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Gamification and experiential learning in the pedagogy of Research Methods:

Introducing the Research Methods Roadmap Game.

Introduction

Research Methods Roadmap ⊙ is a new board game designed to aid the teaching of research methodology.

The game presents a roadmap where students navigate their research journey through the use of small cars to follow an experimental journey on various game boards, which essentially represents a decision tree. Students explore the following stages (*key locations* on the roadmap):

• Choosing a topic

• Research philosophy, including ontology and epistemology

• Research approach

• Research design

• Data collection

• Sampling

• Data analysis

• Reliability and validity

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At each *key location*, the student parks their car and talks through their research, i.e., their research philosophy, ontology until they have stopped at all the locations. At various points when a student gets stuck, there are supporting cards to pick up, which stimulates and challenges student thinking. The game adds value to under graduates, postgraduates as well as advanced postgraduates and depending on the level of study, only one or more of the roadmaps can be utilised.

The game consists of three adjoining research roadmaps and each map can be used to support a particular lecture. Image 1 below, demonstrates research methods students using the board game to learn and apply their knowledge of research methods.

Image 1: Research methods roadmap being used in class by students.

Map 1: Research philosophy roadmap. This map takes students on a journey of subjectivism or objectivism. Students choose their own journey and depending on the road they pursue, their stops will take them to the appropriate ontology, epistemology,

and data collection techniques until they reach the end of the freeway, which is the objective of the game.

Map 2: Qualitative research roadmap. If students have chosen a journey of qualitative research, this map will facilitate stops at the key stages (locations) such as their research approach, sampling, data collection, analysis, reliability and validity, specific to qualitative research.

Map 3: Quantitative research roadmap. On the same principle as the qualitative map, the quantitative map, has key stops associated with quantitative research i.e., writing hypothesis, dependent and independent variables.

All the maps are supported with unique playing cards that challenges and stimulates creative thinking.

The *target discipline* is research methods / philosophy students from level 5 (undergraduate) to level 8 (advance postgraduate) for qualitative and quantitative research. Students use the game to help them make sense of the different approaches that applies to research methodology. The game is presented as various roadmaps which makes it easy for students to visualise the bigger picture of this convoluted topic. The visual maps allow for comprehension and understanding of how each decision impacts on the next stage of the journey i.e., if your ontology is subjectivism, your epistemology could lead to interpretivism.

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When a student stops at a key location, they talk through how their research aligns or are informed at the respective stop on the map, i.e., my ontology is… Students thus talk through their research approach and design at each key location on the game board.

The game consists of three roadmaps which can be utilised by research methods lecturers to support their individual module content for research methods. The maps connect as lectures progress and builds on previous sessions. Each map has supporting playing cards to drive 'participant' interaction. Students are also provided with a supporting template with the same *key locations* as the respective roadmaps, such as; research approach, ontology, methods, reliability and validity. Whilst participating in the game, students populate and take notes on the template, to help them remember their own thoughts and ideas as they progress through the game. Image 2 demonstrates how the three respective roadmaps connect.

Image 2: Overview of the three research methods roadmaps.

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Benefits to student learning and progression

The objective of the game is to enhance dialogue amongst students, facilitated by lecturers to assess player's knowledge of research methods and to provide additional education and support to enhance learning.

Research methods and philosophy apply to all degrees globally and is one of the hardest topics for students to understand. It underpins most dissertations and is typically delivered as a stand-alone credit bearing module, which also has a typically 20% weighting in a dissertation or thesis.

I have also found that many dissertation supervisors found research methods challenging to explain to students, so had the desire to ease the journey and understanding for both lecturers as well as students. After all, the students' learning will only extend as far as the lecturer's own limitations of their understanding of research methodology. In addition, it makes a challenging topic, more engaging to teach and to learn.

I wanted to support and encourage learning through a fun, creative method to allow for an inclusive approach, recognising the VARK model that suggest that the four main types of styles to learn are: visual, auditory, reading/writing, and kinesthetics (Fleming, 2001). This different style of teaching is aimed to be inclusive for students with learning difficulties and neurodiversity. Research has unmistakeably indicated that students adopt unique learning and studying approaches which has been posited as a prominent pedagogical issue (Hawk and Shah, 2007).

