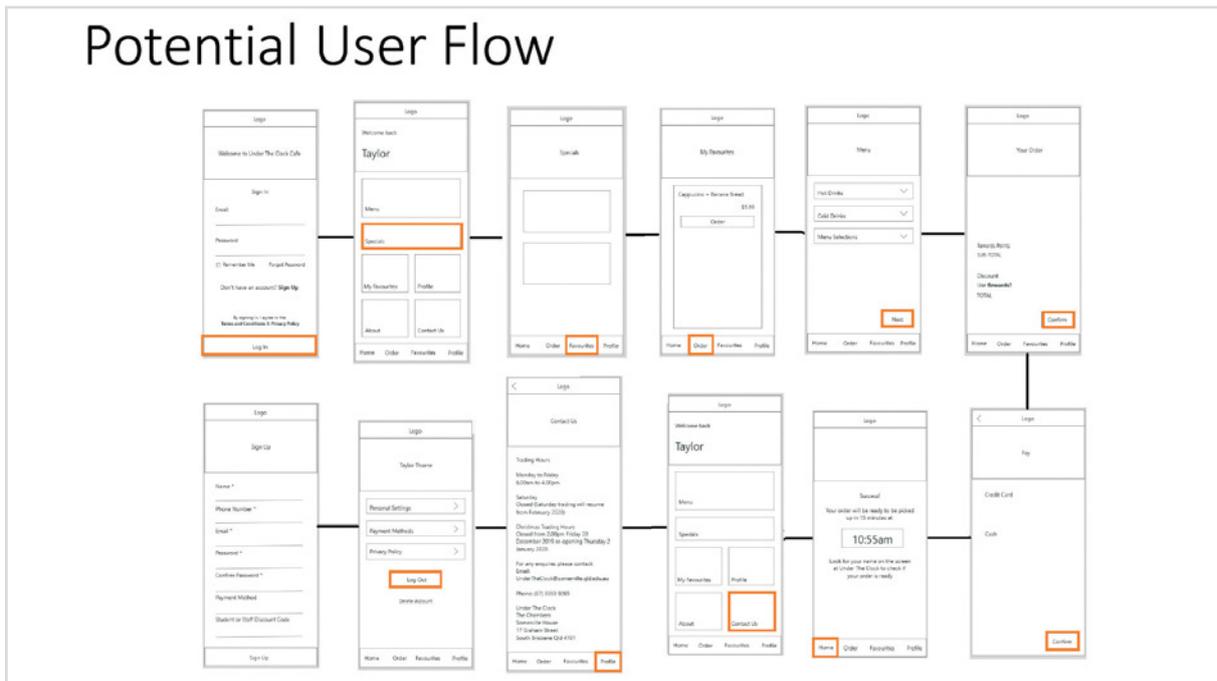
Menu Page

The Menu Page wireframe displays a 'Menu' section with three dropdown menus: 'Hot Drinks', 'Cold Drinks', and 'Menu Selections'. A 'Next' button is located at the bottom right. At the bottom, there is a footer with 'Home', 'Order', 'Favourites', and 'Profile' tabs.

Profile Page

The Profile Page wireframe shows the user's name 'Taylor Thorne' and three settings options: 'Personal Settings', 'Payment Methods', and 'Privacy Policy', each with a right-pointing arrow. Below these are 'Log Out' and 'Delete Account' buttons. At the bottom, there is a footer with 'Home', 'Order', 'Favourites', and 'Profile' tabs.

Here is a potential user flow through the low fidelity model.



Each user persona will have a similar user flow, as their objective in using the application to order food and beverages is the same.

### Potential User Flow

- The user starts on the login/register page. They are required to input their details to access their account.
- From the home page, the user clicks on the specials page to see if there are any new specials of interest to them.
- There are no appealing specials to this user, so they click on their personal favourites page.
- However, the user does not want any of their favourite orders, so uses the tab bar navigator to access the full menu and make a new order.
- The user confirms their order and method of payment.
- The application notifies the user when their order will be ready.
- The user visits home page to access the contact us page and check the café's address.
- The user then uses the tab bar navigator to access their profile and log out.

*I enjoyed the creative aspects of this subject, particularly involving UX design, as they allowed me to further understand how different users interact with user interfaces and how different designs can enhance user experiences in different ways. I thoroughly enjoyed responding to this assessment task as it required intuitive reasoning and 'putting myself in the users' shoes'.*

*I prepared for this task by researching and comparing current user interfaces with similar functions. While doing this, I was inspired by particular features of the different interfaces that enhanced user experience as well as features that would be better to exclude from the overall design. In doing so, I was able to construct an application design that users of any age would be able to navigate.*

**Taylor Thorne, student**

## Low Fidelity Testing

User	Design	Content	Technical Components	Advice/Queries
Ross	Good	Needs improvement	Needs improvement	<ul style="list-style-type: none"> <li>Majority of the links do not work – must fix this.</li> <li>The café's menu has not been incorporated yet.</li> </ul>
Elizabeth	Good	Satisfactory	Satisfactory	<ul style="list-style-type: none"> <li>Many of the buttons are not functioning.</li> <li>The payment page is unfinished – should include the user's details and payment options.</li> </ul>
Noela	Satisfactory	Satisfactory	Needs improvement	<ul style="list-style-type: none"> <li>No photos or colour yet, which makes the application unappealing to use.</li> <li>Some links do not work or connect to the wrong page.</li> <li>The specials page does not allow you to order the specials from that particular page.</li> </ul>
Courtney	Satisfactory	Needs improvement	Satisfactory	<ul style="list-style-type: none"> <li>Add photos related to the café.</li> <li>It may be better to use icons rather than words in the tab bar navigator. This will improve the design.</li> </ul>

Four users tested the low fidelity model, Ross, Elizabeth, Noela and Courtney. As a full-time working father, Ross will represent Ryan Schoeffling. Elizabeth is an elderly widow with a lack of technological skills, therefore will represent Desley Westwick. As Noela has similar technological skills to Liam Bloom and Chace

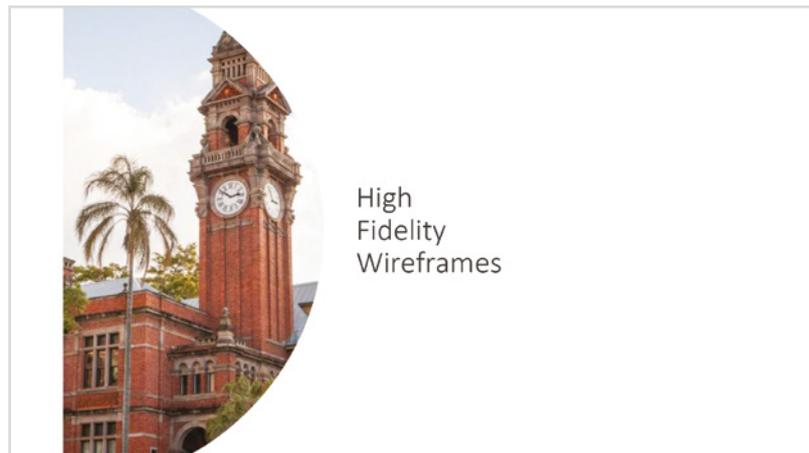
Eastwood, she will represent them. Courtney is the youngest user tester so will represent Zaylee Tatum. Although Courtney is not a school student like Zaylee, she did attend Somerville House and is currently a university student. Here is a brief feedback overview, summarised from each Client Evaluation form.

## Response and Changes

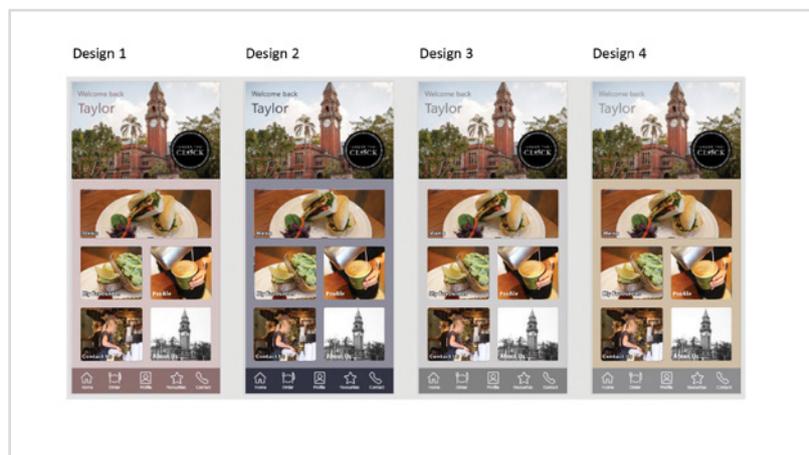
- Adding the food and drinks menu to the application.
- Completing the 'about us' and 'payment' pages.
- Adding photos which are related to the café.
- The specials page will be removed as the café is not interested in providing further discounts (see the interview with the café's manager).
- Use icons in the tab bar navigator on the bottom of each page to improve the applications overall design.

In response to the feedback, certain changes were made to the solution

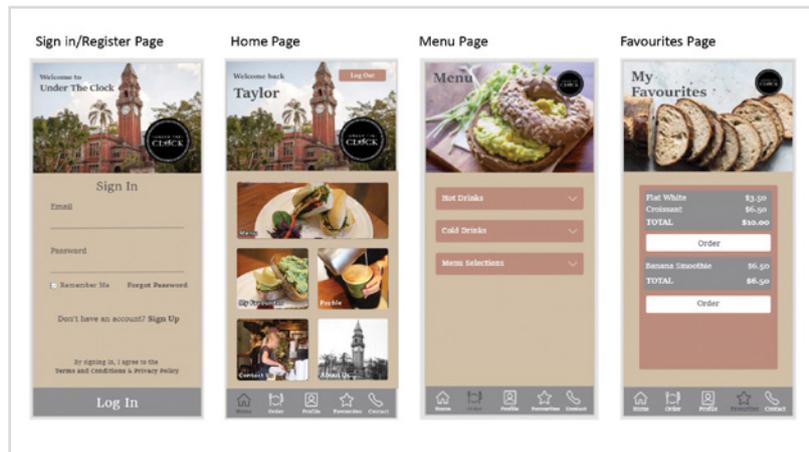
To determine an appropriate colour scheme that would be appealing to a range of users, a survey was conducted with the user testers.



Four colour variations were created. Overall, Design 4 was preferred, thus will be used for the application.



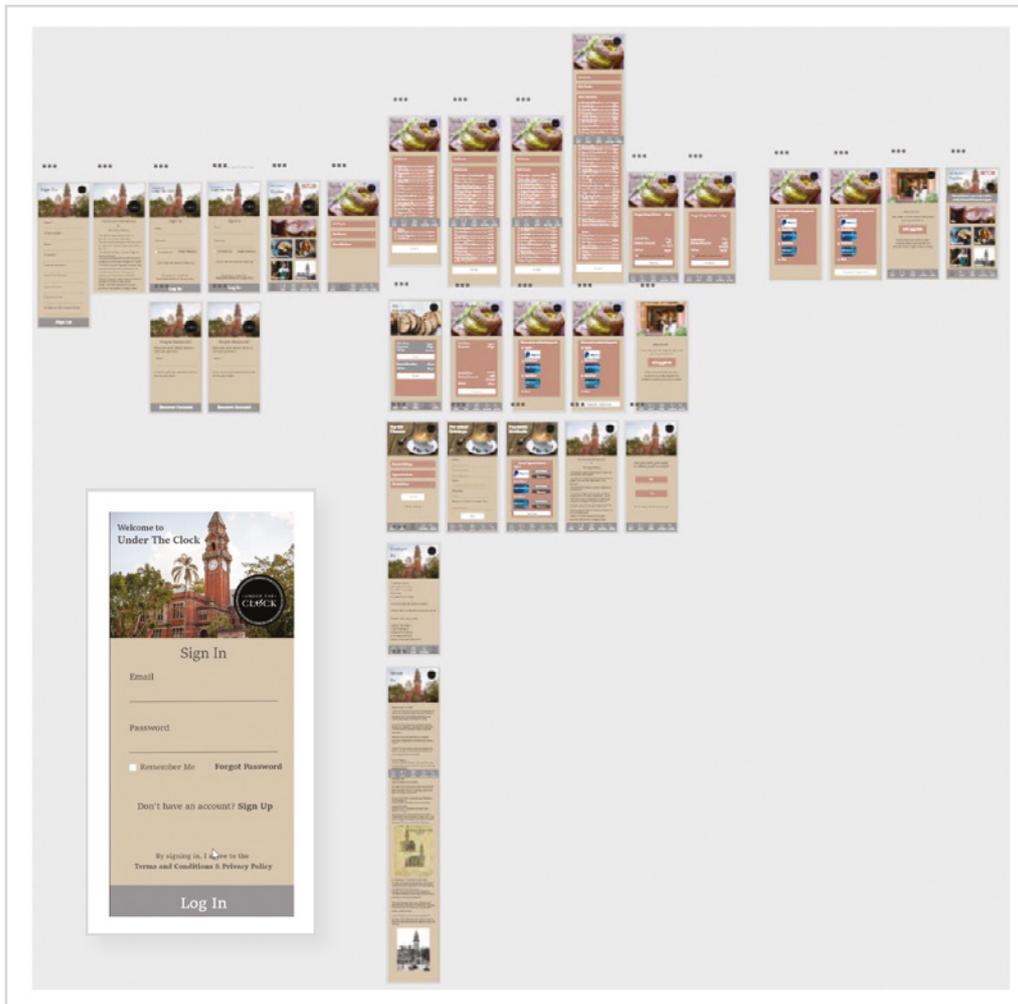
Design 4 was inspired by the 'Precious Metals' colour scheme on the KAE Branding Website by Socio Design. This colour scheme is subtle yet modern with the combination of soft gold and rose gold being complemented by silver and onyx. As well, the soft gold reflects the light, earthy browns observed in cups of coffee.



By incorporating a relatively soft scheme, the user should feel more relaxed while using the application. Some example pages are shown. The background is soft gold and the tab bar navigator is silver. The text on the button is white and the text on the photograph at the top of the screen is onyx.

Here is a potential user flow through the high fidelity model. The font used in the application is Sitka. The Sitka typeface family brings visual interest, readability and typographic consistency to the page with its casual lettering effect. On the home page, the buttons are large, clearly visible and in high contrast to the background. All buttons have slightly rounded edges for a more aesthetically pleasing design. Buttons are

also relatively large, clickable areas which stand out on the page. This ensures elderly users, such as Desley, can more effectively navigate the system with recognisable buttons that require less precision for activation. Text is kept to a minimum on all pages so users can easily comprehend information. For cohesion and easy navigation, the same design is employed throughout.



## High Fidelity Testing

Users	Design	Content	Technical Components	Advice/Queries
Ross	Good	Excellent	Excellent	<ul style="list-style-type: none"> <li>User is unable to log out of their account from the home page.</li> <li>The back button is sometimes difficult to see due to the image behind it – this is only a minor issue.</li> </ul>
Elizabeth	Excellent	Excellent	Good	<ul style="list-style-type: none"> <li>Check all of the links as some did not work.</li> <li>Would be good to see the user's previous orders.</li> </ul>
Noela	Excellent	Excellent	Good	<ul style="list-style-type: none"> <li>Fix the scrolling function on the menu page as when the user scrolls, the menu overlaps onto the image.</li> <li>The user is required to scroll through the whole menu to access the order button.</li> </ul>
Courtney	Excellent	Good	Excellent	<ul style="list-style-type: none"> <li>Check spelling and grammar.</li> <li>Would be good to see the user's transaction history.</li> </ul>

Here is a brief feedback overview, summarised from each Client Evaluation form.

## Response and Changes

- Fixing any spelling and grammatical errors.
- Fixing the scrolling function on the menu pages.
- Fixing any faulty links.
- Adding a log out button to the top right corner of the home page.

## Changes not implemented

- The user's card transaction history.
- The user's order history.
- Changing the image behind the back button to make it more visible.
- Adding the pages required for the user's card details.
- Allowing the user to view their cart during the ordering process.

In response to the feedback, certain changes were made to the final solution. There are also additional factors that will not be changed or included as this is only a prototype. The layout of the menu page will not be changed. Currently, the order button is at the bottom of this page,

thus, the user must scroll through the café's full menu to access it; however, this layout is possibly a positive implementation for café business as user's may choose to purchase more items as they scroll past.

Overall, the prototype includes all of the key features specified by Under the Clock. The user is able to browse the menu, order products, and

pay securely via credit card, PayPal, cash or any other specified method. Here is an evaluation of the prescribed criteria.

Prescribed Criteria	Quality	Questions	Possible Change	Justified Recommendation
Personal (Impacts, Components, Solutions)	Strength	<ul style="list-style-type: none"> <li>• What is the major strength, in terms of quality, appropriateness or effectiveness of the approach of this prototype?</li> <li>• To what extent is this prototype likely to be effective in achieving what I want it to achieve?</li> </ul>	The design allows the user to easily navigate the application and make an order. The colour scheme used is effective and conveys an uplifting tone.	
	Implication	<ul style="list-style-type: none"> <li>• What am I learning about the challenge I am trying to address?</li> </ul>	Users will not be able to use their own cups when ordering through the application.	Notify users of this implication.
	Limitation	<ul style="list-style-type: none"> <li>• What limitations are individuals likely to experience in using this prototype?</li> <li>• What limitations are there in my prototype? What enhancements are not currently incorporated?</li> </ul>	<p>The user cannot view their previous transactions and orders.</p> <p>The user cannot add or remove their personal payment methods; however, the prototype includes buttons for these actions (although these buttons do not work – this lack of functionality is due to complexity and time constraint issues).</p> <p>As this is a prototype, it will not store or collect any personal data.</p> <p>Once the user has decided what they would like to order, they are unable to add or remove items from their order list. Their only option is to either confirm their order or restart the process. This is a significant limitation and would have to be improved if this application was employed in the real world.</p> <p>The user is unable to order more than one of each item – this was not implemented due to the complexity of implementing this function into Adobe XD.</p> <p>The user is unable to view their cart throughout the ordering process.</p> <p>The user is unable to customise their order.</p>	<p>Include the user's transaction and order history.</p> <p>Ensure all buttons carry out their necessary functions.</p> <p>Add a function to allow the user to edit their order.</p> <p>Add a function to allow the user to purchase more than one of each item.</p> <p>Add a cart icon so the user can view their cart throughout the ordering process.</p>

Here is an evaluation of the self-determined criteria and usability principles.

Prescribed Criteria	Quality	Questions	Possible Change	Justified Recommendation
Social (Impacts, Components, Solutions)	Strength	<ul style="list-style-type: none"> <li>Have I become more effective as a result of working on this challenge/project?</li> </ul>	In using Adobe XD, I have developed more technological skills and am able to use the program efficiently.	
	Implication	<ul style="list-style-type: none"> <li>What did I learn about the capacity of myself, especially in terms of innovation?</li> <li>To what extent is this prototype likely to be viable in the current context?</li> </ul>	While the overall design is good, it lacks professional quality. The prototype would be viable in the current context as long as the limitations in the design are fixed.	The icons in the tab bar navigator would need to be updated to something more modern. As well, different effects such as shadows could be added to buttons to enhance the design.
	Limitation	<ul style="list-style-type: none"> <li>What limitations are there in my prototype in terms of social interaction? Eg. Group bookings?</li> <li>To what extent is this prototype likely to be supported by key stakeholders?</li> </ul>	The application does not allow users to connect with other users; however, this would not be an appropriate feature considering the context. By having an application to order products online, face-to-face interaction is limited. At its current state, the prototype is likely to be supported by key stakeholders as it provides a solution to the café's major issue. Although, the design appears relatively simple, rather than professional.	Before the application was implemented in the real world, the design would need to be improved to make the application look more professional.
Economic (Impacts, Components, Solutions)	Strength	<ul style="list-style-type: none"> <li>What are the main qualities of my prototype that should be economically beneficial?</li> <li>To what extent is this prototype likely to be effective in achieving what I want it to achieve?</li> </ul>	The application is specific to the Under The Clock cafe. It also allows the user to add their student or staff discounts.	
	Implication	<ul style="list-style-type: none"> <li>To what extent is this prototype likely to be viable in the current context?</li> </ul>	The prototype includes majority of the necessary functions that would be required in this context. However, it does not include the user's past transactions, history, a function to edit the user's order or a function to order more than one of each item.	Add a function that allows the user to view their past orders and card transactions to improve the application's performance. Add a function to allow the user to edit their order. Add a function to allow the user to purchase more than one of each item.
	Limitation	<ul style="list-style-type: none"> <li>To what extent is this prototype likely to be scalable for greater impact?</li> </ul>	The prototype is only portable to users with iPhone XR/XS. Investment would be required to create this as a functioning application.	Customers using other devices are unable to access the application. Hence, it would need to be made portable to all types of devices.

Usability Principle	Description	Rating 0=poor 5=excellent	Comments
Ease of use for target audience	The system should be easy to navigate.	5	The tab bar navigator allows for quick and easy navigation through the application.
Visibility of system status	The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.	5	There is a bolded heading on each page where the image is located, to inform the user which page they are currently on.
Match between system and the real world	The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.	5	The content is easy for the user to understand and uses language familiar to them.
User control and freedom	Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.	4	The tab bar navigator allows the user to leave the page they are currently on, as well as the back buttons that are dispersed throughout.

Usability Principle	Description	Rating 0=poor 5=excellent	Comments
Consistency and standards	Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.	4	The logo in the header may confuse some users if they think it is a link to the home page. However, this is not considered to be a major issue. Otherwise, the functions of each button are easy to understand.
Error prevention	Even better than good error messages is a careful design, which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.	2	The user must scroll to the bottom of the menu to see the order button otherwise the items they choose will not be added to their order. However, this was not changed as it could potentially be a positive business strategy. As well, once the user has decided what they would like to order, they are unable to add or remove items from their order list. Their only option is to either confirm their order or restart the process. This is a significant limitation and would have to be improved if this application was employed in the real world.
Recognition rather than recall	Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.	5	The user is able to view their order before proceeding to checkout.
Aesthetic and minimalist design	Dialogues should not contain information, which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.	4	No irrelevant information is included in the application. As well, the design is minimalist and simple, making it easy to navigate. However, some of the photos on the home screen do not make it obvious of the button's function, thus would need to be changed to be more relevant.

*The coherent and logical synthesis of relevant information and ideas to generate a purposeful solution, presented in a discerning and fluent manner, makes this response exemplary.*

*The authentic exploration of the problem symbolised with the mind map, symbolisation of user experiences and*

*the evaluation of components to make refinements are particularly impressive. The response demonstrates academic integrity by referencing all third-party sources clearly and in accordance with syllabus response conventions and assessment specifications.*

**QCAA Principal Education Officer**

Here is an analysis of the application's design.

Design Aspect	Rating 0=poor 5=excellent	Comment
Features	4	The prototype includes majority of the features found on takeaway food applications and websites. However, it does not include the user's past history and transactions.
Positioning	5	Features, such as the tab bar navigator and back button were positioned in the same location on each page for easy navigation. On every page, a photograph with the café's logo was implemented as the header to improve the application's design.
Colour	5	The 'Precious Metals' colour scheme is rustic yet effective. It is not overwhelming for users. As well, the user testers commented that the colour scheme made the application more appealing to use.
Typefaces	5	Sitka Text was used as the main typeface for the prototype. Using Adobe XD limited the choice of fonts. However, after thorough research, Sitka Text was chosen as it increases readability and helps readers with visual crowding.

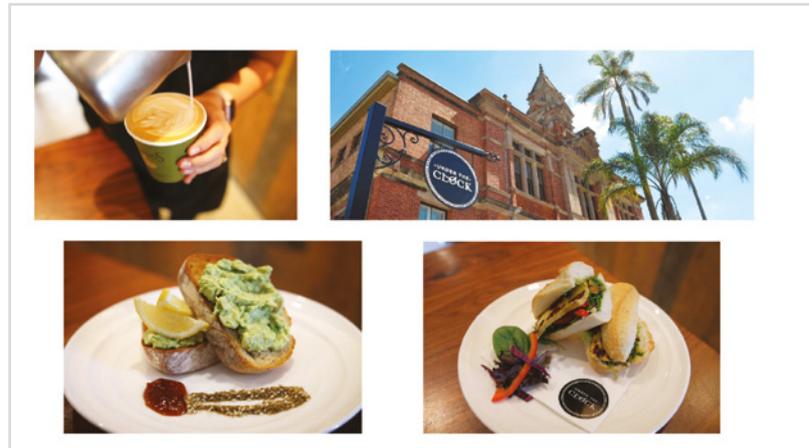
After a thorough evaluation of the solution, it is evident that alterations could be made to improve its usability. The prototype's major limitations are that users are unable to view their cart throughout the ordering process, order more than one of each item, or edit their order list on the confirmation page.

### Recommendations

- Including an interactive map function so the user can get directions from their current location to the café.
- Making the application portable on a range of different devices.
- Improving the design of the application by changing the icons in the tab bar navigator so they appear more professional.
- Adding the user's transaction/order history.
- Add a function to allow the user to edit their order.
- Add a function to allow the user to purchase more than one of each item.
- Change the photos of the buttons on the home screen to make their functionality more apparent.
- Add a cart icon to the ordering pages to allow the user to view their order throughout the ordering process.
- Allow the user to customise their orders.

If these changes were implemented, the prototype's functionality and usability would significantly improve and be viable in the real world. However, due to time constraints, this ideal functionality will not be implemented in the high fidelity prototype.

Throughout the development of this solution, I experienced multiple constraints regarding what could be produced before the assessment was due.



Overall, an effective solution to the café's problem was produced. The prototype considers Under the Clock's main customer groups and although has some limitations, meets the necessary needs and wants of the target audience.

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# Earth & Environmental Science

## Internal assessment 2 Student experiment

Thanh Huynh  
Mackay State High School

### Context

You have completed the following practicals in class:

- suggested practical – design and conduct experiments to model other separation or processing techniques (e.g. crushing, smelting and froth flotation, gravitational separation)
- mandatory practical – conduct an experiment to model turbidity management strategies, using settling ponds
- suggested practical – investigate the effect of slope/revegetation on the volume of water run-off and amount of topsoil lost through erosion.

### Task

Modify (i.e. refine, extend or redirect) an experiment in order to address your own related hypothesis or question.

You may use a practical performed in class, a related simulation or another practical related to Unit 3 (as negotiated with your teacher) as the basis for your methodology and research question.

*Excerpt from Mackay State High School's Earth & Environmental Science IA2, 2020.*

# Effect of alum concentration on water turbidity

## Introduction

### Background Information

Turbidity measures a liquid's relative clarity; the amount of light scattered by particles in a heterogenous mixture (USGS, n.d.). Turbidity is caused by the presence of suspended sediment in a liquid, usually water. Particle suspension is determined by its density; particles denser than the surrounding liquid will settle, however less dense particles remain suspended for longer, due to molecular and electrostatic interactions such as Brownian motion, thermal currents, and dispersion charges (Hancock, 2017).

Aluminium sulphate ( $\text{Al}_2(\text{SO}_4)_3$ ), commonly known as alum, is among the most commonly used coagulants in water treatment (SNF, 2016). It is a primary inorganic coagulant that employs different mechanisms for coagulation depending on dosage. For low doses, i.e. 5mg/L, coagulation is reached via destabilisation, or charge neutralisation. Flocs are formed from collisions caused by electrostatic attraction; when positively-charged metal coagulant becomes attracted to negatively-charged colloids (EPA, n.d.). Entrapment or

sweep flocculation is the main mechanism for higher doses commonly used in water treatment plants, where metal coagulant precipitates form and entrains suspended particles as it settles (EPA, n.d.). Alum is an acidic coagulant (Brandt et al, 2017) that can lower solution pH. However, alum's solubility in water is pH-dependent, which in turn affects its effectiveness and efficiency. Alum's ideal pH is 6–7 (EPA, n.d.). It is present as cations at pH 4–5, and anions at pH 6–8 (Oregon Health Authority, n.d.).

### Rationale

Several studies indicate a general quadratic trend with a peak/trough; an optimal alum dosage; that results in highest turbidity removal. A study on Yellow River water treatment tested doses from 7mg/L to 17mg/L and concluded that 15mg/L had the highest turbidity removal efficiency (Yang, Gao and Yue, 2010). Another study tested doses between 0mg/L and 1000mg/L on industrial wastewater and concluded that 400mg/L maximised turbidity removal (Aboulhassan and Benichou, 2017).

This can be attributed to the net charge (or zeta potential) of particulates approaching zero as dosage increases. An alum underdose results in not enough flocs forming, leaving the solution still turbid, and an alum overdose restabilises suspended particles; zeta potential becomes positive, resulting in the particles' net charges to reverse (Horiba, n.d.). Thus, it is important to use the right dosage to ensure optimal coagulation and maintain cost efficiency.

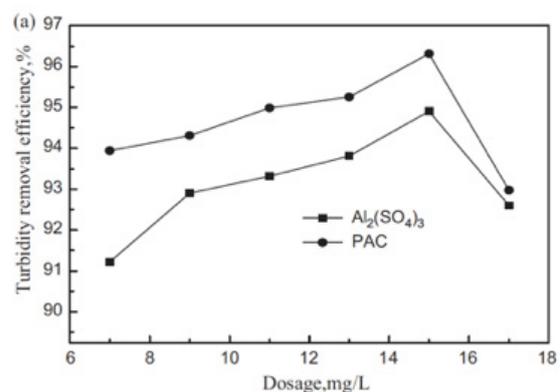


Figure 1: Turbidity removal efficiency of increasing alum and PAC doses (Yang, Gao and Yue, 2010).

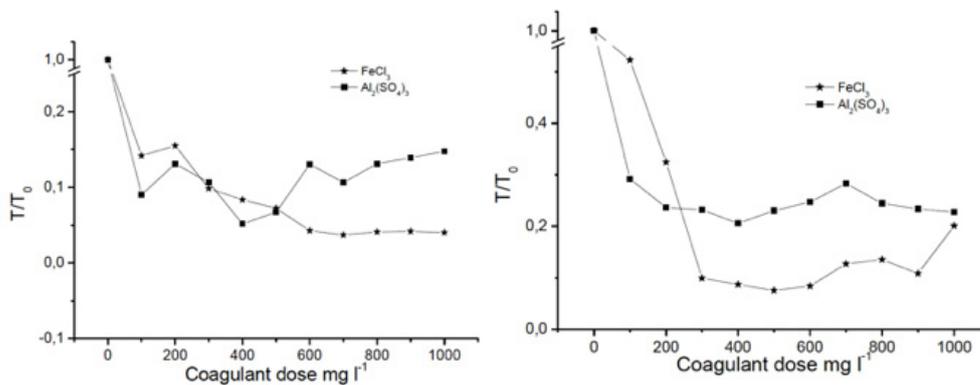


Figure 2a: Effect of coagulant dosage on textile (left) and tannery (right) wastewater. Source: (Aboulhassan and Benichou, 2017).

## Research Question

What is the optimal dosage of aluminium sulphate (alum) that produces the least turbid heterogeneous mixture of water and suspended clay sediment over time intervals of 20min, 40min, and 24 hours?

## Methodology

### Original Methodology

The original experiment used three different alum concentrations to flocculate a heterogeneous mixture. 8g clay and 800mL water (1g per 100mL) was stirred in a large beaker and decanted into smaller beakers, 200mL each. The alum solution was prepared by dissolving 200mg of alum in 20mL distilled water. 2mL ( $100\text{mgL}^{-1}$ ), 6mL ( $300\text{mgL}^{-1}$ ) and ( $600\text{mgL}^{-1}$ ) was pipetted into each beaker. Qualitative observations were recorded after 5 minutes, 30 minutes and 24 hours. Results indicated that  $100\text{mgL}^{-1}$  was optimal for turbidity removal.

### Modifications to Original Methodology

Based on results and errors identified from the original experiment, modifications were made to ensure higher reliability and accuracy of data.

### Refinements

- Number of trials increased from 1 to 3 to meet minimum scientific standard and increase reliability.
- Turbidimeter used to quantitatively determine solution clarity. Samples were taken close to the mixture's surface (as it is the clearest and to avoid disturbing settled sediment) and pipetted into sample bottle. To keep alum concentration constant, samples were returned to mixtures after recording readings.
- Alum solution concentration decreased to  $100\text{mg}$  in  $20\text{mL}$  to ensure thorough particle distribution.
- Mixture prepared in individual beakers for each trial and concentration to ensure exact amount of clay in every beaker.
- Amount of clay in each beaker reduced to  $0.25\text{g}$  per  $100\text{mL}$ , sieved with sieves #60, #120, then #230 to ensure relative uniformity of particles and reduce immediate settling of larger particles.
- Observations at time intervals: 20min, 40min, and 24 hours.
- After alum added, mixture stirred for 10 seconds for even distribution.

### Extensions

- Number of sub-variables increased to four, with even increments:  $1\text{mL}$  ( $25\text{mgL}^{-1}$ ),  $2\text{mL}$  ( $50\text{mgL}^{-1}$ ),  $3\text{mL}$  ( $75\text{mgL}^{-1}$ ),  $4\text{mL}$  ( $100\text{mgL}^{-1}$ ). Based on original experiment results, these concentrations were tested as it was expected that the optimal amount lies either at  $100\text{mgL}^{-1}$  or below.

## Variables

### Independent

- Alum concentrations of  $0\text{mgL}^{-1}$ ,  $25\text{mgL}^{-1}$ ,  $50\text{mgL}^{-1}$ ,  $75\text{mgL}^{-1}$ , and  $100\text{mgL}^{-1}$ .

### Dependent

- Turbidity (measured in Nephelometric Turbidity Units – NTU) of each trial and concentration.

### Control

- Sub-variables in every trial conducted in same laboratory and subjected to same conditions.
- Mass of water and clay: 200g and 0.5g respectively,  $\pm 0.01\text{g}$  (excludes scale tolerance).
- All clay was sieved through #60, #120 and #230.
- All mixtures stirred for 10 seconds after alum was added.
- Measurements taken within 5 minutes after 20min and 40min, and within 2 hours before 1 day.
- Sample bottle rinsed with tap water before next sample.
- Same equipment used; all are rinsed before next trial.
- Different pipettes for alum solution, distilled water, tap water, and mixture.

## Safety & Ethical Assessment

Inspect and dispose glass/porcelain equipment if cracked or chipped as they can cause cuts. Sweep glass fragments with a brush and dustpan. Damaged cords or electronic equipment in contact with liquids may cause electrocution. Place away from liquids, remove spills immediately, and

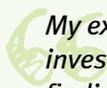
regularly check for damage. Fine clay and alum particles can cause eye, nose or throat irritation or damage if in contact. Anhydrous aluminium sulphate can cause eye damage due to acidity from reaction with water. Use safety glasses and handle fine particles carefully.



*This assessment task was designed to elicit a research question that has relevance for students in their local area. Located on the tropical coast of North Queensland, Mackay experiences many wet seasons accompanied with cyclonic effects having significant*

*changes to local waterways and aquatic populations such as sea grass, turtles and dugongs. Water turbidity and quality in local waterways after cyclone and flooding events is relevant in our local area.*

**Kylie Anthes, teacher**



*My experimental investigation was about finding the optimum concentration of a particular flocculant in a body of turbid water, in which I was able to utilise what I have learnt to further my understanding of topics related to my experimental investigation, such as*

*water treatment, water conservation, and aquatic conservation.*

*My teacher prepared me for this assessment by teaching my class all the information, topics and background that lead up to the assessment. We also had class discussions to further our understanding of a topic, and my teacher*

*also gave us individual research and short essay writing exercises about a particular topic to help improve our research and writing, and practical classes that exposed us to potential IA2 topics and experiments to modify in our own experimental investigation.*

**Thanh Huynh, student**



## Results

### Sample Calculations

Table 1: Sample calculations for 25mgL<sup>-1</sup> concentration after 24 hours.

