UTS

project: Developing the Evidence Base

Final Project Report

About this document: Report developed as part of the ...co-funded research project, to identify and build the evidence underpinning .... and extend its evidence-informed resource integration.

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Knight, S., (2022). project: Developing the Evidence Base – Final Project Report. University of Technology Sydney.

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Knight, S., (2022). projectname: Developing the Evidence Base – Final Project Report. University of Technology Sydney.

Simon Knight

2022-07-25

Contents

Chapter 1

Working with this document

This report was written as a wrapper site to compile a set of outputs, along with their rationale and the overarching narrative. It was written using a tool called *bookdown*, with the aim to make it easier to navigate the materials without getting lost (and to support export to other formats like PDF).

This dummy demonstates two key things:

1. The - very messy - rureporting package, primarily the function `include_doc` which will either iframe embed documents (pptx, docx, pdf - all converted to pdf); or merge docs into a single PDF; a function `include_frag` will take a docx and convert to markdown for inclusion in the html.
2. Show how the files were setup...it's quite messy, but without playing more with `LaTeX` it broadly let me do the things I wanted to in terms of combining documents in a smarter way than Word allowed

Feel free to adapt bits (please credit me if it's useful), obviously the colour scheme and branding are linked to my current institution and cannot be used.

Chapter 2

Introduction

2.1 About the research

The project proceeded as described in the project proposal below. This report provides a compilation of the outputs created through the research, and how these contribute to the intended outcomes.

The work was executed with the following scope and context, that the research would:

- key context 1
- key scope 2
- key scope 3 consider alignment of proposals with respect to the tool as it is, to ensure any recommendations were relatively agnostic with respect to the tool design (unless evidence based rationales existed)

The research aimed to develop resources that would:

1. ground the tool in evidence, with an aim to (a) maximise efficacy, and (b) provide materials and a model to communicate this evidence to stakeholders;
2. provide a path for ongoing research and evaluation; and
3. develop resources to be incorporated into the tool

This was set out in a (lightly updated) project plan, as in 2.2.

2.2 Project plan


UTS
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SYDNEY
project:
Research overview
January – July 2022
UTS CRICOS 00099F

Your requirements

Tool background

Funding context

The focus of this proposed research is to ….

These resources are ultimately intended to support and enhance wider benefits around:

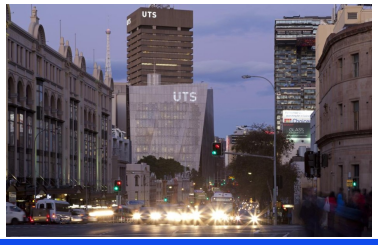
About us

Centre for Research on Education in a Digital Society

- Explores the dynamic relationship between technology and learning – across formal, informal, and professional education contexts throughout the lifespan
- Adopts sociocultural and human-centred approaches to understanding technology in practice to investigate learning technologies, the role of technology and data in learning and the changing learning needs of a digital society

Another unit

- …
- …



Research team

Dr Simon Knight
Research Lead

Simon is Director of the Centre for Research on Education in a Digital Society, and leads the Transformative Learning research theme in the UTS Transdisciplinary School.

He is a recognised researcher in learning and technology and a UTS award winning teacher. He holds a PhD in learning analytics, and education Masters from both Cambridge and UCL Institute of Education, where he also did his high-school teacher training

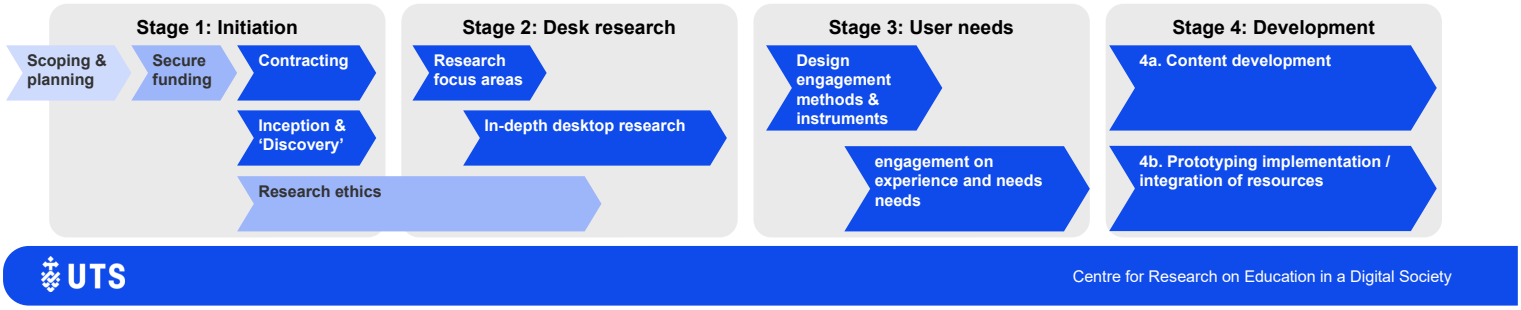
Project description

Overview

As a university committed to practical innovation and the development of impact-driven research that benefits the broader community, UTS is a key partner to industry in helping shape the world we live in. This is built on our culture of collaboration, creativity, use of agile and transdisciplinary approaches, and our industry and community connections to create real-world solutions to complex problems.

UTS has assembled a team of skilled researchers for this project, with expertise in participatory approaches, including for ….

We will take a participatory approach to the design and delivery of the research project, across four stages of work outlined below. This will involve desk research around scholarly and practitioner resources, identification of key needs and user expectations, the development of both practical wellbeing resources and initial prototyping for implementation of these resources into the tool.



