Changemakers: Creativity and Value Creation

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Digital Degree Apprenticeship Computing (Software Development)

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Introduction

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Creativity and innovation (CI) are fundamental to technological and societal change, advancement and is vital to Software Development (SD). This project aims to integrate the emerging and current technologies to provide value to users of fitness applications in the fitness and health industry. This project will highlight topics discussed in unit one to four of the changemakers content: aims and several objectives, research strategies, ethical implications and types of analysis.

Task 1: Ideation & Mind Map

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Q1: Mind map

Areas and concepts discussed in Unit 1 of Topic 1 with detailed found in Appendix two.

The mind map can be found in Appendix one.

Creativity & Innovation

CI are vital aspects of technological and societal progress. Innovation involves generating "novel" ideas into valuable solutions while creativity is the generation of original and effective ideas [1]. Together, they drive progress. By driving this project with CI, these skills will be developed and will assist in continuous sustainable improvement. In a workplace setting, creativity and innovation can provide a "competitive advantage" for organisations especially with leadership innovation [2].

Software Focus

CI can improve aspects of the workplace particularly with software engineering (SE) as described in W. Groeneveld's article it can improve a software developer as a "practical tool". It drives creative problem solving and generates innovative solutions to problems [3]. Furthermore, CI is commonly described as a tool required and "vital" for success as a software developer. SE itself is referred to as result of creativity which converts human knowledge and inventive thinking into functional, value adding software systems [4]. Discussed throughout another article by W. Groeneveld, but summarised in table one, software developers explore the role of creativity within their careers through deliberate techniques, collaborative reflection and curiosity driven experimentation. This is a point clearly shown in figure one where CI and other "critical thinking" skills and knowledge dominate the mind map based on questions of SD creativity. Developing a project using various software skills can develop CI by requiring the developer to generate novel efficient solutions, navigate through complex problems and create a connection between technical expertise and CI intelligence within real word contexts.

Big Data

Similarly, Big Data and Analytics (BDA) provides opportunity for creativity within the sector but additionally enables the "a knowledge-based organizational culture that is innovative and creative" that can be harnessed with this project [5]. BDA is only strengthened by "employee creativity" [6] as CI insights are essential for interpreting the data in meaningful, value orientated ways. Companies and individuals that effectively implement BDA often generate a "propensity for innovation, creativity and future thinking [7]. This shows the value of involving BDA into a project idea to develop CI skills within a project and to result further CI.

The internet of things (IoT) & Wearable technology

IoT aims to assist with all aspects of life and will, if profound enough, "weave themselves into the fabric of everyday life until they are indistinguishable form it" [8]. Using creativity with technology such as IoT can boost aspects of business and leisure with Smart painting exhibitions [9], "daily routine" assistance, all produce interactive and more "immersive … experiences" [9]. This technology is likely to dramatically impact the world and is one of the technologies changing the world, as mentioned in unit one. Businesses can leverage IoT to have a positive effect by increasing revenue significantly [10]. Studies have shown that IoT and creativity are factors that boost company performance by using creative ideas and the application of IoT [11]. Promoting the use of IoT in business, promotes creative solutions and their benefits. With, the soon to be, revolutionary technology IoT will redefine business operations, innovations and global markets [source]. The steel industry uses a variety of IoT for various purposes. Namely, waste tracking, air quality monitoring, radiation and steel quality.

Q2: Select a project idea

Unit one has covered a variety of topics that should be considered when deciding a project idea. CI appears within areas such as study, entertainment, communication and IT. Personal development and progression with CI is more accessible due to new tools like AI to aid with multi-disciplinary education. With the fourth industrial revolution advancing, pairing an idea with a mix of the big six technologies could deem successful and advantageous for CI. This

unit one detail can be found in appendix two.

Out of these technologies, I would like to advance with a software project using Big Data and IoT within the fitness industry to advance individuals towards their goals using social connection as a driving factor keeping users engaged, connected and motivate. By leveraging data collection through wearables tracking biometric data and fitness tracking apps, the project aims to delivery personalised insights, promote social accountability and a gamified approach to fitness. This project aims to use existing fitness applications to boost the project performance. For example, suggesting MyFitness Pal or Strava for food tracking and running tracking respectively. The unique selling point to this project is the social accountability organised from the software platform. The platform will allow for social accountability in two formats: in person and online. In person group methods can positively affect the persons mental and physical wellbeing [12]. Online tracking and distance fitness groups can gamify the experience for the user and “may be effective means of targeting motivational components” [13]. In addition to this, personal trainers can run their training plans from within.

Table 2 in appendix one is a brief description on evidence based features, relevant findings and implications for the project. These aim to add value to the customer or user supported by credible sources that detail numerous benefits to the chosen solution. To develop a credible and useful application, it is critical to include aspects of these studies into the application.

Task 2: Aims, Objectives & Research Area

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Q1. Aims & Objectives

Aim

To design and develop a digital fitness platform that integrates IoT wearables, Big Data Analytics and gamification to enhance user motivation, promote physical and mental wellbeing and encourage social accountability in fitness participation.

Objectives

Design prototype and release a working prototype of the digital fitness platform with IoT wearable integration by end of 2025.

Include gamification features by implementing at least five core gamification elements. For example, points, leaderboards, progress tracking, challenges, and rewards by end of 2026 to boost motivation and engagement.

Include a data analytics integration to develop and deploy a Big Data analytics engine that provides personalised insights and fitness recommendations based on user behaviour and wearable data by end of 2026.

Include user engagement metrics to achieve at least 70% weekly active usage among pilot users within 6 months of launch, measured through platform analytics.

Enable social accountability that enables group fitness features, peer challenges, shared goals, and accountability loops with at least 50% of users engaging socially, online or in person within the first year of deployment.

Push scalability and interoperability to ensure the platform can support 10,000 concurrent users and connect with at least three major wearable ecosystems, Fitbit, Apple Health, Garmin, by end of 2026.

Q2: Identify an appropriate research philosophy

According to unit one topic two of the learning modules which can be found in appendix two, I will be using the research philosophy of mixed methods positivism. This is “led by science” which aligns with the scientific approach of a fitness application using various scientific techniques such as gamification to afflict behaviour change features of the application. To engage users the application must have excess value in the form of sound research built into the application to boost a “one truth” method stated in the aforementioned topic. I intend to gather data to interpret in “strictly objective ways”.

Q3: Search tools and research databases

It is crucial to carefully select the right search tools and research databases. To complete the aims and objectives and to align to the mixed methods positivism research philosophy approach. The tools used will consist of articles from academic journals, scientific books and reports from professional bodies. The database I will use for this project will be ScienceDirect. To evaluate information carefully, using the “CRAAP test” to evaluate the currency, relevance, authority, accuracy and purpose of the information as shown in in unit two topic two appendix two. Briefly, this refers to information or data that is recent and not “superseded by more recent newer information", relevant to your work, project or writing and what “audience it was written for”. Continuing, the CRAAP test ensures authority, accuracy and purpose of the information by assessing credibility of sources, how true and for what purpose the source has to “further evaluate the truthfulness and believability of the information presented [14].

Using Boolean search strategies for identifying research can prove useful in this project. This involves searching key words, using asterisks as a wildcard and using the variety of Boolean operators. For example, using AND, OR, or NOT as stated in appendix two.

To understand the research and to form ideas around concepts, constructing concept maps can prove useful. Concept maps drive innovation through exploration to visualise all moving parts. Providing a fitness application in a saturated market result in a challenge. Implementing a concept map can detail all moving parts of the application to ensure user benefit, engrain science and develop a useful solution.

Task 3: Research Strategies

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Q1. Consider and document strategies to enhance validity, reliability, generalisability and ethical considerations.

It is crucial to consider validity of primary and secondary data. Primary data will be collected by participants in an online and in person setting. This will be collected with wearable devices such as watches and chest straps to gather initial metrics from users. This will be used a benchmark to ensure validity. Pairing this with secondary data from credible databases, ScienceDirect, to gather further research will increase validity.

To increase reliability and the consistency of data collection of users, I will conduct pilot testing with a range of ages and sexes. This can be used to refine the data capture. Additionally, data gathered from ScienceDirect can be used in conjunction to ensure reliability.

It is important to gather ethical considerations with this project as biometric data is being collected and stored for the application to function. For this project to be ethical, informed consent will be gained from participants [15]. Data will be encrypted on the storage cloud as “encryption plays a critical role” in privacy [16]. For the development of the application the data will be anonymised to improve “security and privacy” of data. Furthermore, this aligns with GDPR principles [17]. Participant information debrief sheets will be discussed with the participants and consent forms will be explained and retrieved to ensure full, informed consent.

Q2. Select research strategies/data collection methods

The research strategy used for this project will consist of mixed methods positivist approach with quantitative sensor data complements by qualitative surveys and interviews with users and participants. This position is in line with the data driven goal and behavioural aspect of this project.

Quantitative data collection will be collected in the format of activity tracking data such as heart rates, distances and sleep quality through third party applications. Other forms of quantitative data collection will be extracted using application data such as frequency of logins and time spent on application. Additionally, using a Likert scale questionnaire to gauge a range of data such as motivation, wellbeing and how effective social accountability is for that participant or user. For quantitative data collection, interviews and surveys will be conducted.

Pilot data collection

To gather feedback on feasibility and applicability of the surveys and other data collection, a pilot data collection will be conducted. I intend to detail a survey to determine user experience before and post using the application. See appendix one user form.

Feedback & Improvements

From the feedback received from the survey, improvements could be made to improve user experience.

The findings from the survey clearly show on average people are increasing activity and as a result have an improved mental wellbeing. To improve, analysis of user statistics should be displayed for clear assessment of goals. To increase social accountability of the platform it would benefit the users to receive leaderboards comparing user statistics, anonymously, to promote social accountability and to drive competitiveness of the platform.

Q3. Different types of quantitative and qualitative analysis

Quantitative analysis refers to analysis of “numerical data and statistical analysis” [18]. For example:

- Using the Likert scale to derive value from participants.

- Comparing the correlation between wearable data and user reported motivation.
- Using user active minutes before and post the solution intervention.

Qualitative analysis refers to non-numerical data, typically in the format of words, feelings, emotion and “human experience and perspective” [18]. For example:

- Assessing how users' emotions, accountability, health and fitness changes before and after the solution in the format of their own words.
- Interview feedback from participants.
- Free text survey responses.

Conclusion

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Conclusion

Developing this project has resulted in evidence that shows CI underpins technological advancements, societal progress, and innovation across the world. By using the teachings of unit one to four it is crucial that society demonstrates CI through engaging and sustainable technological solutions. CI “is a means of promoting” the fourth industrial revolution [19] and solutions to human, environmental and global problems. A CI driven approach promotes adaptability, user centred design and continuous improvement. Incorporating aspects of these findings into the project promotes benefits, as discussed, and results in a project containing CI. The proposed project integrates aspects of the Big 6 Technologies that will change the world and features to increase user experience, engagement and retention: IoT, wearable technology, Big Data analytics and gamification. The aim is to enhance user motivation, promote physical and mental wellbeing and encourage social accountability in fitness participation.

The proposed design reflects this aim by using CI in the design process, user experience to influence users with long term behavioural changes such as increased activity and mental health metrics. It is increasingly important to consider CI in SD endeavours and projects. Creativity is equivalent to a tool software developers can harness to problem solve and drive value creation. Creating a connection between abstract software solutions and the user experience is bridged by creatives using CI. Mirroring the creativity detailed in the research from Table 1, this project includes personalised insights, gamified challenges and community driven social engagement.

The quantity of biometric and health data collected will resemble a source of value in the form of actionable insights from data. This data can personalise fitness experiences but allow comparisons across individuals. The use of Big Data Analytics aligns with the projects positivist research philosophy and the data derived from the platform allows the user to focus on evidence based results from the application. From this data, the application can be designed in accordance with the data. Integrating with the emerging trend of IoT creates opportunity for instant monitoring of people through technology with interactive feedback from insights. This inadvertently increased user engagement and retention as value has been created.

Despite the advantageous benefits of these technologies, it is important to consider ethical implications of data privacy, retention, anonymisation, informed consent and GDPR compliance. This project and its research aspects adopts a mixed methods positivist approach including the support of quantitative research in respect to analytics, numerical survey questions and data collected by wearable devices. Inclusively, qualitative research has been used through open ended survey questions to capture emotional insights. Including a pilot survey in this project increases validity of user experience before full implementation [20].

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Appendix 1

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Table One: themes on creativity in software engineering [4]

	Subtheme	Focus Group Occurrence 1	2	3	4
Crea. Techniques	Employing a *birds eye view*		✓		
	Exploring the problem from *different angles*	✓			
	Asking *energizer questions* to bootstrap the creative process		✓		
	Different forms of *brainstorming*	✓	✓	✓	✓
	Mapping solutions from *outside the problem domain*	✓	✓		
	Actively *seeking out new information*			✓	
	Combining multiple ideas into a better one		✓	✓	
Knowl.	Creativity as the *'brew' of different inputs*			✓	
	Continuous learning	✓			
	Using *domain modeling* to gain new insights	✓			
Communicat.	Using the '*rubber duck*' when stuck	✓	✓	✓	
	Visualizing the problem on a *whiteboard*	✓	✓	✓	✓
	Getting *fast feedback*	✓	✓	✓	✓
	Sharing responsibility with all team members	✓			
	Client-oriented designing		✓		
	Working closely with *peers*	✓			
Constraints	Putting emphasis on *efficiency*				✓
	PUtting emphasis on *relevance*		✓		✓
	Putting emphasis on *performance*			✓	
	'YAGNI': *You Aint Gonna Need It*	✓			
	Time-constraints	✓	✓	✓	✓
	Relevance of *context*	✓	✓	✓	✓
	Critical thinking; coming up with *alternatives*	✓		✓	
Curiosity	Start with '*Why?*'	✓			
	The dangers and joy of *repetitive work*	✓	✓	✓	✓
	Complexity as a motivational factor		✓		
	Programming '*for fun*'!	✓	✓		
	Admiration for creative work of others	✓			
	Giving in to that *creative urge*	✓		✓	
	Motivation in general	✓	✓	✓	✓
	Convincing others work creatively		✓		
	Getting out of that *comfort zone*	✓	✓	✓	
	Creative problem solving as a *necessity*		✓		
State of mind	The *social nature* of software development	✓	✓		
	An environment that facilitates *freedom*	✓	✓	✓	✓
	An environment that facilitates *flexibility*	✓			✓
	Being in a *creative 'flow'*	✓	✓	✓	✓
	'Aha' moments and shower thoughts	✓		✓	
	Employing different *productivity tools*	✓			
	Total percentage of *found* themes in each group	69.23%	56.41%	46.15%	30.77%
	Total percentage of *new* themes in each group	66.67%	20.51%	7.69%	2.56%

Table 2: Key findings, implications and user impacts from relevant studies.