Formula	Sample Calculation
$\text{Average} = \frac{\text{trial 1} + \text{trial 2}}{2}$	$\text{Average} = \frac{7.0 + 5.2}{2}$ $\text{Average} = 6.1$
$\text{Uncertainty for mean} = \pm \frac{\text{range}}{2}$	$\text{Uncertainty for mean} = \pm \frac{7.0 - 5.2}{2}$ $\text{Uncertainty for mean} = \pm 1.35$
$\% \text{ Uncertainty} = \pm \frac{\text{uncertainty for mean}}{\text{trial value}} \times 100$	$\% \text{ Uncertainty} = \pm \frac{1.35}{7.0} \times 100$ $\% \text{ Uncertainty} = \pm 19.23\%$
$\% \text{ Average Uncertainty} = \pm \frac{\text{Average 1} + \text{Average 2}}{2} \times 100$	$\% \text{ Uncertainty} = \pm \frac{12.86 + 17.31}{2} \times 100$ $\% \text{ Uncertainty} = \pm 15.09\%$

### Raw Data and Analysis

Table 2 – Raw data

Concentration (mgL <sup>-1</sup> )	Trial	Turbidity after 0 mins (NTU)	Turbidity after 20 mins (NTU)	Turbidity after 40 mins (NTU)	Turbidity after 24 hours (NTU)
0	1	617.5	617.5	617.5	106.2
	2	617.5	617.5	617.5	52.4
	3	590.0	582.7	590.0	112.9
25	1	617.5	372.1	222.7	7.0
	2	617.5	340.5	157.2	1.2
	3	590.0	350.7	213.1	5.2
50	1	617.5	351.6	111.3	4.6
	2	617.5	236.1	137.9	-5.8
	3	590.0	244.5	126.1	3.8
75	1	617.5	245.6	81.1	1.1
	2	617.5	191.1	76.9	-6.6
	3	590.0	169.2	98.8	-3.1
100	1	617.5	236.6	102.3	-5.2
	2	617.5	174.2	57.9	-2.2
	3	590.0	169.1	95.1	6.1

\*maximum value indicated on turbidimeter — actual value may be higher.

\*\*negative values are caused by calibration/mechanical error. Actual values should be higher than 0, and lower than positive values of other concentrations.

**Yellow:** Values omitted from averages and uncertainties.

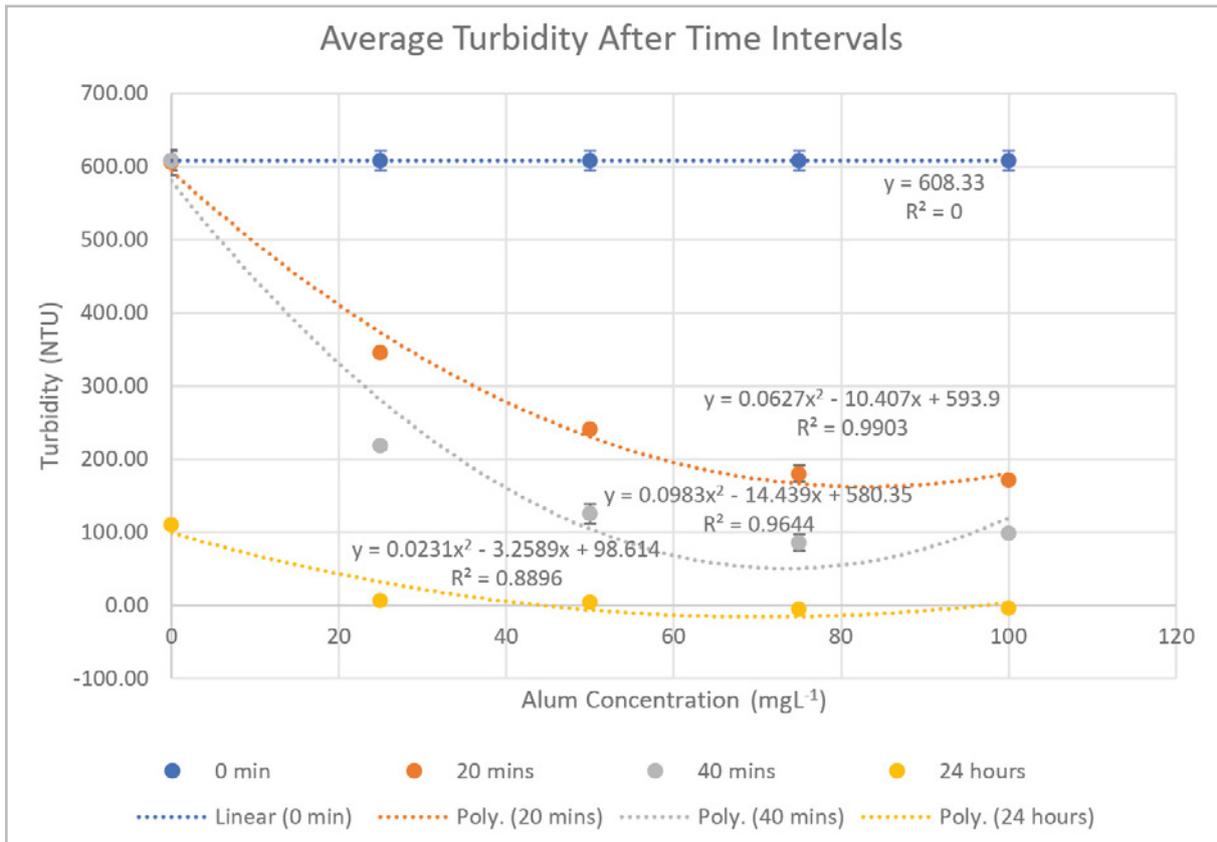
Table 3— Processed data: Averages and Uncertainties

Alum (mgL <sup>-1</sup> )	Trial	After 0 mins			After 20 mins			After 40 mins			After 24 hours					
		Average	Uncertainty of the mean	% uncertainty	Average	Uncertainty of the mean	% uncertainty	Average	Uncertainty of the mean	% uncertainty	Average	Uncertainty of the mean	% uncertainty	Average	Uncertainty of the mean	% uncertainty
0	1	608.33	±13.75	±2.33	605.90	±17.40	±2.82	608.33	±13.75	±2.23	109.55	±3.35	±3.15			
	2	608.33	±13.75	±2.33	605.90	±17.40	±2.82	608.33	±13.75	±2.23	109.55	±3.35	<b>±6.39</b>			±3.06
	3	608.33	±13.75	±2.33	605.90	±17.40	±2.99	608.33	±13.75	±2.33	109.55	±3.35	±2.97			
25	1	608.33	±13.75	±2.33	345.60	±5.10	<b>±1.37</b>	217.90	±4.80	±2.16	6.10	±0.90	±12.86			
	2	608.33	±13.75	±2.33	345.60	±5.10	±1.50	217.90	±4.80	<b>±3.05</b>	6.10	±0.90	<b>±75.00</b>			±15.08
	3	608.33	±13.75	±2.33	345.60	±5.10	±1.45	217.90	±4.80	±2.25	6.10	±0.90	±17.31			
50	1	608.33	±13.75	±2.33	240.30	±4.20	<b>±1.19</b>	125.10	±13.30	±11.95	4.20	±0.40	±8.70			
	2	608.33	±13.75	±2.33	240.30	±4.20	±1.78	125.10	±13.30	±9.64	4.20	±0.40	<b>±6.90</b>			±9.61
	3	608.33	±13.75	±2.33	240.30	±4.20	±1.72	125.10	±13.30	±10.55	4.20	±0.40	±10.53			
75	1	608.33	±13.75	±2.33	180.15	±10.95	<b>±4.46</b>	85.60	±10.95	±13.50	-4.85	±1.75	<b>±159.09</b>			
	2	608.33	±13.75	±2.33	180.15	±10.95	±5.73	85.60	±10.95	±14.24	-4.85	±1.75	±26.52			±41.48
	3	608.33	±13.75	±2.33	180.15	±10.95	±6.47	85.60	±10.95	±11.08	-4.85	±1.75	±56.45			
100	1	608.33	±13.75	±2.33	171.65	±2.55	<b>±1.08</b>	98.70	±3.60	±3.52	-3.70	±1.50	±28.85			
	2	608.33	±13.75	±2.23	171.65	±2.55	±1.46	98.70	±3.60	<b>±6.22</b>	-3.70	±1.50	±68.18			±48.51
	3	608.33	±13.75	±2.33	171.65	±2.55	±1.51	98.70	±3.60	±3.79	-3.70	±1.50	<b>±24.59</b>			

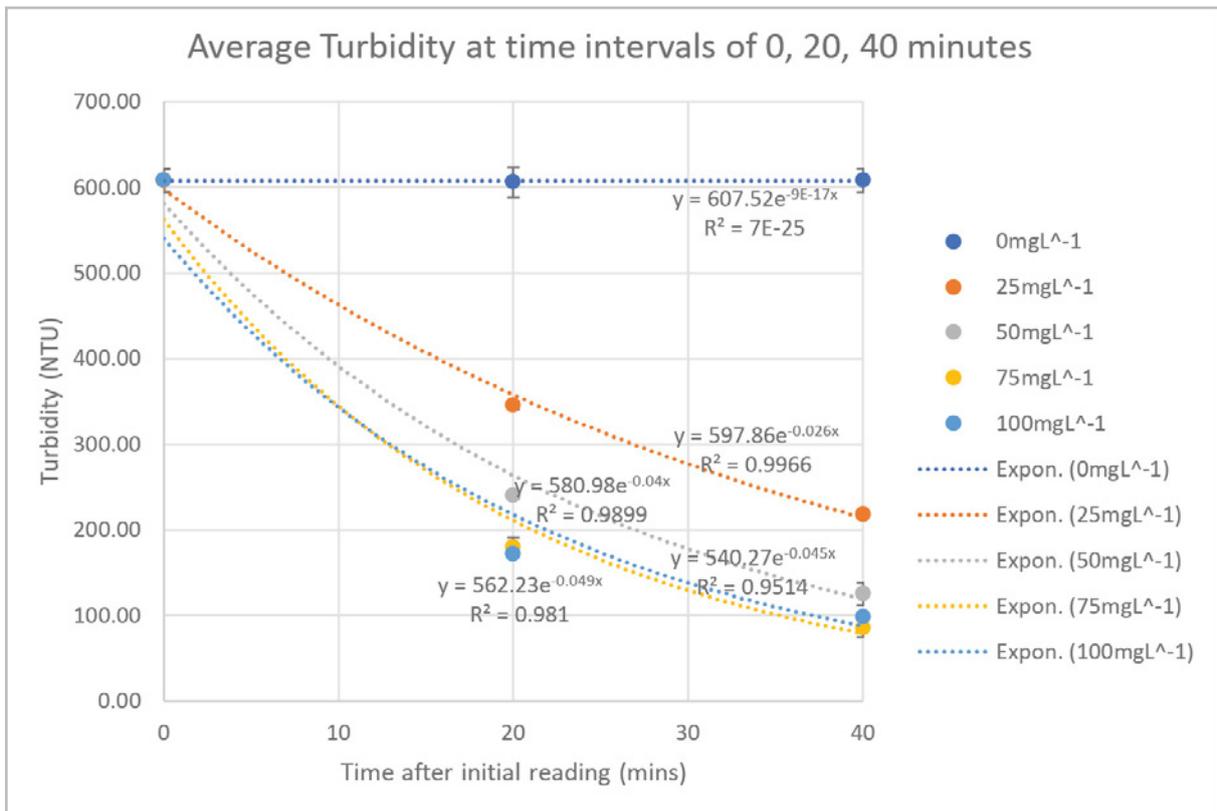
Averages in Table 3 indicate after 20 minutes, 100mgL<sup>-1</sup> was optimal or the least turbid at 171.65 NTU, however after 40 minutes and 24 hours, 75mgL<sup>-1</sup> was optimal, at 85.1 and -4.85 NTU respectively. These values have high uncertainty due to large deviations between trials; average uncertainty percentages increase as alum concentration and time after initial reading increases, becoming as high as ±48.51% (100mgL<sup>-1</sup> after 24 hours). Uncertainty remains low for 0mgL<sup>-1</sup>, as most values reached the turbidimeter's maximum threshold. Due to high variation between trials, many outliers that significantly affect averages and uncertainties were omitted. For example, Trial 2 of 100mgL<sup>-1</sup> after 40 minutes, of 57.9 NTU, was omitted as other trials were almost double in value at 102.3 and 95.1 NTU

## Graphical Data

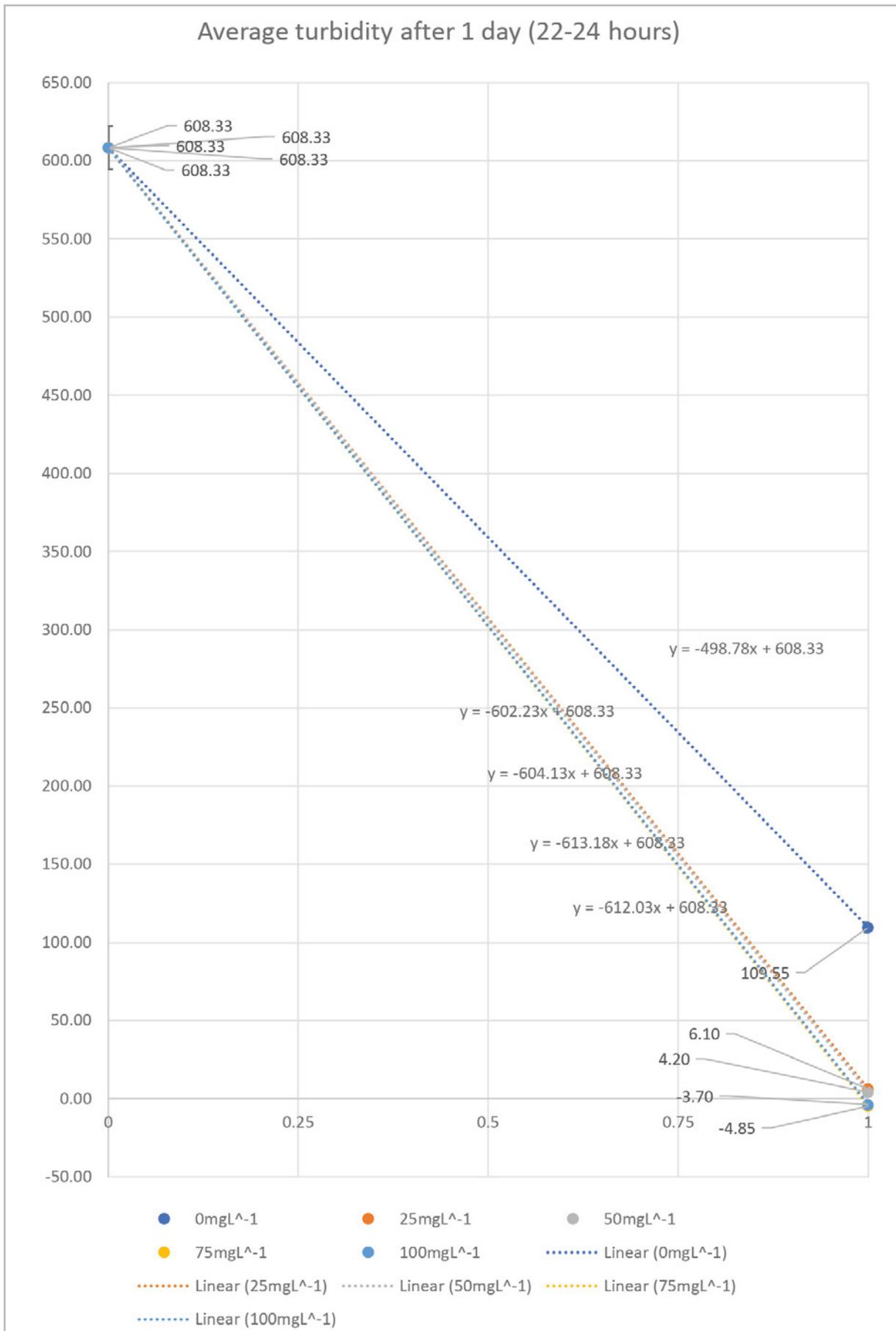
Graph 1: Average Turbidity After Time Intervals with Uncertainty



Graph 2: Average Turbidity after 0, 20, 40 minutes



Graph 5: Average Turbidity after 1 Day (22–24 hours).



Graph 1 indicates after 20 minutes, despite a high  $R^2$  value of 0.9903, the quadratic line of best fit,  $y = 39.196x^2 - 260.18x + 593.9$ , with optimal or minimum value close to  $75\text{mgL}^{-1}$ , does not accurately describe the negative exponential trend in individual values, where  $100\text{mgL}^{-1}$  is optimal. However, for 40 minutes and 24 hours, despite lower  $R^2$  values of 0.9644, and 0.8866 respectively, quadratic trendlines with equations  $y = 61.455x^2 - 360.98x + 580.35$  and  $y = 14.432x^2 - 81.474x + 98.614$  respectively, with minimum values close to  $75\text{mgL}^{-1}$ , match individual values' quadratic trend, where  $75\text{mgL}^{-1}$  is optimal. Graph 1 indicates low uncertainty with small error bars, however average uncertainty is high when viewed as a percentage in Table 3.

Graph 2 shows, except for  $0\text{mgL}^{-1}$ , increasing coagulation rate (steeper trendlines) as concentration increases. Based on trendlines alone,  $100\text{mgL}^{-1}$  yields lowest turbidity until  $\sim 10\text{min}$ , then  $75\text{mgL}^{-1}$  is optimal onwards. However, these trendlines intersected and almost overlap, indicating no distinct optimal concentration. Furthermore, trendlines are skewed by  $0\text{min}$ , resulting in  $R^2$  values decreasing as concentration increases, which reduces their reliability to match individual data (where  $100\text{mgL}^{-1}$  is optimal after 20 minutes and  $75\text{mgL}^{-1}$  after 40 minutes). Graph 3 indicates that despite  $75\text{mgL}^{-1}$  yielding lowest average final turbidity at  $-4.85\text{NTU}$ , the variation with other sub-variables with added alum are negligible, indicating that a distinct optimal concentration cannot be shown effectively after 24 hours.

## Discussion

### Limitations of Data

Due to time constraints, only 3 trials were conducted for each sub-variable. Outliers could not be identified formulaically, only removed in relation to other trials by omitting values with highest deviation from the median. Reliability of data decreased as many outliers were omitted, and averages and uncertainties were determined using only two trials. As time interval increases,

turbidity decreases. As data values become smaller, resolution and uncertainty have a more significant effect. The large variation in data suggests random and systematic methodological, procedural and measurement errors and limitations, which includes calibration and limit of reading.

### Validity and Reliability

#### Errors affecting validity

- Random error: Optimal alum dosage differs depending on time interval. Without outliers,  $100\text{mgL}^{-1}$  was optimal after 20 minutes, however this becomes  $75\text{mgL}^{-1}$  after 40 minutes and 24 hours. Trials within the same sub-variable also suggested different results. After 24 hours, Trial 2 and 3 indicated that  $75\text{mgL}^{-1}$  was optimal, however Trial 1 indicated  $100\text{mgL}^{-1}$ . This is likely caused by incorrect turbidimeter readings or sampling errors, not external conditions, as Trial 1 and 2 results differ despite being conducted simultaneously.
- Results are specific to the sediment particle being used. In water treatment, many types of sediment and other particles may be present, which may yield different results in alum's effectiveness and efficiency, even with the same dosage and starting turbidity.



*Thanh's response demonstrates appropriate application of algorithms, visual and graphical representations of data, systematic and effective analysis of experimental evidence, and effective and efficient investigation of phenomena.*

*An informed application of understanding of the use of non-renewable resources to modify experimental methodologies has been demonstrated.*

**QCAA Principal Education Officer**



- Systematic error: Samples were measured from  $0\text{mgL}^{-1}$  to  $100\text{mgL}^{-1}$ , however some 20min and 40min trials were delayed by up to 5 minutes. This meant readings of higher doses register larger decreases in turbidity compared to being sampled simultaneously with lower doses. Trial 3 final readings were taken 2 hours before 24 hours, however this will not significantly affect turbidity, as later rates of coagulation are lower.
- Systematic error: Mixture pH could be outside alum's optimal as they were not tested before alum was added. Higher alum concentrations, which lowers mixture pH, may be further subjected to inefficient and ineffective coagulation. At lower pH, zeta potential becomes positive when colloidal particles acquire positive charge (Malvern Panalytical, 2017), preventing coagulation by repelling each other and coagulant cations.

### Errors affecting reliability

- Systematic error: Incorrect turbidimeter readings for known samples, different and low threshold readings, negative readings, and significant fluctuations even after calibration may generate significantly varied data across trials.
- Systematic error: Alum solution concentration during preparation may decrease as the solution leaked out as test tube was shaken. Multiple batches were made, and uncertainty increases from risk of incorrect measurements, compounded by resolution and tolerance specified on measuring equipment. Alum particles may not be evenly distributed throughout the test tube, as stored batches were not stirred before experimentation. As alum doses are small, these errors may affect actual amounts added and accuracy of readings.
- Systematic error: Turbidity increases as depth increases, however exact depth extracted varied in every sample. Settled clay particles were resuspended when the pipette was too close to the bottom of the beaker and samples were poured back into beakers. This may slow coagulation rate, compared to if only initial and final readings were taken. All sub-variables used the same pipette. These minor errors may contribute to varied data and limited reliability.

### Improvements and Extensions

The following improvements and extensions are suggested to further extend the scope or refine the methodology:

#### Improvements

- More trials should be conducted to confirm observed trends, enable more accurate averages, lower uncertainties, allow standard deviation calculations, and mathematical outlier removal.
- Using another turbidimeter with higher threshold or a sensor probe to reduce calibration or mechanical errors causing inaccuracies such as varied threshold readings, negative readings and significant fluctuations.
- Only one large batch of alum should be made, using a larger beaker and dissolved with a stirring rod to reduce uncertainty. It should be stirred before using, to ensure even alum particle distribution.

*I prepared for this assessment task by engaging in theoretical and practical learning activities and class discussions. I also researched each of the topics and practicals suggested for this assessment task as well as their scope to determine how they could be modified. As the practicals established preliminary results*

*and observations, I used the results of the practicals to help me generate modifications to the parameters of the experiment and improve the original methodology to produce more reliable results.*

**Thanh Huynh, student**



- Using different pipettes for each sub-variable, extracting samples at a specified maximum depth and pipetting samples back into beakers to reduce disturbing settled clay sediment and ensure alum concentration remains constant throughout experiment.

### Extensions

- Simplifying data collection with only initial and final reading, using shorter timeframes than 24 hours to reduce sampling errors and allow clearer distinction of optimum dose.
- Based on experiment results, concentrations between  $50\text{mgL}^{-1}$  and  $125\text{mgL}^{-1}$ , with smaller increments, can be tested to confirm trends and exact optimum concentration.
- As alum is pH-dependent, mixtures with different pH can be tested with the optimum alum dosage to determine optimum pH for coagulation. This data could then be used to adjust pH of different alum concentrations with acids and bases to ensure fair experimentation.
- Alum could be tested against other flocculants, such as aluminium chloride or ferric chloride to determine the most efficient in terms of dosage requirements and cost.

### Conclusion

Results did not show a distinct optimum alum dosage as graphical data showed little variation between sub-variables after 24 hours, trials over time intervals indicate both  $75\text{mgL}^{-1}$  and  $100\text{mgL}^{-1}$  as the optimal dosage and reliability was limited due to methodological, procedural and measurement errors. However, a trend

and optimum amount is still somewhat evident as results favour  $75\text{mgL}^{-1}$  more strongly than  $100\text{mgL}^{-1}$ , and generally, as dosage increases, turbidity decreases, to an optimum dosage that maximises coagulation to yield the lowest turbidity, then increases again as dosage continues increasing.

*When I'm preparing a response to an assessment task, what is most important to me is to make sure that the data collected was sufficient enough to draw trends and relationships between different variables, that can be clearly displayed in*

*graphical representations, and therefore enables a suitable conclusion to be drawn. The background of the experimental investigation should also be explained in detail with the chemistry behind the reaction, and also the modifications should be*

*made based on results from similar studies and results and observations from the original practical experiment. All parts of the response should be communicated effectively and concisely.*

**Thanh Huynh, student**

*Thanh's analysis was thorough, and the research was extensive and backed by scientific papers.*

**Kylie Anthes, teacher**

*Insightful interpretation of experimental evidence, critical evaluation of experimental processes and effective communication of understandings and experimental findings, arguments and conclusions have been demonstrated throughout the response.*

**QCAA Principal Education Officer**

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# Appendix

## [A] Experiment Set-up



## [B] Methodology of Modified Experiment

Five 250ml beakers were labelled with the alum concentrations  $0\text{mgL}^{-1}$ ,  $25\text{mgL}^{-1}$ ,  $50\text{mgL}^{-1}$ ,  $75\text{mgL}^{-1}$ , and  $100\text{mgL}^{-1}$ . Clay was sieved with sieves #60, #120 and #230 and stored in a plastic beaker. 0.5g of clay and 200ml tap water were measured for each beaker, and a stirring magnet was placed in each one. Each beaker was placed on the hot plate and stirrer, and rotated around the plate to ensure the stirring bar reaches the corners of the beaker. The beaker was stirred until clay was evenly distributed throughout. Alum pellets were crushed with a mortar and pestle. 100mg of powdered alum and 20mL of distilled water was measured and added into a test tube. A stopper was fitted over the top and the test tube was shaken.

The alum solution was measured into the following amounts: 0mL for  $0\text{mgL}^{-1}$ , 1mL for  $25\text{mgL}^{-1}$ , 2mL for  $50\text{mgL}^{-1}$ , 3mL for  $75\text{mgL}^{-1}$  and 4mL for  $100\text{mgL}^{-1}$ . Each beaker was stirred with a stirring rod for 10 seconds. Calibrate the turbidimeter with the known standard and a sample of distilled water. Using a pipette, a sample was extracted into the sample bottle and placed into the turbidimeter. Initial readings were recorded, and the sample was gently poured back into the beaker. The sample bottle was rinsed before the next sample. Samples were taken again after 20 and 40 minutes and after 24 hours. These steps were repeated for Trial 2 and 3.



# *Food & Nutrition*

# Food & Nutrition



## Internal assessment 2

Project — folio

*Michelle Phillips*

Downlands College

### Context (excerpt)

The company ProCarb Foods produces a range of carbohydrate rich foods. Consumer research has identified a need for the company to develop a line extension of carbohydrate side dishes. The analysis of consumer research identified a niche market for a single-serve, easily transported, shelf-stable and preparation-free side dish to accompany meals. The company also values the ethical production of food and has various requirements around ethical production.

### Task

Using the provided stimulus, identify a carbohydrate problem, then develop a solution for a line extension of a carbohydrate-based side dish for ProCarb Foods.

Document the problem-solving process using written and visual modes of communication.

*Excerpt from Downlands College's Food & Nutrition IA2, 2020.*

## Michelle Phillips

Downlands College

### Lemon myrtle couscous — a solution for a carbohydrate-based side dish

## Exploring the problem

### Task evaluation

The purpose of this report is to develop and analyse a sustainable, carbohydrate-based snack that appeals to consumers who are time-poor, for the company ProCarb Foods. To widen the range of clientele, it is also preferred to develop a vegetarian product. To create a successful product, it is necessary to consider the sustainability, packaging, cost of production, sensory profile and the nutrition of the product. It is also important to consider government regulations surrounding the production, processing, storage and labelling of the product. Consumer research has identified a need for

ProCarb Foods to develop a carbohydrate-based side dish. ProCarb Foods are passionate about providing quality products that are both nutritious and tasty. With an increase in consumers who eat on the go, there has been a rise in societal demand for products and services that both deliver quickly and make life easier. The convenience foods market is driven by busy lifestyles and an ageing population. It includes a range of processed foods that have a longer shelf life and are easy to use and prepare, such as frozen foods, ready-to-eat snacks and preparation free meals. Like many other companies, ProCarb Foods,

want to develop convenient and healthy products to keep up with these food trends. In combination with diets such as vegan and gluten-free growing in popularity, foods that appeal to these categories are booming within the convenience food market. It was also discovered by Food Ingredients First (2019) that ‘sustainable meals’ are on the rise. When people aged between 15–20 were surveyed about sustainable eating, three out of four said that they were willing to pay extra for companies which promote and support sustainable packaging and production (Food Ingredients First, 2019).

*The purpose of this assessment instrument was to use the chemical and functional properties of carbohydrate-based food, together with preservation techniques, to develop food solutions for a specified design brief generated for a food production*

*company. The task investigated a range of key determinants such as sustainability, economics, marketing, packaging and distribution that impact the development and production of food products.*

**Geraldine Sevil, teacher**

### Stakeholder analysis

A stakeholder can be defined as either an individual, group or organisation who is impacted, interested or involved in the development and outcome of a project (Landau, 2017). The stakeholders involved in the development of the product are the producers/ food manufacturers, consumers, transportation bodies and distributors, food authorities,

research institutions and retailers involved in the selling and purchasing of the product. In this case, the product is being developed by ProCarb Foods, a carbohydrate-based company who produce easy-to-prepare innovative, healthy and nutritious side dishes that complement main meals.

ProCarb Foods have a strong, loyal clientele; from the marketing survey they conducted, all participants stated they were committed to the products and would continue to buy them. ProCarb Foods produces a range of carbohydrate-rich, nutritious foods such as Wild Rice Salad, Creamy Pesto Pasta and Quinoa Salad Bowl. They support Australian farmers and their products are 100% Australian-made and owned. Customer satisfaction is the core of the

business and they are dedicated to ongoing product development and refinement to meet customer needs. Their products are boxed in biodegradable packaging with a commitment to endorsing sustainable production practices. ProCarb Foods carried out research which identified a niche market for a single-serve, easily transported, shelf-stable and a preparation-free side dish to accompany meals. ProCarb Food’s marketing feedback (Stimulus 2) revealed:



- accurate and discriminating description of stakeholders and company principles.
- 40% of the focus group would like more line extension products (e.g. different types of salad bowls and hot side dish options), 47% would like other products pre-packaged (e.g. Meal kits)
- and 13% would like a range of vegan products.
- Many suggested they would be interested in more creative combinations such as ‘bush flavours’ or ‘Cajun flavours’.
- 85% responded that the visual appeal of the products was good.
- Ability to re-heat the cereal products was important.
- Customers prefer products that are free of artificial sweeteners or colours and other unnatural additives, even if it meant a shorter shelf-life prior to cooking.



The target market for the product are people aged between 16–35 who are time poor and have an interest in healthy living. ProCarb Foods will appeal to young people who work and/or are students, that do not have a lot of time but want a quick and easy, single-serve meal that they can take with them. To appeal to young people, the product must be healthy and contain no artificial colours or flavours. Although the target consumers want to save money, they perceive value in consuming products that are organically-certified and made with natural ingredients. This is supported by research conducted by Statista, the Whole Foods Market had net sales amounting to over 16 billion U.S. dollars in 2017, up from 9 billion U.S. dollars in 2010 (Statista, 2017). Due to vegetarian options rapidly growing, the product also aims to appeal to the vegetarian community (Glass, 2018).

Hence, the product can be marketed to a larger group. For the product to be sold legally, it must follow the guidelines set by the FSANZ and the Food Act (2006). These organisations set and control food standards for Australia and New Zealand. The standards that these organisations set must be followed strictly when producing and selling the product. Other stakeholders involved in the selling of the product, such as retailers (Woolworths, corner shop, local markets etc) and transportation organisations are important to consider when developing the product. The product will be sold locally and at health food stores. Being handmade locally from locally sourced natural ingredients, this appeals to most young people. Being sold locally also reduces food miles and reduces the need for excessive transportation expenses.

*Michelle has provided a coherent and logical synthesis of the problem, stakeholders and provides discerning explanation of food science ideas, facts and principles related to the problem.*

**QCAA Principal Education Officer**

## Constraints and limitations

The following constraints and limitations need to be considered when developing the product.

Constraint/Limitation	Explanation
<b>Nutritional Value</b>	The product must be carbohydrate-based. To align with ProCarb Foods's nutritional morals, the product must be nutritionally balanced and relatively healthy. This places a restraint on the type of product we can produce, for example, traditional desserts will not be investigated as they are usually very high in fat and/or sugar.
<b>Packaging</b>	The product must be packaged ethically to minimise environmental impact. This restricts the use of most plastics. The product must be easily transported and preparation free.
<b>Price</b>	A low price point is desirable to most consumers. Although, as ProCarb uses ethically sourced, nutritious ingredients and sustainable packaging, it is expected that these materials will come with a higher price point. This suggests that the ProCarb Food products may not be cheaper than some of their competitors who use low-quality products, although still competitive. Although, consumers are ready to pay a premium price if they get to buy quality convenience foods with health benefits (Future Marketing Insights, 2020).
<b>Ethics</b>	The product must be sustainably packaged and produced. This could include using reusable packaging such as wax clothes and glass jars. The product must be developed in a way which is safe and sustainable. This includes working in a safe, hygienic and fair workplace. The product must not enforce child labour or discrimination.
<b>Ingredients</b>	The product will use ingredients that are Australian owned and sourced locally, free from artificial additives, contain complex carbohydrates and are of high quality.  The product must include complex carbohydrates.
<b>Type of product</b>	The product must be a line extension of one of ProCarb Foods' pre-existing products. It must accompany the main meal (side dish).
<b>Sensory properties</b>	The product must:  <b>Look appealing:</b> Fresh, colourful, bright and crisp.  <b>Taste appealing:</b> Balanced flavours. Must not be bland, too salty or overly spicy.  <b>Feel appealing:</b> When eating the product, there should be an array of textures that work together to create a positive mouthfeel. Should not be soggy or mushy.  <b>Smell appealing:</b> They must have a fresh, pleasant smell which draws consumers to eat more. Must not be too overpowering.
<b>Shelf-life</b>	The product must be single-serve and shelf-stable. Preservation techniques must be used to eliminate the possibility of microorganism growth which may lead to food spoilage. This restricts the use of meats, fresh vegetables and other ingredients requiring strict temperature control.  The shelf life for this product is 3 months. Once opened, it is to be consumed within 2 days.

## Chemical and functional properties of carbohydrates

The functional properties of food are determined by the food's physical and chemical characteristics.

The chemical characteristics or properties of food are components such as enzymes, acids, alkalis, moisture and nutrients, that enable foods to change during processing and storage, whereas the physical characteristics or properties of food are a food's size, shape, colour, volume, viscosity and elasticity.

These chemical and physical properties work together to determine the functional properties of food and how food may be processed or undergo activities to prepare it for sale (QCAA,2017).

Carbohydrates are the sugars, starches and fibres found in fruits, grains, vegetables and dairy products. Carbohydrates are a macronutrient that plays an important role in maintaining a healthy diet. It is recommended that carbohydrates contribute to 45–65% of our daily energy

intake. Carbohydrates yield is 16.7 kilojoules of energy per gram (McCahon & Pamment, 2019).

The National Health and Medical Research Centre Carbohydrates has not set a recommended daily intake (RDI) or Nutrient reference table (NRT) because your carbohydrate intake varies dramatically depending on activity level, age, gender, weight and height (McCahon & Pamment, 2019). Calorie needs are often higher during the teenage years (which is a part of the target market).

During this period of rapid growth and development, boys require an average of 2,800 calories a day, while girls require an average of 2,200 calories a day.

Carbohydrates have three major functions in the body: provide providing heat and energy, regulating body processes and regulates the use of protein and fat (McCahon & Pamment, 2019). Overconsumption of

carbohydrates leads to overall overconsumption of calories and therefore can contribute to weight gain (McCahon & Pamment, 2019). Overtime, this can lead to diseases such as obesity heart disease and high blood pressure.

On the other hand, under-consumption of carbohydrates can lead to a variety of complications such as fatigue, nausea and constipation (McCahon & Pamment, 2019). If the carbohydrate intake is too low, this can cause the body to enter ketosis.