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These roadmaps are thus designed to recognise that students learn best when teaching methods and learning activities match their learning styles, strengths, and preferences and when there is coherence between the teaching strategies, assessment and the intended learning outcomes (McMahon and Thakore, 2006).

By using the learner's own words combined with the skill of gentle probing, suitable props and intuitive gaming, this roadmap game aims to demonstrate how these teaching aids can help support disadvantaged and underrepresented groups. The game thus promotes student individuality and allows for the student to demonstrate their understanding of the topic area (Race, 1998). In addition, the learning resource is underpinned by Chase and Simon's (1973) chunking theory which offers a natural framework for memorising content though organising the material, thus enhancing students' memory of research methods. Gobet et al. (2004) argue that there is surprisingly little empirical evidence on the educational benefits of games. My research methods roadmap has a direct relationship to learning, supporting the specific application of transferable skills (Race, 1998) which presents new evidence contrary to Gobet et al.'s (2004) findings. A study by Hamari, Koivisto and Sarsa (2014) further supports my findings that the motivational elements of the gaming experience creates user experience (psychological benefits such as fun) and performance outcomes (behavioural benefits such as participation).

The research methods roadmap allows lecturers to provide formative feedback which is aimed to be supportive and to drive improvement, yet also analytical and critical which explicitly links to the learning outcomes of the research methods proposal (Chen, 2005). This notation is supported by Gobet et al. (2004) who posit that board-

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game education is subject to good teaching and coaching techniques to foster the development of high performance.

Concepts of gamification

The research roadmap represents playful educational design through toys, combined with rules which complies within the broad definition of gamification which is usually identified by clear rules and structures of playing (Keusch, 2020). My research methods roadmap game is further supported by the Elemental Tetrad gamification framework (Schell, 2008) which incorporates a natural sequence of events and interactions in addition to aesthetics and mechanics.

To conform to the requirements of a game; three essential components are necessary according to Adamou (2019) which I have applied to my research methods roadmap in table 1 below:

Game building blocks Adamou (2019)	Application to Research Methods Roadmap
Game ingredients: goals, autonomy opportunities, rules, feedback	The **goal** is to reach the end of the roadmap through being able to talk through all key locations on the roadmap, which includes the students research methods approach and design ingredients. **Autonomy** is created as each student has their own unique research topic and therefore follow the roadmap journey as an individual. The **rules** of the game are simple; you can only choose one 'road' to underpin your philosophy and if you are stuck

	at a location, you need to 'pick up one or more cards' and address the instructions from the card.
	Students have the benefit of **feedback** from their peers as well as the facilitating lecturer to grow and develop their understanding and knowledge throughout.
Game components: collaboration, aesthetic, bonus features	**Collaboration** is created in the game through 'dialogue' and sharing problems. Some students help others by taking notes whilst the student is immersed in the game. This is characterized by intense concentration and a lack of self-awareness as explained by Csikszentmihalyi (2008) description of the concept of flow. **Aesthetics** is presented by the beautifully designed roadmaps. Currently, there are no **bonus elements** featured, but this is something that can be considered for future inclusion.
Game elements: avatars, timers and audio	**Avatars** are represented by each player choosing their own 'vehicle' to complete the research roadmap journey. The use of a **timers** is not currently encouraged as this would detract from the purpose of the game, which is to help students find solutions to their research design challenges and adding pressure through timers would be counterproductive. **Audio** is represented through students talking through their research journey and sharing their ideas and concepts with peers.

Table1: Adaption of Adamou's (2019) game building blocks

The infrastructure

This section provides a visual overview of each of the research roadmaps with their unique, respective supported playing cards:

Image 3: Overview of the 3 collective Research Methods Roadmaps.
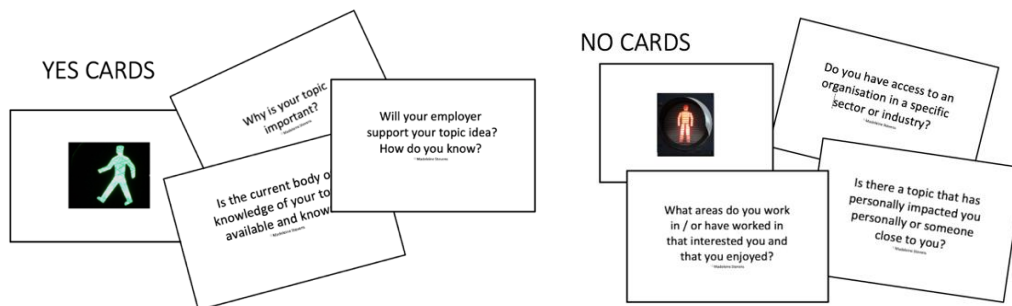
Research Philosophy Roadmap:

Image 4: Research Philosophy Roadmap with examples of 'yes' or 'no' topics for

dissertation cards.