Reference / Study	Key Findings	User Impact	Implications for Proposed App
[21]	A study that reveals “children and adolescents” have increased benefits to health.	Improved physical activity, fitness, sedentary behaviour, and other physical factors.	Confirms an app based approach to physical fitness can raise activity in children/adolescents
[22]	Various studies in this systematic review indicated that	Improved activity.	Additions suggested area “goal setting…progress

	physical activity increased and the behaviour was influenced by “gamification with wearable devices”.		bars, rewards, points and feedback”.
[23]	Numerous studies in this systematic review produce a view that mobile health apps may improve mental health.	Improved mental health.	A health app that promotes, not just physical health but mental health provides more value to customers.
[24]	The meta-analyses from this source suggests that “digital interventions” promote physical activity.	Improved physical health.	A health app could improve the physical activity of “older adults”
[25]	Digital solutions to physical activity are not equally effective for all people based on “socioeconomic status” (SES). Those who it does not have “any efficacy for people of low SES but moderate efficacy for those with high SES”. The study continues to state that low SES people are “left behind” by digital interventions to physical activity. Recommendations are set, from the study, to target low SES people to prevent this.	A greater change in behaviour, activity and fitness.	Low SES people have low efficacy for digital solutions so providing a solution to physical activity for all levels of SES can benefit a greater change in behaviour, activity, fitness and target a larger audience for the app.
[26]	For ages 16 to 27.8 in the meta-analysis has a “significant impact on” increasing total physical activity, step count and other factors.	Improved physical activity.	Early and mid-level adults?
[27] [28] [29]	An influx of gamification within the health app industry can provide little competitive advantage to competitors and may boost the uptake in this solution. A systematic review in 2016 revealed that less than 5% of apps including gamification [27] where as in 2018 out of the “top 50 most popular” health applications “64% used gamification” [28].	Gamification of “mHealth or multimedia” can make solutions more engaging, motivating and easier to sustain over time. This “behavioural” strategy can support adherence to an exercise regimen [29].	By using “feedback”, “monitoring”, “reward”, “threat”, “goals and planning” gamification can be used as a method in reaching popularity with users.
[30]	Conclusions of this systematic review reveals that potentially by providing solutions that “foster self-regulatory skills, opportunities for social engagement and personalization” lifestyle changes can be adhered to. Across the review, “social support was the most frequently identified facilitator” which provides a need for a solution using social accountability.	Providing the user with “opportunities for social accountability… may improve behaviour adherence” thus improving the health of the user.	Promotes long lasting changes to health.
[31]	This systematic review states that “mHealth apps could be	Behaviour change can have the	Goals of the user can be met through behaviour

	effectively adopted for users to improve health-related outcomes" by changing users' behaviour.	desired health effect for the user.	change which improves the efficacy of the solution.
[32]	Targeted "health behaviour" can be expressed via various vectors in this analysis.	This creates a solution for a user that increases adherence to goals.	The solution should touch upon the archetypes of gamification captured in the results of the analysis; namely "competition and collaboration… episodical compliance tracking, inherent gamification for external goals, internal rewards for self-set goals, continuous assistance through positive reinforcement, positive and negative reinforcement without rewards".

Figure one: themes on creativity in software engineering [4]



Mind map

To view the link online, navigate here.

https://www.mindmeister.com/app/map/3733170360?t=NT511azy66

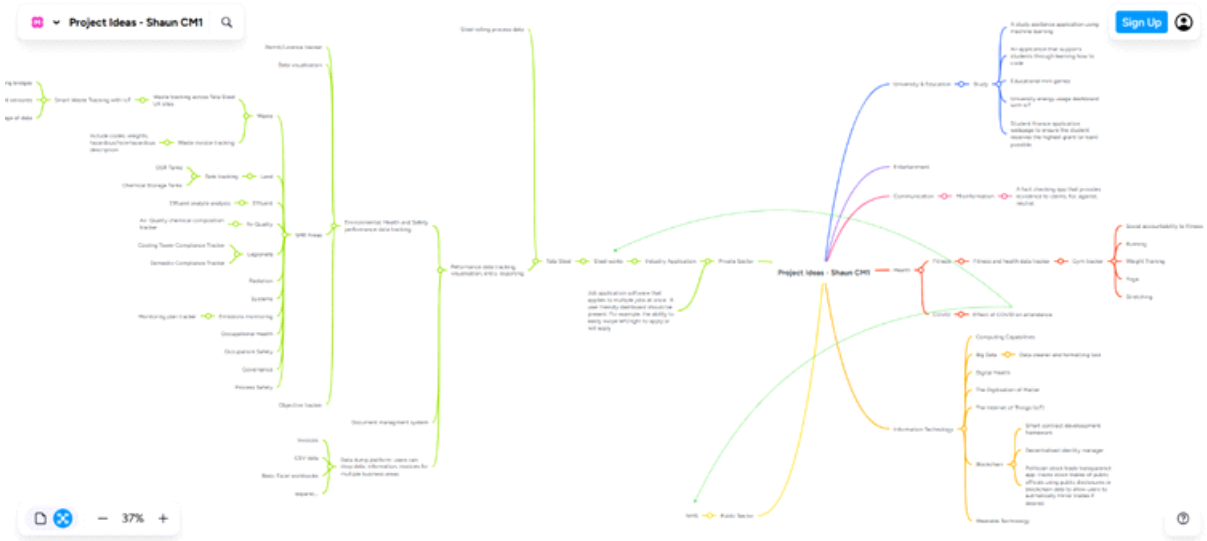


Figure two: mind map (1)

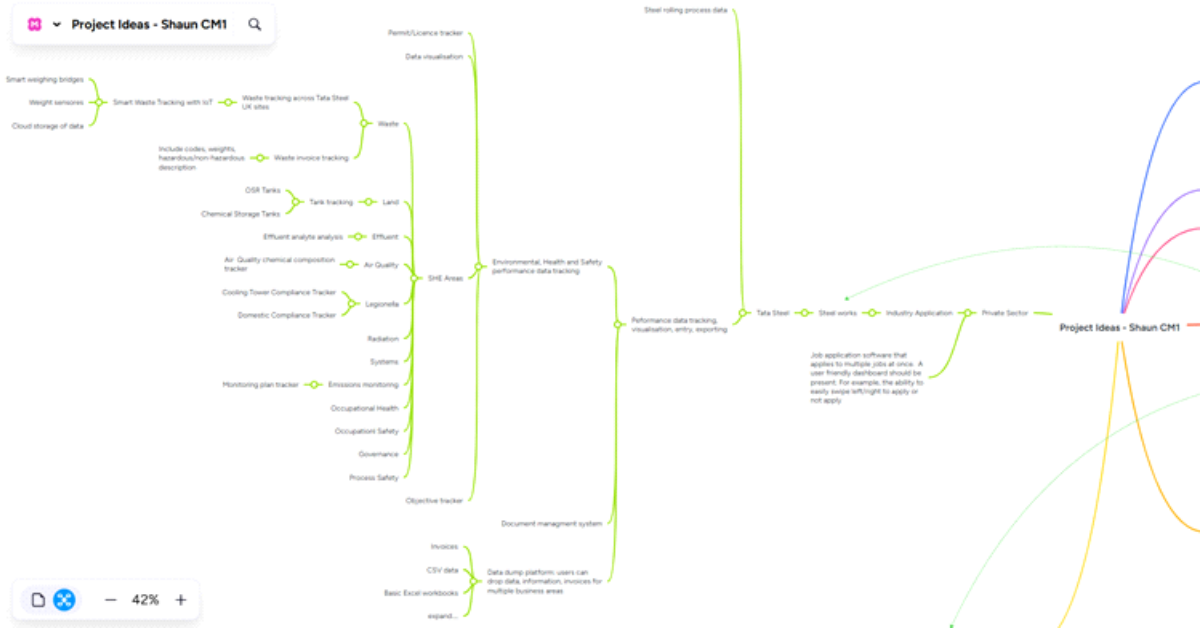


Figure two: mind map (2)



Figure two: mind map (3)



Figure two: mind map (4)

<u>User form</u>

Social Accountability App

This for is to understand how activity, health, fitness and wellbeing has been effect before and post intervention with the application.

1. How was your mental wellbeing prior to using the application?

Enter your answer

2. How was your mental wellbeing post using the application?

Enter your answer

3. Prior to the using the application, how many minutes of activity a week did you complete?

- ◯ 0
- ◯ 1-20
- ◯ 21-60
- ◯ 60-180
- ◯ 180+

4. Post using the application, how many minutes of activity a week did you complete?

- ◯ 0
- ◯ 1-20
- ◯ 21-60
- ◯ 60-180
- ◯ 180+

5. "Using the platform made me more motivated to be active" - please choose which option is most applicable to you.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

6. What, if anything, would you improve about the application?

Enter your answer

User Feedback Results

	Start time	Completion time	How was your ment	How was your mental wellbeing post using the applic	Prior to the using th	Post using the applic	"Using the platform	What, if anything, would you improve about the application?
1	10/28/2025 14:50	10/28/2025 14:51	Bad	Great, better than before	0	60-180	Strongly Agree	nothing!
2	10/28/2025 14:52	10/28/2025 14:54	At my worst	improved, I felt more myself and happy	1-20	180+	Strongly Agree	Improve the social accountability aspect: more social leaderboards and games
3	10/28/2025 14:54	10/28/2025 14:55	great	Even better!	21-60	60-180	Agree	nothing
4	10/28/2025 14:55	10/28/2025 14:56	great	great	60-180	60-180	Neutral	Reward system doesn't feel meaningful
5	10/28/2025 14:57	10/28/2025 14:58	Great	Worse than before	60-180	180+	Strongly Agree	I can't see how my stats translate into goals

Images



Figure 1 [4]

Appendix 2 - Unit 1

21 June 2025 12:54

Unit 1 Topic 1

All following appendix has content from Change Makers Unit 1 to Unit 4 [33].

Task 1

Q1: Mind map of concepts from topic 1 of unit 1.

Unit 1 Topic 1

Section 1: Innovation is everywhere.

Sub-task 1

Innovation is everywhere

Over the last 10 years, the following advancements have occurred in the following areas:

Study

AI powered learning with the use of ChatGPT, Gemini and other AI to support learning and education.

VR education.

AI driven plagiarism checkers such as Turnitin AI features.

Virtual classrooms and bootcamps.

AI language education.

Entertainment

TikTok.

Virtual concerts and events from VR games/platforms.

AI and VR roleplaying games.

AI generated music, small films and art.

Communication

Live transcripts with captions in Microsoft Teams/Zoom for assistance in the workplace.

AI generated email replies.

Virtual influencers.

The growth of AI generated replies for emailing

IT

Low-code or no-code solutions generated by AI driven companies.

Auto threat detection with advancing AI tools.

Advancements of quantum computing experiments.

Personally, over the last 10 years I have participated in new activities that would not have been around 10 years ago. These activities consist of:

- AI support in the form of ChatGPT to assist in work in the form of emailing. Excel, VBA, and coding.
- Driving assistance in my car now consists of camera sensors for collision assist, lane keeping and auto-park technology.
- Online learning platforms for coding
- Video conferencing tools like Microsoft teams for work.

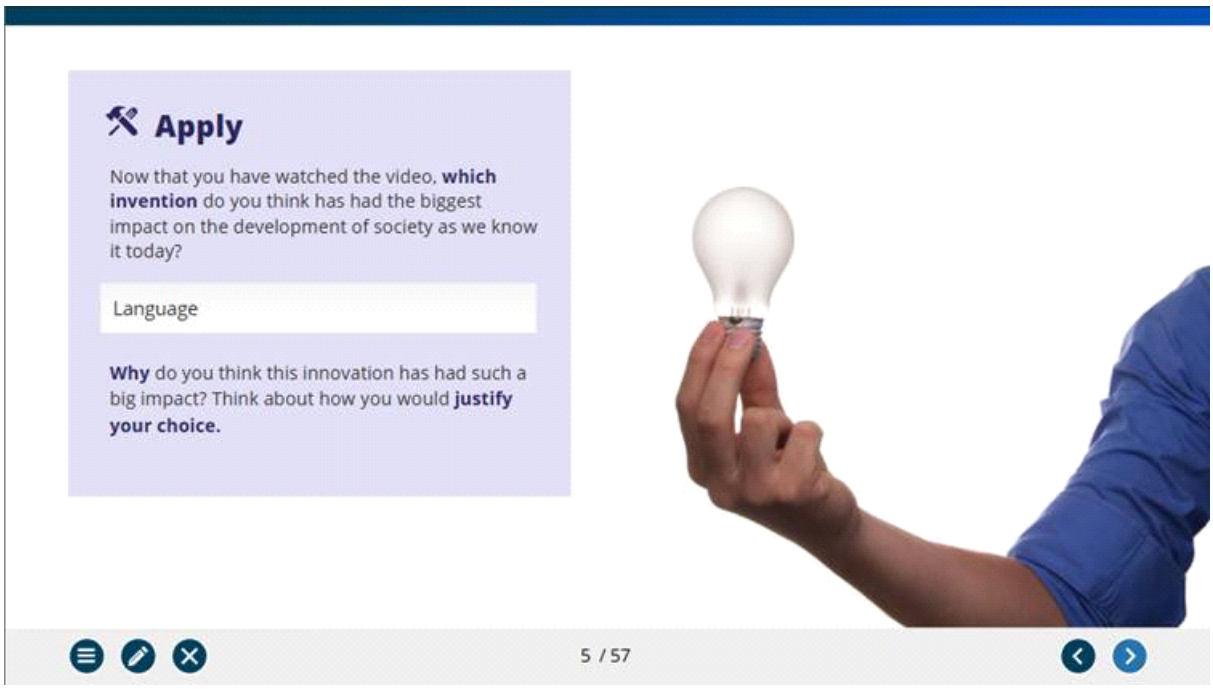
Innovation advancements enable humans to improve in areas such as agriculture, energy, societal advancements and healthcare.