Carbohydrates are organic molecules composed of carbon (C), hydrogen (H) and oxygen (O) atoms and compounds. In their basic form, carbohydrates are monosaccharides (simple sugars (SS)).

When monosaccharides combine with other sugar molecules, they form complex carbohydrates (CC). This is represented in Table 1.

Carbohydrate	Monosaccharides (SS)	Disaccharides (CC)	Oligosaccharides (CC)	Polysaccharides (CC)
Structure	One sugar molecule	Two sugar molecules	2–10 sugar molecules	10 or more sugar molecules
Example	Glucose $C_6H_{12}O_6$	Lactose $C_{12}H_{22}O_{11}$	Raffinose $C_{18}H_{32}O_{16}$	Glycogen $(C_6H_{10}O_5)_n$

Table 1: Carbohydrate chemical structure Table 1: Carbohydrate chemical structure

Carbohydrates are associated with many chemical reactions and chemical functions. It is essential to understand how carbohydrates

interact with other substances and/or heat when developing the product. These are summarised in Table 2.

Reaction	Process	Example
<b>Gelatinisation</b>	When starch molecules are suspended into a hot liquid, they expand and eventually by breaking the intermolecular bonds, allowing the hydrogen bonding sites (the hydroxyl hydrogen and oxygen) to engage more water, they “burst”. This irreversibly dissolves the starch granule in water. This thickens and gelatinises the liquid (McCahon & Pamment, 2019).	Custard
<b>Crystallisation</b>	Crystallisation is a processing technique used to separate a solid dissolved in a solution from the liquid. It occurs when a solution becomes supersaturated. As a supersaturated solution cools, crystals form in the liquid (McCahon & Pamment, 2019).	Fudge
<b>Caramelisation</b>	Caramelisation is the browning of sugar, a process used extensively in cooking for the resulting sweet nutty flavour. The reaction involves the removal of water (as steam) and the breakdown of the sugar (Mayo Foundation for Medical Education and Research, 2019).	Crème Brulee
<b>Leavening</b>	The chemical process used to make baked goods rise by the formation of carbon dioxide, in a batter or dough by using chemical leavening agents such as baking powder or bicarbonate of soda (QCAA,2017).	Bread
<b>Dextrinisation</b>	A chemical change in starch molecules caused by the breakdown of sugar chains when dry heat is applied. This process causes the formation of dextrin and causes browning to occur (McCahon & Pamment, 2019).	Toast browning
<b>Gelification</b>	The process of turning a liquid substance into a gelatinous form, using a gelling agent such as agar-agar, gelatine, carrageenan, gellan gum and methylcellulose (QCAA,2017).	Sauces

Table 2 — Reactions associated with carbohydrates

How carbohydrates react to certain chemicals is also important to consider when experimenting with carbohydrate-based foods. Different substances, such as acids, will have a different effect on carbohydrate’s chemical and physical properties than bases. How these substances

interact with each other can be manipulated in cooking to enhance the texture, taste and palatability of foods. A common example of this is in bread making. The ratios of ingredients have a major effect on how the bread will develop and cook.

### Preservation Technique

ProCarb Foods need a product that is shelf-stable. According to Culinary Lore, shelf-stable foods are that can be safely stored at room temperature in a sealed container. Shelf-stable foods tend to have low moisture, or low pH, or a combination of both (Culinary Lore, 2016). Some foods are naturally shelf-stable because of their very low moisture content. These are foods such

as dried pasta, cereal grains, nuts, certain candies and, in this case couscous. Other foods can be rendered shelf-stable by heat sterilisation, or by use of preservatives and preservation techniques (Culinary Lore, 2016). Preservation usually involves preventing the growth of bacteria, fungi (such as yeasts), and other microorganisms, as well as retarding the oxidation

of fats which cause rancidity (Culinary Lore, 2016). There are multiple techniques used to preserve food and extend their shelf-life, these include, drying, freezing, vacuum-packing, salting/curing, smoking, pickling, canning, and preservative food additives. The preservation techniques used to develop the product are summarised in Table 3.

Preservation technique	Function	Use in development of product
<b>Drying</b>	Reduces water activity sufficiently to prevent bacterial growth	Dried parsley, onion and garlic were used to flavour the couscous.
<b>Vacuum-packing</b>	Strips bacteria of oxygen needed for survival, thereby slowing spoiling.	All ingredients were vacuum-sealed into three separate containers.

Table 3— *Preservation techniques used to develop the product*

### Food processing techniques

Food processing techniques are used to control the access to and consumability of carbohydrate food sources (QCAA, 2017). The processing of carbohydrates includes the application of

heat, dehydration, the addition of additives and the application of cold processes. These are summarised in Table 4.

Processing technique		Example
<b>Application of heat</b>	Applying heat to carbohydrates can alter the appearance, shape, texture, texture and may aid in preserving the product. This process is relevant to the task as couscous is cooked in boiling water.	Boiling and caramelisation
<b>Application of cold</b>	Chilling or freezing food to control the growth of bacteria and pathogens, extending the shelf-life of a product (lor.org.uk, 2017). It also alters the flavour, palatability, texture and appearance of a product. This process is not relevant to the task as the product must be self-stable and therefore is to be stored at room temperature.	Frozen meals
<b>Additives</b>	Additives are substances that are used to enhance the appearance, texture or stability of a product, that are not normally consumed on their own. Additives may interfere with the pH of the product, therefore altering the formulation. Herbs, spices, hops, salt, yeast, water, air and protein hydrolysates are not classed as preservatives. This technique is not used to develop the product.	Aspartame, Benzoate and Monosodium glutamate (MSG)
<b>Dehydration</b>	Dehydration involves removing the water content in a product. As dehydration extends the shelf-life of a food product, it is also relevant in the development of non-perishable, carbohydrate-based, snack-food solution.	Meat dehydration (jerky)

Table 4 — *Carbohydrate Processing Techniques*

### Determination of solution requirements and self-determined criteria for the solution

The solution requirements and self-determined criteria for this task can be retrieved below in Table 5.

Solution Requirements	Self-determined Criteria
Must be: <ul style="list-style-type: none"> <li>• Shelf-Stable</li> <li>• Carbohydrate based</li> <li>• Single-serve</li> <li>• A side dish to accompany the main dish</li> </ul>	<ul style="list-style-type: none"> <li>• Interesting Australian, bush flavours</li> <li>• Quick and easy to make</li> <li>• Suitable for vegetarians</li> <li>• High-quality taste and appearance</li> <li>• Appeal to young people (16–35)</li> <li>• Must be easily transported</li> <li>• Must be ethically and sustainably produced</li> </ul>

Table 5 — *Solution Requirements*

## Developing a solution

To develop a carbohydrate-based product that meets the criteria in Table 5, multiple products were considered such as pasta meal kits, curry and rice meal kits, gnocchi, couscous salad, quinoa salad and pasta salad. Couscous was selected as the main carbohydrate source in the product. Couscous is versatile, quick and easy to make. A summary of shelf-stable, couscous products that are already available to purchase from Woolworths and Coles, can be retrieved from Appendix 1. These products will be used to develop ideas and used as an idea to extend from. The process associated with cooking couscous is boiling. Boiling carbohydrate-based products are the application of moist heat to food (McCahon & Pamment, 2019). Some carbohydrate-based foods require boiling to become palatable, such as vegetables, rice, pasta and in this case couscous. When couscous is boiled, the starch grains swell and absorb liquid, making their taste and texture appealing to consumers. A general method for cooking couscous is:

1. Bring water or stock, fat (oil or butter) and salt to a boil. Add couscous and stir once. Turn off heat and cover to allow the couscous to steam for approximately 5 minutes. Fluff with a fork and serve (Cook for your life, 2018).

Couscous is crushed durum wheat semolina formed into small granules or spheres (Gavin, 2019). It can be used as a substitute for rice, quinoa and noodles. When cooked they are golden in colour and have a pleasant nutty flavour. The texture can range from slightly coarse yet tender for smaller types, or chewy for larger varieties. The neutral taste allows it to be kept as a simple side to serve with stews and braises. It can be transformed into more interesting recipes like hearty fresh salads or infused with broths, stocks, meats, vegetables, and spices for a satisfying meal (Gavin, 2019). Examples of meals that use couscous include Mediterranean couscous salad, Baked capsicums with couscous filling, and Couscous with pork, beans and poached eggs. Moroccan Couscous (the smallest and most common couscous) was chosen to use out of all the varieties, as it is the most accessible, takes the shortest amount of time to cook and is the easiest to prepare. Lemon Myrtle was chosen as the flavour in response to feedback that the company received, saying, “Many suggested they would be interested in more creative combinations such as bush flavours.” Lemon Myrtle is an Australian shrub, whose leaves have been used by Indigenous Australians for a

variety of purposes. Traditionally, Lemon Myrtle was used for its health benefits as it: contains antimicrobial and antifungal properties, is a vegan source of calcium, is a source of lutein, folate, Vitamin A, Vitamin E and essential minerals including zinc and magnesium and, is a source of antioxidants. It has a fresh aroma of citrus, with delicate menthol essence and a strong lemon flavour. In cooking, lemon myrtle can be used in both sweet and savoury dishes. The leaves can be substituted for bay leaves, in marinades, soups, stews, casseroles and roasts. The flavour is intense, but when used sparingly, it complements chicken, lamb, kangaroo and beef dishes well. Lemon myrtle couscous can be eaten by itself or it can be used to enhance dishes such as Lamb Backstraps. Other ingredients could also be added to the couscous to create quick and easy dishes, such as chicken couscous salad, roasted vegetable couscous and salmon and couscous parcels.

*To prepare for this assessment I spent a lot of time researching first. I watched a lot of videos, read a lot of articles and even listened to podcasts. After I had a good understanding of the knowledge needed, I then set up my document*

*and the structure of the folio. I took the majority of my titles and headings straight from the syllabus. I tried to keep it in order so it was obvious that I had covered what was in the syllabus.*

**Michelle Phillips, student**

## Analysis of competing products available in the market

An analysis of shelf-stable couscous products that are already available can be retrieved from Appendix 1. Three products were investigated:

1. Ainsley Harriot Couscous Wild Mushroom
2. Birds Eye Steam Plus Couscous
3. From Basque with love Moroccan couscous

The first two products were cheap and easy to prepare, although, considering their low price point, it is expected that their ingredients are not the best quality. This will have a negative effect on the nutritional value of the products. These products were also heavily packaged using unsustainable methods (plastic). The 2<sup>nd</sup> product also required refrigeration which does not meet the criteria. The third product investigated, Moroccan couscous, fits

the criteria better than the previous products. This product is Australian made from high-quality ingredients, easy to prepare and shelf-stable. The product's ingredients claim to be 100% natural, vegan and free of E-100s. This product has similar ethics and morals as ProCarb Foods. However, the packaging does not meet the standards. An alternative packaging and flavour will be developed to meet ProCarb Foods requirements better.

---

## Trial Recipes

The product is being developed as a single-serve meal, where the consumer will follow the easy instructions on the packet to cook a unique, Australian bush inspired side dish in under ten minutes. To make the product shelf-stable, the ingredients will be separated into three vacuum sealed compartments to inhibit the growth of microorganisms.

These packets contain:

- **Packet 1** — Dried couscous, salt, pepper & dried parsley
- **Packet 2** — Roasted, seasoned macadamia nuts
- **Packet 3** — Lemon Myrtle flavoured macadamia oil

Three recipes were trialled. All three recipes were based on the base recipe, Lemon Myrtle Couscous, as seen in Appendix 2. The first recipe

is the control and does not have any modifications to the original recipe. The second trial recipe used the addition of vegetable stock powder, onion powder and garlic powder to enhance the flavour and make the product more palatable. The third trial recipe replaces macadamia oil with olive oil. This was suggested as the taste of the macadamia oil may be too over-powering for some.

---

## Base recipe (Trial Recipe 1)

The first recipe that trialled on the 11<sup>th</sup> of February 2020, was the original Lemon Myrtle Couscous. This recipe was used as the control as it has no alterations or flavours added to the base recipe in Appendix 2. This product is vegetarian, contains complex carbohydrates and contains no artificial colourings or flavours. Making this recipe was very simple and time-effective, although it was quite bland

and lacked flavour when it was cooked. The macadamia oil used to flavour the couscous lacked a distinct lemon myrtle flavour. This is due to the lack of time allocated to diffuse the flavour into the oil. However, this isn't necessarily a bad thing as it will complement a larger array of sauce-based dishes such as curry and meat well. As the couscous was quite bland, it could not be pleasantly eaten by itself.

This would greatly limit how versatile the product is. It did not have a strong aroma, but it had a pleasant fluffy, soft texture. Although, it was slightly dry. This could have been improved by adding more oil or water to the cooking process. The macadamia nuts provided an appetising crunch and a salty, rich flavour. By analysing its sensory properties in Appendix 4 (A), it scored an average of 6/10.

## Addition of vegetable stock powder (Trial Recipe 2)

This trial uses the same methodology as Trial Recipe 1 except for in Step 3, vegetable stock powder, onion powder and garlic powder were added to the dried couscous to test whether it will enhance the flavour of the couscous. It was chosen to add extra flavours in, so it would be palatable by itself. Therefore, it would be able to be eaten as both

a side dish and a quick, easy lunch/dinner. This recipe had a strong flavoursome taste. It was more pleasant to eat than Trial Recipe 1 and had good texture, with the macadamia nuts providing a crunch. This the addition of the vegetable stock, onion and garlic, contrasts well with the sweetness of the macadamia nuts. Although,

the lemon myrtle flavour was unable to be tasted. Although, because of the addition of the other powerful flavours, it is suspected that if the lemon myrtle taste was strong, the combination of flavours would be too strong. Overall, it was the most popular recipe and provided a score of 9/10, based on its sensory properties in Appendix 4(B).

## Olive oil instead of macadamia oil (Trial Recipe 3)

This trial uses the same methodology and ingredients as Trial Recipe 1, except for macadamia oil is replaced with olive oil. This recipe was slightly moister than Trial 1 and provided a simple and plain couscous. It had a weak lemon myrtle flavour which

was balanced nicely with the macadamia nuts. The product was successful as it didn't have an overpowering taste which implies that it has the ability to be used with almost any flavour. Similarly, to Trial 1, the couscous was quite bland and was too plain to be eaten

by itself. This would decrease the number of uses that the product has. Despite this, the couscous has an appetising texture and a pleasant, weak nutty taste. By evaluating the sensory properties in Appendix 4 (C), it was rated 7/10.

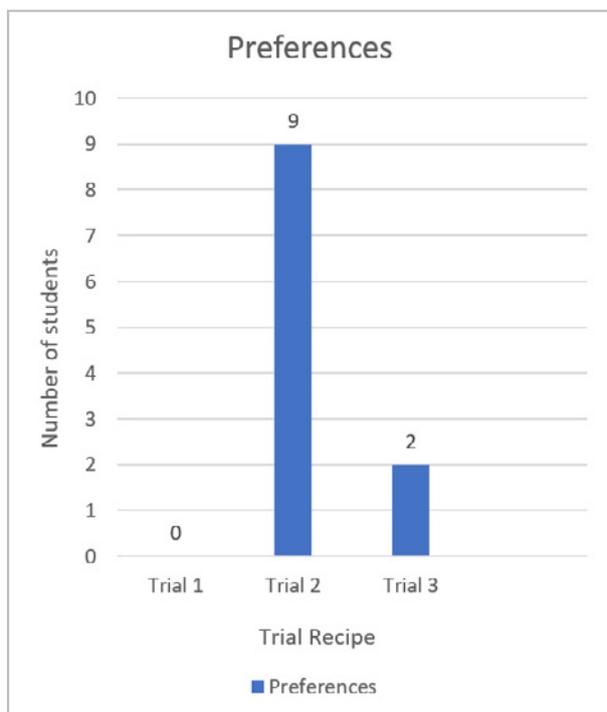
## Sensory Profiling

The product being developed will not be packaged cooked as it would not be shelf-stable. Although to make the couscous palatable to be able to sensory profile, every trial recipe was cooked using the method:

1. Bring ½ cup of water to boil.
2. Add Packet 1 and 2 to boiling water and mix once. Remove from heat.
3. Allow the couscous to stand for five minutes.
4. Add Packet 3 and fluff the couscous with a fork. Serve.

To limit the chance of errors, the same methodology was used to develop every product. The equipment was kept the same and the same person prepared each product. All equipment was thoroughly cleaned between each trial to

avoid contamination. The methodology used can be retrieved from Appendix 3 – Methodology. Each recipe was prepared and was analysed by other students (aged 16–17). Each class member tried all three couscous variations (cleansing in between), they then selected their favourite dish, as well as provide feedback on suggested improvements and extensions. The results from the sensory profiling are summarised in Table 6. 82% of the classmates preferred Trial Recipe 2 (Addition of vegetable stock, onion and garlic). While the remaining 18% said that their preferred product was Trial 3. Trial Recipe 1 was nobodies' first preference. This information is represented using a graph in Figure 1. From this information, it is evident that Trial Recipe 2 was the most popular recipe.



*Michelle has shown an extraordinary ability to discern the complexities of each phase of product development. She articulates well to clearly demonstrate insightful analysis of the problem, information and data related to the chemical and functional properties and processing of carbohydrate-based foods. Michelle has coherently and logically synthesised from both secondary and primary data to develop and recommend improvements to develop ideas for a carbohydrate-based side dish.*

**Geraldine Sevil, teacher**

Figure 1

	Trial Recipe 1	Trial Recipe 2	Trial Recipe 3
<b>Photograph</b>			
<b>Preference</b>	0 = 0%	9 = 82%	2 = 18%
<b>Feedback (quotations from the consumers)</b>	<ul style="list-style-type: none"> <li>• Dry</li> <li>• Plain</li> <li>• Little Bland</li> <li>• Good texture</li> <li>• Couldn't taste the lemon myrtle flavour</li> <li>• Not able to consume a lot by itself</li> </ul>	<ul style="list-style-type: none"> <li>• More flavour</li> <li>• More palatable on its own</li> <li>• Bit too salty</li> <li>• Good texture</li> <li>• Flavour was a little bit too strong</li> <li>• Good crunch (macadamia nuts)</li> </ul>	<ul style="list-style-type: none"> <li>• Slightly sweeter</li> <li>• Better for use in a combination of other flavours (i.e. curry)</li> <li>• Couldn't taste the difference between 1 &amp; 3</li> <li>• Moister</li> <li>• Better than 1, but not as good as 2.</li> </ul>

Table 6 – Sensory profiling and feedback received.

# Analysing data to develop a solution

## Survey

A multiple-choice survey was conducted which questioned people about their preferences surrounding carbohydrate side dishes. The following questions were asked:

1. Are you willing to pay more for environmentally friendly and/or sustainable packaging? (Appendix 5, A)
2. If you are not vegan/vegetarian, do you avoid buying vegan/vegetarian products? (Appendix 5, B)
3. Would you buy pasta/rice with dried vegetables in them? (Appendix 5, C)
4. Are you interested in traditional Australian bush flavours? (Appendix 5, D)

A total of 47 people was surveyed throughout December 2019 – February 2020, from a variety of backgrounds and locations around Australia. The full survey and results can be retrieved from

Appendix 5. The first question was asked to gain whether the consumers are willing to pay more for environmentally friendly packaging, which is essential for developing a product for ProCarb Foods. The majority (65.22%) said that they are willing to spend more but to some extent. The second question was asked to gauge whether, if the product was developed as vegetarian-friendly, whether it would deter people from the product. As expected, the most popular (65.22%) response was “No, I don’t care if they are vegan or not. If I like them, I like them.” Therefore, it was decided that the product should be vegetarian to be available to more people. The third question was asked to determine whether the product should have dried vegetables in them (i.e. dried kale). The responses to this question were rather close, with 39.13% saying that they prefer to add

their own fresh vegetables and 34.78% choosing “yes, as long as it has a pleasant taste”. In response to these results, it was decided to leave dried vegetables out and instead allow the consumer to add their own vegetables into the couscous. The final question was used to gain primary data on whether people would buy Australian Bush flavoured carbohydrate dishes. Most people (42.55%) responded that they would buy it because they like trying new things. Therefore, this will appeal to the adventurous consumer.

The survey results indicate that to make the new product appealing to more young people and the adventurous consumer, they must be high quality and tasty while remaining convenient and sustainably packaged.

## Calorie content

The calorie (cal) content of the products is also something that needs to be considered. A calorie can be defined as the amount of heat required at a pressure of one atmosphere to raise the temperature of one gram of water one degree Celsius that is equal to about 4.19 joules (merriam webster, 2019). Many consumers look for lower calorie content when purchasing products to help them lose weight. Generally,

if they are low calorie, they can contribute to the calorie deficient and in return help, the consumer will lose weight. The calorie content of each product was found by dividing the kJ, from the previously calculated nutritional label, by 4.184. The results in Table 7 reveal that Trial Recipe 2 had the lowest calories per 100g of  $\approx 147.2$ . This is relatively low. As the product is a side dish, a low-calorie content is preferred.

Recipe	kJ per 100g	Calories per 100g
Trial Recipe 1	651.16	155.63
Trial Recipe 2	615.8	147.18
Trial Recipe 3	649.37	155.20

Table 7 – Calorie content of the three trial recipes

## Packaging

The packaging of the product must also consider recent trends, by having sustainable and reusable packaging. ProCarb Foods prides themselves on using environmentally friendly packaging and does not follow traditional plastic packaging. The product will be packaged into three separate packets (as seen in Appendix 3, using Compostable Stand-up pouches which will be vacuum sealed (cryovac), as seen in Figure 2. They are made from high-quality paper and feature an inner metallised lining which is great to repel moisture from oily produce and inhibit the growth of microorganisms.

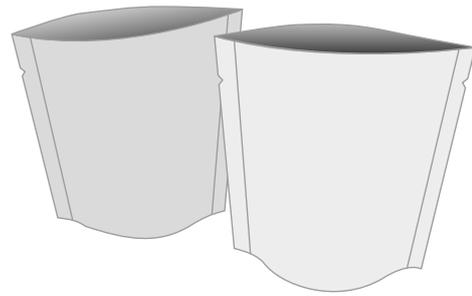


Figure 2 — Compostable stand-up pouches  
Images © State of Queensland (QCAA) 2021.  
CC by 4.0

The clear pouches are great for displaying products and are certified commercially compostable to international standards (TUV). These standing bags have an excellent gas barrier which helps keep the contents fresh. The raw materials are derived from non-GMO and non-fossil-fuel sources and use FSC certified paper. The bags are completely biodegradable, when in soil, however, the shelf life is recommended no longer than 12 months. Other features of these pouches include:

- fridge and freezer safe down to  $-20^{\circ}$  degrees Celsius
- meet the world's standards for compostability
- contain gas and moisture barrier properties and are air-tight when heat/vacuum sealed.

The cost of the pouches is summarised in Table 8.

Product	Quantity Brought	Cost	Cost/unit	Cost/product ( $\times 3$ )
Pouches (190x160x100mm)	1500	\$663.30	\$0.44	\$1.33

Table 8

It was chosen to use these products as they are completely biodegradable and can hold both liquids, in this case, oil, and dry ingredients (couscous and macadamia nuts). This packaging aligns with ProCarb Foods' ethics and morals surrounding the packaging on their item as well as being easily transported and stored.

The three separate pouches will be held together by cardboard and twine, which will have the instructions, nutrition information and other labelling requirements on it. This is further analysed in Figure 3, which uses The Spice Tailor Original Tikka Masala's packaging as an example.

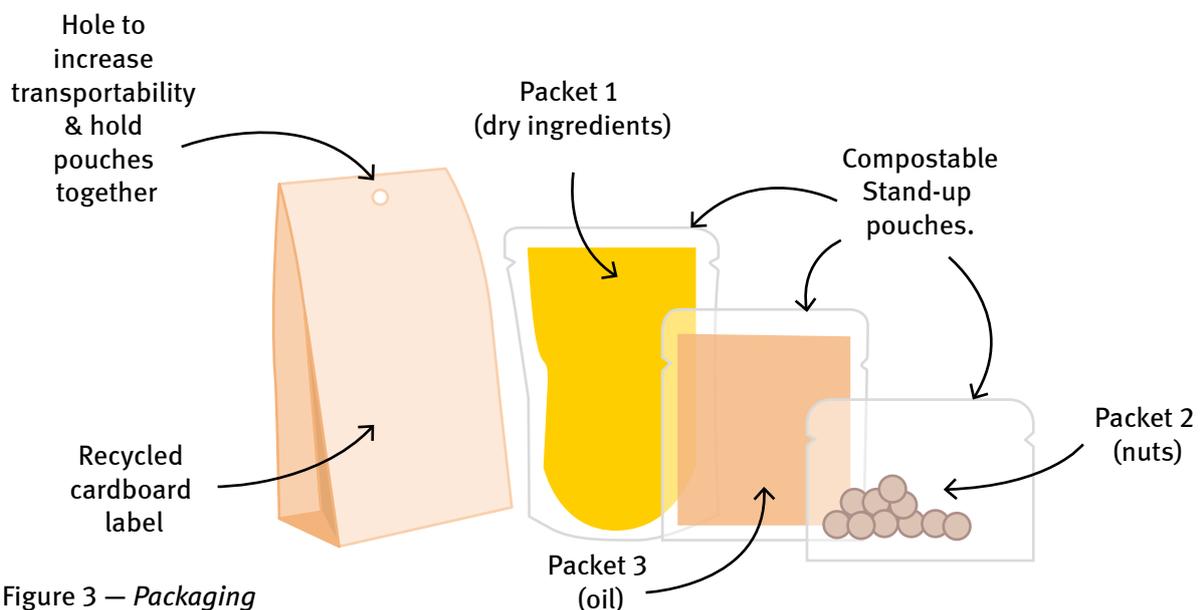


Figure 3 — Packaging

## Laws and Regulations

The laws and regulations surrounding the storage and production of ready foods also must be considered. Foods that can be safely stored at room temperature, or “on the shelf,” are called “shelf-stable.” These non-perishable products that do not require refrigeration until after opening. These will be labelled “Keep Refrigerated.” Food safety regulations outlined by Food Standards Australia New Zealand (FSANZ) apply to every business involved in the handling of food for sale, or the sale of food, in Australia (Queensland Government, 2019). Other food standards that must be followed when selling and producing the protein balls include the regulations outlined by the:

- Queensland food safety legislation, including *The Food Act 2006*, *The Food Regulation 2006*, *The Food Production (Safety) Act 2000* and *The Food Production (Safety) Regulation 2014*.
- Food safety regulations from your local government, including training requirements and rating systems.
- JAS-ANZ — provides accreditation and certification for food safety systems in Australia and New Zealand.
- Department of Agriculture — provides import and export inspection and certification to help Australia keep its highly favourable animal, plant and human health status, and wide access to overseas export markets.

*I really liked this assessment. I feel like it gave me a lot of freedom and the option to explore things myself. Being able to choose our own recipe to modify and develop allowed me to pick something that I was genuinely interested in and wanted to learn more about.*

*I am interested in the Food and Nutrition industry, so I genuinely really liked learning about the subject ... [and] because I have been interested in the subject for a long time and was also studying Biology and Chemistry, a lot of it felt like common sense to me.*

**Michelle Phillips, student**

## Refinement of ideas and the solution

The strengths and weaknesses of each recipe are summarised in Table 9.

	Trial Recipe 1	Trial Recipe 2	Trial Recipe 3
Positives	<ul style="list-style-type: none"> <li>• Able to be eaten in combination with other ingredients and sauces.</li> <li>• Allows people to add their own vegetables and/or meat</li> </ul>	<ul style="list-style-type: none"> <li>• Most popular</li> <li>• Flavoursome</li> <li>• Able to be eaten on its own.</li> <li>• Appeal to time-stricken, young people (Target Market)</li> </ul>	<ul style="list-style-type: none"> <li>• Able to be eaten in combination with other ingredients and sauces.</li> <li>• Allows people to add their own vegetables and/or meat.</li> <li>• High-quality texture</li> </ul>
Negatives	<ul style="list-style-type: none"> <li>• Dry &amp; bland.</li> <li>• Not pleasant when eaten by itself &gt; More time is needed to make it tasteful which does not appeal to time ridden people (Target Market)</li> </ul>	<ul style="list-style-type: none"> <li>• Likely to be overpowering when eaten in combination with other dishes</li> <li>• For some, it was too salty or strong.</li> </ul>	<ul style="list-style-type: none"> <li>• Bland</li> <li>• More time is needed to make it tasteful which does not appeal to time ridden people (Target Market)</li> </ul>

Table 9 — *Pros and Cons of each product*

The information presented in Table 9 was then used to determine the final product.

**Trial recipe 1** (base recipe) — For the final product, it was decided against this recipe as it was the least popular (when sensory profiled). The texture of this product did not meet standards — it was quite dry and produced a pasty mouthfeel. The bland, nutty flavour was not pleasant when consumed by itself. This was due to a lack of time dedicated to infusing the oil and therefore the couscous lacked a distinct lemon myrtle taste. ProCarb Foods pride themselves on tasty and high-quality products and this product does not meet

their needs and requirements.

**Trial Recipe 2** (addition of vegetable stock, onion and garlic) — This recipe was chosen as the final product as it was the most popular and provided the fullest flavour using natural ingredients. This product can be eaten on its own as a light lunchtime snack or it is able to be consumed as a side dish and incorporated into dishes such as lamb chops and Mediterranean salads. This product is versatile, delicious and had a satisfying texture.

**Trial Recipe 3** (macadamia oil substituted for olive oil) —

The third trial recipe had an almost identical flavour to Trial Recipe 1; however, this recipe had a much moister texture. This made the couscous much more palatable. When tasting Trial Recipe 3, the consumers suggested that they preferred this recipe as it did not have an overpowering taste. This indicates that this couscous would be ideal when incorporated into flavoursome dishes. However, because of its bland flavour, it is not as versatile as Trial Recipe 2 and therefore was not chosen as the final product.

*Our school is located in a regional area where food production and agriculture are inherent to the context of learning. This allowed students opportunities to explore regional produce and acknowledge the seasonality and availability of good-quality produce.*

*Students had previously investigated, through experimentation and research, the effects of the chemical and functional properties of a range of carbohydrate foods and formulations that assisted in the analysis phase of the folio task.*

**Geraldine Sevil, teacher**

### Cost analysis

The cost of the product must also be considered. The cheaper it is to produce, the cheaper it will be to buy as a consumer. By using Sugar Kitchen's Recipe Costing Calculator, the batch cost, gross profit (%) and mark up (%) were able to be calculated for the final recipe, Trial Recipe 2. As local, fresh and Australian ingredients are preferred, all ingredients used in calculating the batch cost were retrieved from Honest to Goodness, an Australian bulk wholefoods supermarket. The cost of each ingredient was calculated for each serving, as seen in Figure 4. This was then used to calculate the total cost per serve with and without GST. The total cost was \$4.16 per serving (without GST) and \$4.57 with GST.

Organic Cous Cous Wholewheat	25 000	149.4	83	<b>\$0.50</b>
Australian Macadamias	11340	541.45	40	<b>\$1.91</b>
Organic Parsley Leaf	10	3.8	2	<b>\$0.76</b>
Macadamia Oil	20 000	310	30	<b>\$0.46</b>
Lemon Myrtle Powder	500	63.95	2	<b>\$0.26</b>
Organic Garlic Powder	1000	32.5	2	<b>\$0.07</b>
Onion Powder	38	2.45	2	<b>\$0.13</b>
Vegetable stock powder	38	2.45	2	<b>\$0.06</b>
Himalayan Rock Salt — Fine	20 000	94	4	<b>\$0.02</b>

Figure 4 — *Cost of Ingredients per serve.*

## Suggested improvements and extensions

Trial Recipe 2 was chosen as the final product as it is vegetarian friendly, shelf-stable, quick and easy to prepare, easily transported and most importantly is carbohydrate based. However, alterations needed to be made before the product is able to be sold. Through the addition of superfoods such as kale and the decrease in salt, onion and garlic, the product would be more appealing to the consumer.

Throughout the product development, three variations of lemon myrtle couscous recipes were trialled. The three recipes were then taste-tested and the product that was the most popular, the lemon myrtle couscous with the addition of vegetable stock, onion and garlic,

was chosen as the final product. To improve the process, a higher number of flavours could have been tested to obtain more accurate results. In general, all recipes lacked a distinct lemon myrtle taste, therefore, a different technique of oil infusion could have been used. Other flavours such as lemongrass, bush tomato and native thyme could also have been trialled. It was also observed that the serving size was rather large. This could be minimised to reduce waste and make the product smaller and easier to transport. Other improvements and extensions of the trialled recipes can be retrieved from the table below (Table 10).

	Suggested Improvements
<b>Trial Recipe 1</b>	<ul style="list-style-type: none"> <li>• Addition of chickpeas.</li> <li>• Addition of lemon myrtle powder to dry ingredients.</li> <li>• A larger amount of smaller macadamia chucks.</li> </ul>
<b>Trial Recipe 2</b>	Despite having a pleasant taste, feedback was received that it was too strong. Therefore, less salt, onion, garlic and vegetable stock would be added to the couscous. To enhance the nutrient value of the product, the addition of dried 'superfoods' (such as kale and chia seeds) could be investigated. This would also make the product more marketable as it would contain popular ingredients.
<b>Trial Recipe 3</b>	<ul style="list-style-type: none"> <li>• Addition of lemon myrtle powder to dry ingredients to enhance the lemon myrtle taste.</li> <li>• A larger amount of smaller macadamia chucks.</li> <li>• Addition of herbs and seasoning such as garlic and onion.</li> </ul>

Table 10 — Suggested improvements and extensions

*In this comprehensive response Michelle has used insightful analysis of information and data related to the properties and processing of carbohydrate to identify the essential characteristics and constraints, to determine the solution requirements and to generate self-determined criteria for evaluation of the solution.*

*Critical evaluation and discerning refinement of ideas and her solution has*

*been completed using the self-determined criteria. Michelle has generated a purposeful solution from substantiated evidence and she has critically evaluated and made astute recommendations for future enhancement. Her response also delves into packaging and costing which goes beyond the requirements of the project.*

**QCAA Principal Education Officer**

# Appendix

## Appendix 1 — Similar Products Already on the Market

<b>Product 1</b>	<b>Ainsley Harriot Couscous Wild Mushroom 100g</b>																								
<b>Ingredients</b>	Dried Couscous (85%) [Durum Wheat Semolina], Maltodextrin, Dried Wild Mushrooms (1.9%), Flavourings (contain Milk, Barley), Salt, Vegetable Oil, Dried Parsley, Garlic Powder (0.3%), Mushroom Powder, Sugar, Yeast Extract, Ground Black pepper.																								
<b>Cost/100g</b>	\$1.90																								
<b>Nutritional Information</b>	<p>Servings per package: 2 Serving size: 130g</p> <table border="1"> <thead> <tr> <th>Nutrition</th> <th>Avg Qty Per Serving</th> <th>Avg Qty Per 100g</th> </tr> </thead> <tbody> <tr> <td>Energy</td> <td>794kJ</td> <td>611kJ</td> </tr> <tr> <td>Protein</td> <td>6.9g</td> <td>5.3g</td> </tr> <tr> <td>Fat, total</td> <td>1.4g</td> <td>1.1g</td> </tr> <tr> <td>– saturated</td> <td>0.6g</td> <td>0.4g</td> </tr> <tr> <td>Carbohydrate</td> <td>35.6g</td> <td>27.4g</td> </tr> <tr> <td>– sugars</td> <td>2.1g</td> <td>1.6g</td> </tr> <tr> <td>Sodium</td> <td>437mg</td> <td>336mg</td> </tr> </tbody> </table>	Nutrition	Avg Qty Per Serving	Avg Qty Per 100g	Energy	794kJ	611kJ	Protein	6.9g	5.3g	Fat, total	1.4g	1.1g	– saturated	0.6g	0.4g	Carbohydrate	35.6g	27.4g	– sugars	2.1g	1.6g	Sodium	437mg	336mg
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<b>Claims</b>	“Just add boiling water” — convenience																								
<b>Product 2</b>	<b>Birds Eye Steam Plus Couscous 400g</b>																								
<b>Ingredients</b>	Cooked pearl couscous (28%) (water *wheat* flour) cooked regular couscous (27%) (water *wheat* flour) peas (11%) cooked chick peas (8%) [chick peas water salt antioxidant (330)] carrot (6%) spinach leaf (5%) red capsicum (4%) red onion (4%) yellow capsicum (4%) herbs and spices (paprika chilli celery seed cinnamon mustard seed garlic) sunflower oil parsley salt.																								
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<b>Claims</b>	<ul style="list-style-type: none"> <li>• The benefits of grains + vegetables pearl couscous with chick peas = protein necessary for tissue building and repair + antioxidant vitamin C helps protect cells from free radical damage + folate helps support the immune system.</li> <li>• source of Protein, Vitamin C and Folate when cooked.</li> <li>• No artificial colours, flavours &amp; preservatives.</li> </ul>																								
<b>Product 3</b>	<b>From Basque with Love Moroccan Couscous</b>																								
<b>Ingredients</b>	Couscous, dried apricot, pistachio, garlic, shallots, salt and Moroccan spice																								
<b>Cost/100g</b>	\$3.85																								
<b>Nutritional Information</b>	<p><b>NUTRITIONAL INFORMATION</b></p> <p>Serves 6 per packet as a side dish.</p> <table border="1"> <thead> <tr> <th></th> <th>PER SERVE</th> <th>PER 100g</th> </tr> </thead> <tbody> <tr> <td>energy</td> <td>805.7kj</td> <td>1492kj</td> </tr> <tr> <td>protein</td> <td>6.3g</td> <td>11.6g</td> </tr> <tr> <td>fat, total</td> <td>0.9g</td> <td>1.6g</td> </tr> <tr> <td>  saturated</td> <td>0.1g</td> <td>0.2g</td> </tr> <tr> <td>carbohydrate</td> <td>39.1g</td> <td>72.4g</td> </tr> <tr> <td>  sugars</td> <td>1.5g</td> <td>2.7g</td> </tr> <tr> <td>sodium</td> <td>5.4mg</td> <td>10mg</td> </tr> </tbody> </table>		PER SERVE	PER 100g	energy	805.7kj	1492kj	protein	6.3g	11.6g	fat, total	0.9g	1.6g	saturated	0.1g	0.2g	carbohydrate	39.1g	72.4g	sugars	1.5g	2.7g	sodium	5.4mg	10mg
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## Appendix 2 — Base Recipe

### Lemon Myrtle Couscous

#### *Ingredients*

- ½ cups Couscous (Moroccan)
- ½ cups water
- Pinch salt
- ½ tablespoons dried parsley (finely chopped)
- ½ tablespoons macadamia nuts (coarsely chopped) — separately
- ¼ tablespoon Macadamia Oil — separate
- ¼ tablespoon Lemon Myrtle infused Macadamia Oil

#### *Method*

- Fry chopped nuts in Macadamia Oil until golden brown. Set aside on paper to drain.
- Bring 2 cups water to boil in saucepan. Remove from heat and add 1 tablespoon Lemon Myrtle infused Macadamia Oil and 1 teaspoon salt. Stir.
- Add 2 cups of Couscous, stir and cover and allow to stand for 2–3 minutes while the Couscous swells. Add nuts & chopped parsley.
- Stir and serve on individual plate.