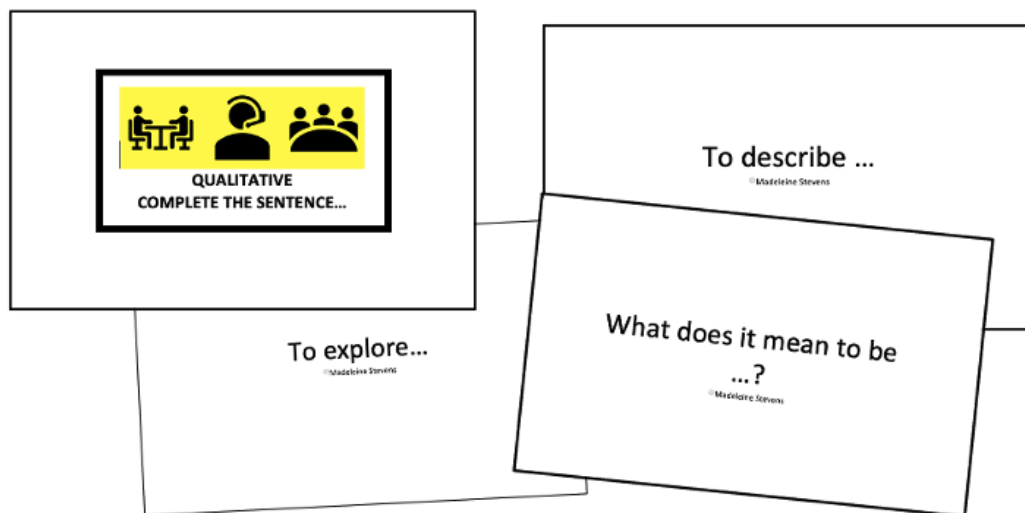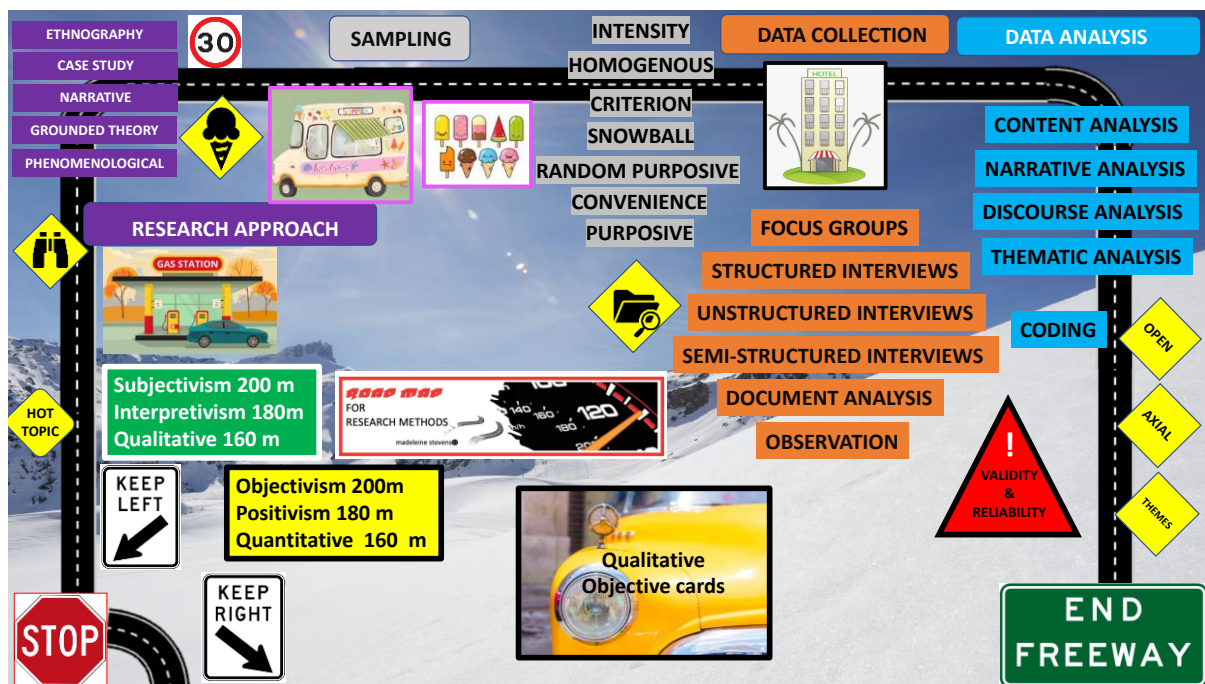**Qualitative Research Roadmap:**

