THE UNIVERSITY OF
MELBOURNE

POSTERA CRESCAM LAUDE

Making it Meaningful:
Redefining Critical Thinking in Healthcare
Education through Mobile Mixed Reality

Melbourne Centre for the Study of Higher Learning (CHSE) Seminar
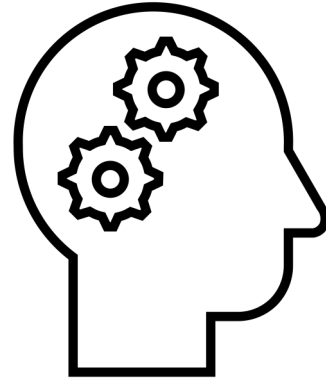**April 2023**

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PhD Candidate

Supervisors: A/ Prof Charles Sevigny
A/ Prof Thomas Cochrane
Chair   A/Prof Karena Waller
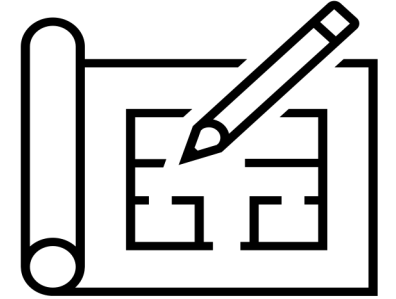
Relevance/ Importance of Study

Shortage of Clinical Practitioners/ Pressure on Educational Institutions

Under-development of **Critical Thinking Skills**

Demand for **Flexibility** of Learning

Design Principles for Healthcare Education

Concise Statement

*"How can **mobile mixed reality** (mMR) facilitate **critical thinking skills** (CTS) in **healthcare education**?"*

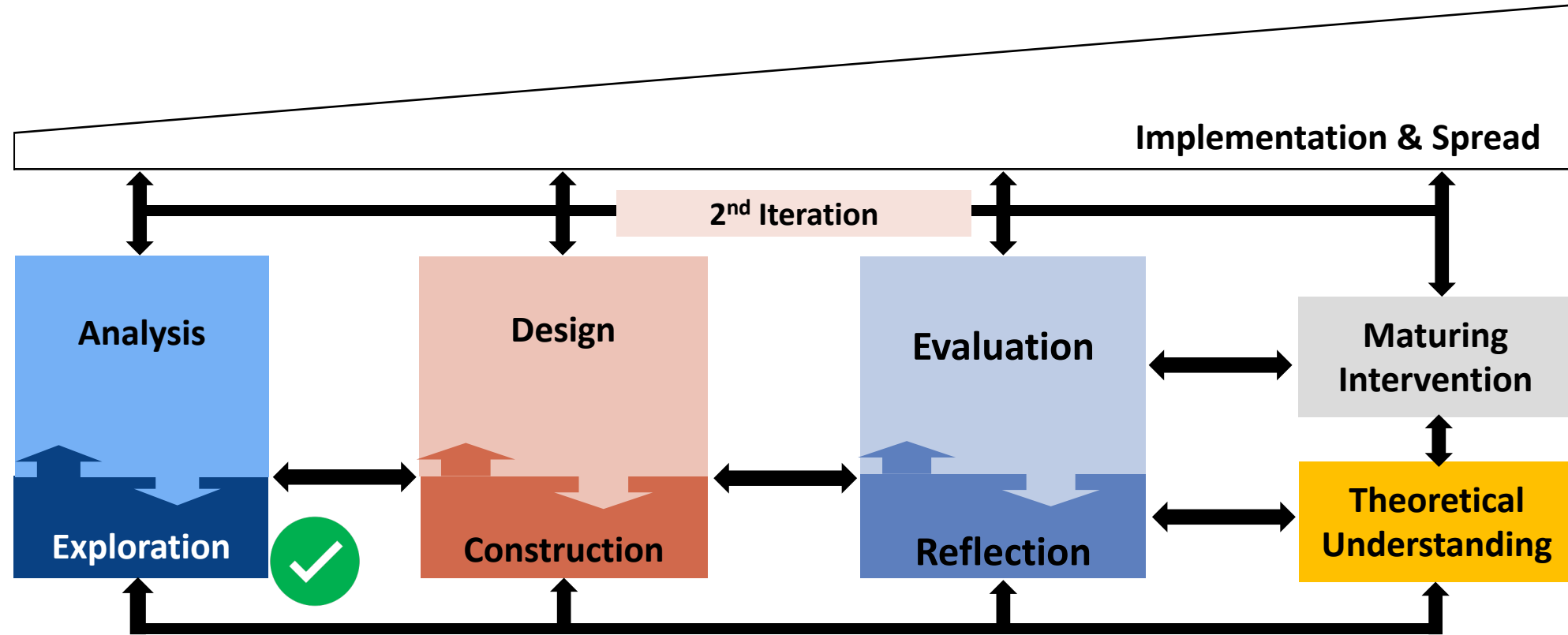| mobile	mixed reality	critical thinking skills	healthcare	education
Smartphone, Tablet, Head Mounted Displays (HMD)/ Headset, Wearables	Presentation of the virtual and real world together	Making judgement, evaluation, analysis, evaluation, inference and explanation	Medicine, Dentistry, Health Sciences	Tertiary education (UG, PG)