## Appendix 3 — Methodology

Step	Methodology	Photo
1	<p>Infuse lemon myrtle into macadamia oil.</p> <ol style="list-style-type: none"> <li>Place ½ of the macadamia oil (or olive oil) and lemon myrtle into a heavy-bottomed saucepan, over low heat until it the herbs start to move. Should be heated to 60 degrees Celsius.</li> <li>Monitor the oil and keep at 60 degrees for 5–10 minutes, ensuring that the oil doesn’t burn. The oil should be very aromatic.</li> <li>Remove from heat and transfer into a sanitised jar. Add remaining oil. If it is not flavoured enough, repeat steps a) and b) and add more lemon myrtle.</li> <li>Allow to cool overnight.</li> <li>When ready to use, strain using a cheese cloth.</li> </ol> <p><b>Packet 3</b></p>	
2	<p>Fry chopped macadamia nuts in Macadamia Oil (or olive oil) &amp; salt until golden brown. Set aside on paper to drain.</p> <p><b>Packet 2</b></p>	
3	<p>Place couscous, dried parsley, salt and pepper (and vegetable stock powder, onion powder and garlic powder for Trial Recipe 2) into a bowl. Mix to distribute ingredients evenly.</p> <p><b>Packet 1</b></p>	

## Appendix 4 — Trial Recipes

### A — Trial Recipe 1 — Sensory Properties

<b>Trial Recipe 1</b> evaluation (once prepared)	<b>Control (no alterations)</b>																
<b>Ingredients</b>	½ cups Couscous (Moroccan), ½ cups water, Pinch salt, ½ tablespoons dried parsley (finely chopped), ½ tablespoons macadamia nuts (coarsely chopped) — separately, ¼ tablespoon Macadamia Oil, ¼ tablespoon Lemon Myrtle infused Macadamia Oil																
<b>Photograph</b>	 <p>Macadamia nuts</p> <p>Parsley</p>																
<b>Preparation time</b>	To cook — 7 mins To prepare — 20 mins (including oil)																
<b>Taste</b>	Bland, nutty macadamia taste, Palatable																
<b>Aroma</b>	No distinctive strong aroma																
<b>Texture</b>	Crunchy (macadamia nuts), soft and fluffy. Dry. Pasty mouthfeel																
<b>Appearance</b>	Light golden colour, light and fluffy, dull, plain																
<b>Nutritional information</b>	<table border="1"> <thead> <tr> <th>Nutrient</th> <th>Qty per 100g</th> </tr> </thead> <tbody> <tr> <td>Energy (kJ)</td> <td>651.16</td> </tr> <tr> <td>Protein (g)</td> <td>3.09</td> </tr> <tr> <td>Fat, Total (g)</td> <td>10.30</td> </tr> <tr> <td>Fat, Saturated (g)</td> <td>1.37</td> </tr> <tr> <td>Carbohydrate (g)</td> <td>11.07</td> </tr> <tr> <td>Sugars (g)</td> <td>0.68</td> </tr> <tr> <td>Sodium (mg)</td> <td>779.96</td> </tr> </tbody> </table>	Nutrient	Qty per 100g	Energy (kJ)	651.16	Protein (g)	3.09	Fat, Total (g)	10.30	Fat, Saturated (g)	1.37	Carbohydrate (g)	11.07	Sugars (g)	0.68	Sodium (mg)	779.96
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<b>Overall rating</b>	6/10																

### B — Trial Recipe 2 — Sensory Properties

<b>Trial Recipe 2</b>	<b>Base recipe with the addition of vegetable stock, garlic powder and onion powder</b>
<b>Ingredients</b>	½ cups Couscous (Moroccan), ½ cups water, Pinch salt, ½ tablespoons dried parsley (finely chopped), ¼ tablespoon of vegetable stock powder, ¼ tablespoon onion powder, ¼ tablespoon garlic powder, ½ tablespoons macadamia nuts (coarsely chopped) — separately, ¼ tablespoon Macadamia Oil, ¼ tablespoon Lemon Myrtle infused Macadamia Oil.
<b>Photograph</b>	
<b>Preparation time</b>	To cook — 7 mins To prepare — 20 mins (including oil)

<b>Trial Recipe 2</b>	<b>Base recipe with the addition of vegetable stock, garlic powder and onion powder</b>																
<b>Taste</b>	Salty, sweet, garlic, briny, flavoursome, palatable, rich, zesty																
<b>Aroma</b>	Weak garlic and onion aroma																
<b>Texture</b>	Moist, soft and fluffy, crunchy																
<b>Appearance</b>	Light golden colour, hints of brown/green from vegetable stock. Aerated and fluffy, slightly more dense/heavy than the control.																
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<b>Overall rating</b>	9/10																

### C — Trial Recipe 3 — Sensory Properties

<b>Trial Recipe 3</b>	<b>Base recipe with olive oil instead of macadamia oil</b>																
<b>Ingredients</b>	½ cups Couscous (Moroccan), ½ cups water, Pinch salt, ½ tablespoons dried parsley (finely chopped), ½ tablespoons macadamia nuts (coarsely chopped), ¼ tablespoon olive oil, ¼ tablespoon Lemon Myrtle infused olive oil.																
<b>Photograph</b>																	
<b>Preparation time</b>	To cook — 7 mins To prepare — 20 mins (including oil)																
<b>Taste</b>	Bland, nutty macadamia taste, slightly sweeter than trial recipe 1. Palatable																
<b>Aroma</b>	No strong aroma																
<b>Texture</b>	Soft and fluffy, moist, crunchy																
<b>Appearance</b>	Slightly deeper golden couscous. Light and slightly denser — Not as aerated.																
<b>Nutritional information</b>	<table border="1"> <thead> <tr> <th>Nutrient</th> <th>Qty per 100g</th> </tr> </thead> <tbody> <tr> <td>Energy (kJ)</td> <td>649.37</td> </tr> <tr> <td>Protein (g)</td> <td>3.09</td> </tr> <tr> <td>Fat, Total (g)</td> <td>10.25</td> </tr> <tr> <td>Fat, Saturated (g)</td> <td>1.45</td> </tr> <tr> <td>Carbohydrate (g)</td> <td>11.07</td> </tr> <tr> <td>Sugars (g)</td> <td>0.68</td> </tr> <tr> <td>Sodium (mg)</td> <td>780.41</td> </tr> </tbody> </table>	Nutrient	Qty per 100g	Energy (kJ)	649.37	Protein (g)	3.09	Fat, Total (g)	10.25	Fat, Saturated (g)	1.45	Carbohydrate (g)	11.07	Sugars (g)	0.68	Sodium (mg)	780.41
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Carbohydrate (g)	11.07																
Sugars (g)	0.68																
Sodium (mg)	780.41																
<b>Overall rating</b>	7/10																

## Appendix 5 — Survey Results

Question Surveyed	Response Data
<p><b>A</b> Are you willing to pay more for sustainable packaging i.e. a glass jar?</p>	
<p><b>B</b> If you are not vegan, do you avoid buying vegan products?</p>	
<p><b>C</b> Would you buy pasta/rice that had dried veggies in it? (Like the packets of veggies that come with 2-minute noodles)</p>	
<p><b>D</b> Are you interested in traditional Australian bush flavoured products? Such as lemon myrtle, wattle seed, native thyme, saltbush and pepper berry.</p>	

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# German Extension.

# German Extension

## Internal assessment 3

Project — investigative folio

**Izabella Baker**

Kenmore State High School

### Context

For this assessment instrument, you will investigate an area of special interest that is different from those you previously studied in Unit 3. You should choose the focus of your investigation to give you the opportunity to demonstrate your linguistic development. Your topic must not be an extension of a learning experience undertaken in the subject matter of Unit 3.

### Task

Investigate a topic of your choosing by selecting a range of authentic German texts to analyse and evaluate in a multimodal presentation.

*Excerpt from Kenmore State High School's German Extension IA3, 2020.*

The script and a selection of images from the slides used in Izabella's multimodal presentation have been reproduced.

# Kunst ist die Sprache von Protest

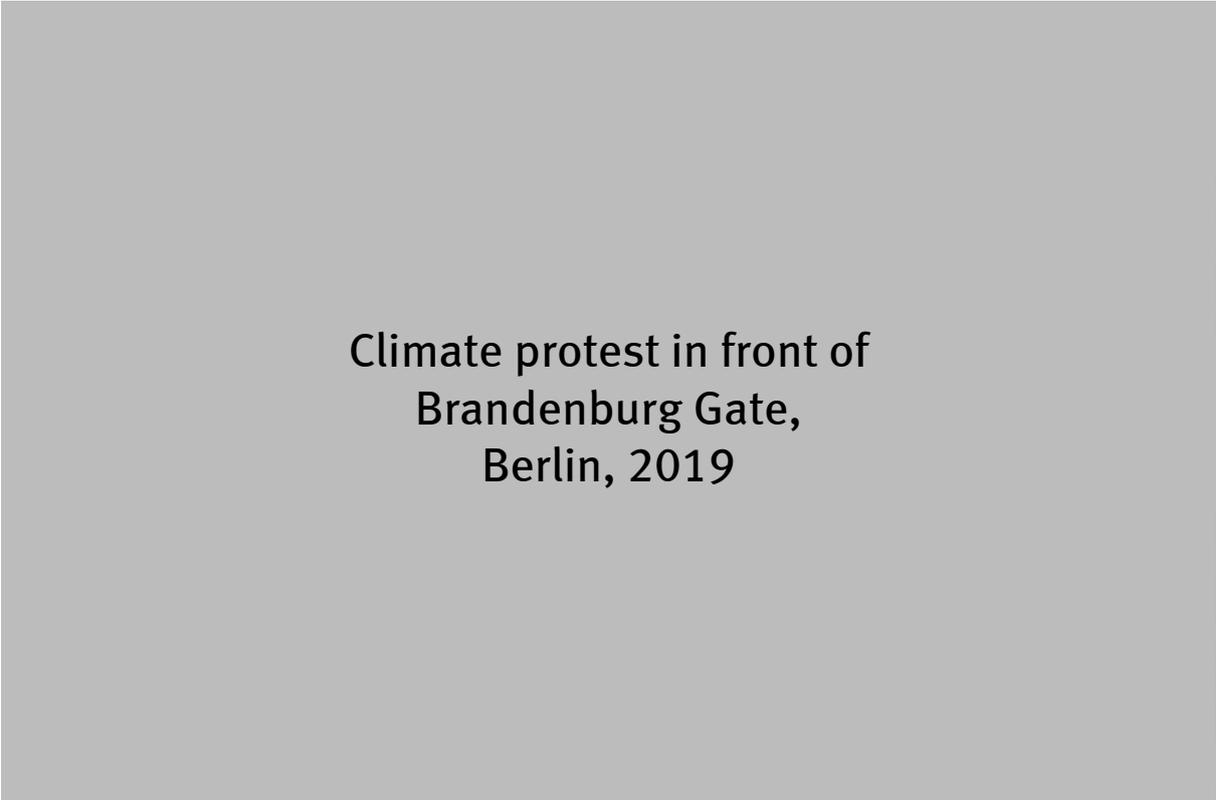
(Art is the Language of Protest)

## Einleitung

Guten Tag, heute werde ich über das Thema Kunst sprechen. Von Gemälde bis Fotografie bis öffentliche Demonstrationen, ist Kunst ein Medium, durch das man sich selbst zeigen kann. In diesem Projekt zeige ich, dass Kunst „die Sprache von Protest“ ist.

Heutzutage beschäftigen wir oft mit verschiedenen Problematik in unserer Gesellschaft. Wenn Menschen nicht glücklich mit etwas in der Gesellschaft sind, protestieren sie. Es gibt verschiedene Arten von Protest. Manche schreiben Lieder, wie zum Beispiel „99 Luftballons“ von Nena, und andere

demonstrieren, beide individuell und in großen Gruppen. In den letzten Jahren, nutzen Menschen Kunst als friedlichen und wirksamen Protest. In Deutschland, wird Kunst benutzt, um zum Beispiel gegen Krieg oder Faschismus zu protestieren. Um meine Aussage zu zeigen, diskutiere ich verschiedene Arten von Protestkunst: Installation, Gemälde, und Graffiti, die gegen etwas in unserer Gesellschaft protestieren. Hauptsächlich, nutze ich drei Artikeln, die Protestkunst analysieren durch verschiedene künstlerische Technik und die Reaktion der Gesellschaft.



Climate protest in front of  
Brandenburg Gate,  
Berlin, 2019

Fabrizio Bensch/Reuters. Used under licence.



Manaf Halbouni Public Art installation "Monument" in front of the Frauenkirche Dresden/Germany. Available on Wikimedia Commons [https://commons.wikimedia.org/wiki/File:Manaf\\_Halbouni%27s\\_%22Monument%22\\_in\\_Dresden\\_mit\\_Blick\\_auf\\_die\\_Frauenkirche.jpg](https://commons.wikimedia.org/wiki/File:Manaf_Halbouni%27s_%22Monument%22_in_Dresden_mit_Blick_auf_die_Frauenkirche.jpg) under the Creative Commons Attribution-Share Alike 4.0 International (CC BY-SA 4.0) licence

## Installation

Als erstes beginne ich mit Manaf Halbounis Installation *Monument*. Manaf Halbouni ist ein syrisch-deutscher Künstler, der in Damaskus aufgewachsen ist. In 2008 flieht er vor dem syrischen Militärdienst nach Dresden. Deswegen, protestiert diese Installation gegen Krieg, spezifisch den Syrischen Bürgerkrieg. *Monument* ist drei Busse, die hochkant sind, in dem Neumarkt in Dresden stehen. Nach Auskunft seiner Website, Halbouni sagt diese Installation stellt „eine Verbindung zwischen den Menschen und Schicksalen im Nahen Osten und Europa“ dar, und symbolisiert „das Leid und die unaussprechlichen Verluste, aber auch die Hoffnung auf Wiederaufbau und Frieden.“

Zweitens, spreche ich über wie Halbouni Symbolik benutzt hat. In einem Interview mit Heike Schwarzer für die Funkstation „Deutschlandfunk“, sagt Halbouni, dass er Symbolik nutzt, um Beachtung der Syrischen

Bürgerkrieges zu verbringen. Busse sind in Aleppo als Barrikade benutzt, um die Bürger zu schützen gegen Scharfschützen. In ähnlicher Weise, ist es auch ein Symbol der humanitären Katastrophe des Bürgerkrieges. Er arbeitet gerne mit großen Objekten, die der Augen auffallen. Dann gehe ich zu die Symbolik dem Standort der Busse. Die Busse liegen vor der Frauenkirche in Dresden. Halbouni sagt diese Installation „soll eine kleine Symbolik entstehen und daran erinnern, dass die Frauenkirche nicht immer so intakt war wie sie jetzt ist.“ Während des Zweiten Weltkrieges, war die Frauenkirche zerstört, und Dresden wurde wieder aufgebaut. Die Süddeutsche Zeitung erklärt, dass der Standort „steht im Zusammenhang mit dem Dresdner Gedenken an die Opfer von Krieg und Gewalt.“

## Protest against Manaf Halbouni's public art installation, Monument, in front of the Frauenkirche, Dresden, 2017

Sebastian Kahnert / DPA via Getty Images. Used under licence.

Schließlich, spreche ich über die Reaktion des Publikums. Halbouni sagt im Deutschlandfunk Interview, dass er eine bessere Welt kreieren will. Mit dieser Installation, möchte er ein Gespräch eröffnen. Deshalb, ist die Zielgruppe alle. Auf eine Seite, Dirk Hilbert, Dresdens Bürgermeister, bezeichnet die Skulptur als „große Bereicherung“ für Dresden. Er sagt, Monument erinnert die Dresden Bürger, „dass auch in unserer Stadt Menschen verfolgt,

erniedrigt und getötet wurden“. Auf der anderen Seite, die rechtsorientierte Gruppe „Alternative für Deutschland“, auch bekannt als AfD, protestiert gegen Monument. Obwohl diese Installation ein Symbol für Frieden, Freiheit und Menschlichkeit sein soll, gefällt es der AfD nicht. Sie beschreiben die Installation als „Missbrauch der Kunstfreiheit“. Der Zweck der Installation und was es repräsentiert verbündet sich nicht mit den Meinungen und Glauben der AfD.



*To prepare for this task, I made a plan ... so I would have enough time to complete and edit this assignment without rushing. Our teacher took us through the QCAA examples of this assignment. Before we started this assessment, we analysed a source (e.g. a photo) in class. This was particularly helpful as it ... allowed us to consult with our teacher and to see if we were on the right track.*

**Izabella Baker, student**

*The student work demonstrated thorough comprehension of language elements, structures and textual conventions to identify the gist and extensive details in all the stimulus texts through an investigative process. The work has shown perceptive identification of how meaning, attitudes, perspectives and values underpin the texts and influence audience.*

**QCAA Principal Education Officer**



Photograph of Old oak tree painting by artists Helge and Saxana Hommes. Used with permission of the artists and photographer Wolfgang Schlabach. Images sourced from <https://www.ruhrnachrichten.de/castrop-rauxel/kunst-als-friedlicher-protest-so-sieht-die-alte-eiche-auf-zwei-oel-gemalden-aus-1467703.html>

## Gemälde

Um Gemälde als Protest zu zeigen, nutze ich zwei Artikeln. Artikel 1, von Maren Carle von der Zeitung „Ruhr Nachrichten“, geht um wie Gemälde als friedlicher Protest benutzt werden. Die Maler, Helge und Saxana Hommes, möchten die alte Eiche schützen. Für eine große Ausstellung, malen sie die alte

Eiche. Die zwei Öl-Gemälde sind 1,6 Meter mal 1,20 Meter groß. In dem Artikel steht es, dass die Gemälde friedlicher Protest sind. Nicht zu vergessen, ist das der Investor der Malern verboten hat, um das Gelände rund die Eiche zu betreten. Artikel 2 erklärt, dass die beiden Künstler planten, die alte Eiche zu malen und den zweihundertfünfzig Jahre alten Baum zu erhalten, mindestens im Porträt.

*Izabella's topic choice is exemplary. This student takes the topic of art to a different level. She identifies that art can be used as a way of protest. She gives fantastic examples; she analyses not only the art but also the reviews in great detail. The student analyses deeply; she displays higher order thinking in her analysis and in the way she links art and society. She clearly makes statements and continues to identify reasons for this in her research. Izabella has an incredible ability to manipulate language. All this in a second language. A fantastic achievement.*

**Chrissie Geuthner, teacher**

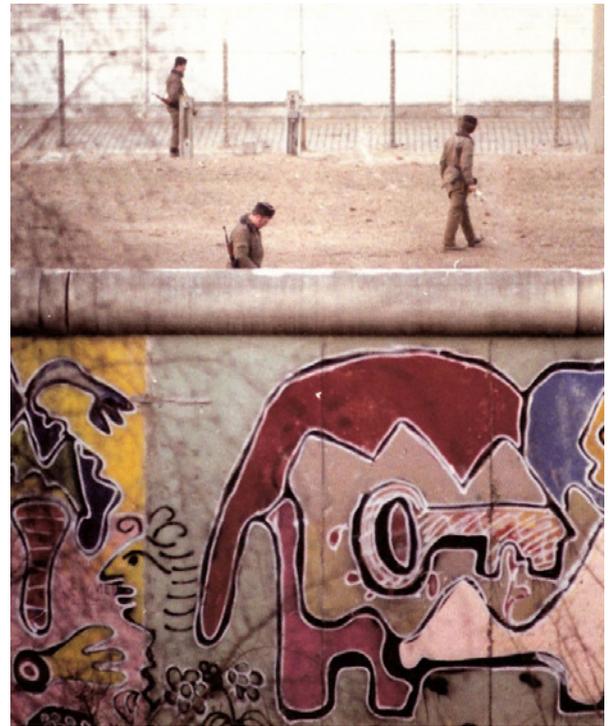
*The work demonstrates the discerning application of language elements, structures and textual conventions to create meaning in proficient and complex German. It integrates the context, purpose, audience and cultural conventions discerningly to create fluent texts in German. Furthermore, the work discerningly synthesises relevant information to cohesively and coherently structure the response and develop ideas.*

**QCAA Principal Education Officer**

Gemäß Artikel 2, erlaubte der Investor den Künstler nicht, die Bäume zu malen. Der Investor will den Baum fällen. Deshalb sind diese Gemälde ein Protest gegen der Investor, der Dreigrund Development heißt. Im Großen und Ganzen, denke ich persönlich, dass diese spezifische Öl-Gemälde nicht sehr effektiv sind. Es protestiert nicht gegen etwas in unserer Gesellschaft, aber gegen den Investor. Dennoch, glaube ich, dass Gemälde effektiv als Protestkunst sein kann.

## Graffiti

Thierry Noir ist ein französischer Künstler, bekannt für sein buntes und einzigartiges Graffiti. Es wird häufig behauptet, dass er die erste Person war, die an der Berliner Mauer gemalt hat. Fast täglich für fünf Jahren, besprüht er die Mauer mit seinen Cartoon-artigen Bildern. Von 1984 bis 1989, hat er die Mauer illegal bemalt vom Westen aus, und nach 1989 von der anderen Seite. In einem Interview mit der Tageszeitung, bekannt als „taz“, sagt Noir: „Früher haben wir die Mauer bemalt, damit sie irgendwann verschwindet. Heute bemalen wir sie, um sie zu erhalten.“ Er wollte die Mauer ein „Mutation“ in der Stadt machen, und bemalt an der Mauer, um es zu verwandeln, verhöhnen, und zerstören. Auf den ersten Blick, sieht seine Kunst nicht wie Protest aus, aber wenn wir sie genauer betrachten, sehen wir das.



Images used with permission of Thierry Noir Studio <https://thierrynoir.com/>  
Sourced from The Guardian (2014) 'Graffiti in the death strip: the Berlin wall's first street artist tells his story' 4 April 2014, <https://www.theguardian.com/artanddesign/gallery/2014/apr/03/thierry-noir-graffiti-berlin-wall.> "

*Discerning analysis and evaluation of the relevant information and ideas in German has been used to draw well-constructed and valid conclusions with substantiated justification of points of view and arguments.*

**QCAA Principal  
Education Officer**

*I think finding a good thesis/topic is most important when responding to an assessment task. I have always been interested in the arts, and the different mediums people use to protest against something, so I combined the two. I also based the theme and style of my presentation on this topic.*

*I enjoyed expanding my knowledge of German and applying my language skills to relevant ideas.*

**Izabella Baker, student**

In den 1980er Jahren, protestiert Noir gegen der Berliner Mauer. Heutzutage, ist seine Graffiti eine Erinnerung des Eisenerner Vorhang und der Berliner Mauer. Obwohl Noirs Graffiti nicht offensichtlich Protestkunst ist, würde ich sagen es ist sehr effektiv. Es ist politische Graffiti, die als der „Darstellung diverser meist gegen die Obrigkeit gerichteter Ansichten“ beschreiben wird. Die Symbolik hinten seiner Kunst ist nicht was gemalt ist, es ust der Standort der Graffiti. Im Interview mit taz, erklärt Noir, will er „der jungen Generation denen, die damals noch gar nicht geboren war, zeigen was die Mauer war“. Für ihn, ist die Mauer kein Kunstprojekt, sondern eine tödliche Grenze.

Es lässt sich nicht bestreiten, dass Noirs Graffiti auffallend ist. Verglichen mit dem Grau der Mauer, fokussiert das Auge auf der Graffiti. Jedoch, sagt er das die Farben nicht wichtig sind, weil „man so viel Farbe an der Mauer malen kann, aber die Mauer wird nicht schön“. Zum Schluss möchte ich gern sagen, dass ich Graffiti als Protestkunst effektiv ist. Noirs Graffiti ist ein Symbol von Widerstand und Trotz, und jetzt eine Erinnerung für die Leute, die ihre Leben riskiert haben, um an der Berliner Mauer zu malen.



Image used with permission of Thierry Noir Studio <https://thierrynoir.com/>  
Sourced from The Guardian (2014) 'Graffiti in the death strip: the Berlin wall's first street artist tells his story' 4 April 2014, <https://www.theguardian.com/artanddesign/gallery/2014/apr/03/thierry-noir-graffiti-berlin-wall.>"

*This assessment is an independent investigative portfolio in which the students select a topic of their interest and expertise within the selection of the syllabus. The students select a collection of text types, researching and analysing the topic of their choice. They create a multimodal presentation, which is followed by a spontaneous student-centred conversation.*

*The students received a variety of text examples: magazines, newspaper, online reading such as blogs, poems, stories and many more. I decided to give the students different check-in points to keep them on track. The spacing of these was important to break this task into smaller sections and give students a clear outline of expectations.*

**Chrissie Geuthner, teacher**

## Zusammenfassung

Alle diese Punkte führen mich zu der Schlussfolgerung, dass Kunst die Sprache von Protest ist. Die Künstler nutzen Symbolik und andere Technik, um gegen etwas in unserer Gesellschaft protestieren. Aller Artikeln stützen dieses Aufsatzes. Ich bin überzeugt, dass Kunst ein effektiv Art von Protest ist. Was aber am

wichtigsten ist, ist die Reaktion der Gesellschaft. Protestkunst muss eine Auswirkung haben, wie zum Beispiel Manaf Halbounis *Monument* oder Thierry Noirs Graffiti an der Berliner Mauer. Deshalb würde ich sagen, Graffiti und Installation die wirksame Protestkunst sind.

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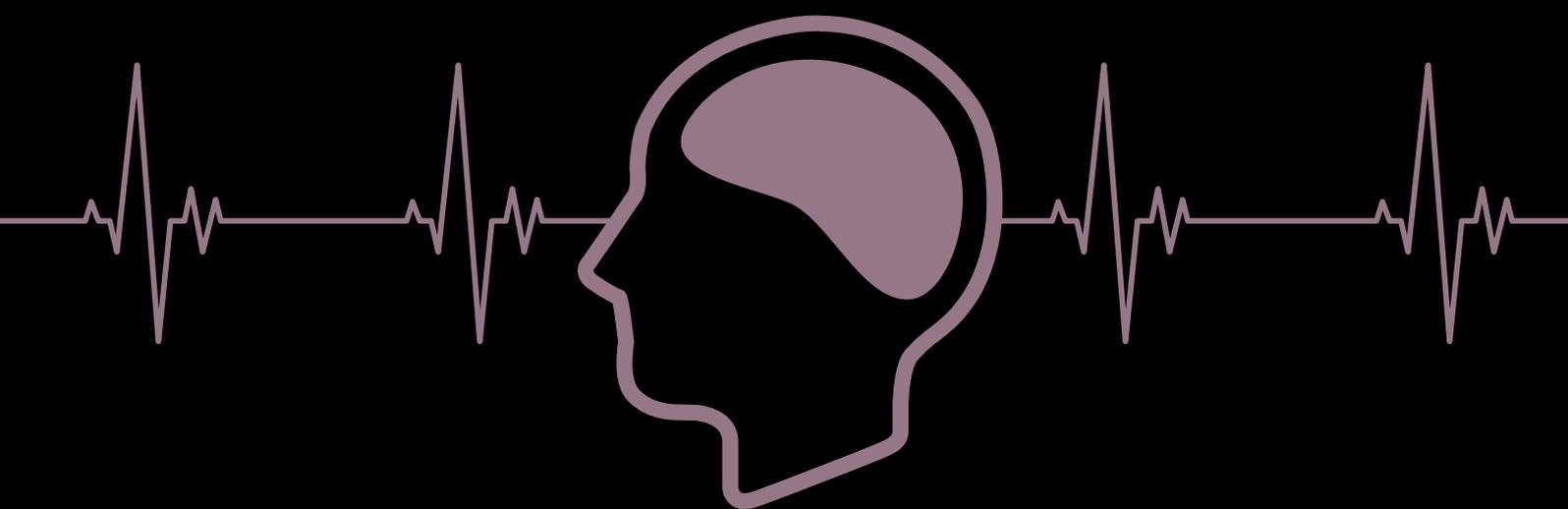
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EX G

# Health



# Health

## Internal assessment 1

Investigation — action research

### *Charlotte Dawson*

Palm Beach Currumbin State High School

#### **Context**

The number of Australians receiving Medicare-subsidised mental health care increased from 1.2 million (5.7% of Australians) in 2008–09 to 2.5 million (10.2% of Australians) in 2017–2018 (Australian Institute of Health and Welfare, 2019). Anxiety is the most common mental health condition in Australia, with one in four Australians experiencing anxiety at some stage of their lives (Beyond Blue, 2019). The social ecological model enables us to understand the multiple layers of influencing factors that impact on anxiety. Targeted action strategies can then be developed to influence those behaviours.

#### **Task**

You are required to investigate an anxiety related issue in the local or Gold Coast community and develop a diffusion action strategy for an innovation and a target group. Your diffusion action strategy should plan for action to mediate, advocate and/or enable innovation diffusion into the local or Gold Coast community. The aim of your strategy is to strengthen, maintain or adapt the community as a resource in relation to the selected anxiety related issue.

*Excerpt from Palm Beach Currumbin State High School's Health IA1, 2020.*



## **Generalised anxiety disorder in relation to Year 7 Palm Beach Currumbin State High School students**

### **Executive Summary**

Throughout this report, Queensland and the local context have been investigated to analyse multiple layers of the social ecological model. Palm Beach Currumbin State High School has been investigated as the local context to understand the underlying influencing factors that impacts individual's health literacy levels. Throughout Australia, it has been found that anxiety within adolescents is an increasing issue which needs to be addressed (McCarthy, 2019). Specifically, adolescents have a low level of health literacy in regard to anxiety as well as low levels of help seeking. Despite the already existing online support networks and programs, more needs to be done to educate adolescents on ways they can seek help and eventually, increase their health literacy. The social ecological model allows an understanding of the underlying elements within the local area which suggests there is a need for an action strategy to strengthen, adapt or maintain the community as a resource for those adolescents suffering from anxiety.

Palm Beach Currumbin State High School (PBC) is mental wellbeing focused. This means, all teachers, students and the supporting environment are aware of the importance of mental health and the need to support one another in an environment as big as this one. The low level of health literacy and help seeking within adolescents provides an opportunity to diffuse the Rise Everyday Mentally Stronger (REDMS) innovation into PBC. This will address multiple layers of the social ecological model and will target the influencing factors for

adolescent's health literacy. When planning for action to enable, advocate and mediate into the PBC community, the REDMS innovation aims to strengthen the community as a resource for those adolescents suffering from anxiety. Critical health literacy levels will be increased and with this, it is hoped that adolescents help-seeking behaviours increase to allow for early intervention, which is seen to dramatically improve mental health issues. A variety of post-test strategies will be measured to investigate the impact of the REDMS innovation as well as exploring the features, characteristics and the setting that will have affected the success and speed of this action strategy.

*The purpose of this task was to investigate an anxiety related issue within the school community as the local context and subsequently plan a diffusion action strategy for an innovation to improve health for a specific target group. The topic of anxiety was selected by students from the three available options within the syllabus. The task focused on the school as the community due to the size of the school population and the potential for achievable impact on specific population groups within.*

**Shane Roberts, teacher**

### **Introduction**

Generalised anxiety disorder is a significant mental health issue for adolescents throughout Australia, with 1 in 3 adolescents experiencing this disorder (McCarthy, 2019). Anxiety related issues have seen to have increased 20% in the past 5 years within adolescents (McCarthy, 2019). Data shows that only 35% of adolescents who experience anxiety are seeking

help (Black Dog Institute, 2016) validating the significance of the issue that adolescents health literacy needs to be increased immediately. The social ecological model and the social justice principle supportive environments have a significant impact on one's ability to seek help when experiencing anxiety (National Center for Injury Prevention and Control, 2020).

Specifically, Year 7 students at Palm Beach Currumbin State High School have a low level of health literacy. With this issue in mind, the objective of this investigation is to strengthen the community as a resource for adolescents suffering from generalised anxiety disorder. Throughout this investigation, ways to reduce anxiety will be identified. As well as this, barriers related to anxiety will be analysed to

determine the most significant area of need. The river of life will also be studied to further identify significant areas of need for those adolescents experiencing this mental health issue (Eriksson, 2008). Furthermore, an action strategy will be developed to educate Year 7 students on anxiety with the intention to improve their health literacy levels as well as encourage help-seeking behaviours.