Image 5: Qualitative Research Roadmap with examples of 'qualitative objective setting cards'.

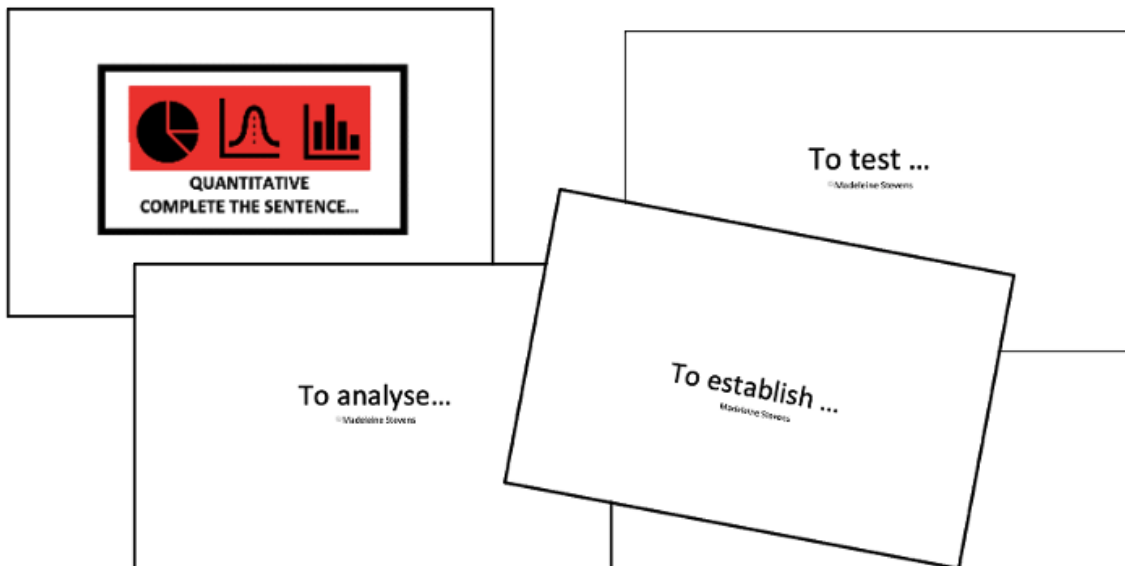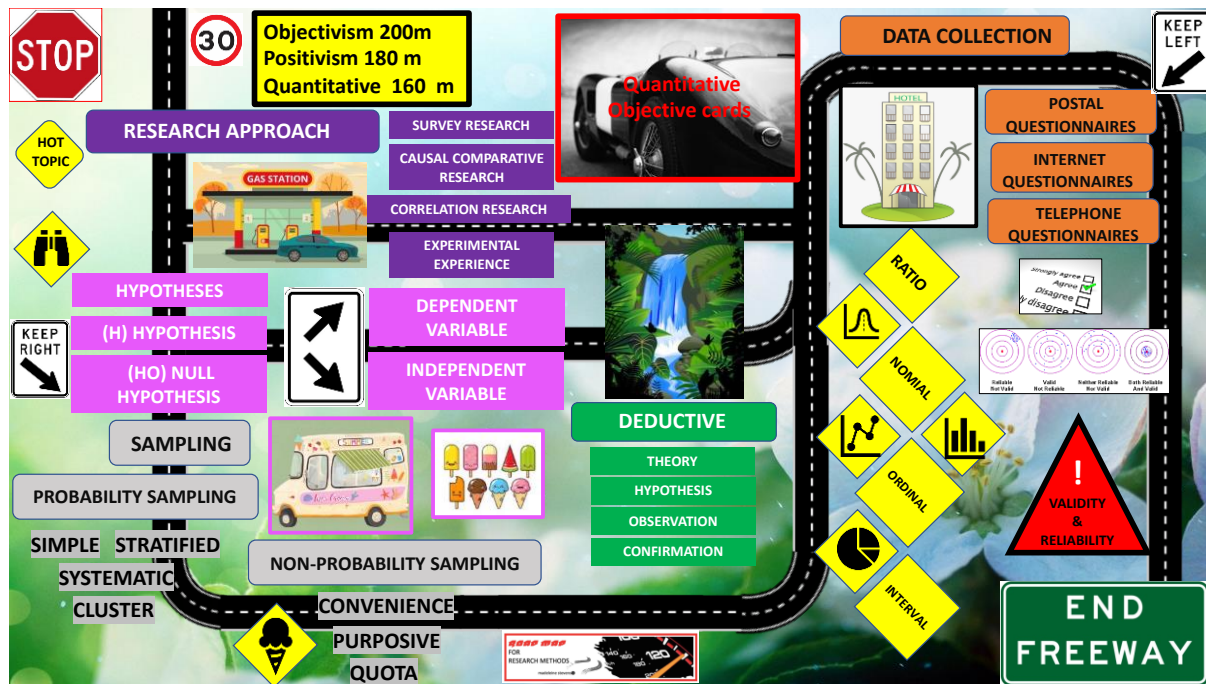**Quantitative Research Roadmap:**