Project description

Approach and key deliverables

Stage	Proposed approach	Key deliverables
1. Project initiation		
2. Desk research		
3. User needs		
4. Development		

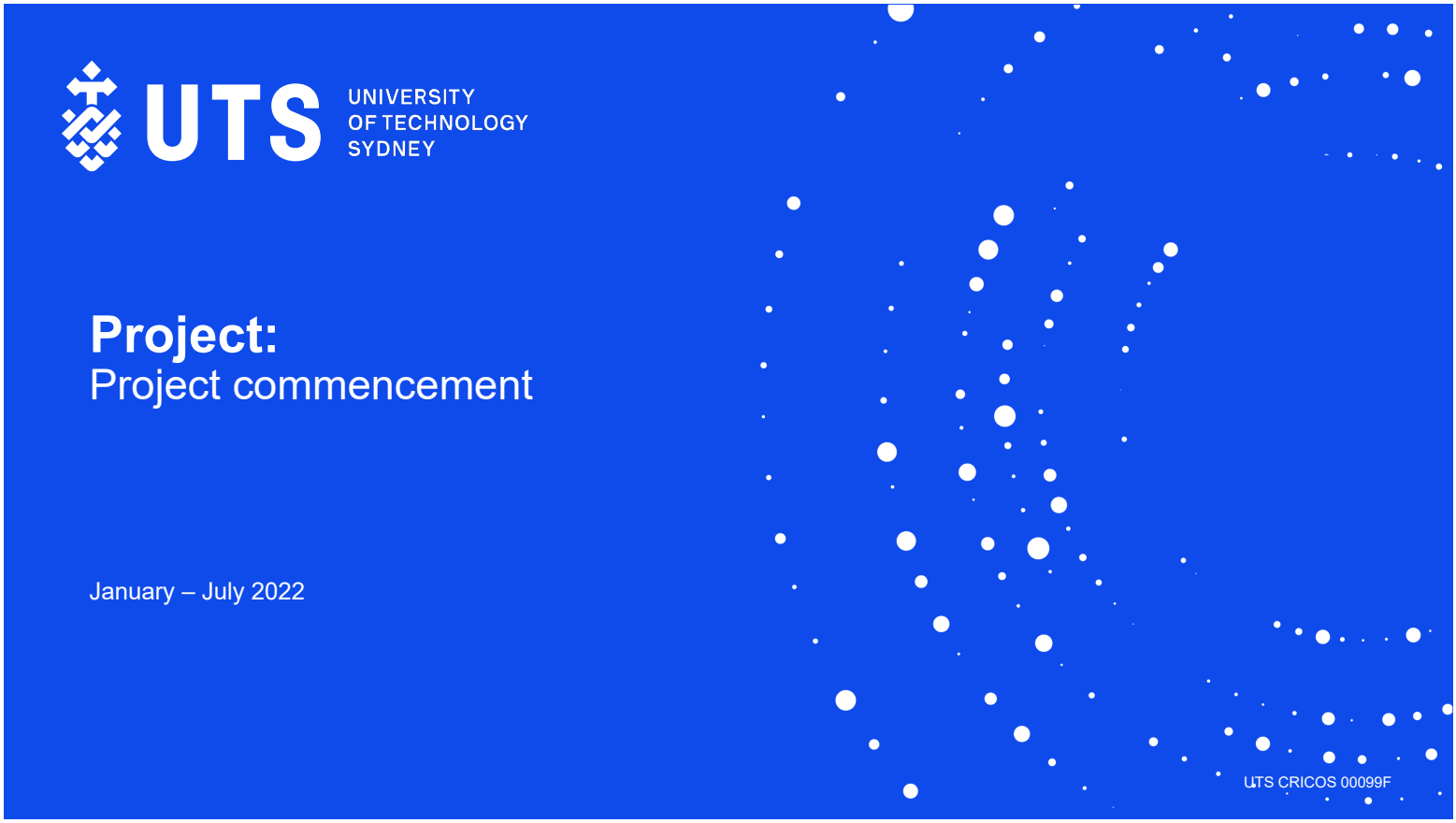
UTS

Project schedule

Timeline and key milestones

The project initiated on the basis of a …start and … end, with tolerance for.

Key milestones were:


UTS
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SYDNEY
Project:
Project commencement
January – July 2022
UTS CRICOS 00099F

Research approach & scope

"What we wish to research and develop is …."

Key inputs:

1. Proposal text + initial literature survey
2. Existing tool & resources
3. Co-design and iteration of our approach together

Considerations:

1. Current UX and articulating the evidence base
2. Evidence for most impactful new resources
3. Evidence & user input re: how to integrate those into evolving UX

Mapping approach

UTS

1. Developing a logic model through a feature:outcome matrix:

1. **Why?** Allows us to map Qs & evidence to claims you may make around impact & narrow scope
2. **How?** Review by team, and mapping to literature