<p><i>How did I prepare for this assessment task? Research! Lots of research and planning. Finding information that interested me. Making sure I have all the data I need</i></p>	<p><i>before starting my writing is most important to me when responding to an assessment task. I am proud of the research conducted for this assessment. The workload</i></p>	<p><i>and the time that went into this were challenging but this effort is what made an amazing task.</i></p> <p><b>Charlotte Dawson, student</b></p>
<p><i>The context analysis and needs assessment has distinguished the importance of health literacy and social justice (supportive environment) as key determinants impacting anxiety and help-seeking for the target group which is Year 7 students at</i></p>	<p><i>Palm Beach Currumbin State High School. The ‘Rise Everyday Mentally Stronger’ (REDMS) diffusion action strategy was developed to strengthen the Palm Beach Currumbin State High School community as a resource for the 2020 Year 7 cohort by increasing health literacy</i></p>	<p><i>and help seeking in relation to anxiety. The Health inquiry model has been used perceptively and clearly signposted in the discussion and planning for the Action sections of the report.</i></p> <p><b>QCAA Principal Education Officer</b></p>

## Discussion

### Queensland Context

When analysing existing personal, social and community resources, it can be identified that the most significant area of need is adolescent health literacy in relation to anxiety. In a recent article, McCarthy (2019) found that there are several contributors to the increasing mental health issue. These include, high expectations and pressure to succeed within school, social media as well as the exposure to unfamiliar environments (Raising Children Network, 2015). Specifically, in 2016, this article showed that of High School students surveyed, 41% of them felt overwhelmed with the high school changes. Dickstein and Siegel (2011) found that only 18% of adolescents experiencing anxiety were treated for their condition. This can suggest that with the large number of adolescents suffering, little are receiving help. When discussing the topic of health literacy, 80% of people aged 6–18 are failing to receive treatments. Moreover, Black Dog Institute (2016) reported that 35%

of adolescents who are experiencing anxiety, are seeking help. Therefore, the remaining 65% of these adolescents suffering from anxiety are not seeking help. Of this, only 30% are seeking referrals for psychological therapy. Focusing on the social ecological model, specifically community and relationship levels of influence, it is found that the most common point of accessing mental health services are schools (Black Dog Institute, 2016). The school environment and teacher relationships are a place in which adolescents prefer to seek help. To support that poor health literacy is an issue within the community, a study from George (2016) identified that 61.7% of adolescents believed their anxiety would get better by itself and well as the majority saying the reason for not seeking help was due to stigma and poor mental health literacy.

This reflects on the individual level of influence from the social ecological model. When focusing on the social ecological model, community impacts such as support, can be identified as an existing enabler for adolescents dealing with anxiety (Remedy health, 2019). Adolescents experiencing mental health conditions, have reported that they are being treated positively

rather than being discriminated against or avoided (Mission Australia, 2018), moving them towards a position of ease within the river of life. It has also been identified that early intervention can critically reduce anxiety (Health Victoria, 2017) as well as being 50% more likely to treat the issue permanently (Black Dog Institute, 2016).

<p><i>Utilisation of frameworks within the subject matter across and throughout the unit learning experiences enabled purposeful</i></p>	<p><i>investigation to first define and understand, then plan and act accordingly. Building on previous learnings helped develop student</i></p>	<p><i>understanding towards purposeful intent to improve health within the context of this task.</i></p> <p><b>Shane Roberts, teacher</b></p>
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**Local Context**

Palm Beach Currumbin State High School is a school in Queensland of 2,654 students. Of this, the Year 7 students make 16.31% of the student population within the school, having 433 students. There is an orientation program for these students to help with the transition from primary to secondary school. Students are assigned to a CARE class which is part of the student’s wellbeing structure. Students do a CARE lesson each week as well as year level assembly’s which aims to promote relationships within and between year levels. There is a Guidance Officer and School-Based Youth Health Nurse which also are part of the student’s support network. There is a house program within the school which works on building the community as a resource for adolescents and works upon also building relationships for teachers and students.

A talk was given by the Middle School Guidance Officer and the School-Based Youth Health Nurse, and they outlined the following key features of the Palm Beach Currumbin community. It was suggested that coping with change and previous anxiety related issues are the main causes of anxiety within this age group however underlying stresses such as friendship groups and separation anxiety from family have an impact on one’s anxiety. Within the local school, an existing CARE program has been implemented to educate students about anxiety as well as it being seen that student’s parents are their biggest support. Recently, within the local High School, more students are realising they have anxiety yet in terms of seeking help, this is still considered an ongoing

issue. The School Based-Youth Nurse and Middle School Guidance Officer believed that majority of the students come and seek help when their anxiety is extremely bad. This means that rather than early intervention, which is their aim for students with mental health issues, their anxiety is more triggered. Existing online resources such as Stymie and Headspace have been reported the most common way of reporting someone who has anxiety. With these online resources, students with anxiety are being confronted and thus are being treated for their anxiety. Thus, the most significant area of need within the local community, is help seeking. A survey was handed to the 2019 Year 7 students. Of this, 77 students were surveyed. 21.05% of those surveyed said they were very worried about starting High School, whilst 26.32% said they were moderately worried (Appendix A).

80.52% of these students could successfully identify the definition of anxiety. The remainder of the students selected another option and failed to identify the accurate meaning (Appendix B). 22.08% of students answered yes to being diagnosed with anxiety (Appendix C). It was found that 59.21% of those Year 7 students, said they went to their parent/guardian for help, 43.42% went to their friends whilst 14.47% said they did not seek help from anyone (Appendix D). It was discovered 54.55% said they haven’t been educated about anxiety within the school, whilst 16.88% said they have been educated about this topic within High School. The remaining students said they were educated about anxiety at Primary School.

Within the local community, adolescent's health literacy in regard to mental health disorders, particularly anxiety, is an area in which needs to be improved. Therefore, an action strategy

must be developed to strengthen supportive environments to encourage help seeking and increase adolescent's health literacy. This will also advocate support within the community.

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## Planning for Action

### Guiding issue question:

What resources and education are necessary to enable a supportive environment at Palm Beach Currumbin State High school to increase student's health literacy and help seeking in regard to anxiety?

The 'Rise Everyday Mentally Stronger' (REDMS) diffusion action strategy targets multiple levels of the social ecological model which affects the

health literacy and help seeking behaviours of Year 7 students experiencing anxiety. With this, it is hoped that the community, being Palm Beach Currumbin State High School, will be strengthened as a resource for those adolescents suffering from anxiety. The most significant diffusion process variables include relative advantage and compatibility.

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### Methodology:

The REDMS diffusion of innovation action strategy will target the current 2020 Year 7 Students within PBC. The most significant diffusion process variables include characteristics of innovation and features of the

setting. Included in this action strategy is an assembly and treasure hunt addressing the level of health literacy and help-seeking behaviours in relation to anxiety.

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### Advocacy

**Objective 1:** Strengthen the PBC community as a resource for those Year 7 students experiencing symptoms of anxiety by increasing their health literacy regarding the signs and symptoms of anxiety and where they can seek help from when experiencing symptoms. An assembly will be a segment communicating basic information about anxiety as well as where they can go to seek help.

**Description 1:** Relative advantage and compatibility are key characteristics of the innovation evident as REDMS is diffused for the first time. An assembly will be held, and this is intended to address the importance of early intervention of those experiencing symptoms of anxiety. The relative advantage of this innovation is the extent in which students are obtaining knowledge they potentially have not been exposed to. In regard to compatibility, this assembly aligns with the CARE and house program. A PowerPoint will be introduced which will inform students of the current support networks throughout the PBC community. More specifically, online help programs such as Eheadspace and the BRAVE program will be explained to students. Characteristics of the innovation suggest that the intended outcome will be successful as well as being assumed that individual students will engage in the presentation. It is hoped that the community

will be strengthened as a resource for those suffering from anxiety.

**Objective 2:** Enhance critical health literacy skills and help seeking behaviours through an engaging treasure hunt. Students will be exposed to the supportive environment that they are within and in turn, will advocate for early intervention.

**Description 2:** This component targets community, relational and personal levels of influence. A treasure hunt throughout the school for year 7 students will expose them to the environment's supportive networks such as the guidance officer and the school-based youth health nurse. The students will hopefully view and engage in the resources in the school which align with the house program and CARE curriculum which are already successful features of the setting. By allowing students to engage with these resources, it is hoped students will be aware of who they can seek help from as well as where they can go if experiencing anxiety. Possible barriers of this innovation include students not participating in the treasure hunt. However, possible engagement incentives include the tuck-shop voucher at the end of the treasure hunt which will hopefully increase student's participation rate.

The relative advantage for this objective is the extent in which students are exposed to the supportive environment they may not have been, and they are aware of where and how they can get help. Compatibility of this is innovation

includes the school environment already valuing and promoting mental health and help seeking behaviours through the CARE and house program.

### Post Test Data Collection and Evaluation Strategies

Reach will be measured by the attendance at the assembly and the treasure hunt will be measured through the number of people who completed the optional activity. Participation statistics on how many people completed the treasure hunt will indicate how many of the students actually went ahead and participated. This will identify the difference between a compulsory assembly compared to an optional event.

Following the assembly, students will be asked to complete a survey monkey based around the effectiveness of the assembly. Component questions will include whether or not they are confident in knowing what to do when either them or someone they know is struggling with anxiety. Throughout the treasure hunt, students will fill out a form answering several questions based around anxiety and the supportive environment. Effectiveness of the treasure

hunt will be measured from a survey monkey upon completion.

Implementation will be measured through interviews with the Year 7 Coordinator and the Middle School Guidance Officer. Interviews will collect information regarding the consistency of the delivery as intended and the time of the intervention. As well as this, the implementation refers to the fidelity of the elements within the REDMS intervention.

The maintenance of this innovation through interviews with key stakeholders such as the year coordinator and the Middle School Dean. These key decision makers will be approached, and it will be discussed as to whether this innovation will be sustainable throughout the community. These key stakeholders ultimately determine whether the REDMS innovation is maintainable.

*Charlotte has accurately recognised, and discerningly described, relevant information from a range of primary and secondary sources about anxiety in the local Gold Coast/Palm Beach Currumbin State High School community context. Insightful analysis and interpretation of relevant*

*contextual information to draw conclusions and to distinguish significant determinants are evident. A sophisticated diffusion action strategy has been developed because of discerning investigation and insightful synthesis of information, with succinct and purposeful use of the Health inquiry*

*model. The organisation of information is coherent, effective and achieves the purpose of completing a context analysis and needs assessment for a target group in the local context.*

**QCAA Principal Education Officer**

*The student response demonstrates insightful analysis of primary and secondary data, and insightful critique of this research through the lens of the social ecological model has enabled Charlotte to distinguish the significant determinants of the anxiety related health issue.*

*The response has also demonstrated insightful synthesis of this analysis and research with the diffusions of innovations model to plan a logical, sophisticated and insightful action strategy including data collection tools to be utilised as an evaluation strategy. Clear alignment of report sections*

*is demonstrated through discerning investigation of all relevant pedagogical and conceptual frameworks and subject matter, selecting and organising information within the response to communicate with clarity.*

**Shane Roberts, teacher**

*This response highlights the value and dynamic nature of Health where a purposeful process and empathetic approach can enact change in a school community*

*context. The action and advocacy oriented-approach of Charlotte's Investigation – action research shows the potential to enable real impact within a school*

*context for a target group, in this instance Year 7 students.*  
**QCAA Principal Education Officer**

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# Appendices

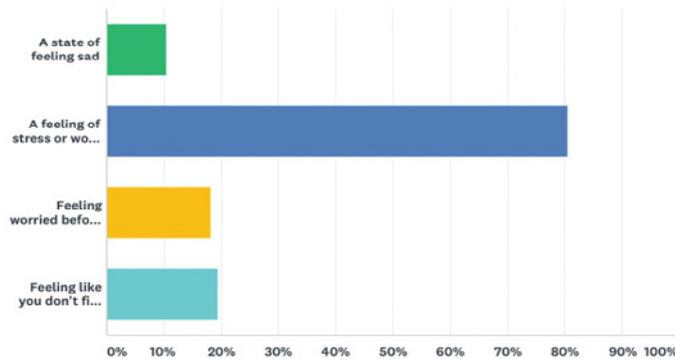
## Appendix A

ANSWER CHOICES	RESPONSES	
A great deal	13.16%	10
A lot	21.05%	16
A moderate amount	26.32%	20
A little	28.95%	22
None at all	10.53%	8
<b>TOTAL</b>		<b>76</b>

## Appendix B

### Q3 Which of these do you believe accurately explains anxiety?

Answered: 77 Skipped: 0



#### QUIZ STATISTICS

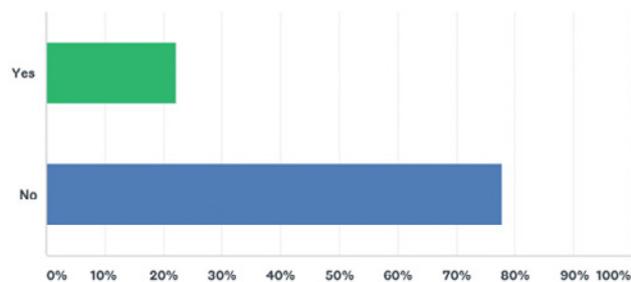
Percent Correct 81%	Average Score 0.8/1.0 (81%)	Standard Deviation 0.40	Difficulty 1/1
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ANSWER CHOICES	SCORE	RESPONSES	
A state of feeling sad	0/1	10.39%	8
✓ A feeling of stress or worry that won't go away, often without any particular reason or cause	1/1	80.52%	62
Feeling worried before an exam	0/1	18.18%	14
Feeling like you don't fit in	0/1	19.48%	15
<b>Total Respondents: 77</b>			

## Appendix C

### Q4 Have you been diagnosed with an anxiety disorder by a doctor?

Answered: 77 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	22.08%	17
No	77.92%	60
<b>TOTAL</b>		<b>77</b>

## Appendix D

ANSWER CHOICES	RESPONSES	
Parent/Guardian	59.21%	45
Siblings	22.37%	17
Grandparent	14.47%	11
Friend	43.42%	33
Teacher	14.47%	11

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### Year 7 Anxiety Survey

SurveyMonkey

Guidance Officer	3.95%	3
School Based Youth Health Nurse	3.95%	3
GP (doctor)	13.16%	10
Dean of Students/Deputy Principal	3.95%	3
Psychologist	18.42%	14
Online health provider	3.95%	3
I didn't seek help from anyone	14.47%	11
Not applicable - I haven't experienced significant worry	13.16%	10
<b>Total Respondents: 76</b>		

## Appendix E

ANSWER CHOICES	RESPONSES	
Yes - at primary school	28.57%	22
Yes - at high school	16.88%	13
No	54.55%	42
<b>TOTAL</b>		<b>77</b>



# Literature

# Literature

## Internal assessment 3

Extended response — imaginative written response

Charlie Adams-McMahon

Kelvin Grove State College

### Context

In this unit, you have explored the craft of writing and storytelling, and the ways that reading and writing are closely interrelated. As part of this focus, you have explored a range of literary texts, the ways these texts use literary devices, language choices, text structures, form and style, and experimented with manipulating these in your own imaginative writing.

Now, you are being given the opportunity to shape your writing into a work of short fiction that is suitable for entry into the fiction category of the John Marsden & Hachette Australia Prize for Young Writers (the JMP).

For young writers aged between 12 and 18, the JMP provides an unforgettable experience. Shortlisted writers meet John Marsden and participate in an exclusive creative writing event at the Melbourne Writers Festival.

### Task

Create an original short story in which you purposefully manipulate aesthetic features and stylistic devices to shape perspectives and representations of concepts, identities, times and places.

*Excerpt from Kelvin Grove State College's Literature IA3, 2020*

## ***The Hermit, the Fool and the Pick-up Truck***

In her stall, Madam K steepled her fingers and crinkled her eyes, manifesting the next person to walk through the beaded curtains. Here is something she couldn't have predicted: She recognises him.

*Madam K's Faiths and Fortunes* is draped in purple and red silks with gold trims. It's tucked away on the bottom floor, catching shoppers on their way out to the car park. There are those who navel gaze introspectively using chart readings, those who pour over their palms in the name of love. Her regular clients are almost exclusively neurotic. The greeting, 'You are exactly where you're supposed to be' soothes people. A brief gesture at the future can calm them down for a moment. So, her deck of tarot is worn, but the Madam likes this touch. She likes fake antiques, it makes her feel young.

This man, under a layer of charm and golden retriever energy — is content.

It's all Donnie Levinson, and she should have known. She's a fraud. This situation is pretty much written into the laws of the universe, 'you will see your ex flourishing'. Madam K realises now, she also recognises him from pickets in the lawns, and tailgates. His big round face and VOTE. Sure, Donnie has a stain on his shirt. His hair is thin around the temples and he's gained some weight. A thought: something about stones and glass houses crosses her mind. After all, she is a 43 year old mall prophet.

He barrels in and sits down, she notes the air of desperation. *Either he found genuine happiness ... or he doesn't recognise me.* They never thought they'd see each other here, so why would he be looking beyond. Her head wrap jingles as she leans forward and says the line.

"You are exactly where you're supposed to be". Its effects are limited on the man, and his wild eyes stare back at her. She starts to think that he'll need some cajoling. The interesting ones always do.

"I need advice," he says.

Her teeth clack together, and she offers a fake smile. "First, I need your name."

Here is the part where she gets her customers to believe in her.

Brian works in the TechHouse across the aisle. The Madam pays him \$25 dollars a day to do research on the web, and then to send her the details. And an extra \$5 to keep his mouth shut. No Myspace or LiveJournal. But Brian did manage to dig up a campaign photo of Donnie's beautiful family.

Under the table, she snaps her phone, but Donnie doesn't seem to notice. Adjusting the cosmos patterned cloth, she notices a wad of cash he must have smacked down. She regains the aura of wisdom as fast as she lost it. She looks upwards towards the third eye and says, "Darling, you must need advice about your wife."

He lets out a sigh, assured he is in the company of the real deal. He runs a hand through his strawberry blonde hair. Her hopes are on repentance for cheating, or a gambling addiction perhaps.

It turns out he wants to go on a holiday, somewhere that would make Sandra happy. Madam K scoffs, she's not a travel agent! But then she remembers.

"Sandra's never been to Europe, so I really would love to go ..."

“But you are afraid of flying,” she finishes for him.

*And you have never told her,* goes unsaid. Now she’s angry, it’s exactly the sort of thing he would do. His problem is that he is too devoted to his family. It’s beyond her understanding, and probably why The Madam is not suited to close relationships. She’s just not a martyr. Sacrifice in small doses and so on.

But he wants his money’s worth, so she closes her eyes and pretends to enter the spiritual realm. Madam K will just get him out of here.

The Madam will tell him he will lose his election. He will get on the plane and end up stranded on an island and will have to fight for survival every day until rescue, or death. Even if they make it, his family won’t. The kids will have to grow up too fast. His spine will be fractured and restructured by the force of the landing, and with his newly found backbone he will tell Sandra exactly how things are going to be done around here from now on. *The kind of hyper specific dribble that hack psychics spit out.*

In her head she hears the voice of the Oracle Norma. In their early training, she had said, “Shame on you. That talk is only good for destroying a reputation”. Much to Norma’s chiding, she hadn’t quite absorbed the moral lesson. The Madam was always more bothered by the economic karma.

Growing up, a smack in the face is the most you’d get for honesty. And where did honesty get Norma? At least on this terrestrial plane, she’s six feet under.

The remnants of kohl eyeliner shift to her cheeks as the Madam opens her eyes.

His look is so intent, she thinks her impromptu plan for revenge has been foiled. Another dish was waiting in the cold room. It was there just ... waiting on her chest. All she needs to do is read his palms. It’s not like she uses the practice of Norma’s ancestors for a lot of good in the world these days. This might be her shot.

She is disgusted with herself. But it is not guilt, it has been too long since guilt. She just knows

Donnie. So emotionally stunted and repressed, republican bred and working. He is bound to still hurt in at least some of the same places. She thinks to when they both got summer jobs picking fruit, and on the drive back he would keep the high beam for miles into town. And here he is, a politician in his second term in local office, in a psychic’s stall. She starts with a “yellow-bellied”.

Donnie was eating it up. He would probably cry.

Norma had always said she had a gift. At first Madam K was cynical, she knew she had a gift for manipulation. When she told her as much, Norm[a] shook her head and sucked her chapped lips to her teeth.

*“How you think of yourself, and of our practice, darling, it is the only thing that will stop you from doing good work here. My Lovely, to be allowed to do a small amount of good, this is all we may ask from this life.”*

These words had been a baptism of sorts. In a rare moment of levity; Norma’s bony arms pushed her straight into the central fountain of her first mall. But it wasn’t because of that. It didn’t matter if she was really clairvoyant, if she could read tarot like the fluent Oracle, or even if she had a connection to the culture the practice was born from. So, Madam K did her best. She made a commitment to advise like a psychotherapist, those too practical to be god-fearing or too insecure to admit it.

In this moment she feels un-reborn. She’s been swept up back into the hostile womb of reality. Maybe it’s fate, or maybe history. But now he decides to recognise her. She is seeing it before she actually can see it. And that look ... It’s like they buried a body together.

He cuts off her tirade. “Do I know you?” He smirks, but he’s gracious. He must know she was working up to the hard-hitting insults.

She clacks her teeth. Like a Devil Child. He says, “Kirsten, I can’t believe it’s you.”

She would answer, but she’s stuck. The strawberry blonde hair is getting ashy.

“How are you?”

“So blessed. So fulfilled.” And she has been blessed, mind you. She’s alive, she’s a free woman. She’s not been jailed, or worse, confined to one place by a drawn out lawsuit. She tells him as much.

“You could make it in jail though, start an unregulated blackjack scheme.”

“Gambling no longer agrees with my lifestyle.” It’s true. Her gift on the table of fortunes does not extend to those in Casinos. She forces a laugh. Asks him about his perfect life.

He asks about the town where she lives. She tells him how free she flies. It was only her mentor tying her to the mall in California, so she’s picked up her domicile and headed through the Midwest after going East. People were much less superstitious here, but it made the ones that visited her a bit more secretive. Secretive is not quite interesting. “The people here, like you,” she says, “are traditional.” *I am anything but traditional.*

“Stop. Stop, please, I didn’t ask where you’ve been, who you’ve met. Why does a dump like this mean so much to you?”

Here is something: he is so rude.

Who asks something like that, to a person like her? How does she show him how happy she is. Her fist clenches like it’s full of four-leaf clovers. He’s still handsome, still kind in the eyes. Madam K figures that the only way to show

Donnie up was to show him. It has always been that way with him.

She steps out into the great expanse with Donnie in tow. The mall is a husk of what it was in the last decade; that is, a gleaming economic future encapsulated into the *NeoDome*. The Madam smiles to herself.

Now the omnipresent white glow next to the skylights are harsh. As traffic dwindles, annual profits are made up by the seasonal panic buyers. Kids suck down their iced drinks before being pulled along by their arms. Old ladies in clumps mall-walk. A straggler once told Madam K all about the glory days. A glistening shrine to wealth at the turn of the decade. An investment in luck and a gamble.

It was a different kind of briskness now. Even the unsighted see that the *NeoDome* won’t last forever.

She raises a sharp nail and a wing of flowing clothing with it. She points at the display case, the mannequins inside with eyelashes but no eyes. At the mallrats who gather together, clearly afraid to brave this place alone. She points at the fruit-juice bar and feels a pang deep in her chest. And then she points to the mothers and daughters in matching *Juicy* sweats.

Madam Kirsten brings her arm down, and her head hurts terribly, like she’s never felt before. And if the pain doesn’t make her feel like vomiting, what she says next will. “I miss you.”

For the first time, she knows the future.

*A creative and innovative approach to the IA3. Charlie has purposefully written an original short fiction story that manipulates aesthetic features and stylistic devices to shape representations and perspectives of concepts, identities, times and places in a subtle and complex way. There is discerning use of patterns and conventions of an imaginative text, and the role of writer to achieve particular purposes for the John Marsden & Hachette Australia Prize for Young Writers is exploited.*

**QCAA Principal Education Officer**

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*Charlie's willingness to incorporate meta-textual and self-referential elements to the narrative mode was particularly surprising and pleasing. This demonstrates a rich and complex understanding of the conventions of narrative writing, and a willingness to experiment with strategies that subvert both the conventions of the genre and the reader's expectations.*

**Simon Kindt, teacher**

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*The inspiration for the story was the people who film and 'explore' (read: trespass on) 'dead malls'. I think all shopping centres represent these extremes of excess and decay in some part. I thought it would be interesting to put a small moment in such a shallow place.*

*I didn't rush the development of my idea into a work. I filled in a few worksheets that helped with character building. I developed the idea until I was confident in my ability to shape it into a plot.*

*Creatively, all my decisions were in service of a cathartic reading experience. One of the challenges was that there was pressure from my peer review to expand on the ending. I'm glad that I resisted that particular urge to bulk out the word count. I'm proud I could bring my fortune-teller character to life.*

**Charlie Adams-McMahon, student**

*The response is the culmination of the Literature course where the student can showcase their writing skills for their final imaginative written piece. It is an opportunity to hone in on the student's skills and abilities as a writer and to concentrate on a literary genre of their choice. Charlie has experimented with approaches to narration and stylistic devices to engage the reader and shape meaning about relevant concepts and ideas. There was a clear purpose established by the student in their short fiction. She engages, explores, celebrates, critiques and entertains in relation to particular cultural assumptions and attitudes about suburban shopping malls, fortune tellers and their clients.*

**QCAA Principal Education Officer**

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*One of my teachers would read a new short story with the class each lesson. I think that the intention was to familiarise us with the genre and its conventions. I also appreciated that we were stepped through the planning phases. Students were often prompted to share feedback on ideas with each other.*

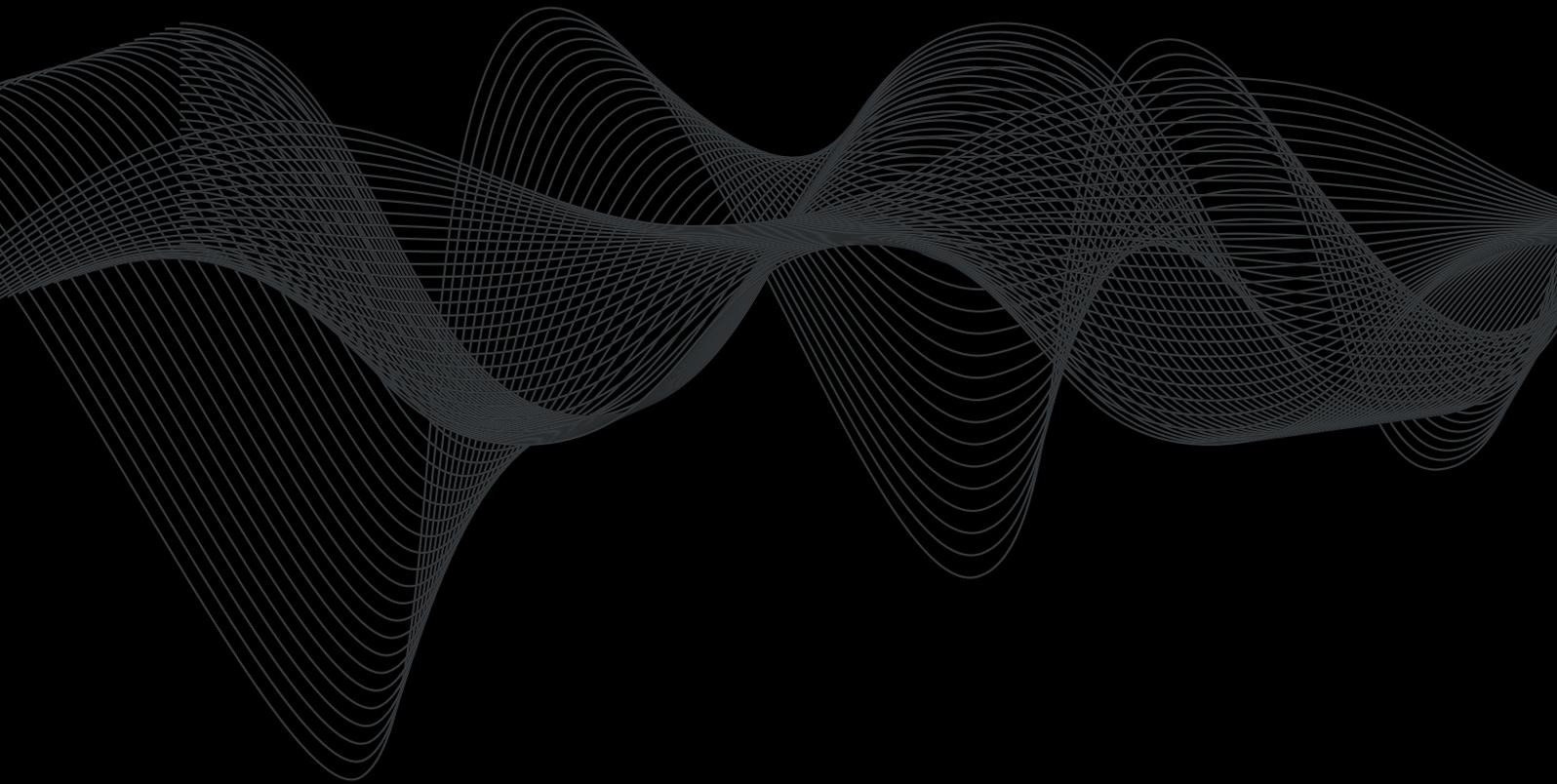
**Charlie Adams-McMahon, student**

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*As the assessment is, in a sense, a culmination of students' development of creative writing skills in both the Literature course, and in their broader journey into creative writing at the college, the design of the task is intended to provide students with as wide a scope as possible, to allow them to explore subject matter and form that is of interest to them. The Literature course, and the English curriculum more broadly at Kelvin Grove State College, deeply and richly value creative writing and allowing students the space and freedom to develop their unique voices as writers.*

**Simon Kindt, teacher**

# Music Extension (Musicology)



# Music Extension — Musicology

## Internal assessment 1

### Annotated bibliography

Olivia Folland

St Peters Lutheran College, Indooroopilly

#### Context

You are working towards realising your potential as a musicologist. Your aim is to use techniques and develop strategies to investigate a music idea. You will initiate best practice in musicology.

#### Task

As a musicologist, research a specific problem, question, issue or hypothesis through collection and investigation of evidence from primary and secondary music sources.

With guidance from your mentor, devise a statement that will inform your investigation of a music idea and complete an annotated bibliography of relevant sources. Your annotated bibliography should include a combination of sources including (but not limited to) journal articles, lectures, scores, recordings or interviews.

Each annotation should provide a selective and concise summary of the text, assessing the source's value, quality and relevance to the specific research topic. Your annotations should demonstrate an understanding of how musical elements and concepts can be used to communicate meaning or ideas about music.

Your annotated bibliography may be used to inform Investigation 2.

*Excerpt from St Peters Lutheran College's Music Extension — Musicology IA1, 2020*

Olivia Folland

St Peters Lutheran College, Indooroopilly

## The effects of music therapy on the cognition of dementia patients

Studies have demonstrated that dementia patients' cognition is improvable through the use of personalised music therapy. The research indicates that music has the ability to increase cognitive abilities within a dementia patient. There have been several studies that look into the link between brain function and music. Some studies suggest that the repetitiveness of music assists with remembering memories as the music carries memories with it. With a focus on emotional connections, perception of musical elements and effective music interventions for cognition, the following annotated bibliography includes a number of references that:

- describe the cognitive functions of dementia patients;
- explore the impact of music from certain eras and their rhythmical features; and
- recommend strategies of personalised music in order to improve the cognitive state of the patient

**Baird, A, Forde Thompson, W & Brancatisano, O 2019, 'A 'Music, Mind and Movement' Program for People with Dementia: Initial Evidence of Improved Cognition', *Frontiers in Psychology*, 16 July, viewed 6 November 2019] (<https://www.frontiersin.org/articles/10.3389/fpsyg.2019.01435/full>)**

The article examines the authors' program: *Music, Mind and Movement* (MMM) and its usefulness in the areas of cognition, mood, identity and motor fluency within patients with various types of dementia. It describes how the 20 participants had weekly group music therapy sessions for seven weeks. Participants were tested in the previous five areas at three points during the study; baseline, post treatment and one-month post MMM program. The authors go on to describe that Thomas and Schlaug (2015) proposed seven capacities of music and they explain that understanding these capacities, "should lead to more effective music interventions for people with dementia" (Baird A, 2019). Overall, the study found that the MMM program may help improve cognition in people with dementia. The article included many charts and diagrams which were helpful by clearly displaying the data. The main limitation for the article is that the research is based on a program that was designed by the authors of this article, meaning there may be a strong bias; however, the authors stated that there were no financial relationships that could have influenced their research. The sample size is also limited meaning the study could be more reliable if a wider range of people had been assessed. Therefore, the article is mostly reliable and supports the usefulness of music therapy in dementia patients for cognition.

**Bruer, R, Spitznagel, E & Cloninger, C 2007, 'The Temporal Limits of Cognitive Change from Music Therapy in Elderly Persons with Dementia or Dementia-Like Cognitive Impairment: A Randomized Controlled Trial', *Journal of Music Therapy*, vol. 44, no. 4, pp. 308–328, viewed 9 November 2019, Oxford Academic, Oxford University Press (<https://academic.oup.com/jmt/article-abstract/44/4/308/916344>)**

The article explores the limits of cognitive change of an 'intention-to-treat' within group music therapy. Intention to treat analysis assesses the original treatment that was assigned to the patient rather than what they eventually received; therefore meaning, after randomisation of patients they are always analysed. The music therapy treatment was based on the Reality Orientation program which targets cognition in persons who are disorientated. The format of this program is beneficial as it prompts dementia patients to focus on their immediate surroundings in order to lessen confusion. Throughout the sessions there would be at least 15 songs. The article describes how prior to the trial Gibbons (1977) recommended that the most effective therapeutic music selections are those that were popular when the patient was the age of 25. The authors describe that it was decided that the Mini-Mental State Examination (MMSE) should be conducted three times per week, intending to assess cognitive change over 8 weeks. Through this research it was found that dementia patients improved their MMSE scores by 2.00 points compared to the control group. All 28 subjects were cognitively impaired, however, only 17 were diagnosed with dementia. Therefore, the findings are difficult to generalise to only dementia. The study's results were clearly presented through the utilisation of tables and graphs. The study was carried out by professionals in their respective areas therefore making the information reliable. The research supports the idea that music therapy can improve cognitive function however, further research is required to improve treatment.

*The student response investigates a selection of sources for relevance and value. Expression of meaning is demonstrated through the summary of key findings. Literacy skills are applied through articulated ideas and controlled structure.*

**QCAA Principal Education Officer**

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*Olivia has researched widely, using a wide variety of sources. The annotated bibliography has been presented very clearly, using an outstanding application of written literacy skills through articulated ideas and controlled structure of information. Olivia has expressed meaning or ideas about music therapy through the precise and informative summary of key findings. She has demonstrated excellence in the investigation and selection of a wide variety of sources, which have then been very closely examined for relevance and value.*

**Christine Taylor, teacher**

Lyu, J & Zhang, J 2018, 'The Effects of Music Therapy on Cognition, Psychiatric Symptoms, and Activities of Daily Living in Patients with Alzheimer's Disease', *Journal of Alzheimer's Disease*, pp. 308–328, viewed 10 November 2019, Semantic Scholar, Allen Institute for AI (<https://www.semanticscholar.org/paper/The-Effects-of-Music-Therapy-onCognition%2C-and-of-Lyu-Zhang/4584a65b9bc1b93f7116b01e574ceb6cbd6718d4>)

The study analyses the efficacy of music therapy on cognitive function of dementia patients, in particular Alzheimer's disease (AD). The authors describe how music therapy and the use of musical elements such as "melody, rhythm, harmony and sound" have been used effectively for years for the management of dementia symptoms. 298 AD patients were randomly divided into three groups: singing group, lyric reading group and control group. These trials were conducted over three months. Cognitive, neuropsychological and activities of daily living tests were conducted at baseline, 3 months and 6 months later. There were no significant effects of music therapy on activities of daily living; however, there was a positive effect on the other categories. The study advised that music therapy is "effective in enhancing cognitive function and mental wellbeing and can be recommended as an alternative approach to manage AD associated symptoms". The study included examination of patients' well-being not only cognitive function which is useful for a broader understanding but is not necessary for the topic of research. The fact that the patients were randomly divided allows for a true-to-life spread across the groups. The article is reliable and supports the use of music therapy to manage dementia symptoms of decreased cognitive function.