Sub-task 2

Innovation changes everything

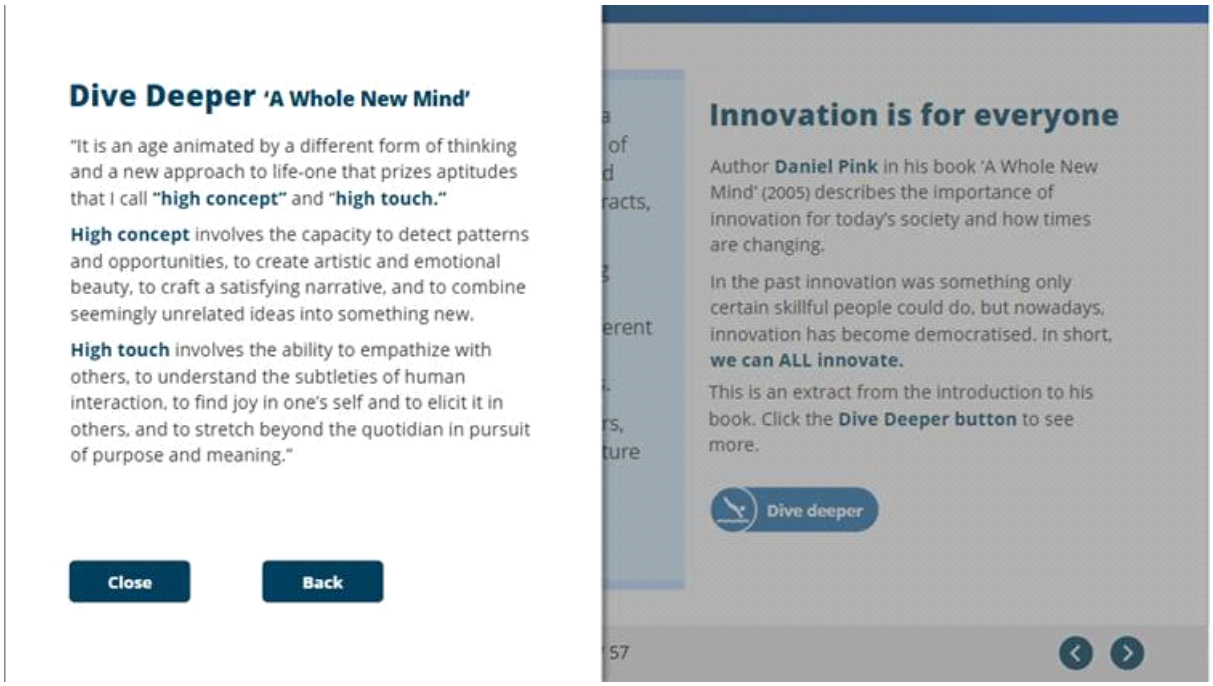
During this task, decipher which innovation do you think has had the biggest impact.

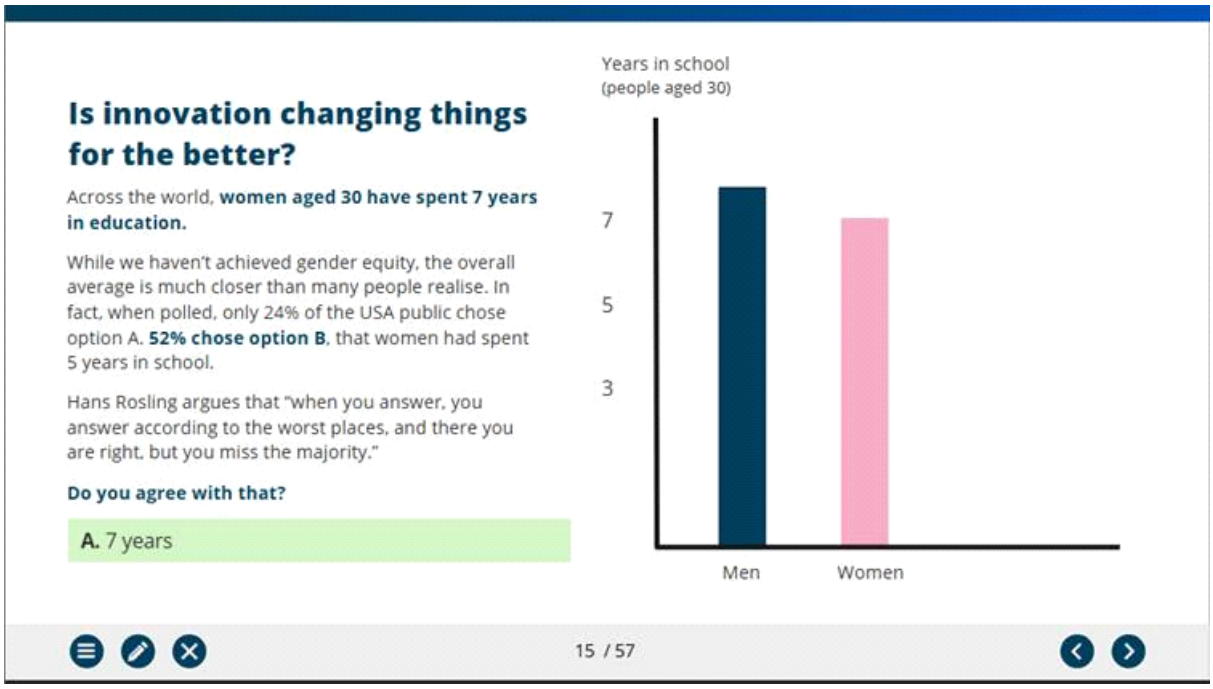
1. Language.
2. Plough.
3. Boat.
4. Democracy.
5. Internal combustion engine.
6. Vaccines.
7. Transistors.
8. Pencillin.
9. Discovery of DNA.
10. Internet.
11. Phone.



Language evolving is a crucial part of human evolution. Arguably, without this “invention” other innovations by humanity would likely not be possible without this form of communication. This allowed humans to detail ideas and pass information to others that will boost longevity and prevent disease, illness and death.

Engagement with content:





Is innovation changing things for the better?

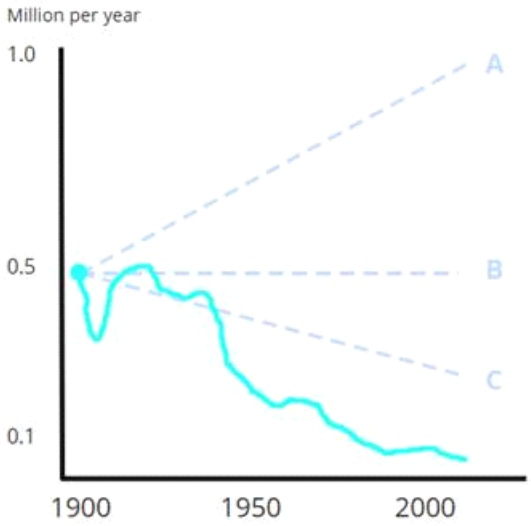
Deaths from natural disasters actually fell to **less than half** over the last 100 years.

In 1900, roughly half a million people died a year from natural disasters such as floods, fires, earthquakes and droughts.

When polled, **only 12%** of the Swedish public chose option C, that deaths from natural disasters had fallen to less than half.

50% agreed with option A, believing that the rate had more than doubled.

C. Decreased to less than half



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Is innovation changing things for the better?

In fact, the percentage of people living in extreme poverty almost halved.

This data was collected in 2014, and more recent data shows that this percentage has fallen even further.

In 1990, 35.9% of the global population lived in extreme poverty. **In 2017, it was only 9.3%.** Although this still means nearly 1 in 10 people live in extreme poverty, this has fallen from over 1 in 3 people in 30 years.

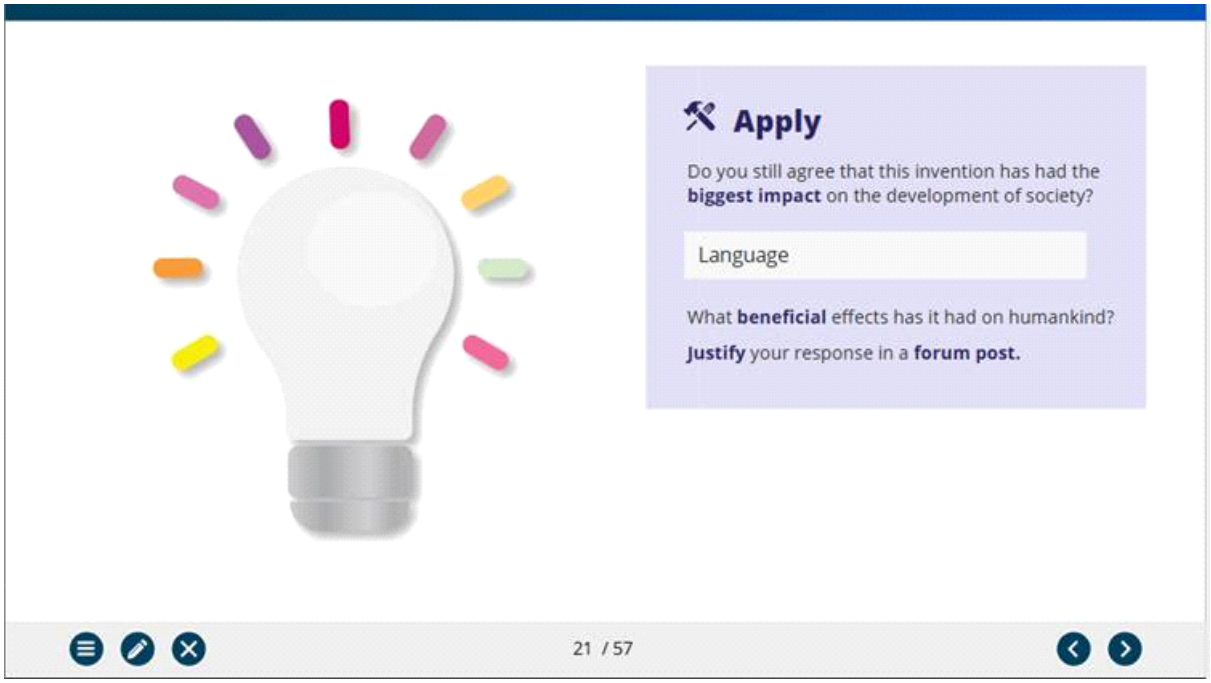
C. Almost halved

As you can see here, many aspects of life have been improved by **modern innovation.**

In general, we are doing much better than in the 'good old days', with higher quality of life and improved access to resources.

These three questions were posed by **Hans Rosling** in a **2014 TED Talk.** In the next activity, we will look at more of his work to see if innovation is really changing things for the better.

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After watching ‘Hans Rosling’s 200 Countries’ video, it’s clear vaccinations and the industrial evolution have played a key role in advancing lifespan and income per country. Language is important to drive these changes however without the invention of vaccines and the time period of the industrial revolution many countries lifespan would be drastically reduced.

Section 2: the onward march of technology

The fourth industrial revolution

Before the revolutions, agriculture required hard labour from farmers. Expand on other areas prior to the rev

The first industrial revolution

Machines replaced the work of people in fields. Wood was not used to produce heat in home but instead coal. Food production moved from single families on fields to manufacturing goods in factories.

The second industrial revolution

The use of electricity for powering homes dominated society

The third industrial revolution

Computers

The fourth industrial revolution

The advent of cyber-physical systems

i.e. Genome editing, new forms of machine intelligence

Engagement

The following slides are key sections of information.

What is the fourth Industrial Revolution?

Revolution		Year	Information
	1	1784	Steam, water, mechanical production equipment
	2	1870	Division of labour, electricity, mass production
	3	1969	Electronics, information technology, automated production
	4	?	Cyber-physical systems

Reflect

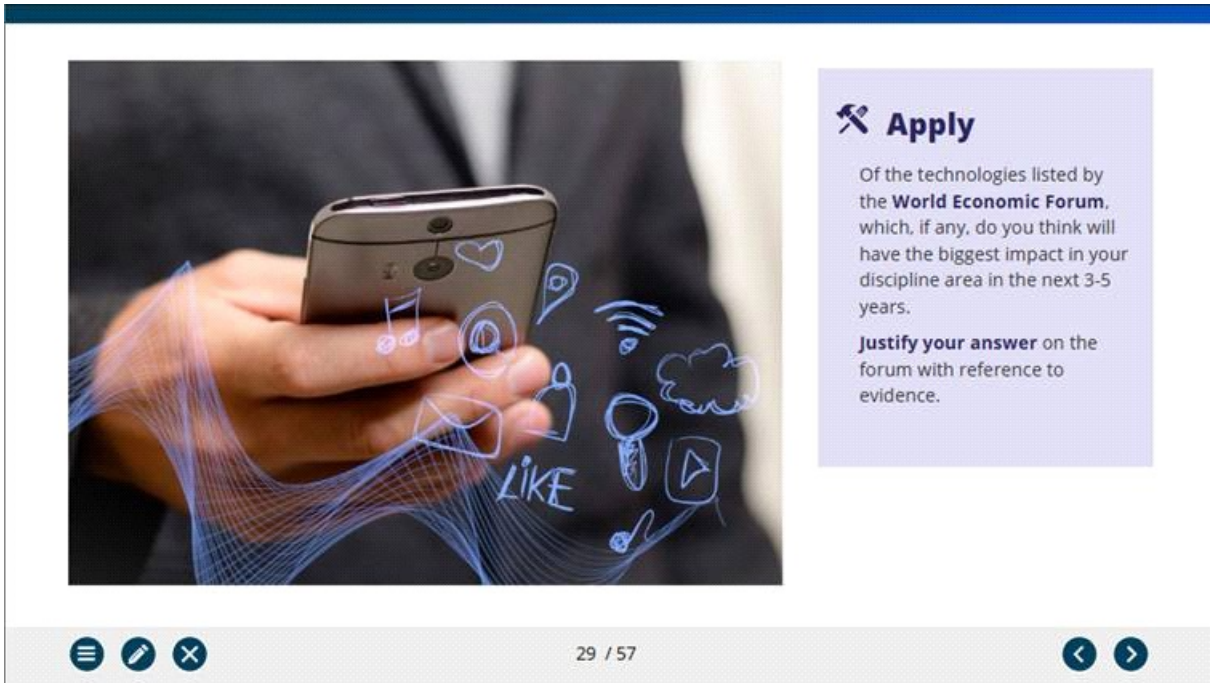
As you can see, the characteristics of each industrial revolution have changed a lot over time.