2. Desk research to situate … in the evidence:

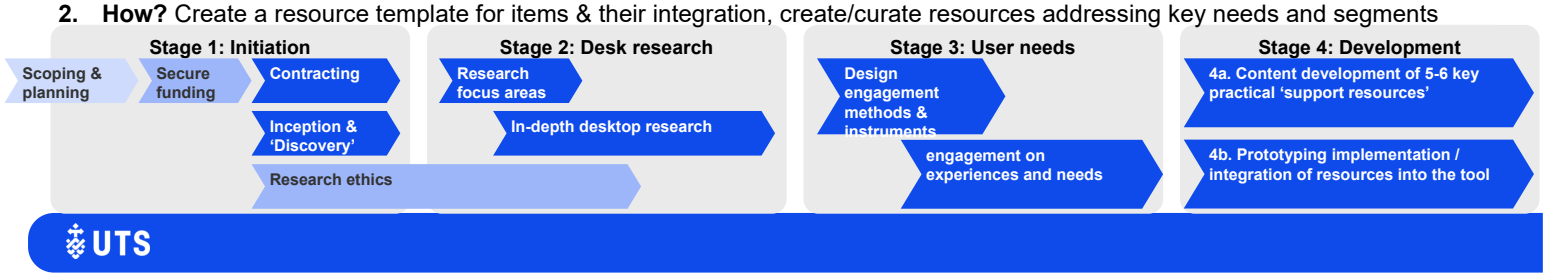
1. **Why?** Provide existing grounding of tool; Suggest new avenues & critical areas of focus
2. **How?** Use the model to guide literature survey & create scenarios identifying potential critical incidents & literature around these

3. User research to identify resource needs and integration:

1. **Why?** Understand what users currently draw on, triangulate with literature & test piloting (split phase)
2. **How?** Use scenarios with screenshots of tool journeys to identify existing resources to integrate, & identify where these are needed

4. Resource development grounded in evidence for your outcomes:

1. **Why?** Stages 1:3 identify needs & ground how to address these, phase 4 builds (in a way you can adapt in future)
2. **How?** Create a resource template for items & their integration, create/curate resources addressing key needs and segments



Chapter 3

Overview of Research Outcomes

3.1 Overview of project and outcomes

The research was conducted through a collaborative project between ….

UTS undertook:

- A mapping activity to identify the program logic and theory of change for the platform (see 4).
- Evidence synthesis, targeting the key drivers in the model, distiling this evidence into key recommendations, and stakeholder-oriented FAQ (see 5)
- Evidence synthesis and design mapping, drawing on existing resources and evidence to develop practical resources for the intervention…
- User research, using scenarios that helped focus the evidence synthesis and connect user experience to key issues in design and development (see 7)

3.1.1 Overview of resources produced

Practically, this work has produced:

- A theory of change via a feature:outcome matrix model, with key questions and drivers identified
- Evidence syntheses * 3
  - FAQ distillations * 3

- An overview of models…
- An overview of intervention models and theories of behaviour change, with implications for …
- A classroom slidedeck, and teacher resources to support stakeholder understanding of, and engagement with the tool
- An approach to mapping resources for use in the tool, and a preliminary mapping of these into an xslx
- A user study with key user insights and connections of this to the existing evidence base

Chapter 4

Mapping theory of change through a feature:output matrix

4.1 Brief background to theory of change

Theories of change can be used to make clear how learning technology innovations are designed to produce their desired outcomes in a given context (Century & Cassata, 2016; Cukurova et al., 2019; Weatherby et al., 2022).

However, identifying the key features in technologies that produce their impact can be hard. Therefore, working with a range of experts and end users, with the technology and resources created to support the innovation, can be a helpful way to identify and define these features, and express their relationship to outcomes (Century & Cassata, 2016).

It can also be challenging to align research evidence with innovations and existing practices, because priorities in evidence production and use may differ, and often we have to navigate incomplete or jigsawed evidence alongside new and emerging tools and practices (Ming & Goldenberg, 2021, p. 130). For example, while evidence is often referred to in terms of a hierarchy from anecdotal to causal (often randomised control trials), this may not reflect evidence *quality* for particular *purposes* (Cukurova et al., 2019; Weatherby et al., 2022).

Similar to logic models, in the field of 'persuasive technology' behaviour change support systems can be modelled using an 'outcome/change' design matrix. These matrices are intended to map desired changes (attitudes, existing behaviours, or compliance with new behaviours), to outcome spaces (formation, alternation, reinforcement) (Langrial et al., 2013; Tikka & Oinas-Kukkonen,

2019). This model can be used to map *features* that target particular behavioural or attitudinal changes, to *outcomes* that reflect the longer term changes in users. Moreover, they provide an additional approach to mapping evidence to connect features of interventions to desired outcomes.

Similarly, 'driver diagrams' have been used in implementation and improvement research in education, to express how the key drivers towards our goals are addressed by secondary-drivers, to develop measurement models that allow us to test interventions across contexts (Bryk et al., 2015).

Practically, many funders now *require* applicants to have an explicit theory of change model. For example, the Victorian government 'Mental Health Fund and Menu' supplier application requires a logic model. These can be used to:

1. Make explicit how tools/interventions are connected to existing evidence
2. Shape product development, by making clear how proposed product changes influence desired outcomes
3. Drive evaluation by clearly defining desired outcomes, the observable indicators and outputs we may measure to evaluate progress on these outcomes, and the features of the tool that may be producing outcomes (and could be systematically varied).

4.2 References in this section

Bryk, A. S., Gomez, L. M., Grunow, A., & LeMahieu, P. G. (2015). *Learning to improve: How America's schools can get better at getting better*. Harvard Education Press.

Century, J., & Cassata, A. (2016). Implementation Research: Finding Common Ground on What, How, Why, Where, and Who. *Review of Research in Education*, *40*(1), 169–215. https://doi.org/10.3102/0091732X16665332

Cukurova, M., Luckin, R., & Clark-Wilson, A. (2019). Creating the golden triangle of evidence-informed education technology with EDUCATE. *British Journal of Educational Technology*, *50*(2), 490–504. https://doi.org/10.1111/bjet.12727

Langrial, S., Stibe, A., & Oinas-Kukkonen, H. (2013). Practical Examples of Mobile and Social Apps using the Outcome/Change Design Matrix. *PERSUASIVE (Adjunct Proceedings)*, 7–13.