Brotons, M, Koger, S & Pickett-Cooper, P 1997, 'Music and Dementias: A Review of Literature', *Journal of Music Therapy*, vol. 34, no. 4, 1 December, pp. 204–245, viewed 10 November 2019, Oxford Academic, Oxford University Press (<https://academic.oup.com/jmt/article-abstract/34/4/204/895628>)

This article differs from the others analysed due to its nature of reviewing other literature sources instead of being its own study focuses on reviewing literature that has been published relating to the topic of music therapy in combination with dementia. The article aims to offer recommendations for clinical use, but also for further research. A total of 69 references were reviewed, 42 of which were empirical studies (evidence attained through direct observation). 30 of the empirical studies were clinical studies that used music as a therapeutic intervention. The article effectively analyses the reliability of certain cognitive tests through discerning critiques of other literature sources. The author criticises the Mini-Mental State Examination (MMSE) as it lacks distinction of "minor language deficits and lack of assessment of fluency and intentionality." As well as criticising, the article offers recommendations of tests such as Glynn's (1992) MTAT which tests the efficacy of music therapy on behavioural patterns on patients with Alzheimer's disease and other related disorders (ARD). The research and findings are limited by the fact that the article was released in 1997 meaning it may not be reliable for modern reference. Another limitation identified in the article is that over half the research conducted was done by medical professionals who are not music therapists. Many tables were used throughout the review to demonstrate data across the studies with clarity. The article supports that music therapy can enhance cognitive skills in ARD patients; however, the research is over twenty years old, making recent research more reliable.

**Vink, A 2003, 'Music therapy for people with dementia', Cochrane Library, viewed 12 November 2019, <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD003477.pub2/abstract>**

The study examines ten studies on music therapy as a treatment. It aims to assess the efficacy of music therapy for improving emotional and social functioning and reducing cognitive and behavioural issues. Studies that used varying methodologies were included in the review allowing for a broader perception of music therapy. The studies were analysed by two reviewers who found that the methodologies were of low quality due to there being no long-term effects of the treatment; therefore, results could not be validated. Many of the studies reviewed had high risks of bias, discrediting the outcomes. Any form of music therapy (any treatment based on music) was considered in this review meaning the authors have failed to eliminate variables between studies; henceforth, diminishing the reliability of the results. There was an inability for the authors to refute or endorse any claims or effects stated within the studies being reviewed. Authors of the review concluded that although the ten studies were in support of music therapy treatment, they were unable to draw any useful conclusions.

**ABC Science 2016, Power of Music on The Brain I Dementia & Parkinson's, online video, 6 June, viewed 15 November 2019 <https://www.youtube.com/watch?v=rnUSNbtVJI>**

ABC Science's video intends to demonstrate the power of music on the brain. The video uses reliable primary sources including the pioneers of the music therapy idea and their patients. Brain scans have shown that music is connected to the brain through many ways such as movement and memory. This therapy involves curating a personalised playlist of music for dementia patients consisting of music that is favourable for the patient. It is supported through this documentary that music from the 1950s works best for improving emotional and cognitive problems as it was music known to them in their 20s. A combination of musical elements allow the messages to be transmitted to the brain and become memory, later in life

contributing to the ability to recall the music. The documentary focuses on the impact of music on the brain through the use of tempo, pitch and dynamics. One of the researchers describes the belief of music being the pre-evolutionary language, describing how sounds links to the prelinguistic stages as a child causes dementia patients to still be able to remember music and its' elements. The primary sources used in this video assist in gaining a first-hand perspective. Visual representation of the therapy is beneficial to witness the physical reactions of the patients to their music. Experts contended that music therapy through the use of personalised playlists had a definite response from dementia patients.

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*The thing I enjoyed most about musicology in Music Extension was the flexibility it provided with assessment topics. I was able to combine two of my passions: music and psychology. I prepared for this assessment task by researching different topics to find one that not only was of interest to me but also provided a multitude of research around it. I had to make sure that there was enough evidence of musical elements, rather than just medical terms, as this was a risk combining the topic of psychology with a Music Extension assessment. Choosing a topic of interest, and then ensuring that there is enough information to be found on the topic from many varying types of sources, allows for a more in-depth analysis.*

**Olivia Folland, student**

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*To prepare students for this assessment, I made a pro forma to assist with the process of creating an annotated bibliography. The students studied exemplars of annotated bibliographies and had the opportunity to be mentored by a musicologist. The task itself is reflective of the syllabus; however, Olivia's choice of topic reflected an interest in the use of music as a therapy.*

**Christine Taylor, teacher**

## Research Process and Ideas:

During the beginning of my research process I first had to decide on a topic that not only was of interest to me but also one that provided a multitude of research around it. From the beginning, the topic of psychology and music was very interesting to me, so I looked into what different ideas there were around that topic. Child development came up but the idea that was of most interest to me was how music was able to treat dementia patients.

Once I started the research stage, I considered changing my topic because I had been struggling to find a link between musical elements and cognition. Most of the articles and journals described music therapy in more medical terms rather than talking about the elements of music. Through further research I was able to find how musical elements assisted in cognitive function.

The research then continued smoothly, and I structured my annotated bibliography based on a combination of styles that I had researched online. For each source I first noted the citation, then outlined what the main point of the article was and what it was trying to get across. The viewpoint of the author was then taken into consideration followed by the strengths and limitations of the article. To finish, a final evaluative statement about the overall findings and usefulness of the research.

## Overall Reflection:

If the research were to be conducted again more varying sources would have provided a more in-depth analysis rather than the use of mostly academic studies. The effects of music therapy on the cognition of dementia patients was a good choice of topic for me to make as there is a lot of research surrounding it; although, finding information on musical elements proved difficult. The sources showed an overall support of the use of music therapy to treat dementia with few insignificant results. The findings from this research for my IA1 has provided good grounding for further research for my IA2.

*Each annotation is clear, succinct and demonstrates discernment in summarising the main ideas in the source. The range of sources relates directly to the topic and demonstrates an exceptional understanding of the implications for practitioners.*

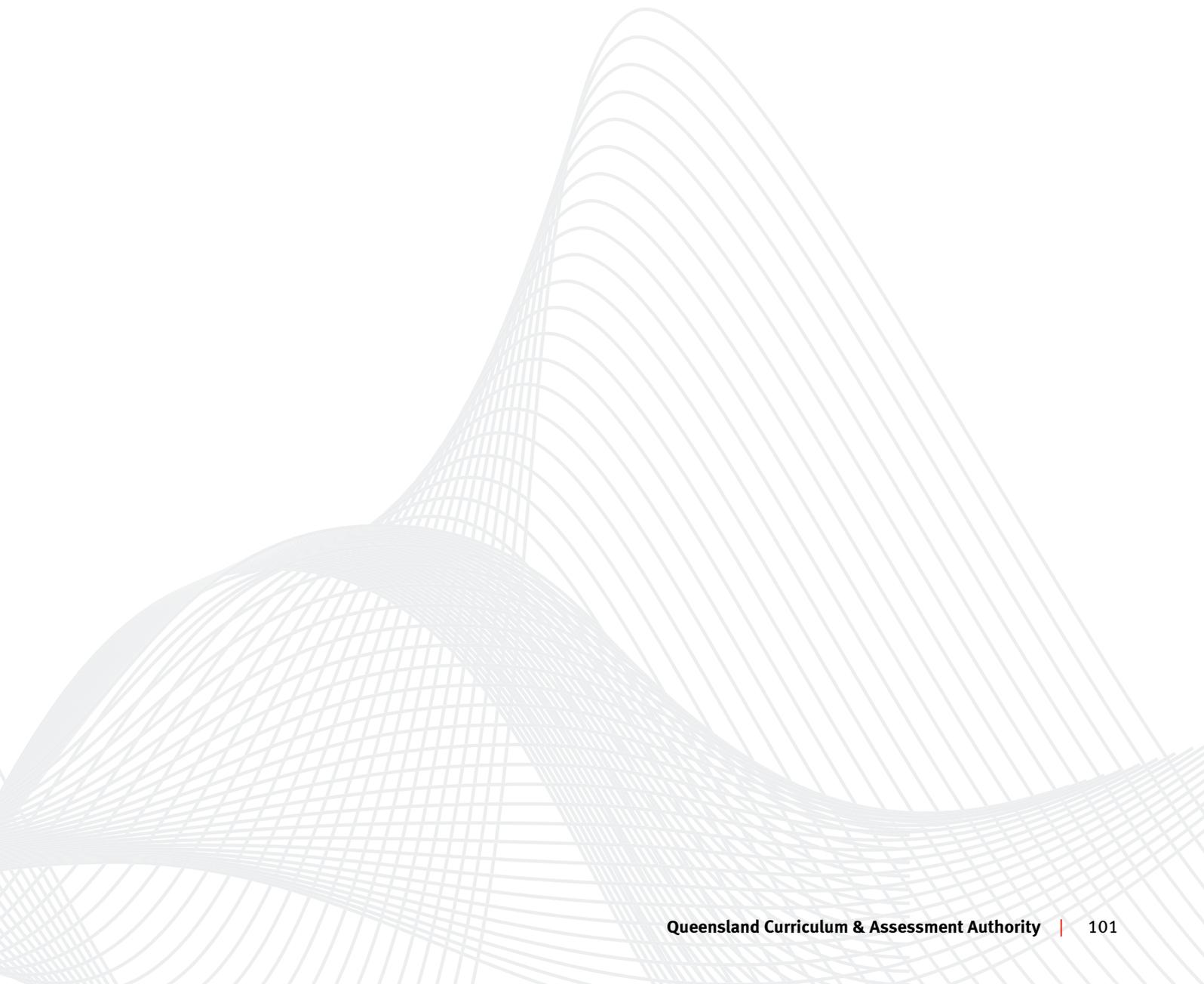
**QCAA Principal Education Officer**

*My teacher prepared me for this assessment through many musicology writing exercises for practice and showing me past students' writing to draw inspiration from. I also prepared for this assessment by looking at different writing structures and formatting in order to present my work in a succinct yet thorough manner.*

**Olivia Folland, student**

*The purpose of the annotated bibliography is clearly articulated and supported with musicological research.*

**QCAA Principal Education Officer**





# Psychology

# Psychology



## Internal assessment 3

### Research investigation

Kacy Miaco

Charters Towers School of Distance Education  
Our Lady of the Southern Cross College

#### Context

During this unit you have explored the ways psychology is used to describe and explain how others influence our development, behaviour and thinking. An understanding of the social processes involved in the development of relationships is essential to appreciating the responses and actions of others.

#### Task (excerpt)

Gather secondary evidence related to a research question in order to evaluate a claim. Develop a research question based on a number of possible claims provided. Obtain evidence by researching scientifically credible sources, such as scientific journals, books by well credentialed scientists, and websites of governments, universities, independent research bodies or science and technology manufacturers.

*Excerpt from Charters Towers School of Distance Education's Psychology IA3, 2020.*

# Kacy Miaco

Charters Towers School of Distance Education  
Our Lady of the Southern Cross College

## Social media increases conformity

### Rationale

In the marketing industry, companies are constantly pressured to interact and engage with consumers, by influencing consumer purchase decisions stimulated by social conformity (Science Direct, 2016). The emergence of social media networks has fundamentally altered the marketing landscape, by enabling consumers on social media to exchange user-generated content and for businesses to exploit consumer conformity behaviour to attain product recognition and acceptance (Science Direct, 2016).

Conformity is the tendency for individuals to change their behaviour, internal views and attitudes, as a result of social influence and pressures challenged by an opposing majority (Wijenayake, Berkel, Kostakos & Goncalves, 2019).

As established within social psychology research, Asch's conformity experiments (1951), provided evidence that although participants knew their answer was wrong, the role of peer pressure in group settings can significantly influence the capacity for individuals to make decisions (Wijenayake, Berkel, Kostakos & Goncalves, 2019). With "74% of consumers depending on social networks to guide purchase decisions" (Science Direct, 2016), 'informational influence' is a form of social conformity that informs individuals to accept the majority's judgment in uncertain situations. This ensures a form of guidance and security for one's belongingness to the group (Turner, Wetherell & Hogg, 2010). When a consumer knows little about a product, they rely on the perceptions

and judgments from the reference group to be credible and therefore more likely to be accepted (Seng & Keat, Sciendo, 2014). However, with advancements in computer-mediated-communication like social media, social interactivity has transitioned into an online platform enabling consumer engagement through "product discovery, recommendation, discussions, and information sharing" (Science Direct, 2016), that exposes consumers to online engagement that potentially influences purchase intentions.

This investigation addresses the refined research question;

Can previously reviewed online content by Facebook users, stimulate informational conformity in other Facebook users?

*The purpose of the assessment is to engage with a claim (a statement with no justification of fact) by developing a research question that enables evaluation of the claim. The evaluation uses secondary data from peer-*

*reviewed journal articles to interpret the research evidence. Students then justify their conclusion with respect to the research question in order to support or refute the claim. They are also asked to evaluate the quality of*

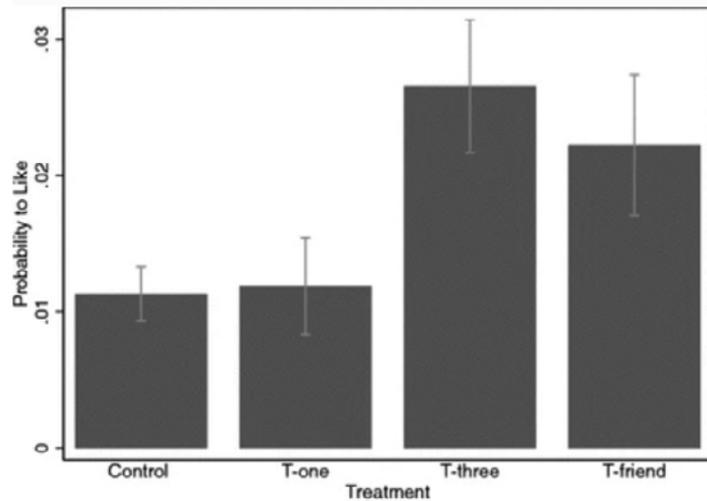
*the evidence used to reach their conclusion. Claims were chosen to support the diverse and complex educational and personal backgrounds and learning requirements of our students.*

**Wendy Rea, teacher**

## Evidence

In 2017, Professor Egebark & Mathias Ekström conducted a natural field experiment investigating the extent of social conformity through determinants such as group size and social ties. The experiment tested whether Facebook users were more prone to support (*Like*) content if someone has done so previously. Participants were randomly assigned to either three different treatment conditions: (1) one stranger has *Liked* the content, (2) three strangers have *Liked* the content, and (3) a friend has *Liked* the content. Participants responded by choosing to indicate a *Like* to show appreciation.

In Figure 1, there were significant differences in mean probability of liking, between participants exposed to the influencing variables of group size (T-one & T-Three) and social ties (T-friend). In the control, there was a probability of 0.01 of liking content shared on Facebook. However, in testing whether group size triggered conformity, the error bars in T-one, significantly overlaps with the control and is not statistically significant in increasing the probability to like as an indicator of conformity. With higher variability scores around the 0.01 mean in T-one, the variability of the results indicated by the error bars in the control, are within the parameters of the T-one condition, denoting



**Figure 1:** Mean probability of liking an advertised product separately for each treatment. **Source:** (Egebark & Ekström, 2017). \*Error bars indicate two standard errors of the mean.

no statistical difference provided that the error bars were also calculated two standard errors of the mean. However, the T-three condition observed higher probability responses that was  $>0.02$ , with increases in group size. This is significantly higher in the probability to like and a non-overlapping error bar compared to T-one, indicating statistical variability in results on average. Although error bars overlap between T-three and T-friend, T-friend not only displays high probability on average ( $>0.02$ ), however, both conditions have increased probabilities to like (indicating approval) when exposed to larger group size and social ties.



*Kacy's response demonstrates an informed application of social psychological research related to a claim. She has effectively sourced research relevant to the research question, and*

*provides an insightful interpretation of the evidence within the research related to the research question. She critically evaluates the evidence to form a justified conclusion to*

*the claim, and effectively communicates this through the use of statistical and scientific representations.*

**QCAA Principal Education Officer**



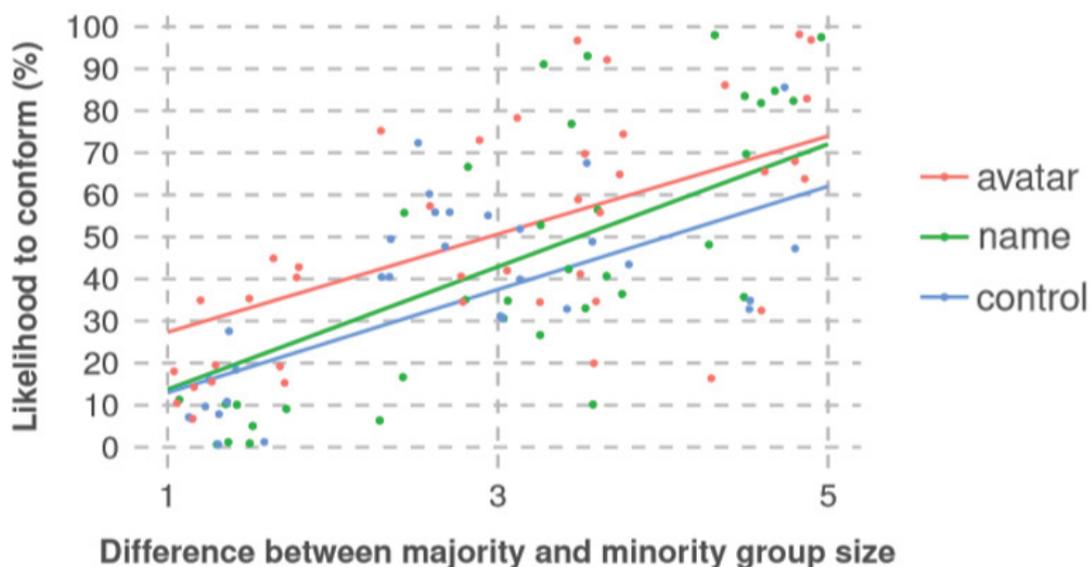
A limitation of this evidence was that the study was not repeated in a second trial, to observe whether T-three & T-friend remains statistically significant from the control. This limits conclusions that can be drawn, as a second comparable measure was not produced, and therefore lacks ecological validity as findings are limited to a single set of results.

Furthermore, the participant sample consisted of Swedish university students aged 26–35, therefore, caution must be considered before generalising the results beyond this participant demographic to general Facebook users. Provided that Facebook users comprise of a diverse range of ages and ethnicities, the sample was not representative of the population and requires further

extrapolation for the validity of the results obtained in this study. Lastly, as the study was conducted in an online setting, researchers struggle to observe every detail of the subjects' behaviour. Hence, it is difficult to determine whether the participants noticed the updates posted, as the updates position within the newsfeed could have affected the observability to the participants.

Further research into social conformity was conducted by Wijenayake & Berkel et al (2019). Researchers investigated whether online gender representation cues, acted as informational influence to incite gender biased conformity in stereotypical gender-related topics. As online users perceive gendered representations of their

friends through usernames and avatars in networking platforms like Facebook, researchers investigated whether individuals are more likely to accept the opinions of stereotypical masculine and feminine avatars and names, as informational gender cues for stereotypical masculine and feminine topics. Participants completed an online quiz containing multiple-choice questions on topics stereotypically perceived as masculine (sports) and feminine (fashion), where they submit their answers and confidence scores prior to and following the presentation of fabricated peer answers. For the purpose of this experiment, a change to the participant's answer was considered an indicator of conformity.

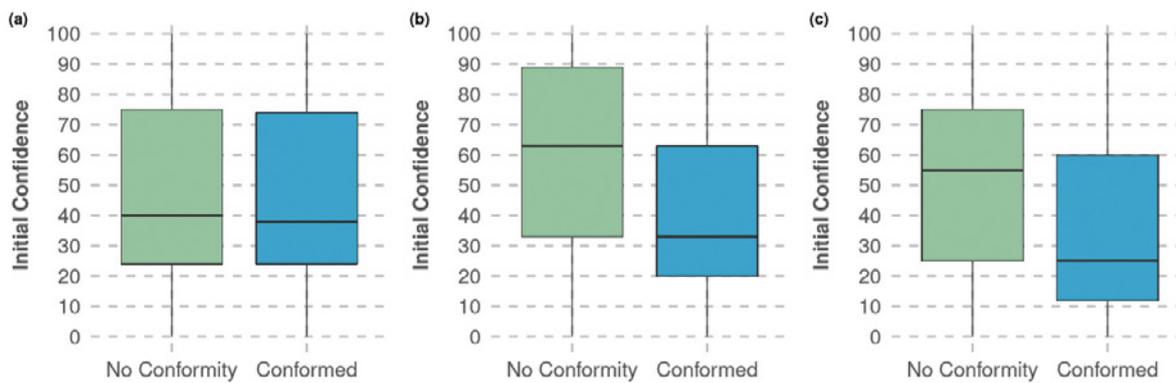


**Figure 2:** The likelihood of participants conforming to the majority in the control, 'names' and 'avatars' condition. **Source:** (Wijenayake, Berkel, Kostakos, & Goncalves, 2019).

**(1) control:** where votes were represented by a grey square, removing any gender cues from peer answers.

**(2) names:** displaying stereotypical masculine and feminine names as gender cues.

**(3) avatar:** displaying stereotypical masculine and feminine silhouette avatars as visual perceptive gender cues.



\*Participants were randomly assigned to either three different treatment conditions.

**Figure 3:** Initial confidence of participants and conformity behaviour across the three conditions: (a) control, (b) names, (c) avatars.

In Figure 2, ‘avatar’ was the highest gender cue to initiate a high likelihood to conform with 30% to >70%, as a present majority increased from 1 to 5 members. As the likelihood to conform was 30% – >70% in ‘avatar’ (Figure 2), this is corroborated by Figure 3C, with the initial confidence in the ‘no conformity’ at >50 – demonstrating high confidence in the selected answer. However low confidence was observed in the ‘conformed’ at <30, indicating low confidence scores lead to higher likelihood to conform. This is similarly observed again in ‘name’ in Figure 2, where the likelihood to conform were in the parameters of 10% – >70%, as the initial confidence of

those who ‘conformed’ was >30 in Figure 3B. In Figure 2, the ‘avatar’ and ‘names’ observed the highest likelihood of conformity compared to the control, with 10–60% likelihood of conformity when majority group size increased. Indicated by a 40 in both the ‘no conformity’ and ‘conformed’ initial confidence scale (Figure 3a), suggests that the absence of gender cues, does not influence individuals to conform as an indicator to accept stereotypical masculine and feminine topics. Thus, it can be concluded from the evidence presented in this study, that through informational influences such as gender cues and increases in group majority,

the likelihood of conformity increases, as self-confidence for self-selected answers decrease.

A limitation of this evidence is that although the study focused on engaging consumers online, the study predominantly focused on gender bias conformity. Participant answers were deemed to be a measure of stereotypical gender knowledge, rather than informational product review that may not accurately address the research question. In addition, participants were required to complete an unrealistic online multiple-choice quiz.

*“In preparation for this assessment task, I realised it was not only vital to understand the concepts and theories that govern psychology, but also to understand how these theories contributed to the behavioural outcomes*

*of real-life experiments. After learning about the content in class, I found it very helpful to undertake further research in how these psychological concepts are applied in the real world and to my own experiences. This really*

*assisted me in gaining in-depth knowledge of how these psychological processes are attributed to the causes or predisposition of specific behaviours – foundational for writing a report.*

**Kacy Miaco, student**

A method that lacks validity and reliability, provided that the informational cue did not mimic the realistic settings of Facebook, where product content is naturally embedded throughout the newsfeed and would be difficult for researchers to generalise their findings from their methodology.

Lastly, the study only included participants who self-disclosed their gender as either man or woman and did not consider transgenders.

This is inconclusive to two

discernible categories only. Although this study reveals the potential of increased consumer conformity on stereotypical gendered products, limited evidence can be concluded from this study with certainty.

Lastly, Seng & Keat (2014) investigated the effectiveness of networking sites in influencing product consumer perception and consumer purchase intention on sports products. A Facebook page was organised to advertise a brand of sports shoes, where the control (n = 57) was exposed

to a page with minimal information about the shoes, while the experimental (n = 59) were exposed to additional information consisting of 'likes' and positive comments about the sports shoes. Participants in both experimental and control were further categorised into groups with differing levels of sports involvement. All participants completed a survey using a 4-item instrument with a 7-point Likert Scale to test buying intention and a single 15-point Likert Scale to test for perception of product.

		<i>Control</i>		<i>Experimental</i>		<i>t-value</i>
		Mean	SD	Mean	SD	
Perception	Low Sports Involvement	7.54 <sup>a</sup>	1.26	9.74 <sup>b</sup>	1.65	-5.80*
	High Sports Involvement	7.86 <sup>c</sup>	1.58	10.39 <sup>d</sup>	2.33	-4.79*
Buying Intention	Low Sports Involvement	2.84 <sup>a</sup>	0.89	3.21 <sup>b</sup>	0.75	-1.72**
	High Sports Involvement	2.77 <sup>c</sup>	1.07	3.22 <sup>d</sup>	1.01	-1.66

Note. <sup>a</sup>n= 28. <sup>b</sup>n= 31. <sup>c</sup>n= 29. <sup>d</sup>n= 28.  
\*p<.001, \*\*p<.10

**Table 1:** Effect of Sports involvement on online social influence. **Source:** (Send & Keat), Sciendo, 2014).

*Kacy developed an individualised response to a unique research question to address the claim social media increases conformity. She demonstrated highly informed application*

*of understanding and insightful interpretation, analysis and critical evaluation of the use of social media to increase informational conformity. She communicated with a discerning use*

*of language and her response was above expectations of students at this level of education in Psychology.*

**Wendy Rea, teacher**

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*Kacy's response demonstrates a thorough identification of relevant trends, patterns and relationships through an*

*effective analysis of the quantitative data. The response shows a critical evaluation of research by providing an insightful*

*discussion of the quality of the evidence.*

**QCAA Principal Education Officer**



*Teaching and learning was undertaken through the Distance Education mode of learning, as Kacy was a school-based learner who completed Psychology through the Charters Towers School of Distance*

*Education. Teaching and learning experiences included explicit teaching of skills required, development of curiosity to engage with and critically analyse sources which support or refute*

*the claim, recognition and evaluation of quality sources, mastery or meaning and use of cognitive verbs and deconstruction of exemplars and the ISMG.*

**Wendy Rea, teacher**

*After considering all the results of the data, it was interesting to find similarities and differences in the research I collected, which aided my understanding in*

*why some results were achieved indicated by commonalities and similarities which validated each other. My big advice in undertaking this research investigation,*

*is to find the similarities between the experiments and how these can be used to support or reject the claim.*

**Kacy Miaco, student**

In Table 1, the low sport experimental group significantly scored higher in their perception towards quality of product ( $\bar{x} = 9.74$ ,  $s = 1.65$ ), compared to the control group ( $\bar{x} = 7.54$ ,  $s = 1.26$ ) where the  $p < 0.001$ . This observed a 2.2 difference in the mean with slight variability in the results as indicated by the standard deviations. The low sport experimental also significantly scored higher in their buying intention ( $\bar{x} = 3.21$ ), compared to the control with ( $\bar{x} = 2.84$ ) at a statistically significant p-value score of  $< 0.10$ . This is similarly observed again, in the high sport experimental, scoring a statistically significant score ( $p < 0.001$ ) at ( $\bar{x} = 10.39$ ), compared to the high sport control ( $\bar{x} = 7.86$ ) in the perception. However, in the buying intention, although the high sport experimental scored higher ( $\bar{x} = 3.22$ ) compared to the control ( $\bar{x} = 2.77$ ), this was a non-statistically significant score  $> 0.10$ . For both low and high levels of sport involvement, the differences between control and experimental groups were statistically significant, suggesting that social influence online has an effect on the perception of products despite the levels of sport participation. However, social influence only has a moderate effect on the buying intentions of highly involved participants. Within this

study, it can be concluded that with low sport involvement, informational influences inform an individual's perception and buying intention.

A limitation to this study is that it only examined the effect of positive social influence on the perception of quality and buying intention. Effects of negative comments by fellow users is not examined in this study and could be an area for future work. Moreover, this study was conducted using sports products and involvement, and is unclear whether the findings can be generalised to non-sporting products. Other product categories need to be investigated, to validate the results through a comparative measure and ensure statistical strength. Furthermore, the utilisation of surveys consisting of a point Likert-scale system, is a self-report system which lacks reliability due to its limitations that exposes participants to misinterpretation and uncertainty. Lastly, the product used was a new product by a brand company. The study did not investigate if social influence can change existing attitudes of existing brands or products. As consumers may have formed attitudes towards existing brands, the effect of online social influence may remain limited specifically to the parameters of this study.

## Conclusion

Through the evidence presented from Johan Egebark & Mathias Ekström (2017), participant exposure to group size and social ties, significantly contributed to observable conformity on Facebook. With statistically significant mean differences between participants exposed to the influencing variables of group size (T-one & T-Three) and social ties (T-friend), the study observed increased probabilities to like. This is corroborated by the findings of Wijenayake & Berkel et al (2019), concluding that as the votes for a single answer increased from the majority, the likelihood to conform also increased to >70%, in the 'avatar' and 'names' cue. Despite Wijenayake & Berkel's

lack of statistical validity, the correlation between conformity and majority size from these studies, suggest that group size and the social ties from a reference group (gender cue or T-friend), ensures a form of reference triggering informational conformity in users.

Additionally, there were increases in conformity in participants who ratified their answer, when there was decreases in self-confidence scores from the findings of Wijenayake & Berkel. Similarly, the evidence from Seng & Keat (2014), suggest that with participants with low sports involvement, positive reviews of the product in the experimental,

significantly contributed to the informational influence in informing the individual's perception and buying intention compared to the knowledgeable highly sports involved participants. Although there were increases in conformity, and observable relationships between informational cues and conformance in majority group settings, the evidence presented in this investigation suggest previously reviewed online content can stimulate informational influences. However, not specifically to Facebooks users which requires further investigation to overcome the limitations and propose a valid conclusion with confidence.

## Evaluation

To determine the scope of validity and reliability within the evidence, the execution of the methodologies, possible variables and the conditions in which the data was obtained, will be evaluated to suggest improvements and extensions.

Firstly, the methodologies utilised by Wijenayake & Berkel et al to measure online conformity, is a flawed method which subjects the findings to unrealistic settings. Although the experimental aim of the quiz tested gender cues in conformity, quizzes are an inaccurate form of measure to test conformity, as questions are objective that promotes 'right' and 'wrong' answers corresponding to the nature of masculine and feminine topics. This subjects participants to social desirability to resonate

with their respective gender considered correct, instead of examining a change in attitude or perception such as 'reviewing previously reviewed online content' as addressed by the research question. In addition, a quiz does not accurately imitate the context of Facebook settings. This can be improved by investigating the effects of each gender on online content review and inclination to conformity. To measure this, two processes would be implemented where participants would be tested on baseline perception of product, and after exposure to the product update online. The number of likes on the product by participants, will be measured to provide two sets of findings and undertake correlational studies that

will increase the ecological strength and validity of the findings.

Furthermore, through the research provided by Johan Egebark & Mathias Ekström and Seng & Keat (2014), these articles were sourced from reputable sources that were peer reviewed. This increases reliability and validity, provided that the research conducted has also been scrutinised and reviewed by other experts in the field to ensure the article's quality. However, although some of the evidence presented in this investigation are credible and reliable, further extrapolation of the findings will provide greater insight and validity to the current research presented in this essay. An extension

would be to examine if different products appeal to different demographic social groups, that may potentially be a catalyst to incite informational influence in other users. Provided that Seng & Keat investigated sports products, by exploring other products, this warrants a future study whether in 'trend' versus 'non-trending' products can influence informational

influence for social acceptance conformity for researchers to confidently extrapolate their findings in the context of pop-culture and conformity. In contrast, instead of exposing participants to positive reviewed content, subjecting participants to negatively reviewed content is worthy of comparability in the changes of attitudinal and perception behaviour by self-report Likert

scale measures.

Thus, the evidence obtained in this study concludes that positively reviewed content on Facebook, can stimulate informational conformity in other Facebook users, and as such provide support to the claim "social media increases conformity".