Now you have seen an overview of the fourth industrial revolution, we will look at some of the new technologies that will potentially change our way of living.

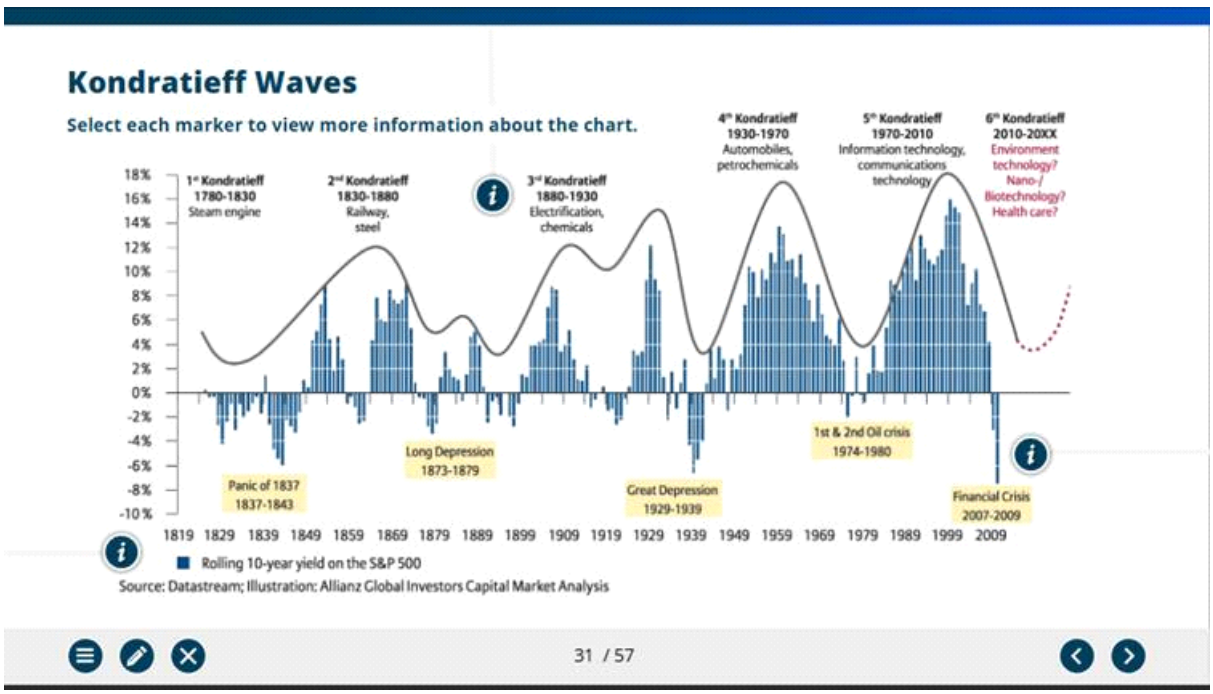
Technologies are changing our world

The World Economic Forum (2016) has identified six technologies that will change our world:

- Computing capabilities
- Big data
- Digital health
- The digitisation of matter
- The Internet of Things (IoT)
- Blockchain



All of the technologies combined have a potential to exponentially benefit each other. Not one, but all have the potential to expand human technological capabilities. Big Data aligns with my career and within the department that which I work in the Environment Department. Leveraging big data from multiple sources is key to advancing and driving business decisions and is often a forgotten resource in many companies. Using vast amounts of data that companies have collected across many years is a vital asset to any company and country.



Research further

Engagement

The following slides are key sections of information.

Check

Drag the revolution to the correct definition.

a. Steam, water and mechanical means of production — First Industrial Revolution

These are the correct definitions for the first and fourth industrial revolutions.

If you'd like to remind yourself of the definitions of each, let's **revisit that slide.**

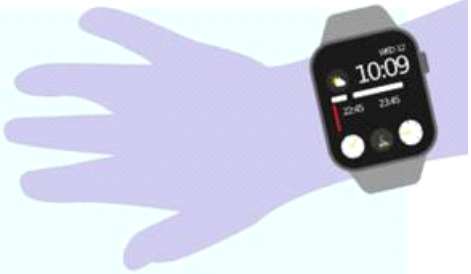
d. Cyber physical systems — Fourth Industrial Revolution

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Check

By 2025, what percentage of people are expected to be wearing clothes connected to the internet?

- 5%
- (•) 10%
- 15%

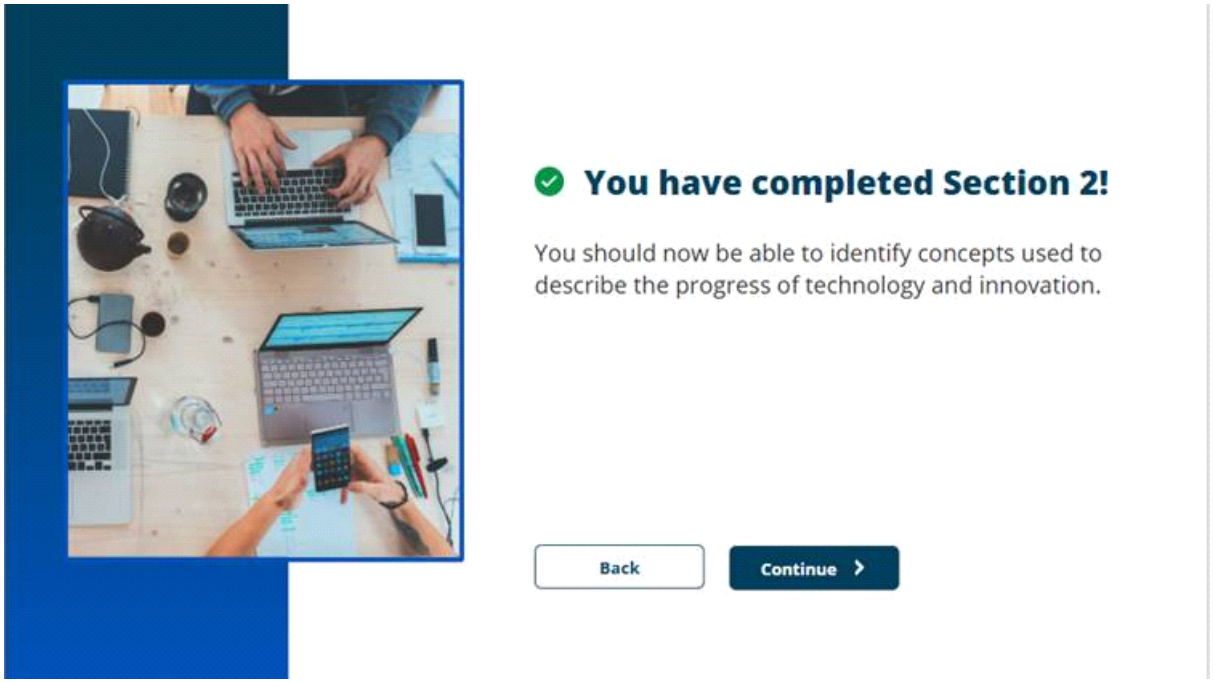


Within the next decade, how many sensors are estimated to be connected in the Internet of Things?

- One billion
- One million
- (•) One trillion

Submit

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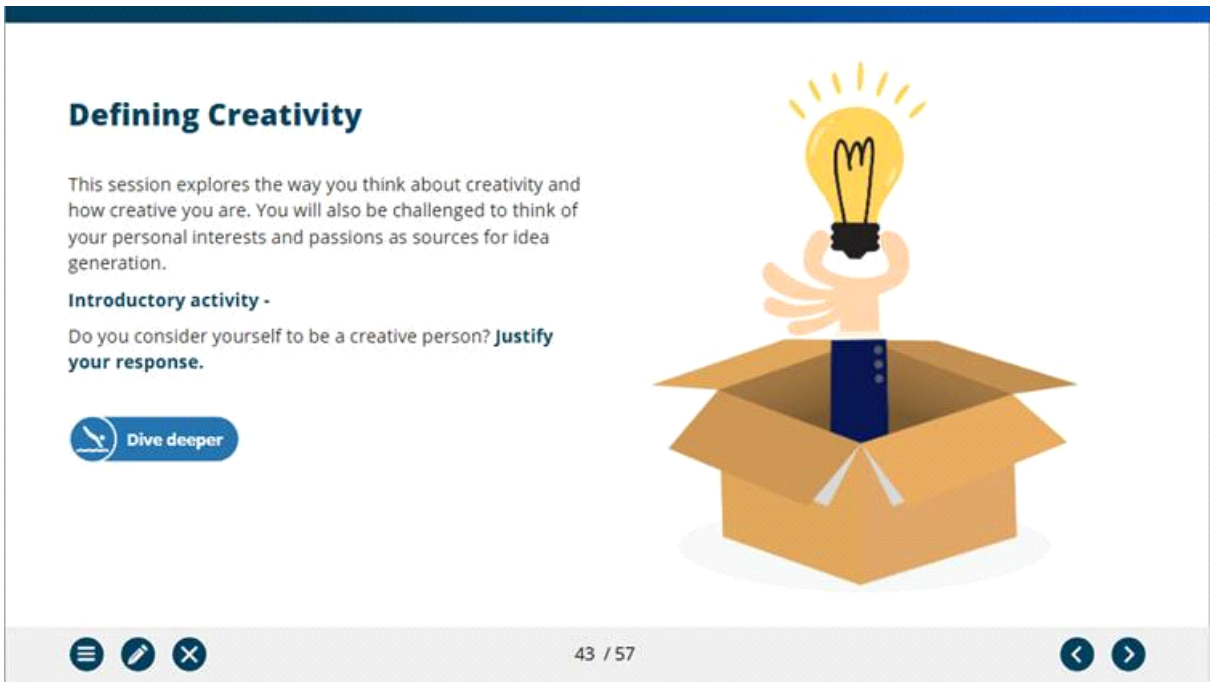


Section 3: Creativity and You

Defining Creativity

Engagement

The following slides are key sections of information.





Dive deeper: Creating data solutions within my career is vital in displaying data to various stakeholders throughout the business. To ensure data is displayed as necessary, it's important to be clear, concise and direct but creativity is required.

To tackle problems and generate creative solutions is a key skill to have within the field of big data.

Engagement

The following slides are key sections of information.

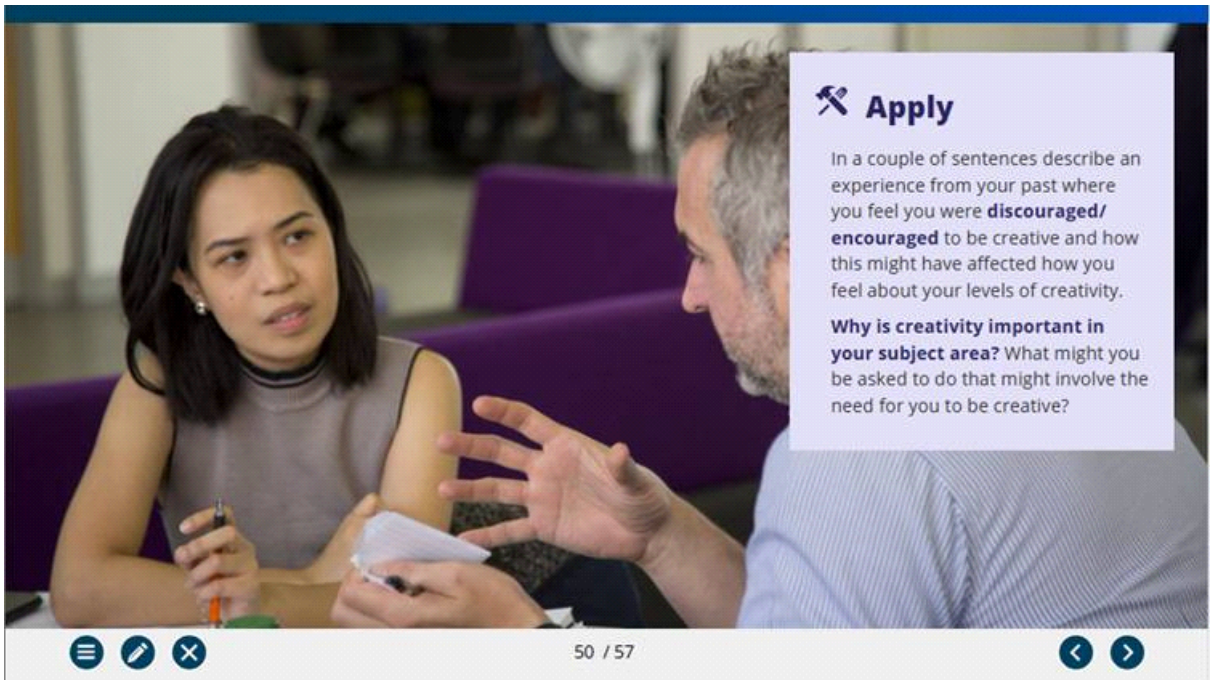




Discussed in the video above are concepts of how during education people are taught to become less creative and make less mistakes.

Apply

The following slides are key sections of information.