Pedagogical Affordances, Perceptions, Design Principles of Mobile Mixed Reality, and Critical Thinking Skills

Educational Design Research (EDR)

Implementation & Spread

2nd Iteration

| Analysis | Design | Evaluation | Maturing Intervention |

Exploration | Construction | Reflection | Theoretical Understanding

Designing *while* implementing (Amiel & Reeves, 2008; Koivisto et al., 2018)

Iterative (Ethics)

Susan **McKenney** & Thomas **Reeves** (2012, 2019)

Analysis Phase…

Literature Review
- mMR, critical thinking, theoretical framework [in healthcare education]
- Systematic Review- PRISMA, Covidence, PROSPERO (CRD42021286931)

Analysis

Exploration Phase

Focus Group
- Staff, students, healthcare industry representative, mMR developers

- **Critical Thinking**
  - Ill Defined
  - "Freedom of Failure"
  - Timing/ Scaffolding
- **Making it Meaningful**
  - What "gaps" does it full"
  - [Inter] Connectedness
  - Personality/ Passion
  - Co-design/ Community of Practice
  - Opportunity to Interact
  - Include [and Measure] Sensory

- **Mobile Mixed Reality**
  - Digital Equity
  - Scalability

Exploration

Purposeful Critical Thinking: What

"Freedom of Failure"

#1005 (Learning Software Developer) *"But you know, in the clinical sciences, **having the freedom of, of, of failure really enhances, you know, that sort of that critical thinking**. But, you know, think of how we can actually, sort of, maybe reduce that down to something that we could put forward to our undergraduates is basically, **is allowing them to fail design and design something that they're going to lose. Kobayashi Maru.***

Making it Meaningful: How

[Inter]"Connectedness"

#1002 (Lecturer) *"I think a valuable learning experience is one in which the students are interested in. So I think if there's some reason that they care about learning this thing, they're much more likely to actually learn it."*

#1008 (Student) *"I think hands learning, is one of the best way to keep things engaging, actually being able to touch and feel what you're learning very easy to do in physiology, a lot harder in something like chemistry [laughter]. To explain background, but that sort of thing, something that [inter]connects with what you've already learned, as well. So you can see where it fits in the broader sense "*

#1009 (Student) *"But the one thing I always remembered was someone, the particular professor explained that, something like a zero order kinetics was like, that's what happens when you have to go pee after you have a certain amount of drinks. Because that's when you get that amount. That's the only thing I've ever remembered in that class."*

Making it Meaningful: How

Include [and Measure] Sensory

Move Around (Virtual Environment)