*In the report, I am particularly proud of the conclusion because I believe conclusions are a great way in condensing all the major findings of the report into a clear*

*and logical summary that is supported by the literature in the data.*

**Kacy Miaco, student**

*To sum up the response, Kacy clearly extrapolates the credible findings of the research to the claim.*

**QCAA Principal Education Officer**

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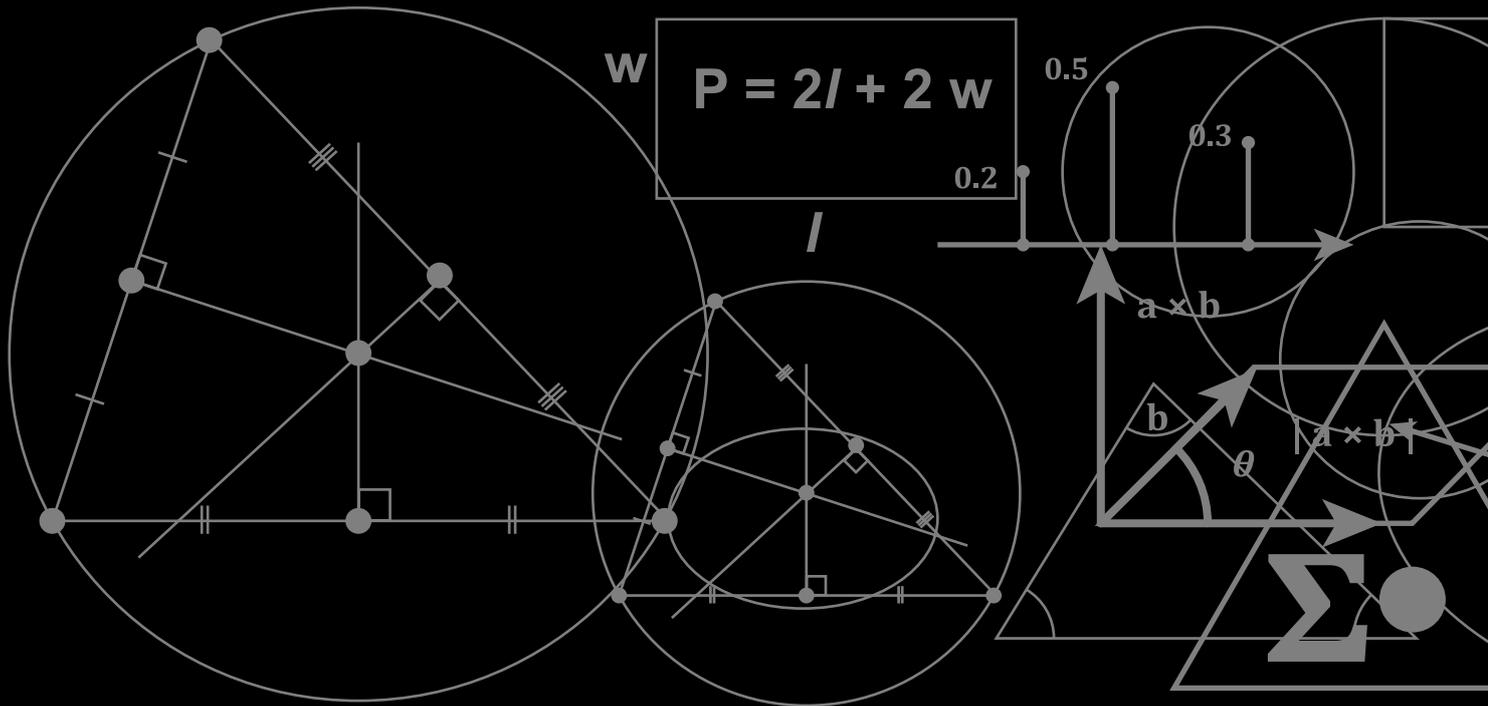
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# Specialist Mathematics

# Specialist Mathematics

## Internal assessment 1

### Problem-solving and modelling task

Braden Simm

Nambour Christian College

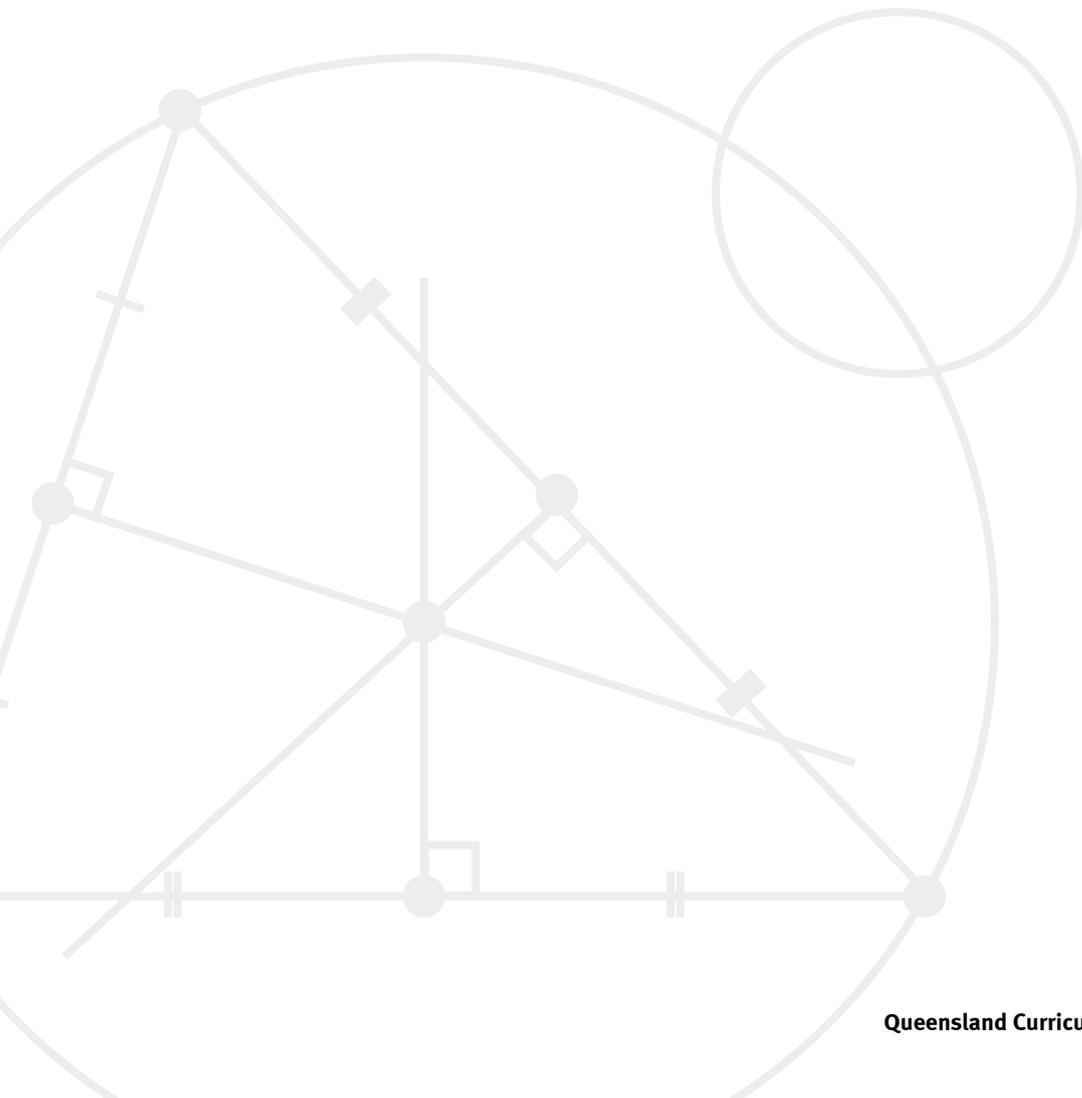
#### Context

The projectile movement of a light object such as a plastic plant pot thrown through the air (like throwing a ball) has its motion drastically affected by air resistance; which is demonstrated in the path, velocity and acceleration characteristics. This motion is different from projectiles little affected by air resistance.

#### Task

Determine and evaluate the effect of air resistance quantitatively in this situation; particularly with respect to path, velocity and acceleration behaviour.

*Excerpt from Nambour Christian College's Specialist Mathematics IA1, 2020.*



## Vector calculus

### Introduction:

The aim of this report is to investigate the quantitative effect of air resistance (drag) on displacement, velocity, and acceleration. To examine this effect, the path of a plant pot will be analysed to see if any influence of drag can be measured. Using the software

Logger Pro, a video of throwing a plant pot can be analysed to place points across the plant pot's path and determine its displacement and approximate velocities at given times.

Typically, projectile motion is represented parametrically with respect to time. Separating

the vertical and horizontal components of motion. When considering simple projectile motion, air resistance is regarded as negligible and all acceleration is constant. Such a scenario can be described with Newton's equations of linear motion:

$$s = ut + \frac{1}{2}at^2 + s_0$$
$$\frac{ds}{dt} = v = u + at$$
$$\frac{d^2s}{dt^2} = \frac{dv}{dt} = a$$

When separating the horizontal and vertical Cartesian components parametrically with the parameters of simple projectile motion, the following equations are generated:

$$s_y = h = u_y t - \frac{1}{2}gt^2 + h_0$$

$$v_y = u_y - gt$$

$$a_y = -g$$

$$s_x = u_x t + s_0$$

$$v_x = u_x$$

$$a_x = 0$$

These equations describe perfect parabolic motion with the path being symmetrical either side of the vertex.

*In this Problem-solving and modelling task, I wanted to use an experiment to video a projectile object that was exhibiting some drag, and to use video and maths analysis and modelling*

*to evidence and model the drag in this projectile motion. We have a history of doing video analysis of projectiles as a way to use maths modelling and to substantiate projectile*

*mathematics. Using Logger Pro has always provided an interesting way of studying this motion.*

**Rodney Chamberlain,  
teacher**

*Braden's solution to the Problem-solving and modelling task is a unique response, which uses both technology and analytical skills to build and refine a model for a projectile.*

*To accurately model the motion of the projectile chosen, it was necessary to explore models beyond the quadratic model normally used. Braden has clearly communicated his strategy*

*and decision-making process and included appropriate supporting evidence to justify his decisions.*

**QCAA Principal Education  
Officer**

## Solving:

Figure 1 shows these displacement equations manually applied to the path of the plant pot in Logger Pro. Considering vertical displacement, air resistance is quite negligible. The main influence drag has over the path is increasing

the time of flight. Even with this increase of time, the horizontal displacement is shorter than the predicted path without drag. Thus it can be inferred that air resistance is a factor and mainly affects motion in the horizontal dimension.

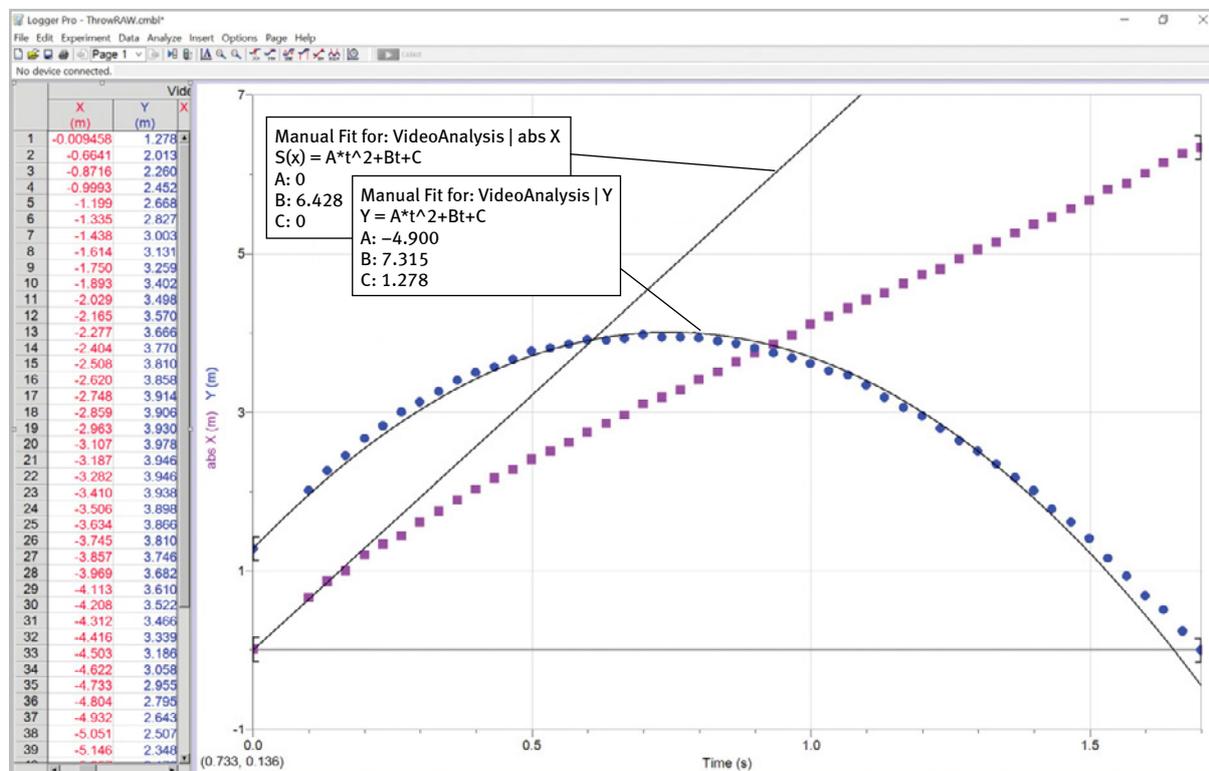


Figure 1: Horizontal and Vertical Displacement Assuming No Drag

When factoring air resistance into these equations, the deceleration it causes must be assumed constant ( $k$ ). As drag always acts in opposition to velocity, the acceleration in the vertical dimension due to air resistance will reverse as the projectile reaches its peak height (*apex*):

$$s_y = h = u_y t - \frac{1}{2} (k + g) t^2 + h_0$$

$$v_y = u_y - (k + g)t$$

$$a_y = -(k + g)$$

$$[0s < t < t_{apex}]$$

$$s_y = h = \frac{1}{2} (k - g) (t - t_{apex})^2 + h_{apex}$$

$$v_y = (k - g) (t - t_{apex})$$

$$a_y = k - g$$

$$[t_{apex} < t < 1.7s]$$

$$s_x = u_x t - \frac{1}{2} k t^2 + s_0$$

$$v_x = u_x - kt$$

$$a_x = -k$$

If the above equations are applied to the path of the plant pot, then it would be expected that they should accurately model the flight path if air resistance is in fact constant.

When responding to an assessment task, general knowledge and understanding of the mechanics of a topic are very important. In class,

we discussed various mathematical models involving air resistance in order to develop a preliminary understanding of the topic. I prepared for

this assessment task by considering the possible solutions and planning the procedures to deduce each.

**Braden Simm, student**

## Method 1:

### Vertical Dimension:

The peak height of the plant pot was assumed to occur at  $t = 0.7\text{s}$ . This time was chosen as it is very slightly after the highest data point (0.6990s, 3.979m, 0.239m/s) at which the velocity approaches zero. Using this point for apex information, two 2nd order polynomial regressions, matching the form of the vertical displacement equations described above, were performed at  $t < 0.7$  and  $t > 0.7$ . The equations generated were:

$$h = 7.839t + 5.838t^2 + 1.304 : [0 < t < 0.7] \text{ and}$$

$$h = -4.012(t - 0.7)^2 + 3.90 : [0.7 < t < 1.7]$$

These two equations modelled the vertical motion very well. The regressions fit the data points well as indicated by the correlation values in Figure 2. Due to the evident validity

of this method, the linear motion method was continued to the next step: velocity.

By using the displacement equations generated, the values for initial velocity and acceleration were substituted into the above velocity formulas achieved earlier through differentiating the displacement equation. These two velocity equations are:

$$v = 7.839 - 11.676t : [0 < t < 0.7] \text{ and}$$

$$v = -8.024(t - 0.7) : [0.7 < t < 1.7]$$

Evident in Figure 2, these two lines continue to model the data, fitting the velocity plot. These velocity equations do deviate slightly from the plot at the beginning and end of the flight path but it appears an accurate model.

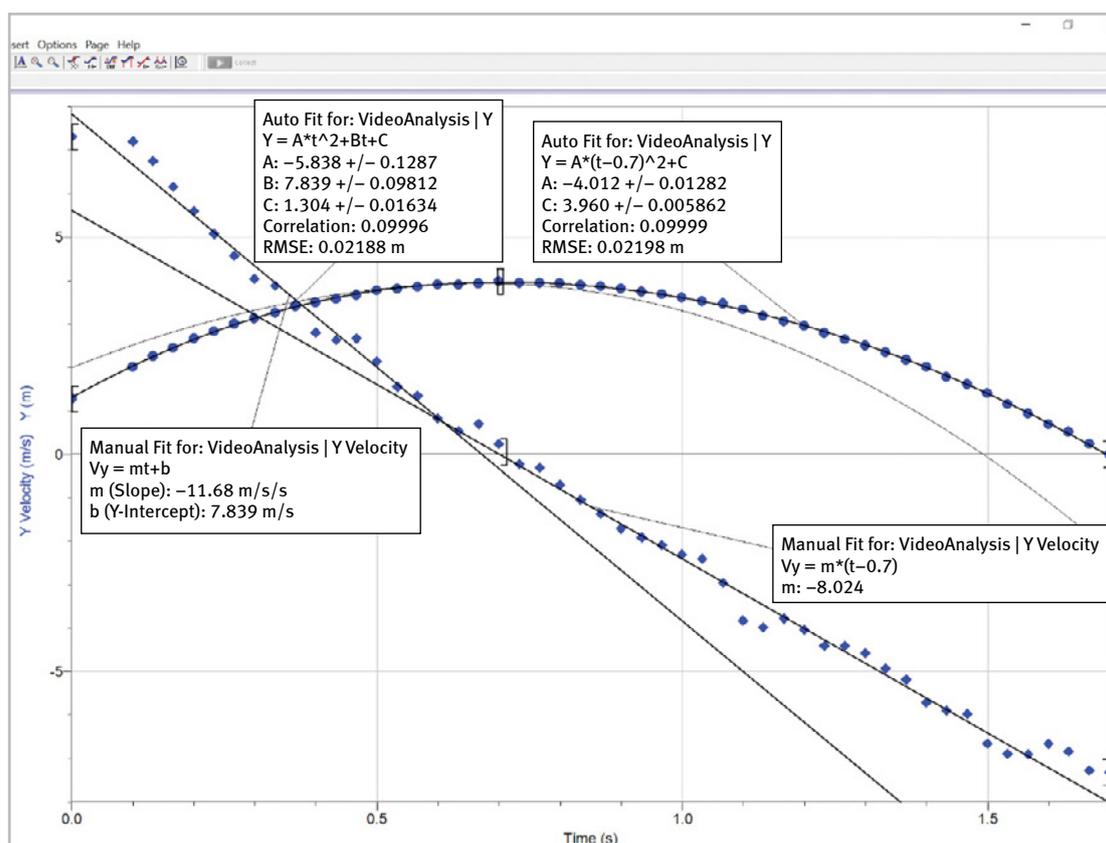


Figure 2: Plot of Vertical motion

Continuing this model, it can be concluded that:

$$a_y = -11.676m/s^2 = -(k + 9.8)$$
$$k = 1.876m/s^2$$

$$a_y = -8.024m/s^2 = k - 9.8$$
$$k = 1.776m/s^2$$

The average value of which is  $1.826m/s^2$ .

This method suggests that the magnitude of air resistance is in fact constant. If the same method can be applied to the horizontal motion, then it is reasonable to assume for velocities of less than  $10m/s$ , air resistance is approximately constant.

### Horizontal Dimension:

For horizontal motion, the only source of acceleration in this scenario is from air resistance. As the ball never changes direction on the horizontal axis, the acceleration due to drag will only act in one direction also. As such the equations can be applied to this dimension simpler than the vertical.

Using a quadratic regression in Logger Pro, the equation that described the horizontal displacement is:

$$s_x = 4.241t - 0.4408t^2 + 0.3211$$

This regression fits the data points quite well with a correlation value of 0.9992. The main outlier, as seen in Figure 3, is the initial displacement which should be zero. However, considering the deviations in flight path caused by the non-uniform shape of the plant pot, this was considered a reasonable approximation.

When differentiating this equation to create a velocity function, an error with the model became significantly evident. The linear velocity equation produced was:

$$v_x = 4.241 - 0.8816t$$

Extremely evident in Figure 3, this equation hardly fits the data points. The initial velocity generated in the displacement equation of  $4.241m/s$  has a large difference of 34% from the actual value of  $6.428m/s$ . The shape of the plotted velocities shows a decrease in speed with time, the rate of change of which also decreases. This plot indicates that the acceleration caused by drag is *not* constant, and thus a different set of equations must be formulated in order to model the motion.

*To prepare students for this assessment, we had studied vector calculus in relation to motion and in particular to projectile motion.*

**Rodney Chamberlain, teacher**

*I spent most of the assessment time researching and understanding the mathematical models of air resistance so that I could more easily navigate through the topics in my report. I am quite satisfied with the inferences I made from the mathematical expressions themselves regarding the nature of drag.*

**Braden Simm, student**

Braden has used appropriate technical language while creating a report that is engaging. The graphs included have been

carefully selected to support the arguments made.

**QCAA Principal Education Officer**

The presentation of the assessment best allowed me to construct an essay-style writing piece as well as allowing for a linear development of the mathematical processes. From my mathematical studies I have

extended my ability to visualise problems as a series of steps and processes, which aids in problem-solving.

**Braden Simm, student**

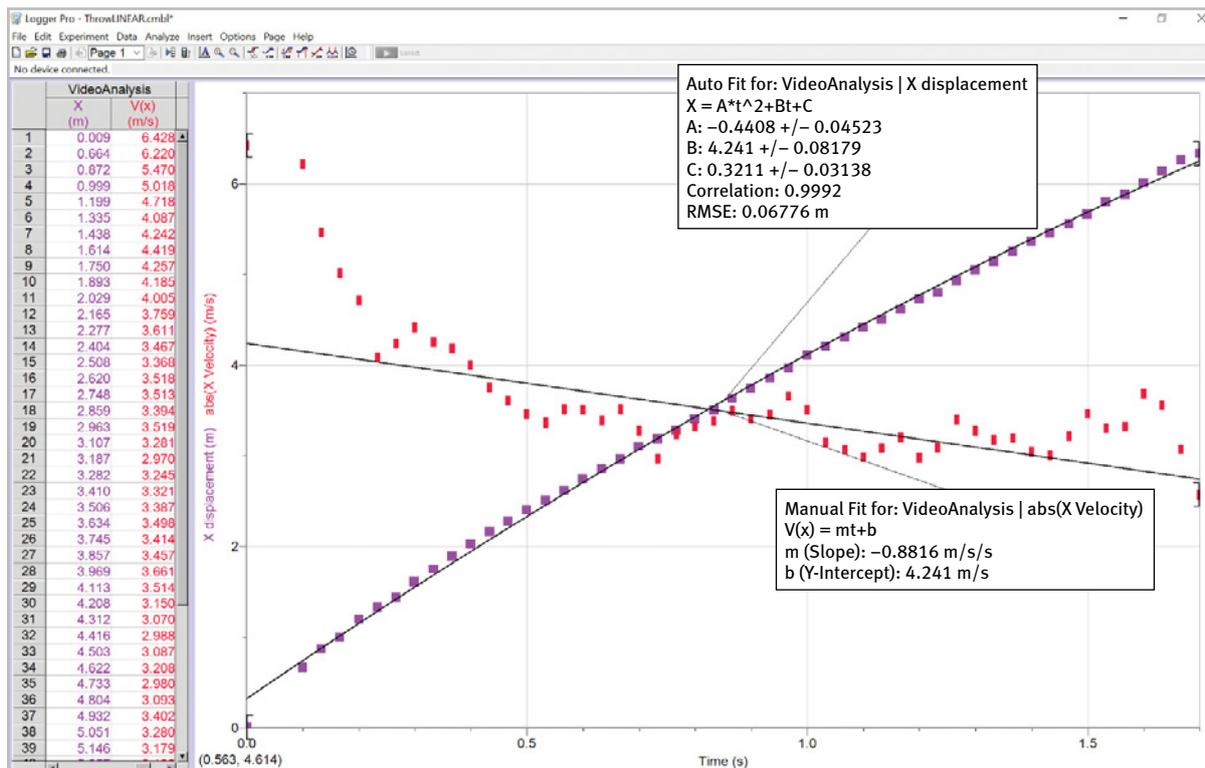


Figure 3: Plot of Horizontal Motion

## Method 2:

### Horizontal Dimension:

As the plot of horizontal velocity has the most evident deviation from a linear model, it was focused on in order to develop a new model. After trialling multiple regressions, the best fit was an exponential curve with the equation:

$$v_x = 3.575e^{-4.052t} + 3.188.$$

To test if this relationship describes the motion of the plant pot, it can be integrated — resulting in a displacement equation — and compared to the plot of horizontal displacement. If the curve fits, it would indicate a model that fits this data set.

$$v_x = \frac{ds_x}{dt} = 3.575e^{-4.052t} + 3.188$$

$$s_x = \int (3.575e^{-4.052t} + 3.188)dt$$

$$s_x = \int \frac{3.575e^u}{-4.052} du + \int 3.188dt$$

$$s_x = -\frac{3.575}{4.052} e^u + 3.188t + c$$

$$s_x = -\frac{3.575}{4.052} e^{-4.052t} + 3.188t + c$$

To solve for the constant of integration, the initial conditions must be considered:

$$s_0 = -\frac{3.575}{4.052} e^{-4.052(0)} + 3.188(0) + c$$

Thus:

$$s_0 = -\frac{3.575}{4.052} + c$$

$$c = \frac{3.575}{4.052} \quad [s_0 = 0]$$

$$s_x = -\frac{3.575}{4.052} e^{-4.052t} + 3.188t + \frac{3.575}{4.052}$$

Evident in Figure 4, after inserting this equation into Logger Pro it is seen to follow the plot quite well. The trend now passes through the initial point whilst fitting the rest of the data points. This confirms that the exponential

velocity equation generated does in fact reliably model this data set. To investigate what this relationship indicates about acceleration, the velocity equation can be implicitly differentiated to produce acceleration.

$$v_x = 3.575e^{-4.052t} + 3.188$$

$$v_x - 3.188 = 3.575e^{-4.052t}$$

$$v_x - 3.188 = e^{-4.052t + \ln(3.575)}$$

$$\ln|v_x - 3.188| = -4.052t + \ln(3.575)$$

$$\frac{d}{dt} \ln|v_x - 3.188| = \frac{d}{dt} [-4.052t + \ln(3.575)]$$

$$\frac{dv_x}{dt} * \frac{d}{dv_x} \ln|v_x - 3.188| = \frac{d}{dt} [-4.052t + \ln(3.575)]$$

$$\frac{dv_x}{dt} * \frac{1}{v_x - 3.188} = -4.052$$

$$\frac{dv_x}{dt} = -4.052(v_x - 3.188)$$

$$a_x = -4.052(v_x - 3.188)$$

Assuming that this equation correctly models the drag acting on the plant pot, it implies that the acceleration is dependent on the instantaneous velocity of the projectile. The equation also stipulates that if the horizontal velocity was to fall below  $3.188\text{m/s}$ , air resistance would speed

it up. This is obviously an impossible concept as drag always acts in opposition to the direction of motion. It therefore can be concluded that, for this isolated experiment, as the velocity approaches  $3.188\text{m/s}$ , air resistance becomes negligible.

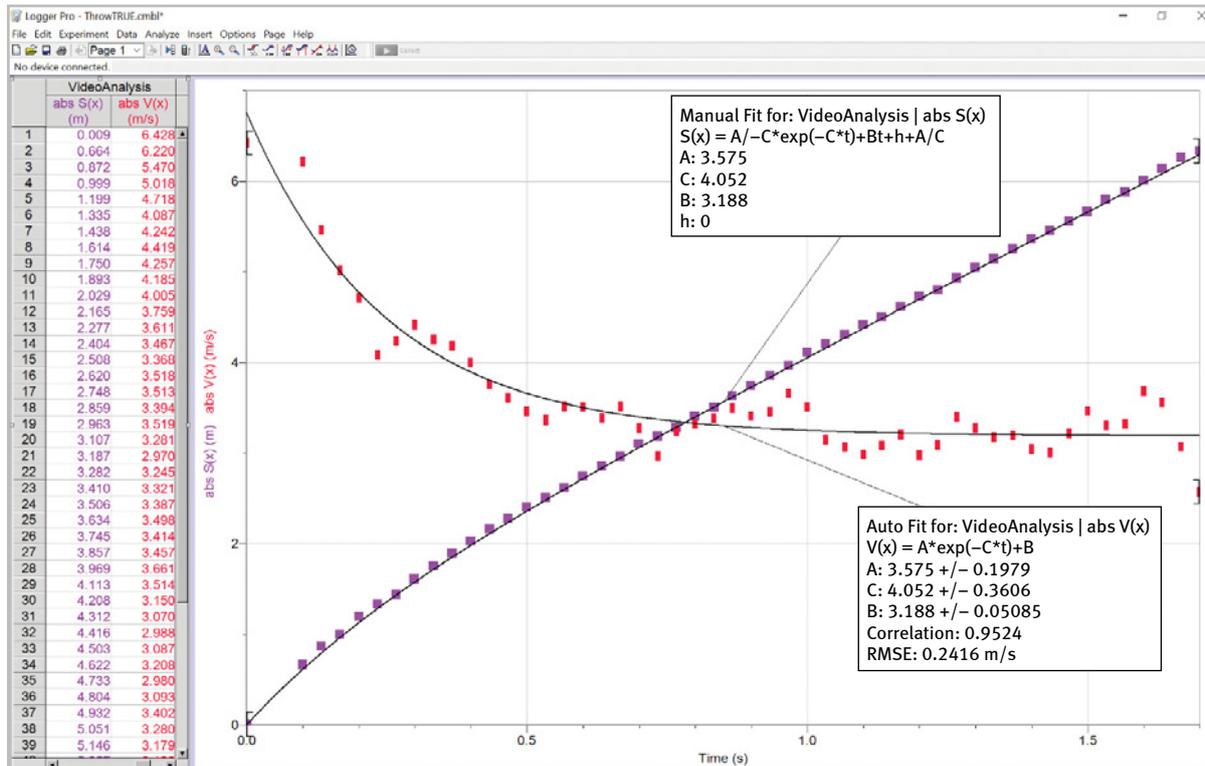


Figure 4: Plot of Horizontal Motion with Exponential Regressions

### Vertical Dimension:

Considering the increased modelling capability of the exponential function, a similar process can be performed on the vertical components of motion. A similar manipulation to that imposed on the linear equations (in order to produce a function before and after the maximum height) is not required in this instance. This is because, as seen by the horizontal acceleration equation derived earlier in method 2, the acceleration is dependant on the velocity. Therefore, as the velocity becomes negative, the acceleration should oppose this and act in the positive direction without any changes to the basic function. It is assumed that the constant acceleration of gravity will be absorbed into the constants in the equation – this will be addressed later.

The exponential regression that fits the vertical velocity is:  $v_y = 28.77e^{-0.4528t} - 20.82$

Displayed in Figure 5, this curve appropriately fits the change velocity about  $t = 0.7$  that had to be modelled with two linear regressions in method 1. This confirms the previous assumption that air resistance's dependence on velocity will naturally compensate for the change in direction of the force of drag.

Integrating this function as previously shown (with an initial displacement of  $1.278\text{m}$ ) produces the displacement equation:

$$s_y = -\frac{28.77}{0.4528}e^{-0.4528t} - 20.82t + 68.816$$

As expected, Figure 5 shows that this curve produces a very close fit to displacement plot — continuing to validate this model.

At the negligible altitude variation involved in this experiment, the acceleration due to gravity (gravitational field strength) remains approximately constant — at  $\approx -9.8m/s^2$ . When determining the acceleration equation for the vertical components, it is therefore expected that that linear constant will appear somewhere in the expression. Once again performing an implicit differentiation on the velocity function, the following acceleration equation is produced:

$$\frac{dv_y}{dt} = -0.4528(v + 20.82)$$

$$\begin{aligned} \text{range}(-B * -C) &= \{(20.82 + 1.679) * -(0.4528 + 0.03854); (20.82 - 1.679) * -(0.4528 - 0.03854)\} \\ &= \{-11.05; -7.93\} \end{aligned}$$

Clearly,  $g$  fits within the range allowed by the errors calculated by Logger Pro. Therefore the acceleration equation can be approximated to:

$$a_y = -0.4528v - 9.4273$$

$$a_y = -0.4528v - g$$

To create the linear constant of gravitational acceleration ( $g$ ), the distributive law is applied to this equation:

$$a_y = -0.4528v - 9.4273$$

In order to have the drag equal zero at an instantaneous velocity of zero, the constant must be completely absorbed by  $g$ . Visible in Figure 5, the velocity equation produces absolute error values with each of the constants it computes. To determine whether or not it is reasonable to completely approximate the constant of  $-9.4273$  with  $g$ , these errors were considered. The only values that influence the acceleration are the 'C' and 'B'. It is reasonable to infer that if  $g$  fits within the range stipulated by these errors, then the constant can be reasonably approximated with  $g$ . The largest magnitude of the constant that can be outputted is as follows:

This expression can then be interpreted that acceleration due to drag approaches zero as the instantaneous velocity also approaches zero. However, it does not come to an equilibrium at this point as gravity still exerts a force.

*“ Braden has been discerning in his selection of mathematical techniques and concepts. In choosing between technology or an analytical approach, he was discerning in choosing an approach that justified the decisions made in the model development.*

**QCAA Principal Education Officer**

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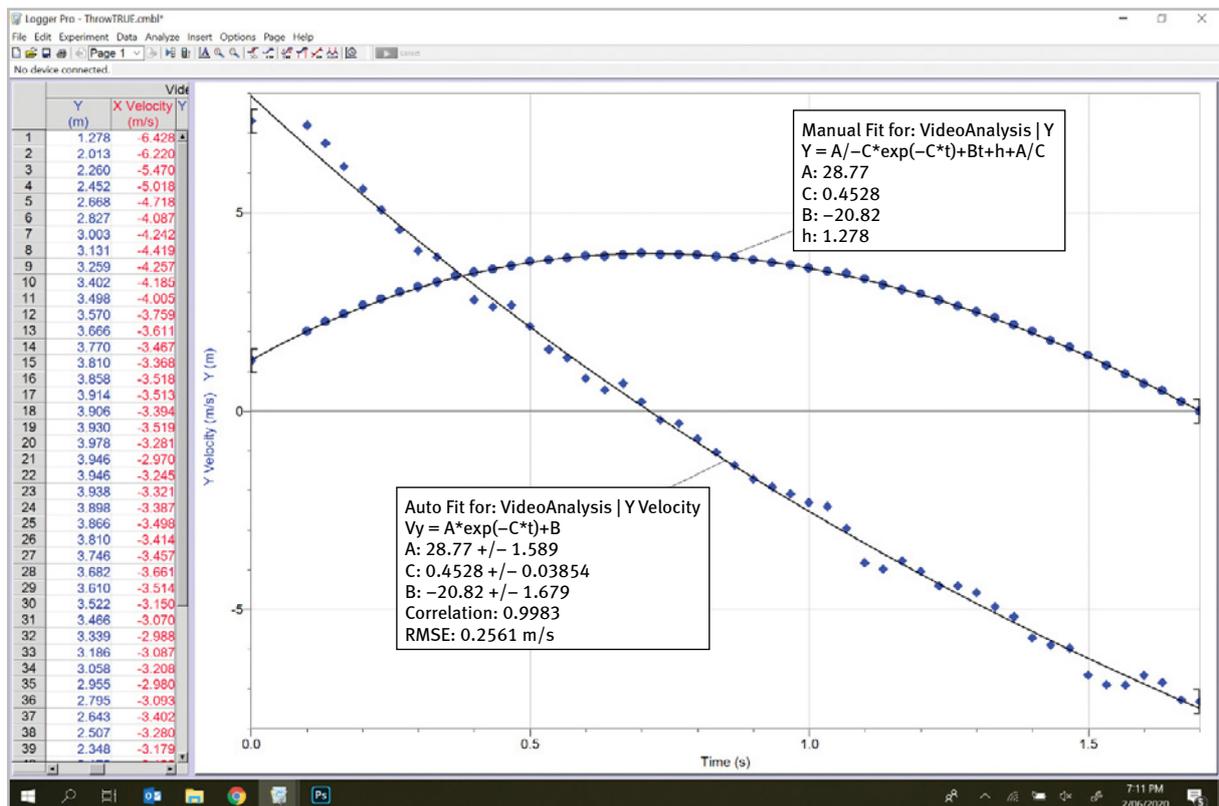


Figure 5: Plot of Vertical Motion with Exponential Regressions

### Limitations and Assumptions:

- The main limitation of this report is the collection of data points acquired on Logger Pro. To plot each point, the path of the plant pot must be manually followed frame by frame. Due to the non-uniform shape of the plant pot, its approximate geometric centre was traced rather than its centre of mass or any other point. This may result in inaccurate data points as air resistance influences different parts of the pot differently. Additionally, human error is involved where points aren't accurately selected due to difficulty in perceiving the correct location to track.
- The shape of the plant pot (as aforementioned) influenced its path, creating irregular deviations in velocity components.
- Due to the angle of the camera, the scale projected over the video for the data collection is inaccurate. Additionally, the scale must be manually set resulting in human error.
- Logger Pro automatically calculates the velocities in the table. This results in error as this occurs over relatively large intervals, creating a very jagged plot. This is very obvious in the horizontal velocity graphs.
- When manipulating the vertical acceleration equation, the approximation of the constant to gravity not entirely valid. It was predominantly used so that the drag was zero when velocity was zero — improving the practicality of the model.

## Validity:

Research indicates that drag is in fact in some way proportional to velocity. This makes the conclusions drawn from method 2 more credible. Projectile motion is not however normally

modelled with an exponential equation. However, that model can still be used effectively for this particular data set.

## Conclusion:

Analysing the projectile motion of a plastic plant pot, this report deduced that air resistance does not provide constant deceleration. Instead, it was found that the drag is proportional to its instantaneous velocity. The velocity of an object only influenced by drag therefore gradually decreases by a reducing amount. The effect air resistance therefore has on the displacement of a projectile is reducing its maximum height and range in such a way that removes the symmetry from simple projectile motion as the latter half of the path will appear ‘squished’ compared to the first. This is evident for two reasons, the horizontal dimension undergoes deceleration and acceleration in both dimensions is not constant. The mathematical modelling developed through method 2 of this report is not a general representation for all projectile

motion scenarios and likely only applies to this particular experiment. The quantitative effects of drag investigated in this unique scenario is that horizontally, air resistance becomes negligible as the projectile reaches  $3.188m/s$ .