Image 6: Quantitative Research Roadmap with examples of 'quantitative objective setting cards'.

Resources: Depending on participant numbers, resources required per table:

* 1 x qualitative research roadmap (A1 size map)

* 1 x quantitative research roadmap (A1 size map)

* 1 x research philosophy roadmap (A1 size map)

* 1 x toy cars – (size of 'hot wheel' cars) per person

* 1 set of qualitative objectives cards (postcard size)

* 1 set of quantitative objectives cards (postcard size)

* 1 set of 'yes topic cards' (postcard size)

* 1 set of 'no topic cards' (postcard size)

* 1 x research methods template per person

* Instructions of how to play

The challenges: How and when they were encountered, how they were overcome

This section will outline some of the challenges I encountered during the design of the

Research Methods Roadmap game.

Continuous improvement through action research:

The concept of the Research Methods Roadmap commenced with rough sketches

combined with the relevant academic content which allowed for several versions of

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trials and errors. Through the process of action research, the roadmaps developed and improved through five iterations over a period of twelve weeks. Reason and Bradbury (2001) define action research as;

> "participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview which we believe is emerging at this historical moment. It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities." (Reason and Bradbury, 2001:1)

With every challenge comes an opportunity. As a result, when a roadmap was used in class and an area for improvement was identified, the map was enhanced and improved for the following week. Therefore, the learning content, including the three research roadmaps and supporting playing cards, went through a process of applied action research, where an adaptive cycle of participatory research allowed for continuous improvement (Mackenzie et al., 2012).

The use of action research design was driven by Brydon-Miller et al. (2003) who posit that action research drives how we go about generating knowledge on implementing change. My aim to enhance the journey of understanding research methods for students as a large-scale change, aligns with Coghlan's (2016) definition of the theory of action; where assumptions were made, which lead to action strategies and subsequent consequences. This presented itself as improved iterations of the research roadmaps and consequently, one map evolved to three different maps.

Adelman (1993:7) defines action research as "the means of systematic enquiry for all participants in the quest for greater effectiveness through democratic participation."

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Consistent with Adelman's (1993) approach through trialling the roadmaps in class, the opportunity was created to improve the design and flow, by gaining active insights through student participation.

Design content:

As I designed the research roadmaps myself, one of the challenges I faced was transferring my sketches to digital and presentable content, whilst not having suitable software and clipart. Often images found were subject to licencing and copyright protection, which posed several challenges to find online material to use without incurring significant costs.   As a result, a lot of unsophisticated and time-consuming editing took place creating the maps in PowerPoint. Getting the scale correct from a PowerPoint presentation to an A1 boardgame, to ensure the toy cars fitted on the roads and the playing cards were the correct size, posed several challenges which meant several trials and errors took place in the actual scaling and physical design of the content. This had a knock-on effect which meant I was often challenged by the balance of producing the maps and allowing sufficient time to get the material printed and corrected, before the next lecture, allowing a week to design, print and correct between lecturers.