Experience when I've been discouraged:

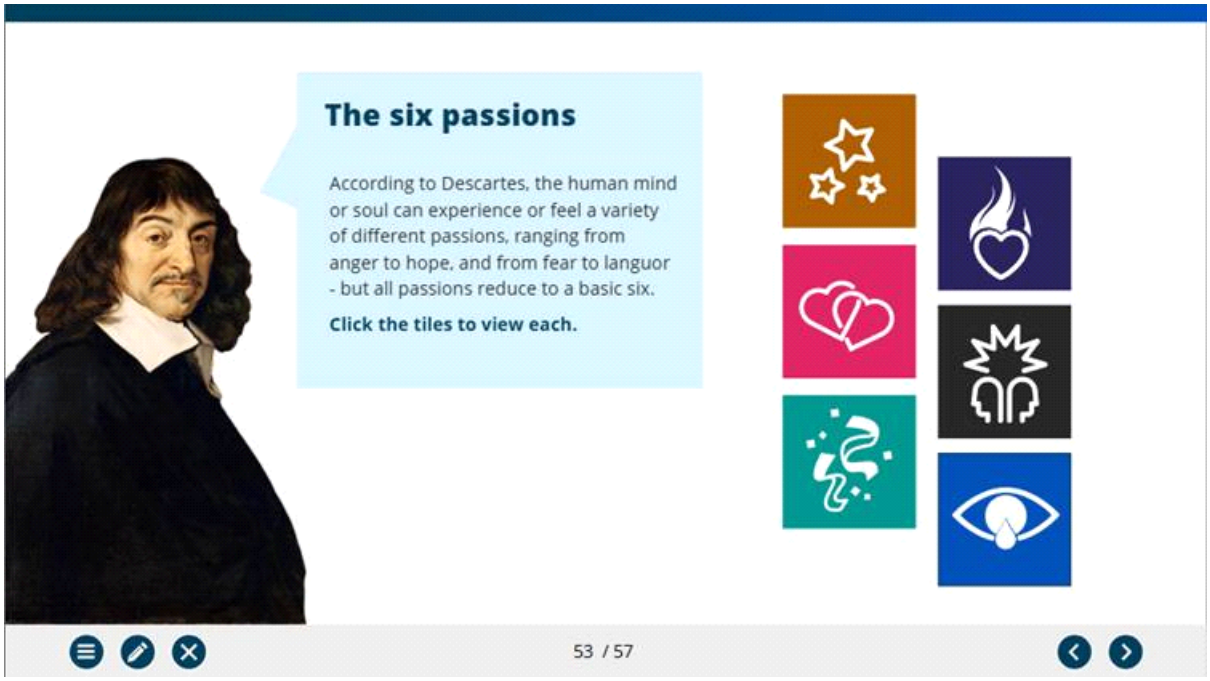
- I wanted to expand my scope in work as an apprentice to cover another department as the department I worked for and this other department were soon to merge. This coverage of another department was required but too big of a task at the time. I felt like this blocked my creativity.

Experience when I've been encouraged:

- Work: after completing projects and progressing through apprenticeship.
- University: while completing my studies I've experienced encouragement from

managers and the university staff.

- Switching careers: supported from my family, friends and managers.



The six passions discussed, according to Descartes, are as follows:

Wonder.

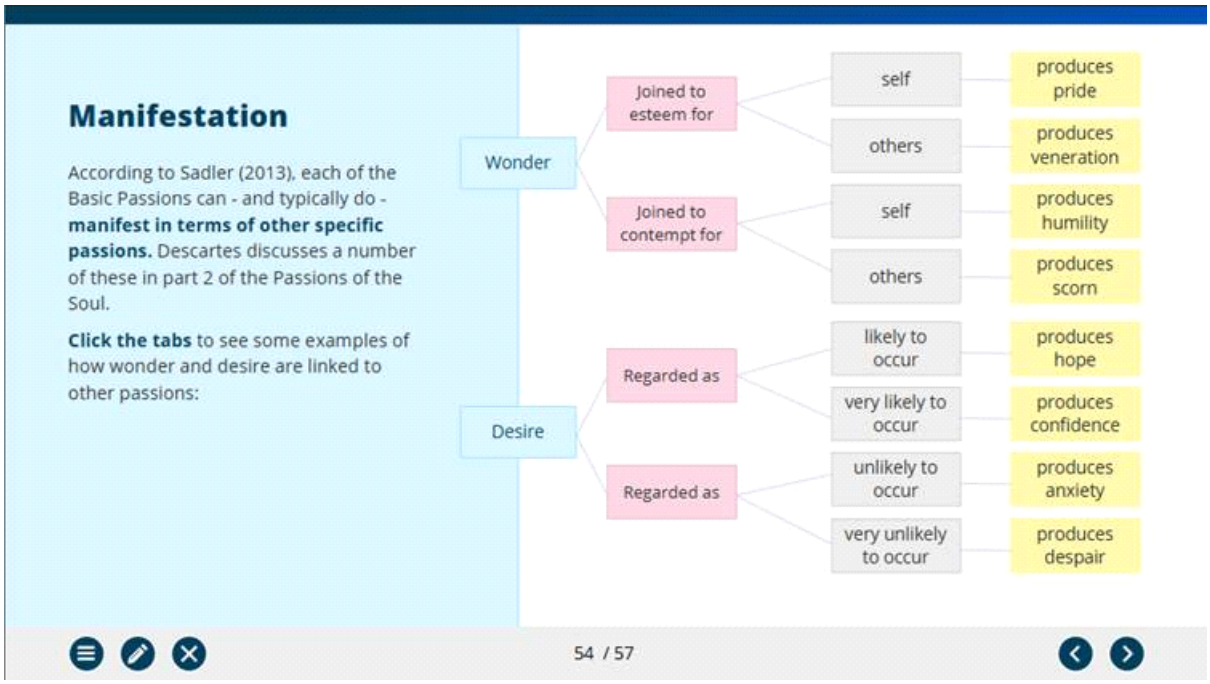
Desire.

Love: opposite of hatred

Hatred: opposite of love

Joy: opposite of sadness

Sadness: opposite of joy



From this section I've come to understand myself capable of creativity and it has drawn out passion areas as sources for my idea generation. Creativity has driven evolutionally impact from business, industry and society.

Read:

/Reflective practices Hargreaves J

/Tools for valuating research Nardi PM

/"Turner, E. (2020) Be Less Zombie: How great companies create dynamic innovation, fearless leadership and passionate people"

Task 1: Mind map

Choose project either on a passion or a career-driven project.

Q1

Unit 1 Topic 1 areas/concepts

- Unit 1 Topic 1
  - AI driven platforms related to:
    - Study, entertainment, communication and IT2
  - Technologies that are changing the world
    - Computing capabilities
    - Big Data
    - Digital heath
    - The digitisation of matter
    - The internet of things (IoT)
    - Blockchain
    - Wearable technology.
  - Innovation
  - Creativity

Personal interest related to computing (software development)

Using the six passions, I'll discuss project ideas.

- The six passions
  - Wonder: mental health chatbot for students.
  - Desire: a study assistance app with machine learning.
  - Love: a coding app to allow people to learn coding by using drag and drop elements.
  - Hatred: hatred of online misinformation; a fact checking app, browser extension to assess content validity.

    - Joy: educational mini games.
    - Sadness: Smart waste tracking app using IoT.
- Big data
    - Effects of COVID on university, Tata Steel works, NHS.
    - Tata Steel works.
        - Steel rolling process data.
        - Site attendance before and after company changes.
        - Environmental/H&S performance and data tracking.
            - Governance and Systems.
                - Site data entry, display/visualisation, export platform.
                - Permit/Licence tracker for ease of display across site.
                - Data dump platform. Allows users to quickly upload data in any format.
                - Objective tracking platform where each site can update their objectives monthly.
                - Document management system.
            - Waste and land.
                - Waste tracking across Tata Steel UK sites.
                - Land and tank data tracker.
                - Site of Special Scientific Interest (SSSI).
            - Water, effluent and legionella.
                - Legionella data tracking across Tata Steel UK sites.
                - Effluent analytes analysis.
                - Water invoice tracker.
            - Emissions monitoring.
                - Individual site planned emissions monitoring tracker.
                - Analyte tracker.
            - Air Quality.
            - Radiation.
            - H&S data and information tracking.
                - Mobile app for H&S assistance.
            - Strategic Capex data tracker for all needs including environmental, H&S, performance etc.
    - University.
        - Big data dashboard for university energy usage.
            - Possibly using IoT.
        - Student finance application webpage to ensure the student receives the highest grant (or loan) possible.
        - Job application software that applies to multiple jobs at once.
            - The front end can appear to be like Tinder where you swipe left/right to jobs that you like.
    - Data cleaner and formatting tool.
- Web and mobile app development.
    - Fitness and health tracker.
- Software development and innovation.
    - Projects involving software in enabling new technologies.
- Data analytics and visualisation.
    - City/town wide population/pollution tracker.
- Data science and machine learning.
- Cybersecurity.
- Finance and trading.
    - An app that follows the US/UK politician stock market trades and allows users to link brokerage accounts to follow automatically with their trades based on set behaviours.
- My passion ideas
    - Movie transcript word count and dialogue analyser.

- An app that supports elderly, children, and non-tech-savvy individuals with technological issues.
  - Elderly-friendly mode: emails, technology set up, online banking.
  - Child-friendly mode: gamified tutorials, cartoon-style explainer videos.
  - Non-tech-savvy mode: forums and community help, in app diagnostics for common problems, assistance via AI chatbot.

Sources

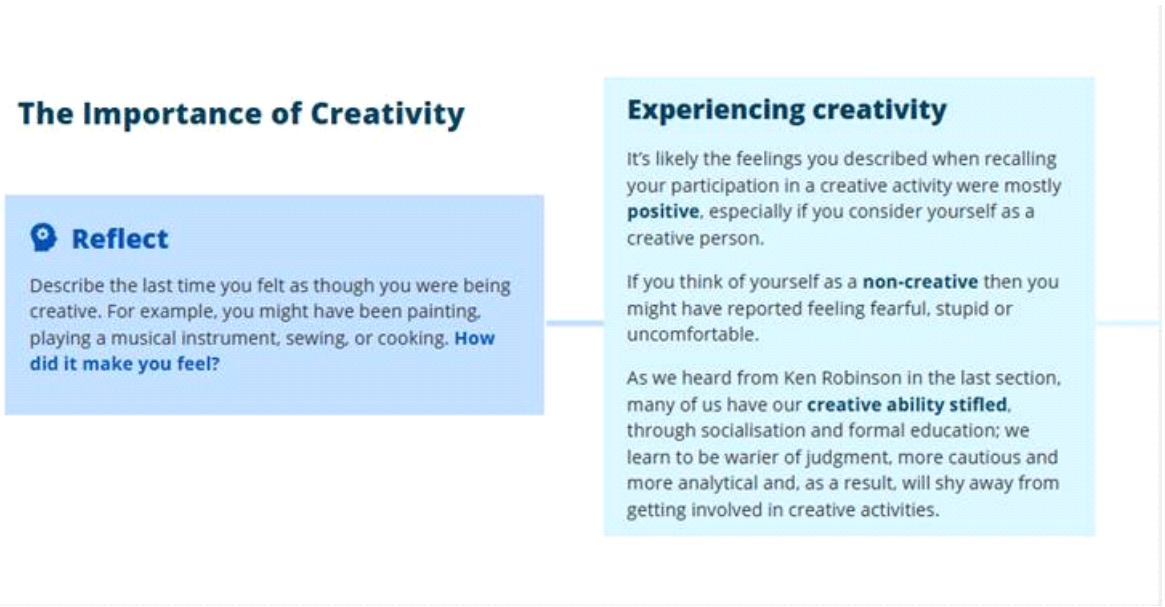
- Unit 1 Topic 1
  - AI driven platforms related to:
    - Study, entertainment, communication and IT
  - Technologies that are changing the world
    - Computing capabilities
    - Big Data
    - Digital heath
    - The digitisation of matter
    - The internet of things (IoT)
    - Blockchain
    - Wearable technology.
  - Innovation
  - Creativity

Unit 1 topic 2

Section 1: Creativity & Well-being

Reflect

The following slides are key sections of information.



I was designing code. It made me feel inquisitive and gave me energy.

Engagement

The following slides are key sections of information.

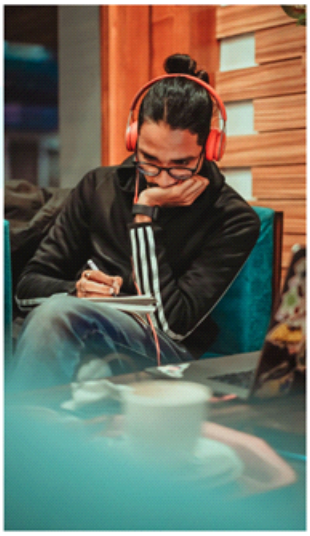
The BBC Arts Great British Creativity Test

Even a small amount of creativity can help you cope with modern life, reveals new research by BBC Arts and UCL

In the largest study of its kind, with almost **50,000 participants**, the BBC Arts Great British Creativity Test, in partnership with UCL, explored how creative activities can help us manage our mood and boost wellbeing.

Led by **Dr Daisy Fancourt**, UCL Senior Research Fellow and former BBC Radio 3 New Generation Thinker, the Great British Creativity Test research shows there are three main ways we use creativity as coping mechanisms to control our emotions:

1. a **distraction tool** - using creativity to avoid stress
2. contemplation tool - using creativity to give us the mind space to **reassess problems** in our lives and make plans
3. a means of **self-development** to face challenges by building up self-esteem and confidence



A study carried out by the BBC of 47,924 participants reveals creativity can benefit mental health, benefit problem solving and builds self-esteem and confidence.

Creativity and Your Wellbeing

Lower psychological wellbeing **significantly impacts** on student learning and experience, whilst **good wellbeing can lead to better learning and performance**. There is evidence that engagement in creativity can help in the achievement of positive, flourishing experiences that improve feelings of wellbeing.