This is indicated by the differential equation

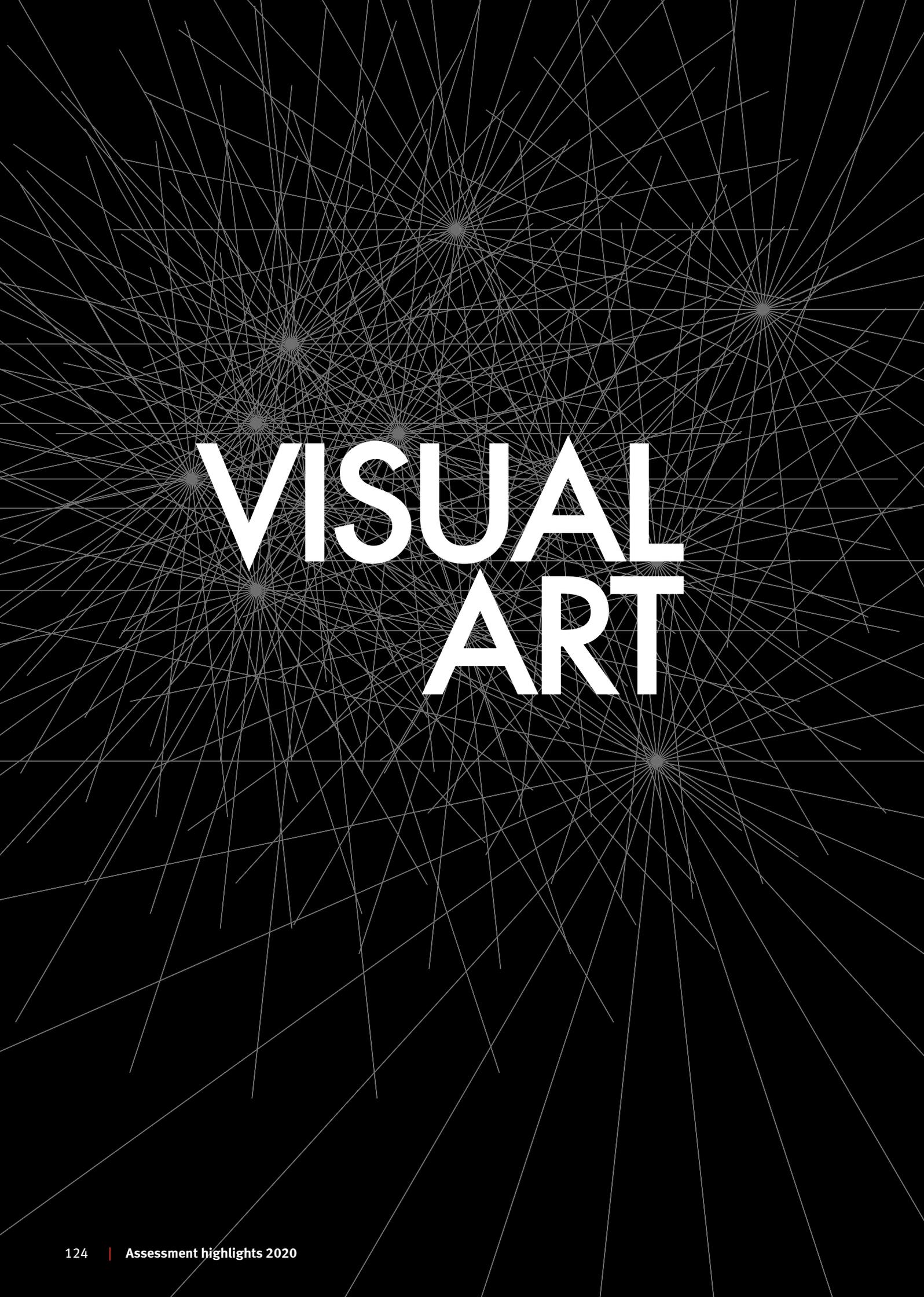
for acceleration:  $\frac{dv_x}{dt} = 4.052(v_x - 3.188)$ .

Vertically, air resistance becomes negligible when approaching a velocity of  $0m/s$  but is constantly undergoing acceleration from the gravitational field of the earth. This is described with the differential equation for vertical acceleration:

$$\frac{dv_y}{dt} = -0.4528v_y - g.$$

*“Braden found some differential equations on his own to describe projectile motion with drag, and he used this mathematical approach to process and model the video data. Yes, it was unexpected and very sophisticated.”*

**Rodney Chamberlain, teacher**



# VISUAL ART

# Visual Art

## Internal assessment 2

Project — inquiry phase 2

Matthew Schoutrop

St Joseph's College, Gregory Terrace

### Context

Unit 3 explores the concept of 'Art as knowledge'. This project provides opportunities for you to enrich your knowledge and aesthetic experience of the world through critical thinking, making and responding to art in the contemporary, personal, cultural and/or formal contexts.

As an artist, you will continue to extend your knowledge as you develop your art practice and use your artwork to communicate this knowledge to an audience. You will be challenged to consider the way art can communicate your individual interpretation of culture and spirituality in reaction to the thoughts and concepts of others.

As audience, you will consider what you can learn from works of art and how prior knowledge and experiences can influence the way visual language is read and understood.

Inquiry phase 2 is the second stage in the self-directed body of work.

### Task

Create and resolve artwork/s that communicate the concept 'Art as knowledge', and the focus and context/s you defined in Inquiry phase 1.

Write artist's statement/s and display artwork/s to communicate your focus and artistic intentions to an audience.

*Excerpt from St Joseph's College's Visual Art IA2, 2020.*

# Matthew Schoutrop

St Joseph's College, Gregory Terrace

## Guardian

### UNIT 3

#### Art as Knowledge

#### Self-directed Focus

To explore the ephemeral connections between death and rebirth in relation to the human condition

#### Self-directed Inquiry Question

How artists use form to reflect on death and rebirth in relation to the human condition?

### Focus from investigation – Inquiry phase 1

My inspiration to explore the human condition stems from a recent journey to the high country of Northern Victoria. The high country is an ancient, rugged and picturesque place that has endured many life cycles. Then in the first few weeks of January this year everything was lost. Fires ravaged the high country, reducing vibrant colour into a lifeless husk. This transition from life to death was immediate and created an overwhelming



sense of loss within me in terms of the human condition. However, in the wake of all this devastation, new life returned through the cycle of rebirth. Using the research methodology discussed in Liam Hearne's facilitated workshops, I am looking to explore the concepts of lifespan that define the evolving emotions within my human condition.

### Guardian (2020)

#### 190cm x 60cm x 20cm Wearable Suit

7 variations of hand fossicked seed pods, birch twigs, dried plant matter, jacket, hessian sack, wire, zip ties, moss, polymesh, Duct Tape, Mud Face paint

2 X 29cm X 42cm print and 1x 74cm X 46cm print on matte photographic paper on 120cm X 150cm Black Masonite Board

In challenging associations of the stark contrasts between life and death, my investigative body of work will explore a view that represents the movement between the two and the idea that they may be closer together than they are perceived. In building upon 'Conductor,' 'Guardian' will look to liberate and enclose the human form in a capsule of textural form that prepares the occupant for the life beyond death and the death after life. By challenging the socio-norm, the work will be a tactile and tangible expression of reflections into mortality.

## Matthew Schoutrop

### Guardian (2020)

#### 190 x 60 x 20 cm Wearable Suit

7 variations of hand fossicked seed pods, birch twigs, dried plant matter, jacket, hessian sack, wire, zip ties, moss, polymesh, Duct Tape, Mud Face paint

2 X 29cm X 42cm print and 1 X 74cm X 46cm print on matte photographic paper on 120cm X 150cm Black Masonite Board

### Artist Statement

Guardian is the keeper of the bridge that connects soul to body.

Guardian is a wearable pod that works to juxtapose the end points of life and death by placing symbols of each side by side. Life wrapped in the husk of death.

The live tissue of my own human condition is protected by dormant life; seed pods waiting to flourish and live again. The shroud of Guardian allows me to recognise enlightenment; clear vision, understanding and acceptance of a perpetual lifecycle that begins with death and end with life. Inside Guardian I am a sentinel; I stand on the bridge; at peace with my mortality in this time of transmigration. I seek to extend my hand towards those looking on to share this personal metamorphosis between the physiological and spiritual journey that we all face in our lifecycles.

Ashes and dust that release life and spirit – all in my hands as Guardian.

## RESOLVED BODY OF WORK

Installation view

### **Guardian (2020)**

**190 x 60 x 20 cm**

**Wearable Suit**

7 variations of hand  
fossicked seed pods,  
birch twigs, dried plant  
matter, jacket, hessian  
sack, wire, zip ties,  
moss, polymesh, Duct  
Tape, Mud Face paint

**2 X 29cm X 42cm print  
and 1x 74cm X 46cm  
print on matte  
photographic paper on  
120cm X 150cm Black  
Masonite Board**



*Matthew has created meaning by working with advanced sculptural methods and an individualised art practice. Representation is enhanced for audience through the location and presentation of the artwork in an authentic context. He has analysed and interpreted artworks*

*of self and others through the personal context to construct new knowledge, leading to experimentation and exploitation of media and symbolism. Matthew has evaluated and justified the application of visual language, influences, media approaches and communication with audiences to*

*reach conclusions and resolution. A well-crafted artist statement invites a dialogue between artist and audience by addressing the personal context and conceptual nature of the work.*

**QCAA Principal Education  
Officer**

## RESOLVED BODY OF WORK

Installation Image



### **Guardian (2020)**

**190 x 60 x 20 cm**

**Wearable Suit**

*7 variations of hand  
fossicked seed pods,  
birch twigs, dried plant  
matter, jacket, hessian  
sack, wire, zip ties,  
moss, polymesh, Duct  
Tape, Mud Face paint*

**2 X 29cm X 42cm print**

**and 1x 74cm X 46cm**

**print on matte**

**photographic paper on**

**120cm X 150cm Black**

**Masonite Board**

*The exemplary aspects of Matthew's assessments reflect an advanced level of experimentation, and exploration of alternative methodologies of art making practice. His work was highly insightful and informed by thoughtful investigation*

*into his key artists. Matthew's work evolved and developed from his own personal visual aesthetic, through application of high order skills and insightful academic practice.*

**Alison Rooney, teacher**

## RESOLVED BODY OF WORK

Installation Image

### **Guardian (2020)**

**190 x 60 x 20 cm Wearable Suit**

7 variations of hand fossicked seed pods, birch twigs, dried plant matter, jacket, hessian sack, wire, zip ties, moss, polymesh, Duct Tape, Mud Face paint

2 X 29cm X 42cm print and 1x 74cm X 46cm print on matte photographic paper on 120cm X 150cm Black Masonite Board



*Matthew has developed sophisticated and innovative approaches with materials, processes and techniques to communicate intended meaning through critical*

*reflection and non-literal symbolism. The engaging artworks and each of the carefully curated submission components demonstrate synthesis of concept, focus,*

*personal context and media to communicate the resolution of complex problems.*

**QCAA Principal Education Officer**

## RESOLVED BODY OF WORK

Installation Image

### **Guardian (2020)**

**190 x 60 x 20 cm Wearable Suit**

*7 variations of hand fossicked seed pods, birch twigs, dried plant matter, jacket, hessian sack, wire, zip ties, moss, polymesh, Duct Tape, Mud Face paint*

**2 X 29cm X 42cm print and 1x 74cm X 46cm print on matte photographic paper on 120cm X 150cm Black Masonite Board**



*The assessment reflects the school's culture of learning. As Matthew's response shows, students are highly motivated to engage in the Visual Arts with intense academic rigour within the studio setting. Matthew demonstrates*

*advanced experimentation, exploration, investigation and the development of a distinct contemporary visual aesthetic and academic practice.*

**Alison Rooney, teacher**

## ANNOTATED DETAILS OF THE RESOLVED ARTWORKS

### Developing

- Personal context – Seeing the lush and wonderful beauty of the Victorian High Country ravaged by fire was an emotional loss when all life was lost instantly.
- When new life came from the black pasture's regeneration was enacted by nature's natural life cycle prompting my use of dormant seed pods and organic plant matter.
- My focus is communicated through a suit that envelops my human form in dormant materials; thus, places the symbols of life and death side by side.



**Guardian (2020) (Details)**  
 190 x 60 x 20 cm  
**Wearable Suit**  
 7 variations of hand fossicked seed pods, birch twigs, dried plant matter, jacket, hessian sack, wire, zip ties, moss, polymesh, Duct Tape, Mud Face paint  
 2 X 29cm X 42cm print and 1x 74cm X 46cm print on matte photographic paper on 120cm X 150cm Black Masonite Board

### Researching

Research influencing my central focus:

- Ana Mendieta's 'Silueta Series' (1973-1980) investigates the extension and reduction of form and its spiritual and physical connections to nature.
- Nick Cave's 'Soundsuits' (1992-2012) works to insulate and shield the wearer from the outside world with a layer accumulated materials and meanings.
- Robert Klippel undertakes the manipulation and organisation of found objects to create authentic sculptures that resonates with the history and morality of the audience.

### Reflecting

- The textural and lineal repetition of the seed pods worked to enhance the verticality of Guardian.
- Standing very tall and with the majority of my body concealed; I was instilled with confidence, understanding and acceptance of the morality that lay around me.
- With my face revealed I could see the reactions from others but was protected by the suit from their pessimism and negativity; positive in the ideal that to attain enlightenment you need to die before you have the opportunity to live.



*The design of the initial IA1 task (Investigation – inquiry phase 1) aimed to keep the stimulus as broad as possible to ensure student responses were diverse. The provision*

*of two distinct stimulus activities one week apart granted a time framework for students to consider their experiences. The second stimulus was specifically designed to*

*generate an individual inquiry portal to ensure diversity in their focus in IA2 (Project – inquiry phase 2).*

**Alison Rooney, teacher**



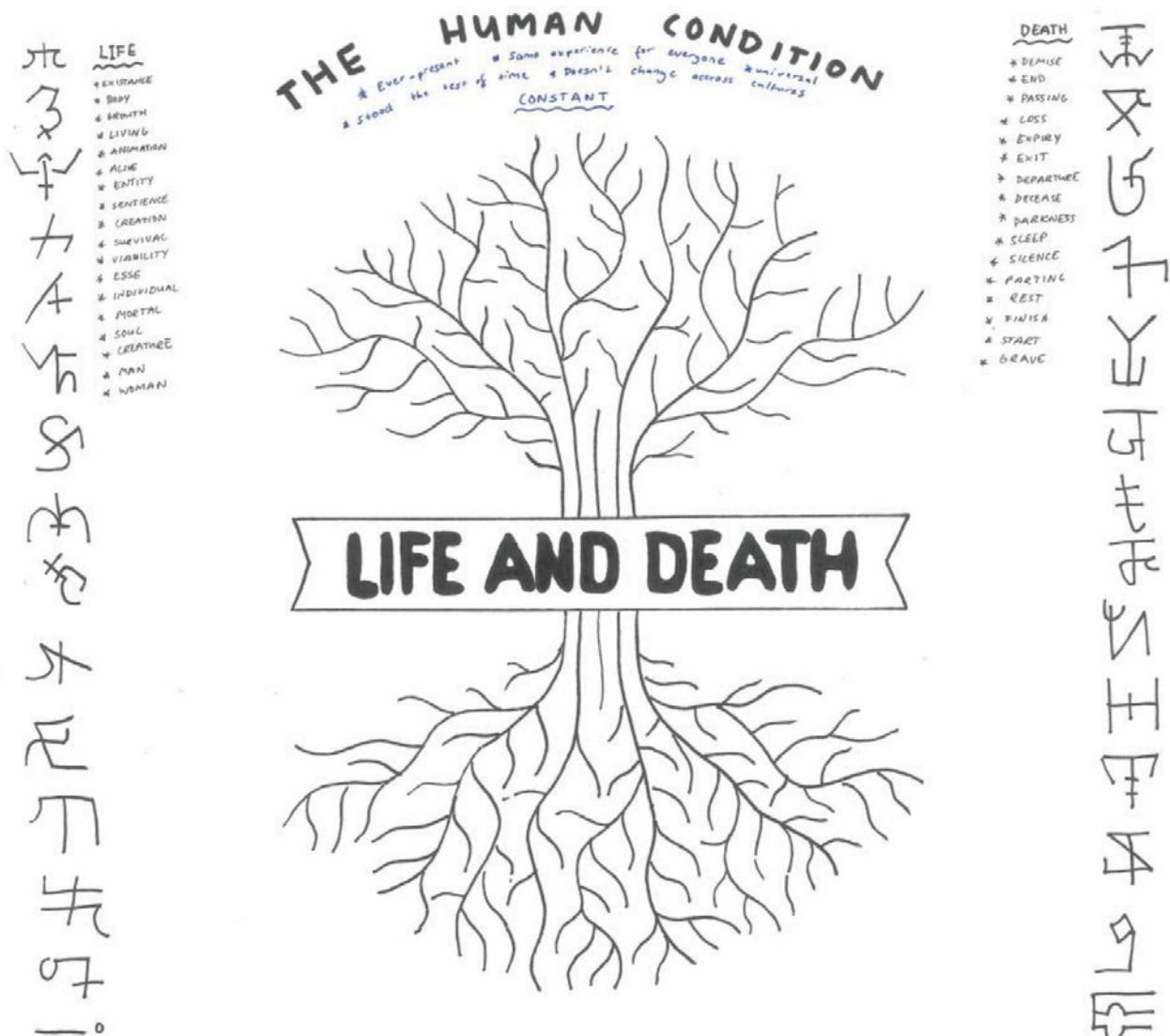
*When responding to an assessment task, a quality and original idea that reflects my response to the brief, and a detailed plan of delivery are most important to me.*

*I searched for quite a while for something that gave me inspiration. It was the devastation of the bushfires that allowed me to find inspiration in the creation of new life and hope. Coming up with the initial idea was then quite simple — what was difficult was interpreting it into a form that could be worn. The fragile nature of the seed pods made the suit difficult to assemble — but through testing and trying different techniques I managed to develop a process that gave me the result I thought worked and was proud of.*

**Matthew Schoutrop, student**



## Extracts from supporting evidence



- \* The focus of my body of work will be about the transition between life and death and the possibilities of life that comes from death. In challenging associations of the stark contrasts between life and death, my body of work will specifically explore a view that represents the movement between the two and that they might be closer together than they are perceived.
- \* This body of work will look to liberate and enclose the human form in a capsule of textural form that prepares the occupant for the life beyond death and the death after life.
- \* Throughout the construction process of this body of work, construction techniques from 3 mentor artists will be replicated and taken into account.
  - \* Ana Mandieta
    - her search for identity and solace in 'Silueta Series'
    - Spiritual and physical connection with nature
  - \* Nick Cave
    - interactive art
    - Soundsuits
    - 'Soundsuits' act as barrier against racial discrimination
  - \* Robert Klippel
    - Manipulation/organisation of found objects to create sculptures
- \* To investigate the concepts of life and death, the manipulation of position and placement will be investigated. The foetal position is something that is commonly associated with birth; and is practiced inside in the small, enclosed concave space of the Whomb. On the other hand, the horizontal lying position that is assumed in a coffin is associated with death, but considering, it is also practised in a small enclosed space.
- \* Concepts of the concealment of form and the extension of form will also be investigated.

IMAGES TAKEN AT TOOMA FARM (VICTORIAN HIGH COUNTRY) JUST BEFORE THE BUSHFIRES

• SHOOTING FROM (SMALL - NEED TO BE HIGHER)  
 • LOCATED IN TOOMA (VIC)



TOOMA SUNSET FROM ENVIRONMENT HIDE



ROADWAY TO ONLY ROAD



FLOWER FARM PHOTO ZONE (FRONT OF HOUSE)

STRAWBERRY STRAWBERRY STRAWBERRY

TOO HIGH PHOTO PHOTOS

MEANINGS I WANT TO EVOKE FROM BODY OF WORK

• In terms of content though with the body of work should be viewed, there were perspectives that possibly will be considered in the making process  
 • The first concept was derived from the way Ana Mendieta placed herself in her landscape photography, using her own body as the focus in the work. This technique I will explore, possibly making the photographs as an extension of myself. This way, the photographs will create a very personal link to my own form and physical space and personal content. Essentially, the work will be a visible and tangible expression of reflection into mortality.

Ana Mendieta, *Siluetas Series* 1973-1980

ANA MENDIETA - SILUETA SERIES

• Association and reduction of form  
 • Body + subject and spiritual connection between them  
 • Mendieta's bodies forms connect into each, shaped from sand, or located in clay beds  
 • One universal energy runs through everything from water to rain, from sun to earth, from spirits to plants, from plants to galaxies"

• The second series came with material into the work artist Bourgeois, as she considered state of mind through physical objects of old items of clothing that carry meaning and memory, also relating to strong psychological content. Subsequently, this work will have a heavy suggestion of past psychological states suggesting protection, warmth and abandonment. This process/technique will also be used to evoke ideas of memory in the audience.

Henry Moore, *Recurrent Figure* 1938

RECURRENT FIGURE 1938 (very good)

• Evolution in form from **solid** to **void**  
 • **solid** form into **void**

Louise Bourgeois, *Arched Figure* 1999

SUBVERSIVE BITCHING - 1999

• **subversive** - **bitching**  
 • **subversive** - **bitching**  
 • **subversive** - **bitching**  
 • **subversive** - **bitching**  
 • **subversive** - **bitching**



NO (BLUE) LIGHT (UP)



• **subversive** - **bitching**  
 • **subversive** - **bitching**  
 • **subversive** - **bitching**  
 • **subversive** - **bitching**  
 • **subversive** - **bitching**

• In terms of the work content (social-cultural context), death is mainly considered as a time of pain, mourning, loss and ultimately, an ending. But this body of work will challenge the audience and invite the audience to be able to move closely to the life bringing moment of death and what work is making the audience to view the work in a more positive way to create different interpretations towards it.

IMAGES TAKEN AT TOOMA FARM AFTER BUSHFIRES



REMAINS OF (ROAD WITH ALL THE GREAT TREES/PLANTS)



REMAINS OF (ROAD WITH ALL THE GREAT TREES/PLANTS)

• **subversive** - **bitching**  
 • **subversive** - **bitching**  
 • **subversive** - **bitching**  
 • **subversive** - **bitching**  
 • **subversive** - **bitching**

# NATURAL ELEMENTS

- Human imagination to nature can be investigated
- In addition to human-like elements (human emotions), textures of nature will be explored in the body of works representing imagery of natural found objects
- This artwork will be the surface to explore a simulated tree, branch, fern or hairy appearance, with high emphasis depicting the brown colour
- Elements blend into the natural environment that surrounds it - not suggesting/imitating the link to nature that human made forms to keep
- Movement & everything is linked back to nature

## TYPES OF 'FOUND' NATURAL ELEMENTS TO BE USED:

- **SEEDS**
  - Seed of one half/seed (Nuts)
  - Dots of seeds, get with seeds inside
  - Any other seeds
  - Different sizes/shape
- **STICKS / BARK**
  - Thin logs, use in actual design
  - Thick sticks / bark that has changed to ground
- **LEAVES**
  - Faint logs, central tree
  - Other tree types
- **DEAD MATERIAL FROM TROPICAL WARM**
  - Seed about bush
  - Seed / without branch
  - Leaves etc
  - No material from sharing stick
- **PLANT 'SERIES'**
  - Group of small tree / stems
  - Stems / twigs
  - Dry if uncertain

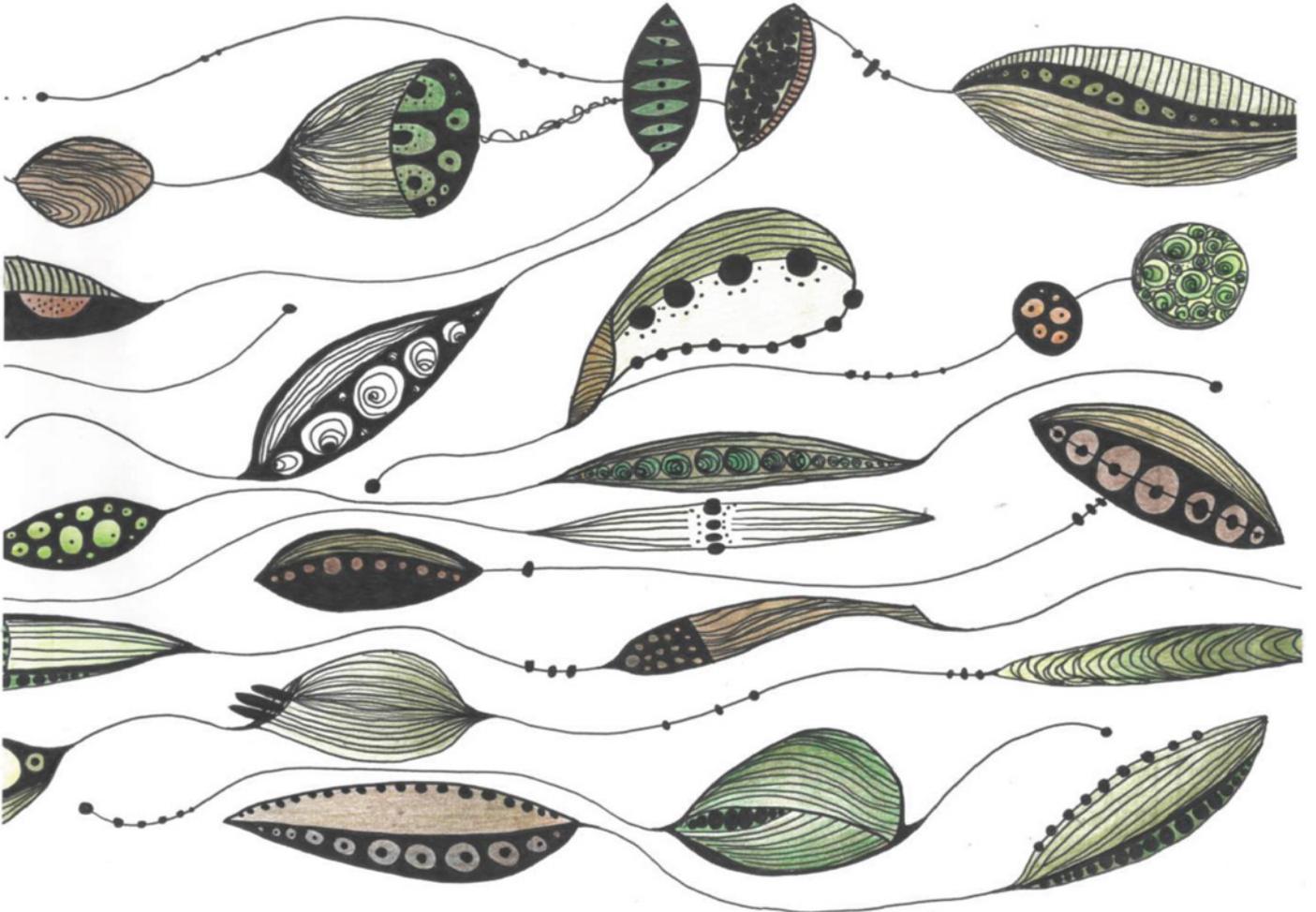


INSPIRATION FROM NATURE WITH ARTISTS

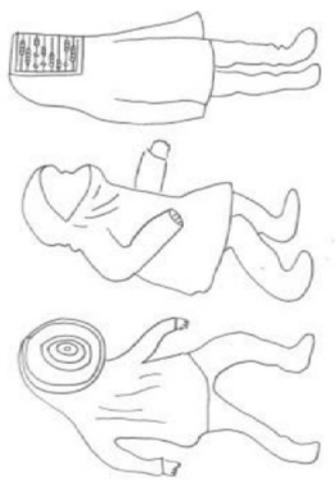


THE CONDUCTOR

- **THINKING, CREATING, FEELING, AND MOVING** BUT, **MOVING**
- **THE CONDUCTOR** IS A **MOVING** ARTIST

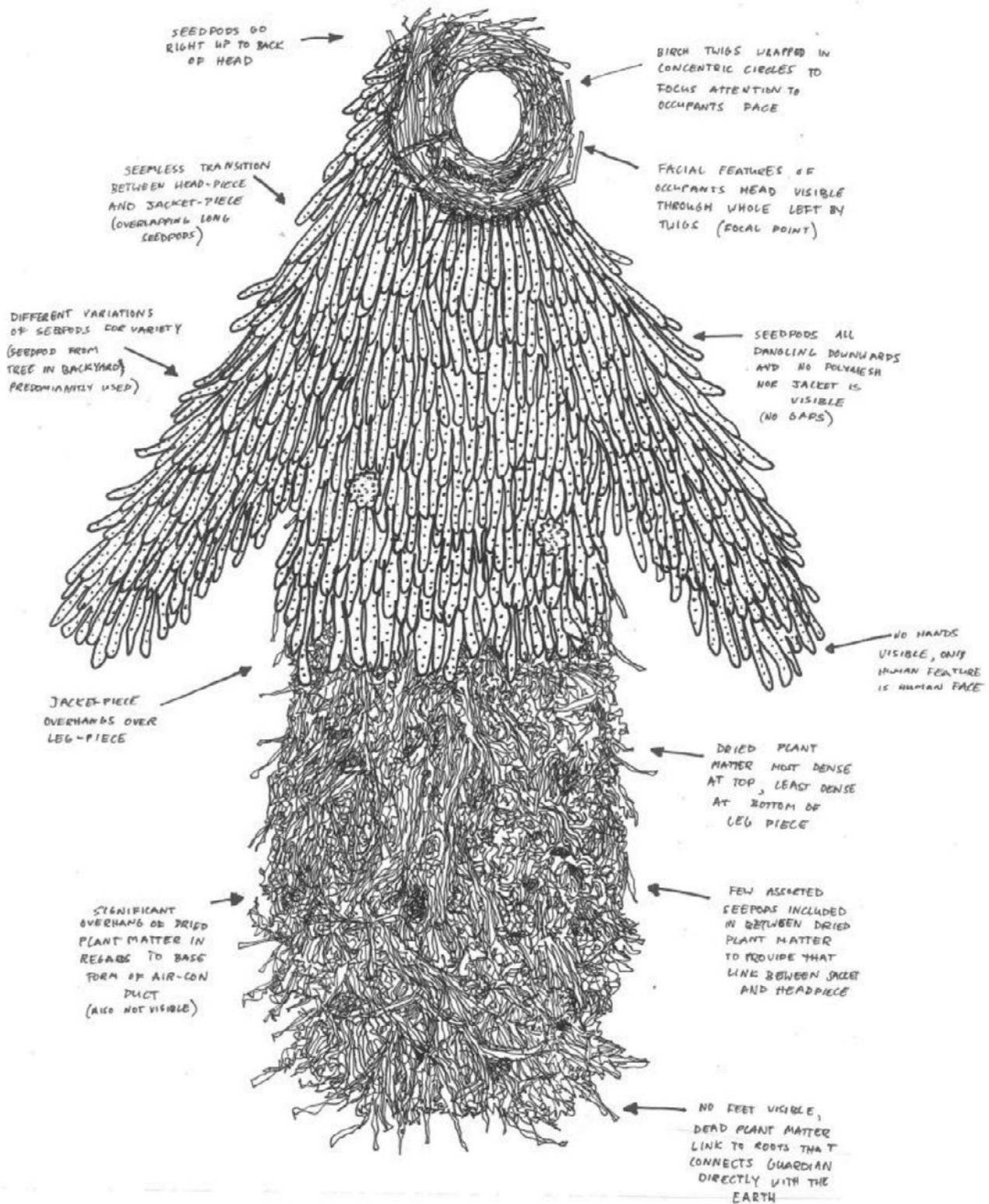


## CAVE - SQUID SHIRTS - INSPIRATION



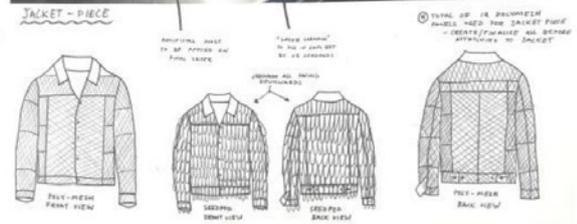
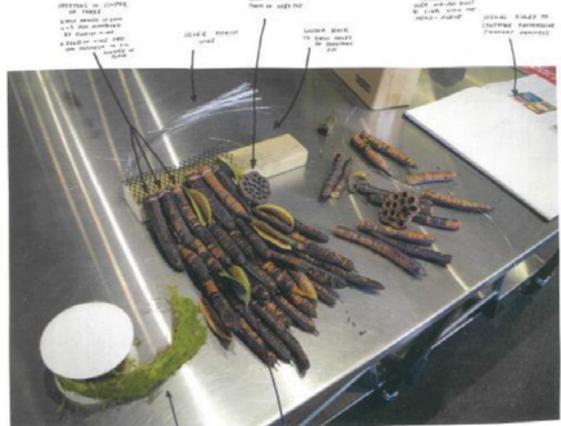
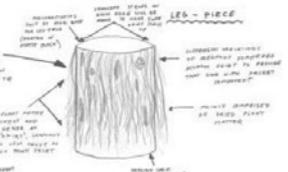
# FINAL DESIGN

\* SKETCH OF FINAL DESIGN FOR 'GUARDIAN'  
 \* USING FINE-LINER PENS

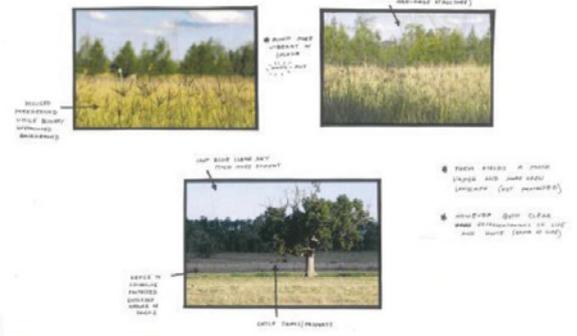


**EXPERIMENTAL PHASE - THE PANES**

- 1. 2 SET 20x15cm EXPERIMENTAL PANES
- 2. CONSTRUCTIVE DESIGN MATERIALS
- 3. COMPONENTS
  - 1) DIRT-PIECE
  - 2) LEAF/JACKET - PIECE
  - 3) LEAF/CONSIDERS - PIECE

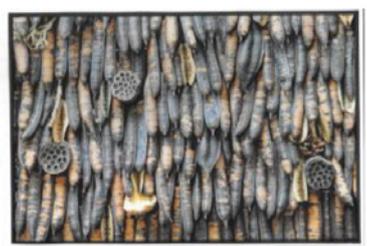


**LANDSCAPE EXPLORATION**



**CONSTRUCTION PROCESS**

- 1. PHOTOGRAPHIC COPY OF 'MONEY' COMPLETED BUNDLING SHEET WITH LAYERS TO BEAD FORWARDED SEED POPS (2 CONSIDER TYPED USE)
- 2. FINISH DURING TO ATTACHING TO DIRTY SURFACE
- 3. 1800 SEEDS WERE USED THIS FAC



- 1. (FROM DESIGN) OF PANE IMPLEMENTED FOR EACH FROM THE BASE OF THE DIRT AND LAYERS OF CONSIDERS (2) PANELS. (MAY SYNTHESISE) (MAYN) (MAYN)
- 2. CONSIDERS
- 3. CONSIDERS USE
- 4. CONSIDERS USE



- 1. (FROM DESIGN) OF PANE IMPLEMENTED FOR EACH FROM THE BASE OF THE DIRT AND LAYERS OF CONSIDERS (2) PANELS. (MAY SYNTHESISE) (MAYN) (MAYN)
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- 2. CONSIDERS
- 3. CONSIDERS USE
- 4. CONSIDERS USE





*The supporting evidence is a comprehensive demonstration of Matthew's journey throughout the inquiry. It shows the ways he has reacted and responded to new knowledge, investigations of material qualities and construction considerations and artist research, and his consideration of audience in the display and selection of imagery for the resolved collection of works.*

**QCAA Principal Education Officer**



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**Queensland Curriculum  
& Assessment Authority**

PO Box 307, Spring Hill QLD 4004 Australia  
Level 7, 154 Melbourne Street, South Brisbane  
T + 61 7 3864 0299

[www.qcaa.qld.edu.au](http://www.qcaa.qld.edu.au)