Building confidence with research methods lecturers

The initial views of research methods lecturers were positive. Nonetheless, it was challenging for them to use the roadmaps, without having the full opportunity of witnessing how I used it in class and therefore, arguably there was an initial challenge with consistency of how to use the roadmaps and a clear understanding of the rules and applications. These challenges were addressed by scheduling briefing sessions

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with demonstrations prior to lectures taking place. Irrespective of these challenges, my fellow lecturers were enthusiastic and supported the pilot stage, by trialling the roadmaps in some of their research methods lecturers.

How the initiative was received by the users and the learning outcomes

The Research Methods Roadmap game has received positive feedback from both internal and external sources, lecturers, as well as students at undergraduate and post graduate level.

"Student feedback provides important evidence for assessing quality, it can be used to support attempts to improve quality, and it can be useful to prospective students" (Richardson, 2005: 409). Accordingly, I draw on student feedback to support the concrete outcomes associated with my research methods intervention and practice.

The module where the research methods roadmap was first piloted was a level 7 (Masters) cohort of 62 students during the first semester in 2021. As can be seen below in figure 1, a 97% over all student satisfaction rate was achieved. This is the highest satisfaction rate this module has achieved. Within the Liverpool Business School, we have 12 Research Methods modules with an average student satisfaction rate of 68%. This level of student satisfaction at 97% is 'unheard' of for such a difficult module.

Overall, I am satisfied with the quality of this module.

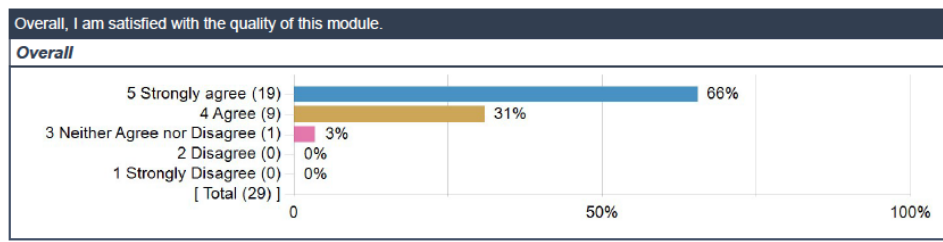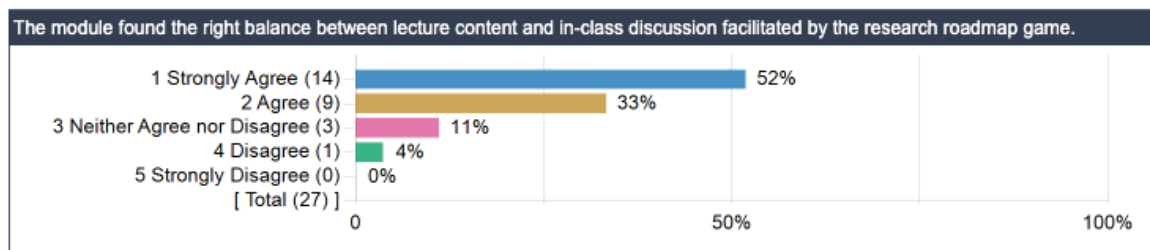| Overall, I am satisfied with the quality of this module.			
Overall			
5 Strongly agree (19)	66%		
4 Agree (9)	31%		
3 Neither Agree nor Disagree (1)	3%		
2 Disagree (0)	0%		
1 Strongly Disagree (0)	0%		
[Total (29)]	0	50%	100%

Figure 1: Student satisfaction rate for the first pilot

Quantitative feedback specific to the Research Methods Roadmap game:

Quantitative feedback indicate a student satisfaction rate of 85% for using a combination of seminars and the research methods roadmap to facilitate discussion, with 77% of students agreeing that the research roadmap was helpful to develop their understanding of research methods, as demonstrated in figure 2. The results are caviated as the pilot study involved two different leturers and it is difficult to determine to which extent the roadmap was applied and used consistently.

The module found the right balance between lecture content and in-class discussion facilitated by the research roadmap game.