Visual

Haptic (Feedback)

Sound

Biometrics (HR, Stress)

Touch

Mobile Mixed Reality: How

Digital Equity

#1005 (Learning Software Developer) *"But I, so you know, everyone's got an AR device in their pocket. My phone has more power than probably three of our Quests combined. Mind you, it is, you know, the latest and greatest, but it's not hard, and we have plenty of iPads that we can sort of hand around. And that's basically an AR powered device."*

#1007 (Lecturer) "I guess the accessibility to the technology, in many ways... ...is a challenge. Even if you do have a headset, you **still need an internet connection, wireless, you know, all these sorts of things**."

Mobile Mixed Reality: How

Scalability

#1005 (Lecturer) *"You do have those small group tutorials where you're expected to come in and you know, come in every week with the same people in, you know, 20 to 30 and do that but you know, obviously with the **class sizes** that we have in SBS that's near on impossible without, you know, completely blowing out budgets, and taking up half the university's rooms at once."*

#1006 (Lecturer) *"I find interesting is that there's **a call to go back to the basics**, in a way. There's nothing wrong. We can do incredible stuff, we have the resources, but we forget the basics. And many of those things work very well. **I mean, why do you need to reinvent the wheel**, maybe this experience is working as well as this. And maybe you should focus on that. Then you can, in the future, things improve, that it's less expensive, whatever."*

#1003 (Immersive Media Coordinator) *"There's a lot of **360 imagery and video stuff, where you can kind of just go somewhere, put a camera down**."*

Storyboard Template Example: Hamstring Sprain

Mechanism of Injury	Signs & Symptoms/ Assessment	[Preliminary] Diagnosis	Treatment, Progression	Return to Sport Function, Participation

2

Outline a common "story" of how this injury occurs

3

Subjective
"Hurts when straighten my knee"

Objective
Limping when walking; pain "twinges" on activity
Bending knee against resistance causes pain;
Strength 4/5 in knee flexion

1

Primary Diagnosis
Grade 2 Hamstring Strain

7

THREE Key Exercises (steps, video)

Screening
Safety Considerations
FITT Principles
Overload
Progression
Monitoring

6

Appropriate Timing (SMART)

4- 8 weeks

Evaluation
"What SPECIFICALLY could you MEASURE that is APPRORIATE and REALISTIC at this TIME to ensure effective RTS?"

Key Resources

5

Distractor Signs

*G1: Tightness, though walking without pain; full strength
G3: large "lump" in hamstring, walk with pain*
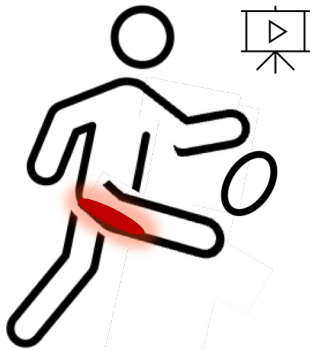
4

Distractors
(what it is NOT- Differential Dx)

Grade 1 (G1) strain

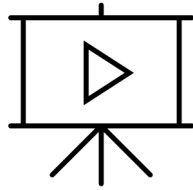*Grade 3 (G3) strain*

9

Distractor Treatment/ Solution
(what will be INEFFECTIVE)

8

Inappropriate Timing (SMART)

G1: < 4 weeks

G3: 3 months

Mechanism of Injury | Signs & Symptoms/ Assessment | [Preliminary] Diagnosis | Treatment, Progression | Return to Sport Function, Participation

"Dylan, a Div 2 club level AFL player has sustained a hamstring strain in pre-season training"

Grade 1 Hamstring Strain ❌

Grade 2 Hamstring Strain ✅

Grade 3 Hamstring Strain ❌

Exercise 1

Exercise 2

Exercise 3

<4 weeks ❌

4- 8 weeks ✅

3 months ❌

Concussion Example (Seekbeak)

Thank you

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