Ming, N. C., & Goldenberg, L. B. (2021). Research Worth Using: (Re)Framing Research Evidence Quality for Educational Policymaking and Practice. *Review of Research in Education*, *45*(1), 129–169. https://doi.org/10.3102/0091732X21990620

Tikka, P., & Oinas-Kukkonen, H. (2019). Tailoring persuasive technology: A systematic review of literature of self-schema theory and transformative learning theory in persuasive technology context. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, *13*(3), Article 3. https://doi.org/10.5817/CP2019-3-6

Weatherby, K., Clark-Wilson, A., Cukurova, M., & Luckin, R. (2022). The Importance of Boundary Objects in Industry-Academia Collaborations to Support Evidencing the Efficacy of Educational Technology. *TechTrends*, 1–14.

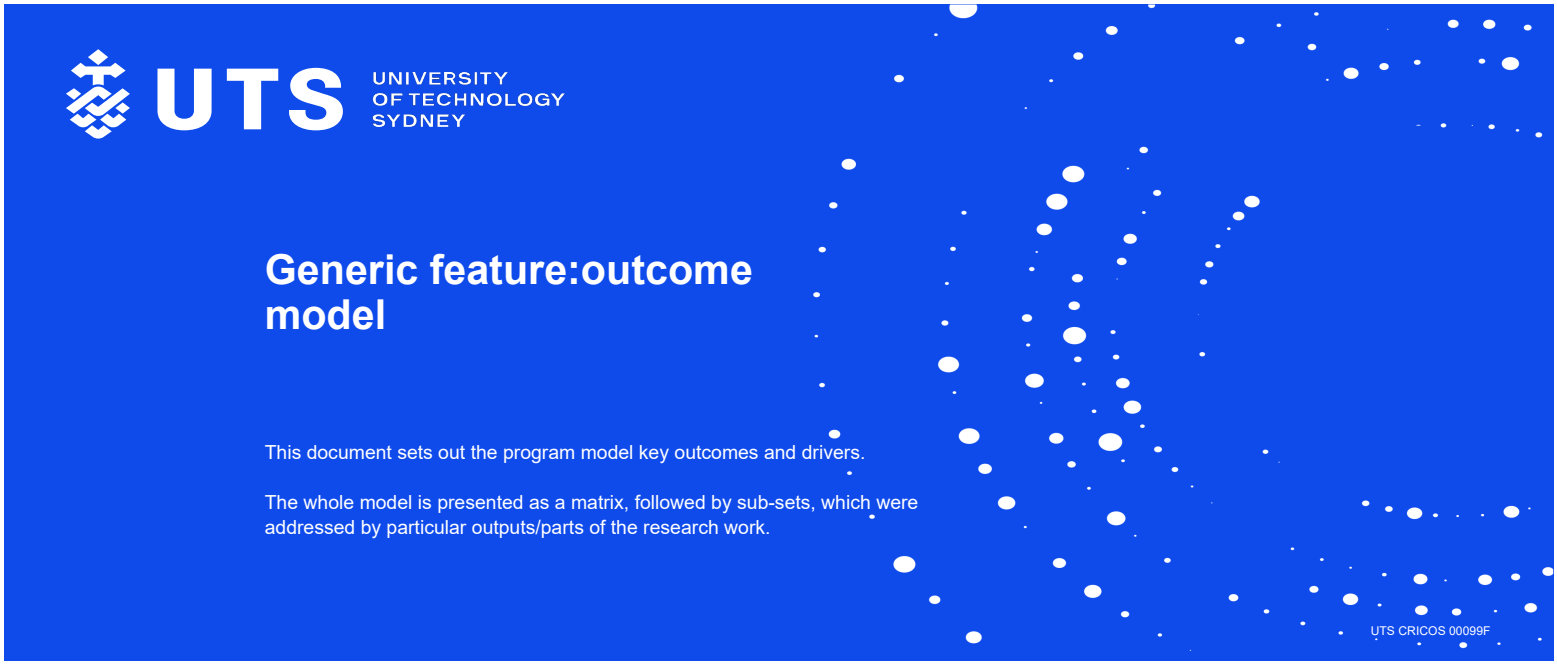
4.3 The model

UTS and x have co-developed a model that represents x's program logic, and allows mapping to evidence and evaluation against this logic. The model is based on:

1. Our discussions and x's existing stated model (grounded in practice and experience)
2. Consultation with subject matter expertise
3. Our knowledge and initial scan of the literature and relevant policy and practices resources

This representation of the model shows how x's key features relate to its key outcomes and drivers. It was used to create key questions, targeted in the evidence synthesis and user testing, as shown in 4.3.1. The aim of this model was to focus on the key grounding evidence, and where that evidence might have implications for change and evaluation models