The module found the right balance between lecture content and in-class discussion facilitated by the research roadmap game.			
1 Strongly Agree (14)	52%		
2 Agree (9)	33%		
3 Neither Agree nor Disagree (3)	11%		
4 Disagree (1)	4%		
5 Strongly Disagree (0)	0%		
[Total (27)]	0	50%	100%

The research roadmap utilised has been helpful in developing my understanding of my chosen research methods approach.

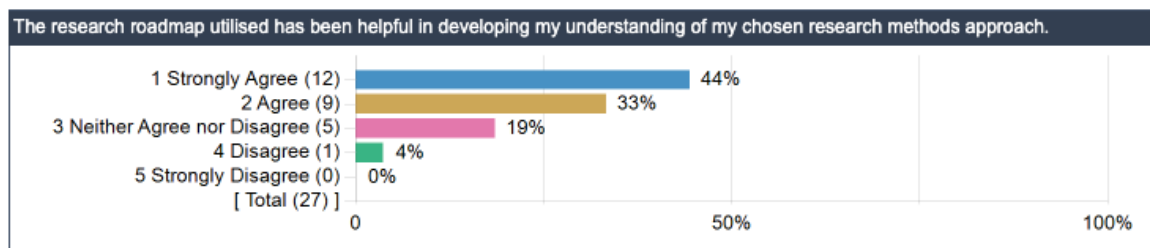| The research roadmap utilised has been helpful in developing my understanding of my chosen research methods approach.			
1 Strongly Agree (12)	44%		
2 Agree (9)	33%		
3 Neither Agree nor Disagree (5)	19%		
4 Disagree (1)	4%		
5 Strongly Disagree (0)	0%		
[Total (27)]	0	50%	100%

Figure 2: Student satisfaction rate specific to the roadmap for the first pilot

Qualitative feedback specific to the research methods roadmap:

Undergraduates:

Undergraduate student testimonials	"The research game was a great talking point to get us started on our research journeys, definitely prompted some good questions/answers." (Level 5) "I wanted to provide some feedback for the research methods game as last night's session was a nice change from looking at slides and it was a fantastic game that was very engaging and informative." (Level 5)
Lecturer testimonial	"I used the Research Methods game with a part time undergraduate cohort. The students have found some of the content in the Research Methods difficult to digest. I decided to use this game after all the content had been delivered. The aims were to provide an overview, check understanding, and encourage discussions about their own areas of exploration without PowerPoint slides! The board is designed well and provides a pictorial overview of the elements of a research project. We used one car for the five students present and I facilitated. At each juncture there were plenty of constructive engaging discussions with everyone participating, resulting in enhanced understanding of the links between research philosophy and methods! Having the board as a visual was very useful to keep the discussions flowing and on track to progress the students. I would use it again and perhaps encourage more confident students to take the class on their journey across the board." (Senior Lecturer - Research Methods, level 5)

Postgraduates Master students:

Postgraduate students' comments	"I enjoyed exploring different methods of data collection - in particular, testing dissertation topics on the 'road map' were very interesting." (Level 7)
	"It has been great to also visualise the paths we need to take which Maddy has made through the road map! Thank you!" (Level 7)
	"Maddie's knowledge in the area is invaluable! I also really enjoy discussing our topics with others, got so much out of it." (Level 7)
	"Encourages deep personal thought relating to your topic of choice." (Level 7)
	"The module has allowed me to understand research in a way that was not presented to me when completing my undergraduate degree. I feel a lot more confident to approach this in the future." (Level 7)
	"Learning about the types of methodologies to use for dissertation and using the roadmap to help shape our research methodology." (Level 7)
	"Brainstorming and chatting with fellow students regarding subject ideas." (Level 7)
	"Understanding the dissertation process and the different ways of collecting information." (Level 7)
	"It is all really interesting and very interactive lectures which keeps us engaged." (Level 7)
Postgraduate students' testimonials	"The game board really helped me with my research methods because I am a kinaesthetic learner and going through the map Maddie provided helped me step by step to know this is what I should write about and why. I find that this is more of a fun and enjoyable method to a somewhat trivial process. It really helped me with the assignment and learning of the importance of research methods also." (Level 7 student with dyslexia, who achieved distinction: 83% for Research Methods)
	"I used the research methods roadmap at the start of my proposal journey, and it really helped me to understand the choices I needed to make in order to determine what my research would look and feel like and even the kind of researcher I wanted to be. I am quite visual and have to ask lots of questions to gain an understanding of exactly what I need to do. This ticked both for me and I think it would offer a solution for most learning styles. It would also