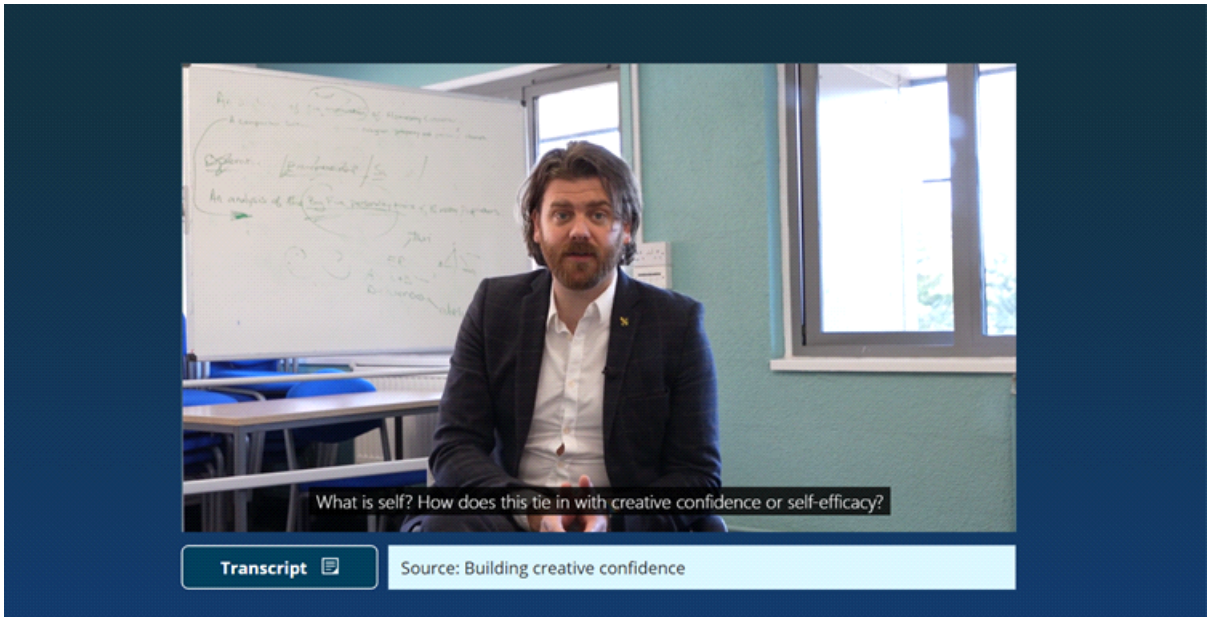
Some research, published by the University of Derby, found that:

"Rather than hoping that creativity emerges over time, this might be the most effective starting point for any educational experience. After all, if students and academics within the academic community are confident in their creativity, resilience and wellbeing will undoubtedly follow. If creativity and wellbeing are fully developed, universities can perform more effectively as a power source for creativity and wellbeing in communities and society."

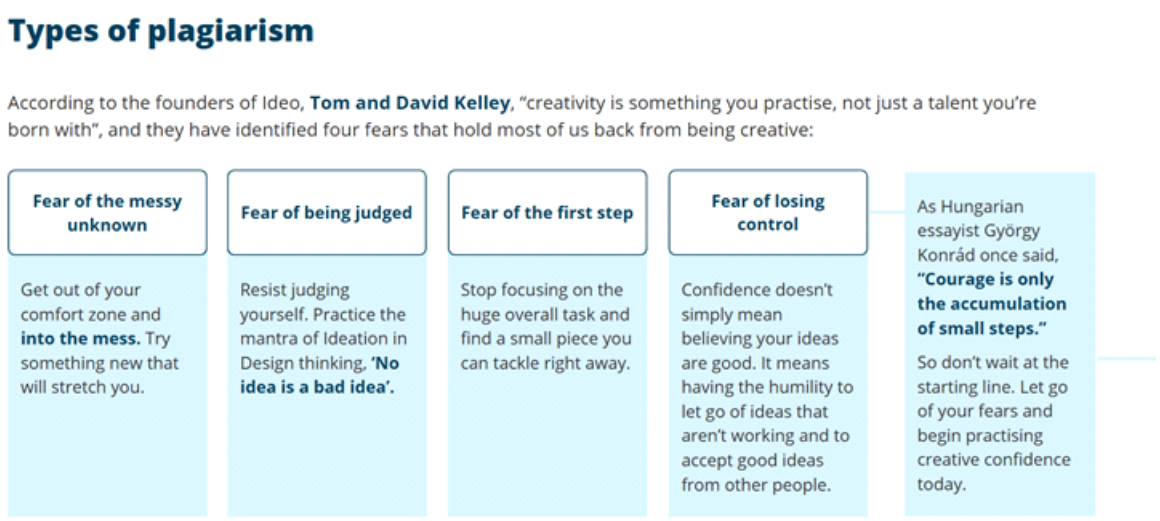
It is therefore essential that opportunities for being creative are provided as part of your University experience, even in those disciplines where creativity might not be an obvious bedfellow.

From transcendence to general maintenance: Exploring the creativity and wellbeing dynamic in higher education

Within this topic the idea of "play" is discussed to encourage the creativity. Further conversations are discussed about the following:



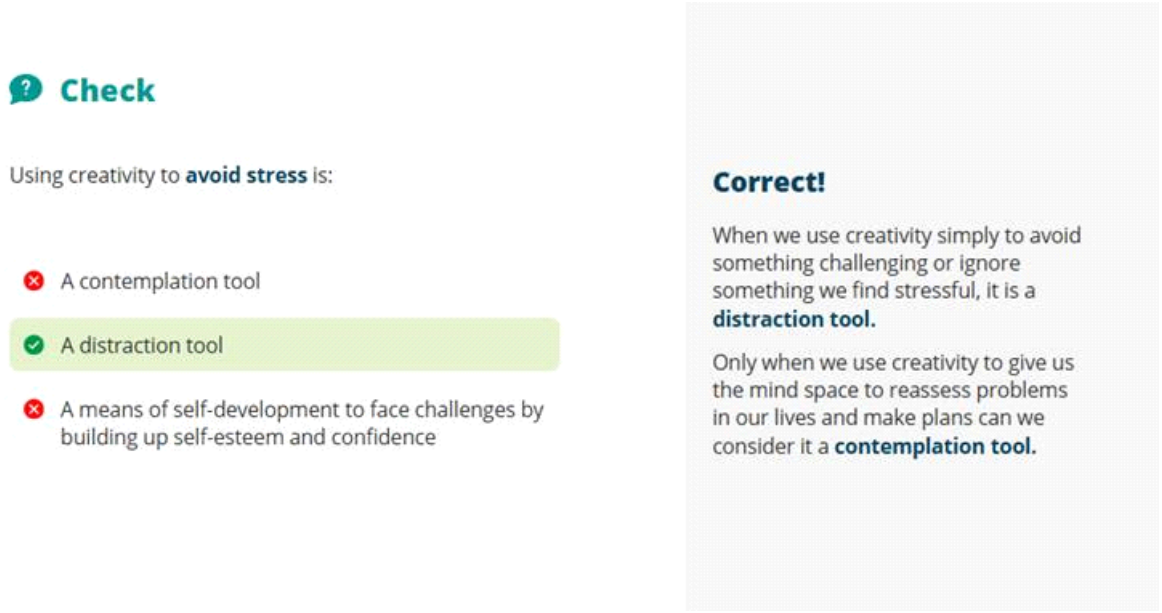
Creative confidence is the ability to express ideas freely without fear of judgment, and it's crucial for wellbeing because it helps us navigate emotions and pursue goals without being held back by self-doubt. Self-efficacy, closely tied to creative confidence, is the belief in our ability to manage emotions and challenges without adopting limiting beliefs that stifle our potential. To build creative confidence, we must first challenge our limiting self-beliefs, embrace failure as part of growth, and take small, consistent steps with curiosity and openness rather than chasing perfection.



The image outlines four common fears that block creativity: fear of the messy unknown, fear of being judged, fear of the first step, and fear of losing control. Overcoming these involves stepping out of your comfort zone, suspending self-judgment, starting small, and being open to change and collaboration. As György Konrád said, "Courage is only the accumulation of small steps," reminding us that creative confidence grows through consistent, fearless practice.

Check

The following slides are key sections of information.



Recognise how your philosophy impacts your investigations

Section 2: Hold a conversation that can confidently include the definitions of

, Epistemology and Axiology

Objective Ontology: Reality exists independently of individuals, as a fixed system that can be studied without considering personal influence.

Subjective Ontology: Reality is shaped by personal experience and perceptions, making it fluid and dependent on the observer.

Epistemology : How do we gain knowledge?

Foundationalism: Knowledge is built on a few core truths that cannot be doubted, often explored through scientific, quantitative methods.

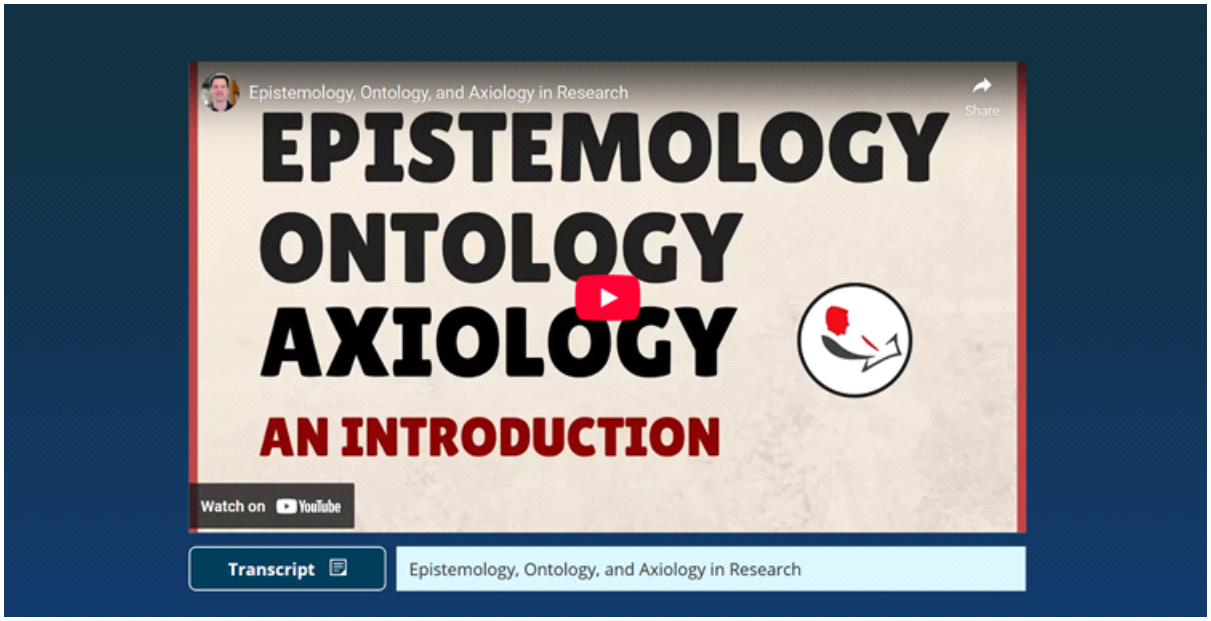
Coherentism: Knowledge is valid when it logically fits within a web of beliefs, usually developed through qualitative methods like interviews.

Pragmatism: Knowledge is judged by what works in practice, accepting that truth can vary based on context and utility.

Axiology: What values guide our research?

Ethics: Studies what is morally right or wrong, guiding responsible and respectful research practices.

Aesthetics: Examines the nature of beauty and sensory experience, interpreted through science, culture, or the arts.



The video continues about through these topics.

Epistemology is the study of knowledge, how we come to know what we know, and it underpins research methods: for example, objective knowledge aligns with surveys and statistics, while experiential knowledge supports methods like ethnography.

Ontology is the study of existence and reality, what we believe about human nature and our role in the world, shaping whether research focuses on individuals, social systems, free will, or structural forces.

Axiology is the study of values, what we consider good, ethical, or worthwhile, and it questions whether research should be neutral or strive to improve society, revealing how personal beliefs influence the research process.

Continuing:

1. Foundationalism Definition: Knowledge is built on a few self-evident truths that cannot be doubted. Pro: It provides a clear and precise view of reality, allowing strong and logical conclusions. Con: If the base truth is flawed, the whole argument falls apart, especially in real-world applications like biology.

2. Coherentism Definition: Knowledge is valid if it fits logically within a consistent system of beliefs. Pro: It allows for flexibility by letting researchers keep useful parts of a theory even if one part fails. Con: Logical consistency can still support false claims, making it difficult to judge accuracy in misleading arguments.

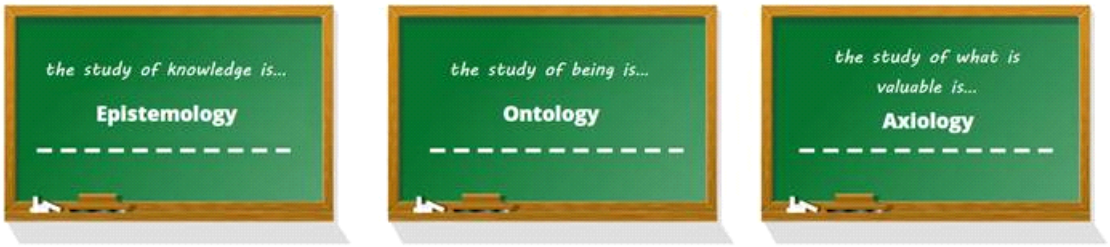
3. Pragmatism Definition: Truth is what works in practice and serves a useful purpose. Pro: It adapts to change and accepts that what is true can evolve over time based on new knowledge or context. Con: The idea of "what works" is vague and may lead to flawed decisions if usefulness is judged only in the short term.

Check

The following slides are key sections of information.

Check

If we were to translate the following words from Greek, what would they mean? **Drag each** of the three forms of philosophy to their correct definition.