4.3.1 The model


UTS
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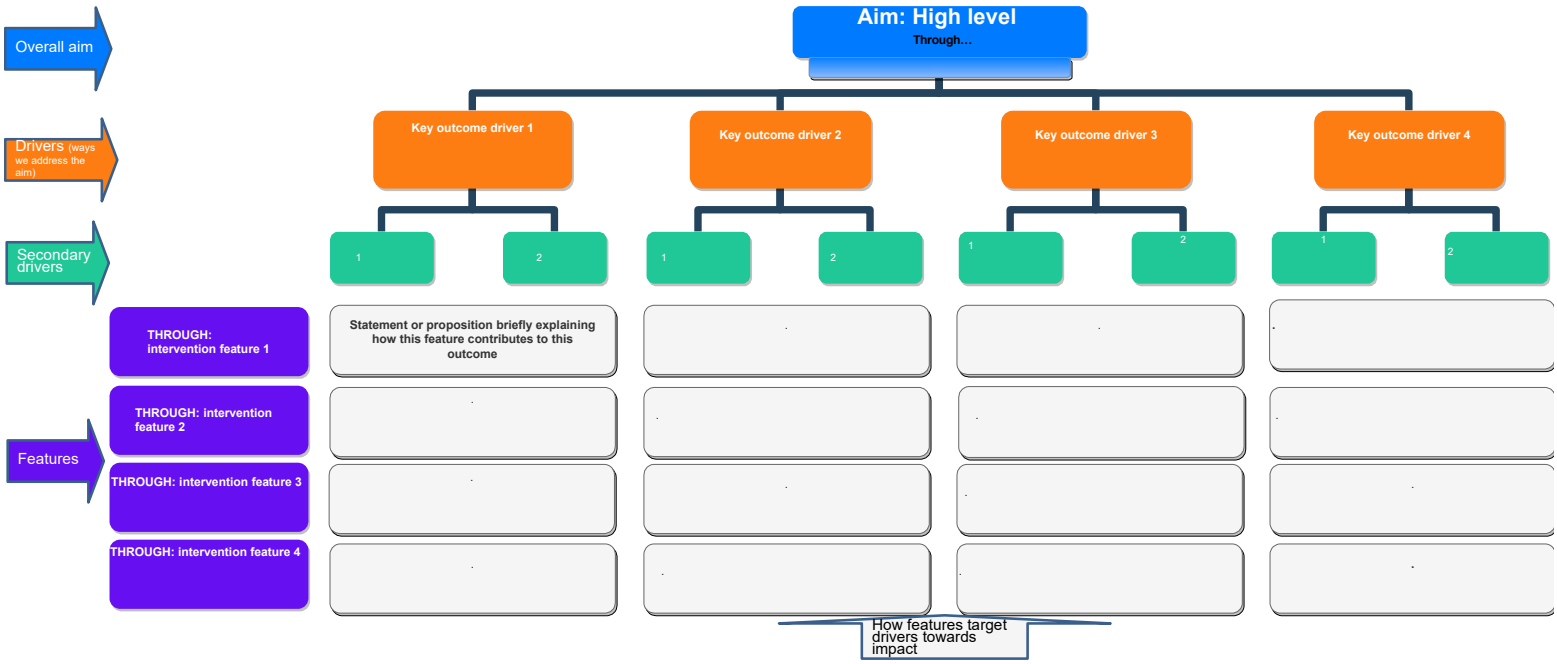
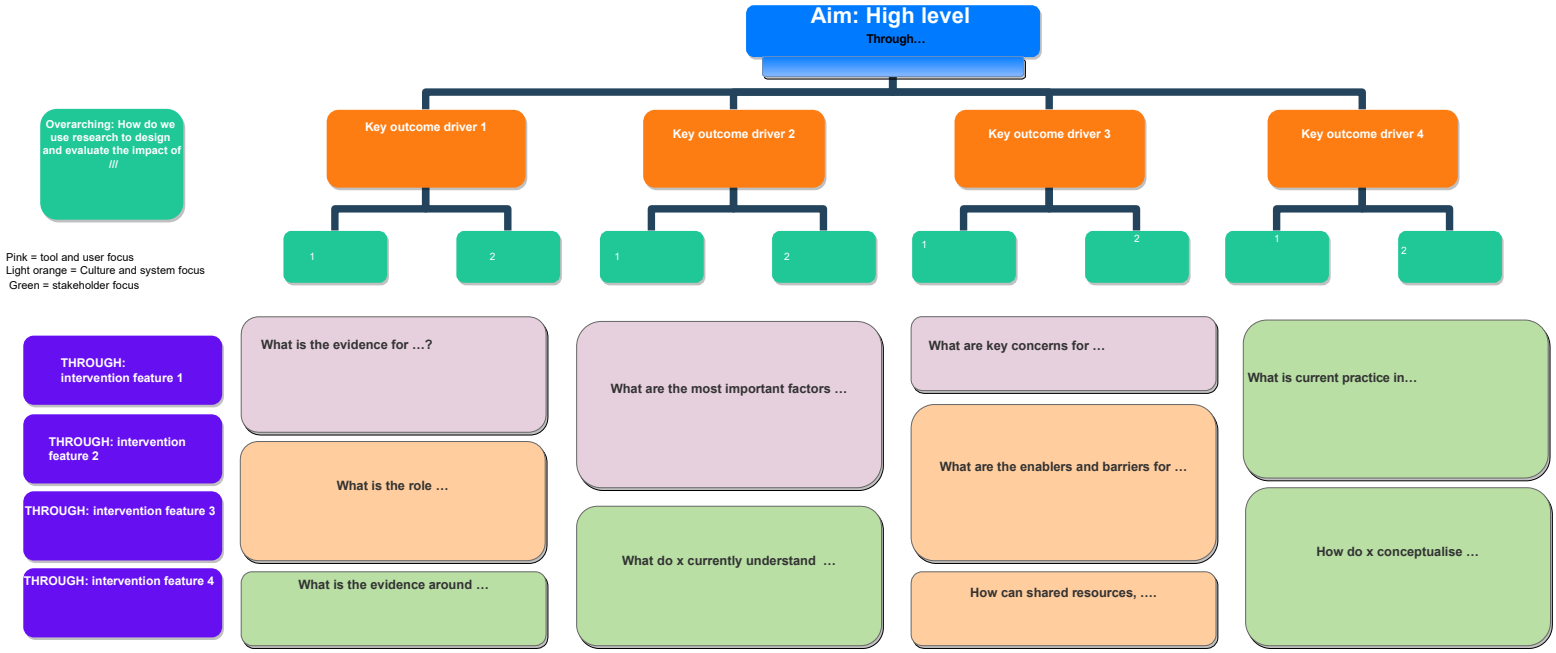
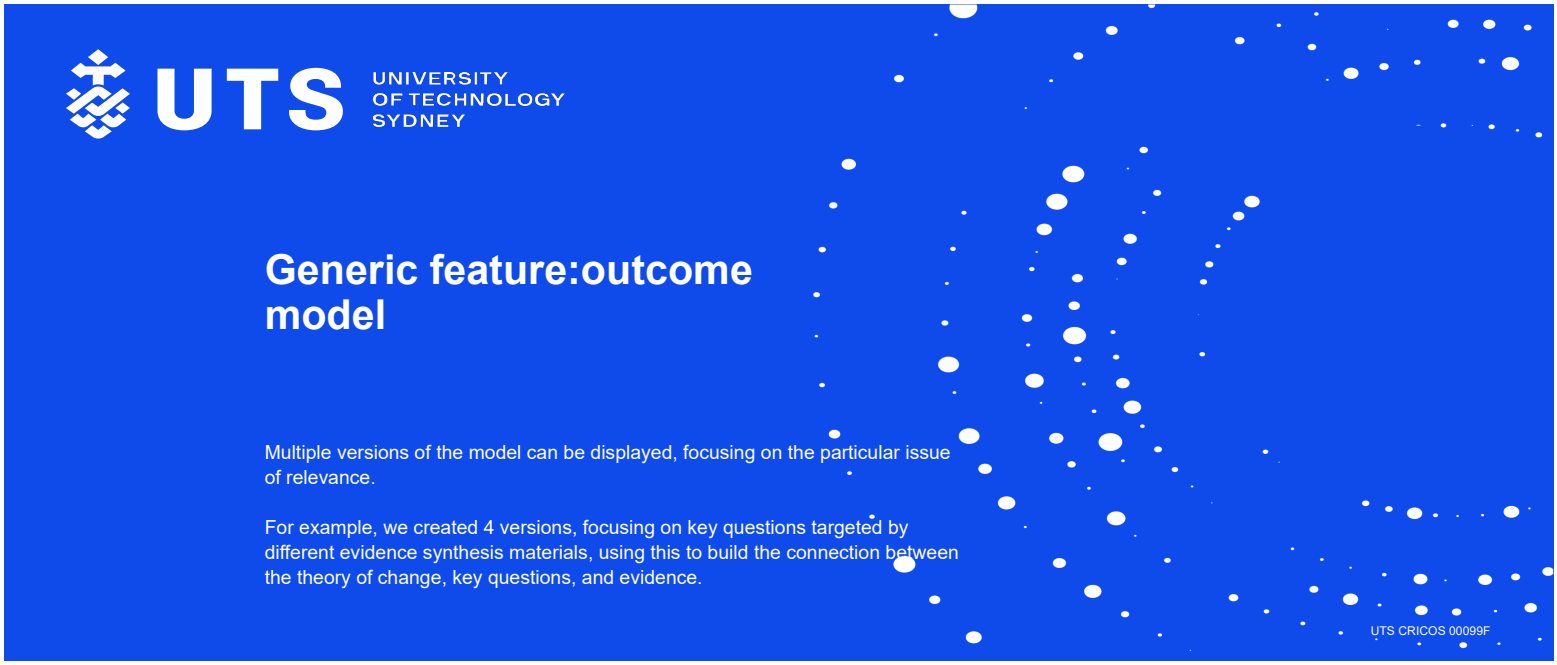
Generic feature:outcome model
This document sets out the program model key outcomes and drivers.
The whole model is presented as a matrix, followed by sub-sets, which were addressed by particular outputs/parts of the research work.
UTS CRICOS 00099F