	be helpful to people with learning disabilities such as dyslexia- due to the visual element. It allows for focus and discussion - without the confusing detail. It adds fun and encourages everyone get involved- introvert or extrovert!” (Level 7 student who achieved 78% for Research Methods)
Lecturer testimonial	“My observation of the value of the game is how well it has been received by our international students (composed of Indian, Indonesian, Chinese). I used the game to build on the Watson Box exercise - I did that bit in 'plain English' then tasked them to superimpose in groups their plain ideas using RM terminology - the game helped them do this in a light touch way, for which I was grateful. Makes RM less 'dry'.” (Senior Lecturer - Research Methods, level 7)

Postgraduates PhD / DBA students:

Postgraduate students’ testimonials	“I have found the Roadmap to be a fun way of exploring different philosophical positions for the subject area of choice. Within four years I have completed 2 degrees and I am at the beginning of my PhD journey. I could have done with such an accessible snapshot of methodological choices at the start of my undergrad. I am glad I now have this to hand to stoke the methodology fires when I reach that section of my PhD. I would recommend this to university students at all levels of their educational path.” (PhD student)
	“This is such an important project that is really shaking up the way we teach methodological approaches. Bring on the Research Methods Roadmap! A game changer!” (DBA student)
Professor testimonials	“It would be applicable to early-stage PhD/DBA candidates. I could see it working nicely in the DBA research cafes.” Professor, Scholarship and research “I would say it engages reflection and discussion around methodological decisions at levels 6 through to 8 with increasing levels of dialogue around the implicit assumptions in the model.” Professor, Teaching and Learning

External feedback:

Profession	Feedback
Sessional lecturer	"Wow, just wow Dr. Madeleine Stevens, this is taking research methods to a totally new level. I love the way you and your students are continually thinking outside of the box to explore and leave no stone unturned."
Subject Leader within Business School	"Looks amazing. I have heard great things about the game, really keen to find out more."
Subject Leader within Business School	"It's such a fantastic idea, a great resource for our brilliant Master's students."
Programme manager, Business school	"This innovative and immersive approach to research methods is a 'game' changer."
Associate Dean of Education	"Absolutely love this approach! Creative masterpiece. Dare I say, the Rolls Royce of Research Methods teaching."
Head of Wellbeing and Organisational Development	"Astounding! I love seeing the work you are doing Madeleine."
Lecturer	"Well done Dr. Madeleine Stevens, a great initiative."
Sessional lecturer	"Looks fascinating, Dr. Madeleine Stevens. Speaking from a student perspective, I love interactive learning. This sounds like a great session. I can see how visualisation would help with understanding and maintaining engagement. Such a great initiative and concept."
SAGE research methods editor	"It looks interesting and I can see that it will have an impact with those that use it."
Academy of Management representative	"Research methods course is often the hardest course for students to understand. An inclusive and interactive game shall be engaging and interesting to attract students. It also leads to better understanding and memory of knowledge."

Student results:

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After piloting the research methods roadmap for the first semester, the following results was achieved:

The impact of this game has resulted in student marks increasing from 56% average to 62% with pass rates increasing from 86% to 94% in the first semester of piloting.

Plans to further develop the initiative

The research methods roadmap is currently being patented with copyright.
Various discussions and ideas are currently taking place:

1. Development of the roadmap into a mobile application
2. Development of the roadmap into a Virtual Reality platform

Both these proposals will endeavour to include links to academic content, i.e., if you stop at a *key location*, you can click on 'ontology' which will provide students with further academic detail and references, essentially representing a 'digital format'.
The game will be presented at various conferences throughout 2022 to be tested by research methods experts across the world with the aim to refine and tweak the content to its best possible version.

In addition, the game development and content can be enhanced. Currently, there are no bonus elements featured, but this is something that can be considered for future inclusion. There are also opportunities to extend the roadmaps to include a map for ethical decision making and mixed-methods research.

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Conclusion

The overwhelming positive response to the game has been recognised by various stakeholders, from students to research methodology experts and personally, I am looking forward to sharing the resource widely to promote a more pleasant experience for all students and researchers.

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