The correct order is as follows:

The study of knowledge is... Epistemology

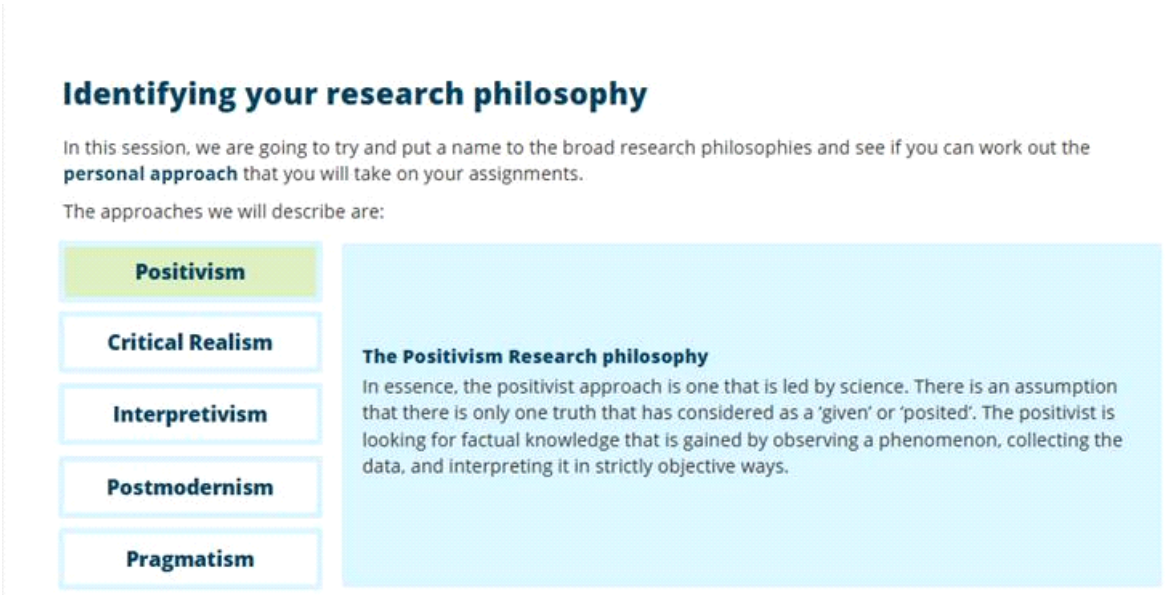
The study of being is... Ontology

The study of what is valuable is... Axiology

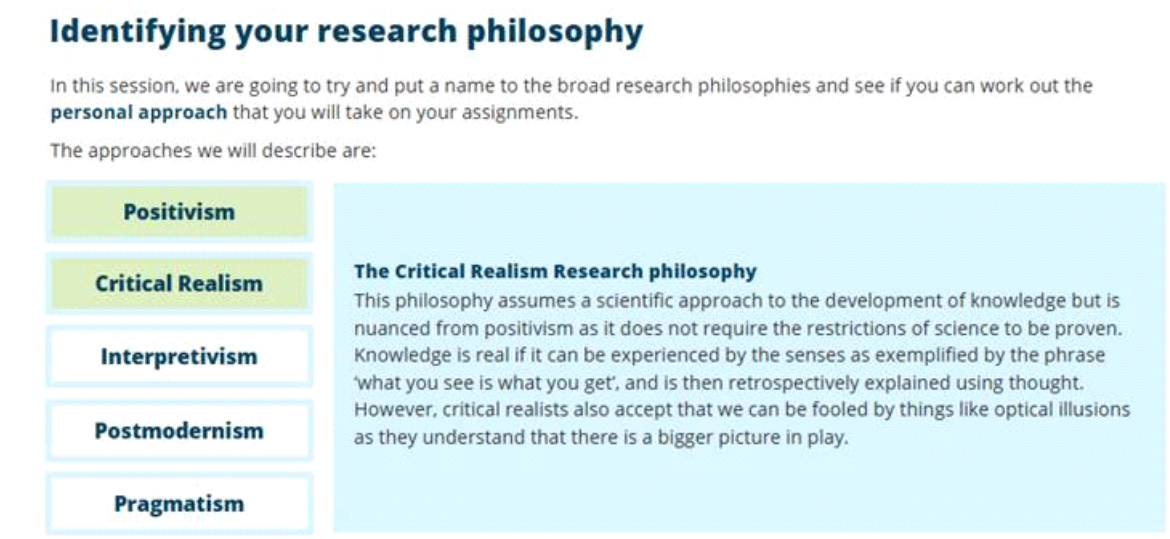
Section 3: Define your research philosophy using this terminology Understand how your philosophy can impact your investigation

Identify your research philosophy

Positivism



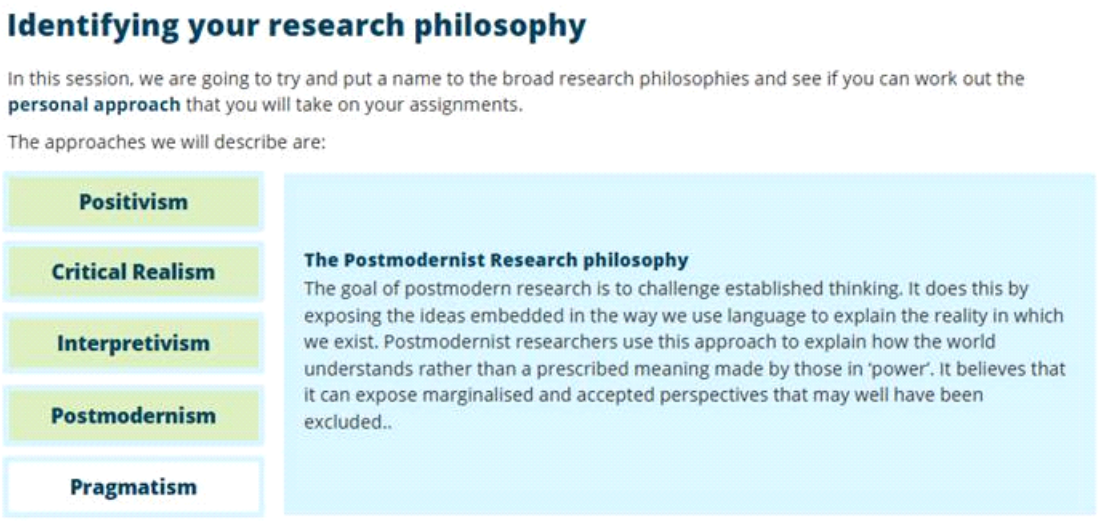
Critical Realism



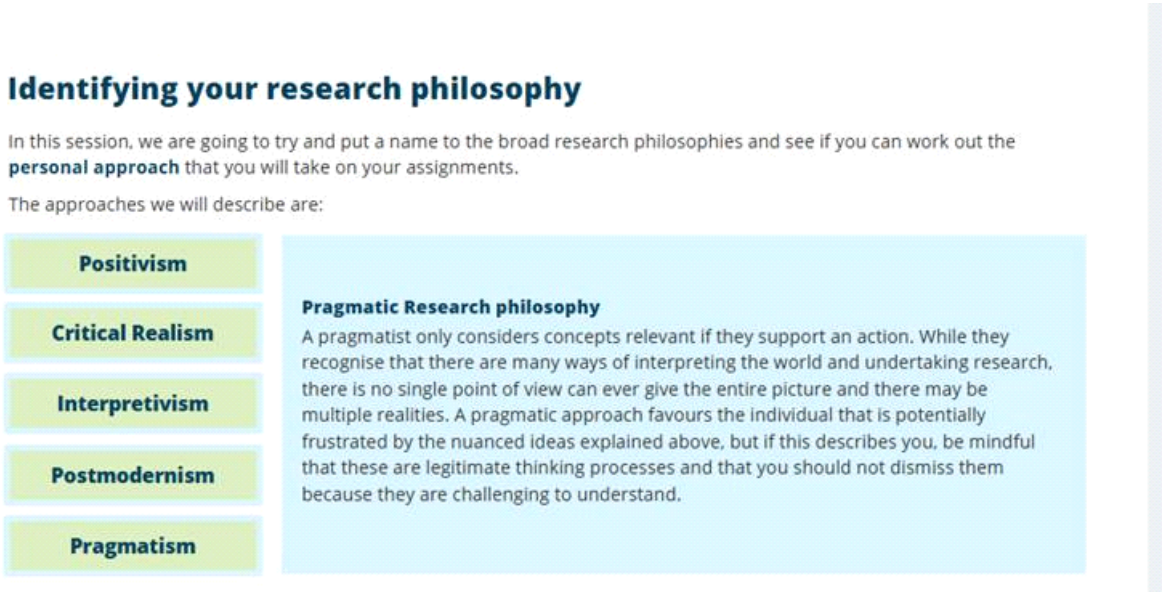
Interpretivism



Postmodernism



Pragmatism



Reflect

The following slides are key sections of information.



The aspects I agree with are a selection of each.

Further reading

Further reading

To support your learning from this lesson, have a look at the following resources.

- From transcendence to general maintenance: Exploring the creativity and wellbeing dynamic in higher education.
- Why more play is the key to creativity and productivity
- Creative Confidence: Unleashing the Creative Potential within Us by David Kelley and Tom Kelley.
- Chapter 4 Understanding research philosophy and approaches to theory development *Available from the UWTSD library.*
- Saunders, M., Lewis, P. & Thornhill, A. (2012) "Research Methods for Business Students" 6th edition, Pearson Education Limited



Unit 1 Topic 3: The Known Knowns

Section 1: Selecting an appropriate database

Engagement

The following slides are key sections of information.

Researching the Known and the Unknown

Using this matrix, we can further explore the idea of an **unknown known.** This is knowledge for which we are unaware but if we were aware, we would know the reasons behind it.

An example for your research would be to expose pieces of research that few people are aware of. Alternatively, your research could transplant an idea from one domain into another context.

Finally, an **unknown unknown** is a thing for which Rumsfeld was ridiculed.

	knowns	unknowns
knowns	***Known Knowns*** Things we are aware of and understand.	***Known Unknowns*** Things we are aware of but don't understand.
unknowns	***Unknown Knowns*** Things we understand but are not aware of.	***Unknown Unknowns*** Things we are neither aware of nor understand.

Evaluating accuracy and suitability of sources

Evaluating Information

When you search for information, you are going to find a lot of it. What you must consider whether it is **trustworthy**, **accurate** and **suitable** for your assignment? How do you know it is going to be good?

The **CRAAP test** is a useful checklist that can help you evaluate the credibility and relevance of the information you find.

CRAAP is an **acronym** that you use to frame your judgment before including the material in your research.

Click the lettered tabs to see more information.

C **Currency.** Is the material recent? Has it been superseded by more recent newer information? Newer information is generally perceived to be better.

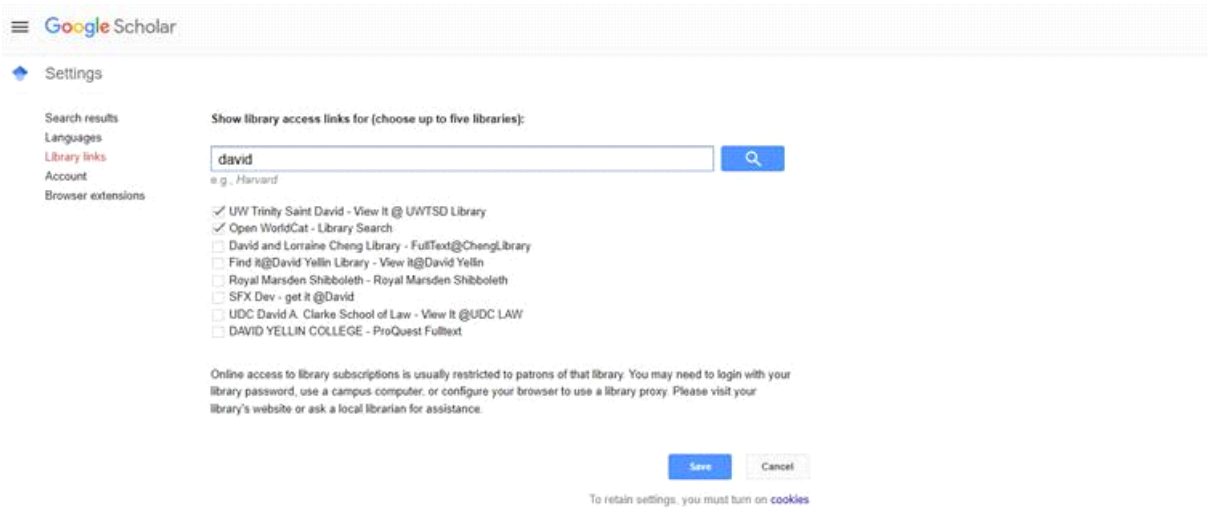
R **Relevance.** Does it relate to your work? Think about the audience it was written for and consider if it matches your audience. While doing this think about the level it is written at.

A **Authority.** Does this material have credibility? Who wrote and published it? Was it sponsored by a person or individual that may have an ulterior motive?

A **Accuracy.** In your mind, is this material true? It could do this by demonstrating some evidence it may be supported by statistics. Did someone else check it before publication. Peer reviewed content is material that has been reviewed by someone before it was allowed to appear in the real world.

P **Purpose.** Before using the material, consider what it has been written for. It may have been created to sell something; it could be there as a piece of entertainment meant to make people laugh.

As instructed, when using Google Scholar you can indicate to the site which university your from to get accurate results.



Reflect

Yes, I use this	Name	Information
◉	*ERIC*: Education Resources Information Center	
○	Google Scholar *and* Google Books	
○	Internet Archive Scholar	
○	JSTOR	
○	Project Gutenberg	
◉	PubMed	
◉	ResearchGate	
○	Semantic Scholar	

ERIC Institute of Education Sciences

The **Education Resources Information Center** is an online digital library of education research and information.

It provides access to 1.5 million bibliographic records and is available to the general public. One of its main aims is to provide education research to improve teaching, learning, and educational decision-making.

Reflect

Here is a list of some of the **most popular databases** for academic study.

Which ones do you use? **Select the buttons** of that you do use.

For databases that you don't know, **click their name to see more.**

Can you think of any other databases? Share any that aren't listed here on your **Moodle** forum.

You can also share any comments about the websites here and how you find their usability.

Other useful databases are ScienceDirect.

Section 2: Using Boolean search strategies for identifying research.

Key Tips

Search 2-4 key words.

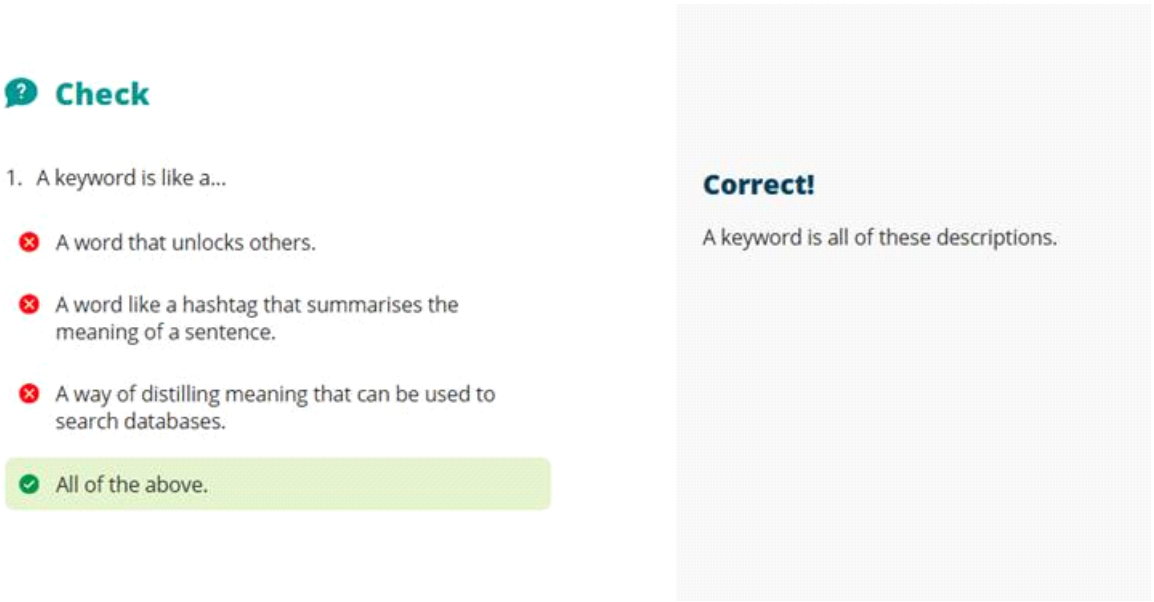
Use quotations to have multiple keywords into one.