Overall aim
Drivers (ways we address the aim)
Secondary drivers
Features
Aim: High level
Through...
Key outcome driver 1
Key outcome driver 2
Key outcome driver 3
Key outcome driver 4
1
2
1
2
1
2
1
2
THROUGH: intervention feature 1
THROUGH: intervention feature 2
THROUGH: intervention feature 3
THROUGH: intervention feature 4
Statement or proposition briefly explaining how this feature contributes to this outcome
How features target drivers towards impact


Aim: High level
Through…
Overarching: How do we use research to design and evaluate the impact of ///
Key outcome driver 1
Key outcome driver 2
Key outcome driver 3
Key outcome driver 4
1
2
1
2
1
2
1
2
Pink = tool and user focus
Light orange = Culture and system focus
Green = stakeholder focus
THROUGH: intervention feature 1
THROUGH: intervention feature 2
THROUGH: intervention feature 3
THROUGH: intervention feature 4
What is the evidence for …?
What is the role …
What is the evidence around …
What are the most important factors …
What do x currently understand …
What are key concerns for …
What are the enablers and barriers for …
How can shared resources, ….
What is current practice in…
How do x conceptualise …


UTS
UNIVERSITY
OF TECHNOLOGY
SYDNEY
Generic feature:outcome model
Multiple versions of the model can be displayed, focusing on the particular issue of relevance.
For example, we created 4 versions, focusing on key questions targeted by different evidence synthesis materials, using this to build the connection between the theory of change, key questions, and evidence.
UTS CRICOS 00099F

4.3.2 Adaptability to program logic models

This model is intended to be adaptable to a traditional logic model, as in the example (removed here)

Chapter 5

Evidence synthesis: Situating + directions for evaluation and development

We have developed a synthesis of evidence, based on the program logic matrix 4 and questions. These syntheses should:

- Represent the evidence base x draws on and give language to that
- Be shareable providing stakeholders with an understanding of the research background
- Support development of x by pointing to gaps (in the tool, or existing evidence) and methods for evaluation

In each of the syntheses, the sections and purposes should:

- Provide a key summary
- Highlight implications

- Point to lessons for future work
- Link to practical use cases (including those expressed in the developed scenarios).

These resources comprise:

1. Three evidence syntheses .
2. Three Frequently Asked Questions (FAQ) summaries, with questions and answers directly linked back to the longer and fully referenced evidence syntheses.

5.1 First question space

Introduction

Prepared by:
Prepared for:

Purpose: This document provides a synthesis of existing evidence. This synthesis is designed with an intent to:

1. be useful to you, because it represents the evidence base the intervention is grounded in and helps give a language to that;
2. be something you can share to demonstrate the evidence base to external stakeholders;
3. guide future development and evaluation within the tool and its use

Using this resource: To do that, these documents are designed to:

1. provide a summary of the key evidence;
2. highlight key implications in tool design and implementation;
3. point towards lessons for future evaluation work.

Desktop Research – Overview

The following sample of desktop research approach aims to provide an indicative document for discussion, feedback and dialogue to inform the further research. It focuses on one of the key questions identified through the mapping of key drivers and outlined below and presented previously. A list of the key questions and themes for the desktop research are also outlined below.

MODEL questions inserted here

Figure 1: primary and secondary drivers research mapping

Desktop Research/Literature Review
Topic: How do …[key question from feature:outcome model]?

Key questions: *key subquestions*

Background assumptions and context
There are some key provisos in this review:

- The majority of evidence-based studies (particularly Random Controlled Trial – RCT's) focus on intervening in or improving mental health for students rather than focusing on building general resilience and wellbeing.
- Many of the findings referenced below are from research with technology x not y…
- Many studies are primarily run with cohort x not y
- Relatedly, many studies focus on interventions with characteristic x not y

Subsection 1 addressing a question?

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Subsection 2 addressing a question?

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What are the UX/design implications for ….?

The literature has a number of potential implications. *However* it is important to remember that any recommendations from literature are based on the specific aims and theories of change being evaluated and investigated in that literature. The intervention adopts a different model to much of this literature, and therefore the recommendations are not directly transferable.

Design Implication	status	Comment
*	⏳	Less suitable in your context.
	✓	Core function,
	⏳	Unclear status
	⊘	Priority area
	⊘	Priority area
	⊘	(will be part of above responses)
	⏳	Explicitly in the model.
	✓	Largely present, may need some framing
	⊘	
	⏳	See below

DRAW ON KEY LITERATURE WITH DESIGN IMPLICATIONS, E.G.:
**Mental Health Smartphone Apps: Review and Evidence-Based Recommendations for Future Development,* (Bakker et al., 2016), specifically targeted at MHapp development;
+ Noting also the provisos, and limitations in systematic evidence syntheses thus far noted above, and in Punukollu and Marques (2019), who specifically reviewed evidence around apps for young people.

What are potential implications of these findings?

This table is intended to provide an overview summary of the evidence synthesis, mapping the key takeaways to the driving questions.

Explanatory note.

= strength of evidence, with 3* indicating very strong evidence (e.g. from systematic reviews, meta-analyses, and multiple robust randomised control trials); 2* indicating multiple experimental or quasi experimental designs; and 1 * other studies such as observational or correlational work.

is used to indicate a positive effect found, or supportive evidence.

is used to indicate a negative effect found, or non-supportive evidence.

is used to indicate the evidence is unclear or/and underexplored or/and cannot be addressed using quantitative research.

This approach is informed by van der Bles et al.'s discussion (2019)

Driver	Evidence	Comment
Are x a valid measure?		
Do x support behaviour change?		
Do x support belief change?		
Do x contribute to positive measure y?		Positive small effects, stronger for outcome x than y, with provisos in evidence as below
Does tool x support stakeholders y in practice?		
What are the key concerns and preferences for young people in using y?		

Area of exploration and future evaluation:

Issue	Implication
There is a gap in the research in the area of …	consider establishing an ongoing research evaluation, investigating…. This should include use of validated instruments regarding …
Stakeholders may not feel prepared to implement…	The priority UX area around… provides a useful step forward here, these resources must consider how x will interact with them.
A key recommendation in the literature is evaluation of any tool against its intended outcomes	

a.

Bibliography

Bakker, D., Kazantzis, N., Rickwood, D., & Rickard, N. (2016). Mental Health Smartphone Apps: Review and Evidence-Based Recommendations for Future Developments. *JMIR Mental Health*, *3*(1), e4984. https://doi.org/10.2196/mental.4984

Punukollu, M., & Marques, M. (2019). Use of mobile apps and technologies in child and adolescent mental health: A systematic review. *Evidence-Based Mental Health*, *22*(4), 161–166. https://doi.org/10.1136/ebmental-2019-300093

van der Bles, A. M., van der Linden, S., Freeman, A. L. J., Mitchell, J., Galvao, A. B., Zaval, L., & Spiegelhalter, D. J. (2019). Communicating uncertainty about facts, numbers and science. *Royal Society Open Science*, *6*(5), 181870. https://doi.org/10.1098/rsos.181870

5.1.1 Checkins FAQ

Introduction

Prepared by:
Prepared for:
On:

Purpose: This document translates the literature evidence synthesis on checkins into a 'Frequently Asked Question' aligned with the matrix model. This FAQ is designed to:

1. Provide a 'snapshot' of the research evidence, useful in conversation and materials with stakeholders;
2. Mirror the extended literature review, so the detail is *always* available to those who want it, and you can provide assurance that the claims made are warranted by the evidence;
3. Align with the matrix model, which shows how the features of the tool target particular outcomes;

Topic: [Topic 1]

Key questions: *[key questions in topic]*

Background assumptions and context
[repeated from synthesis]

Key question 1?
One line distillation 1.

Key question 2?
One line distillation 2.

...

Chapter 6

An evidence informed tool: Identifying factors

6.1 Background

This section addresses the following questions in the model, through evidence synthesis, resource creation and mapping, and resources for stakeholders. Specifically, we analyse, evaluation of existing models of x and behavioural change, existing resources, and design research regarding …

1. .
2. .
3. .

6.2 Factors in the space

6.2.1 Background

Work was undertaken to align with evidence-based models of x, to identify the key *factors* that constitute x, and their relationship to y.

6.2.2 Document 1

Based on this initial mapping..

A document setting out models in the space.

6.3 intervention designs

Document setting out models for intervention in the space.

6.3.1 Resource mapping

Documents mapping a range of existing external resources to the model in 6.3.1.

Search

Dummy PDF

Inclusion criteria:

- here
- and here

6.4 Stakeholder resources

Based on the research, two key stakeholder-oriented resources were created:

1. A powerpoint resource, intended to introduce factors …
2. A guide which provides an overview of the background to x and its use in classes…

These can be augmented with the resource mapping…

Chapter 7

User research

7.1 Background

A scenario based approach was used to focus the research, and engage with stakeholders via interviews. These scenarios help us to focus in on key issues that arise (1) out of the existing evidence base, and (2) in practice. The scenarios are intended to:

1. help map out how x 'works' to achieve its impact,
2. to explore this with teachers, to understand how they would use the tool, what existing resources they make use of that could be incorporated into the tool, and where there are gaps in the tool
3. in a second round of interviews, to revisit the scenarios once support resources are piloted, to evaluate their potential

In addition to scenarios, the teacher interviews made use of other open questions, and a brief survey.

A feature of the design approach adopted is that the emergence of the literature, and its mapping to a change model for the tool/implementation should be considered in the design and execution of subsequent phases (which may also indicate need to review further literature, or/and revise the model). As such, the exact nature of the scenarios selected for semi-structured interview was iterated, and shaped to address the particular foci of the emerging work. This process was informed by both the existing tool and its user journey(s), and literature including work using or describing scenarios, and research using other methods such as survey instruments to probe particular drivers of change.

7.1.1 Research ethics in Australia

- Ethics required for any research involving human participation, this is done at a university level
- The process sets out what we'll do and why, who will participate, and how we'll recruit them
- The UTS research team sought and gained HREC approval

7.2 Approach

Participants were invited to…

The interviews were recorded via video conferencing software, and transcribed in part, with prior permission of the participants.

Scenarios were developed to capture the user experience, particularly with reference to the key issues and questions identified in the model. This allowed us to clearly link the implicit theory in the matrix, the evidence synthesis, any open questions, and the user experience and needs together, to triangulate and identify key areas of focus.

Phase 1 Interviews

Semi-structured interviews via video conferencing software…

Phase 2 Interviews

These semi-structured interviews again took place via video conferencing software …

7.3 Removed here

Both sets of scenarios removed.

A round 1 and round 2 report were developed, with a powerpoint (not included here).

Chapter 8

Proposed Directions

A set of recommendations are presented below, drawing on the evidence synthesised, analysis of other tools and platforms available, expert input and practitioner input.

These recommendations are intended to situate x's connection to the evidence base at present, possible gaps/misalignment with this evidence, and opportunities to align and contribute to the evidence base.

8.1 Assumptions

The literature has a number of potential implications for x development. However it is important to remember that any recommendations from literature are based on the specific aims and theories of change being evaluated and investigated in that literature. x adopts a different model to much of this literature, and therefore the recommendations are not directly transferable.

We have tried to provide these recommendations in a fairly agnostic form, so they are not contingent on specific implementation (and prioritisation), which is largely the remit of x

8.2 Recommendations

1.

8.3 Key resources (collated from elsewhere, for reference here)

8.3.1 doc 1

Headline issues from the range of docs (not covered in the evidence synthesis summaries).

8.3.2 Key issues from evidence synthesis

You'll see below that these recommendations (key issues largely highlighted in red) are reflected across the teacher work and wider analysis of the evidence.

This document compiles the:

- UX/Design implications
- Evidence strength implications
- And areas for future work

For each of the evidence syntheses.

Evidence synthesis 1: [title]

What are the UX/design implications for [intervention]?

Design Implication	status	Comment
	⌛	Less suitable in x
	✓	Core function
	⌛	Unclear status
	⊘	Priority area
	⊘	Priority area

What are potential implications of these findings?

This table is intended to provide an overview summary of the evidence synthesis, mapping the key takeaways to the driving questions.

Explanatory note.

🔍 = strength of evidence, with 3*🔍 indicating very strong evidence (e.g. from systematic reviews, meta-analyses, and multiple robust randomised control trials); 2* indicating multiple experimental or quasi experimental designs; and 1 * other studies such as observational or correlational work.

🔍⊕ is used to indicate a positive effect found, or supportive evidence.

🔍⊖ is used to indicate a negative effect found, or non-supportive evidence.

⌛ is used to indicate the evidence is unclear or/and underexplored or/and cannot be addressed using quantitative research.

This approach is informed by van der Bles et al.'s discussion (2019)

Driver	Evidence	Comment
	🔍⊕🔍⊕🔍⊖	

Area of exploration and future evaluation:

Issue	Implication

Chapter 9

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