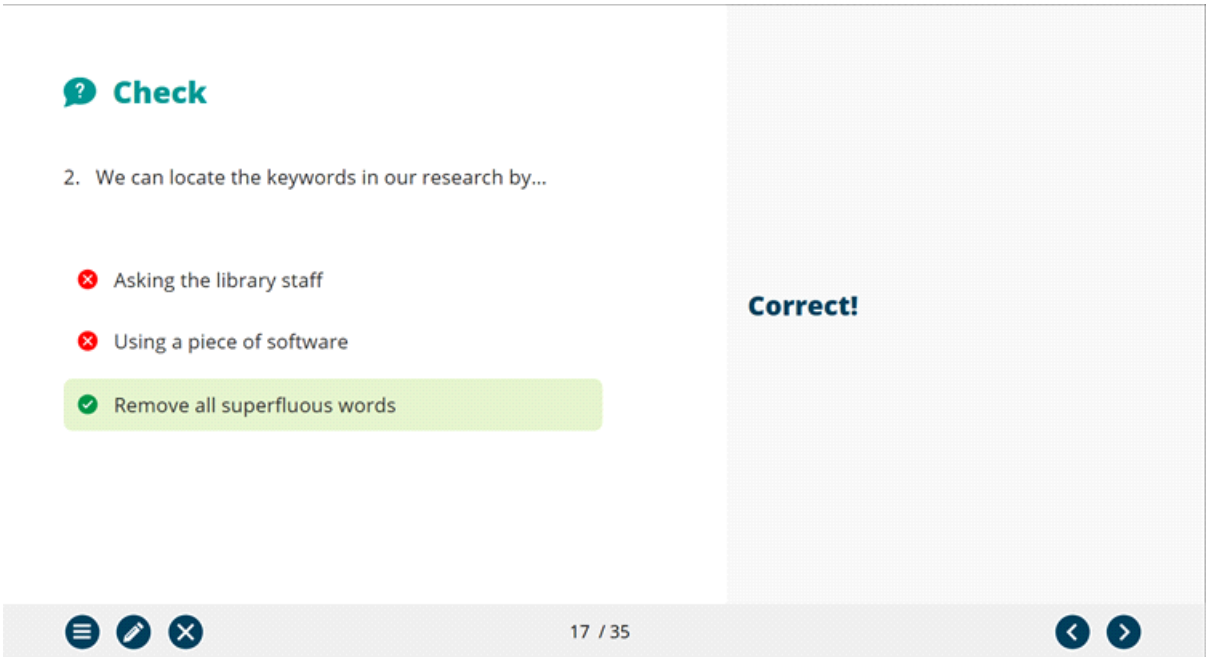
Use * (asterisk/wildcard).

Boolean operators: AND, OR, NOT e.g. musician NOT ‘Ed Sheeran’.

Finding more keywords: using alternative words.

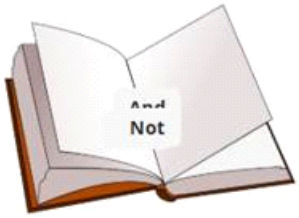
Check





Check

3. Drag all the correct common Boolean operations to the book. Drag the incorrect options into the bin.





Correct

Section 3: Develop a systematic approach to identifying themes for literature search.

Engagement

Being overwhelmed

Have you ever been in a situation that you have **too many options to consider?**

When starting your literature review it can be quite daunting to consider the **amount of material** that is available even with (or because of) the tools that are accessible from the library with their Boolean search facilities.

'Analysis paralysis' is the practice of becoming stalled in the decision-making process in such a way that nothing is ever decided.

Often, tools like the ones that you are given by UWTSD, such as the ones described previously from the library, have us **circling around the problem** without committing to developing actual assets.

One way of dispelling analysis paralysis is to use what is called a **concept map.**



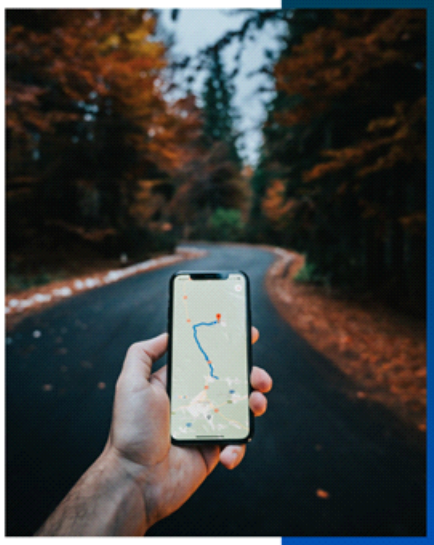
Understanding concept maps

When we look up the word concept, we find it is an **abstract idea or a general notion.** A map is a guide that helps us when we become lost.

It is the generality of the notions that can sometimes make us feel overwhelmed.

To reduce these overwhelming feelings, it is wise to try to slow down our thinking and **approach the problem a small step at a time** and reduce the generality into specific notions.

It is these specific notions that will form the **direction of our research.**



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Understanding concept maps

Concepts are only introduced to the chart with a strictly linked proposition that joins one notion to another. Always remember the purpose of you diagram is to **ORGANISE** your ideas and form the way you will conduct your research.

The approach we call **concept mapping** is to expose **concepts** and **propositions**.

A proposition is the academic term used to describe **how two concepts are joined**. When we have a shape to our concepts and propositions we have a better idea of the literature that we should review.



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The Basic Building Blocks of a Concept Map

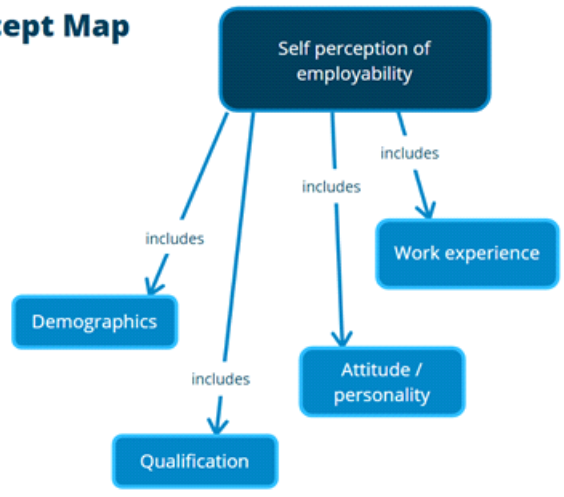
The idea of a concept map is to draw **as simple a diagram as you can** that organises your thoughts. A complex map will simply overwhelm. When your chart starts to feel complex, **revise it down.**

A way of maintaining simplicity is to limit your map to one page and **ONLY use three units** to make up the diagram.

Each unit will have a single purpose.

Shapes ✓	is used on top of the arrows to explain the relationship.
Arrows ✓	
Text ✓	

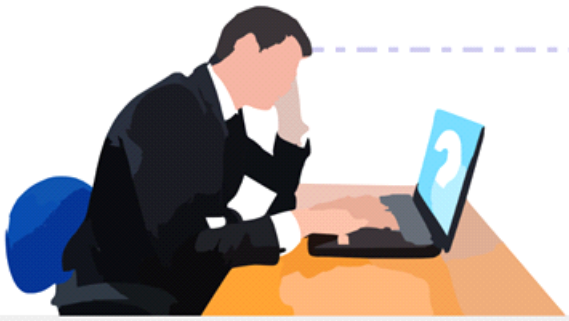
Click the tabs to see how each forms part of a concept map.



The steps to making a concept map

This example has been taken from a video by Lucid Software.
You can see the video for **further explanation** and try Lucidchart for free with your university email.

How to Make a Concept Map



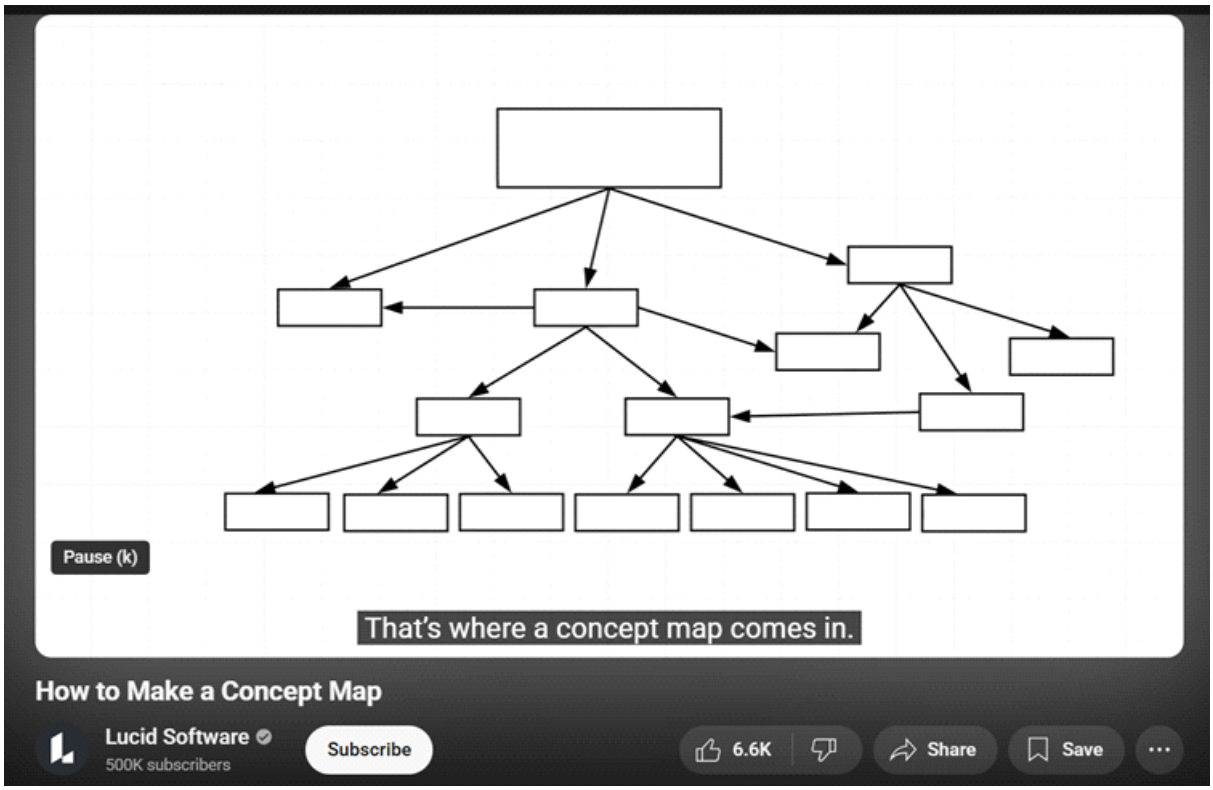
Apply

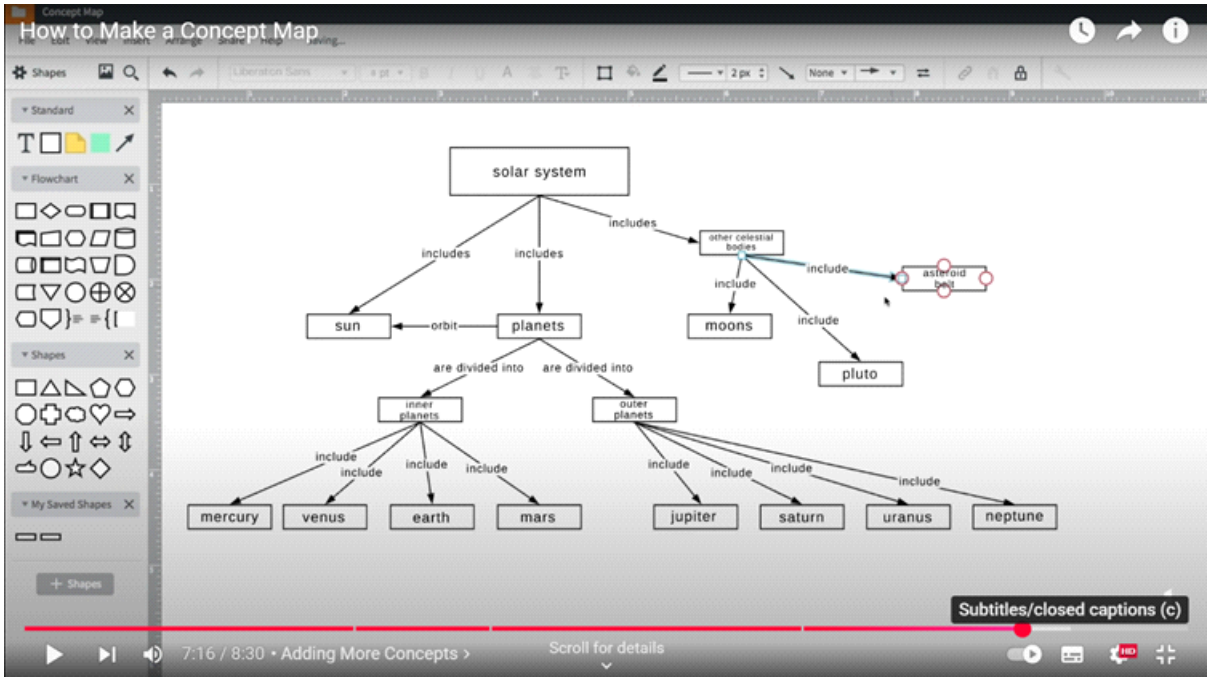
After watching the video, **create your own concept map.**

Use whatever you feel most comfortable with – an application like Microsoft Whiteboard, or a real whiteboard, or just pen and paper.

Try and identify **propositions** and **crosslinks**, and how these would apply to how you research.

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Rectangle: Concepts.

Arrows: Relationship between concepts.

Text: Used to describe the relationships between concepts.

Proposition: two concepts linked with a description

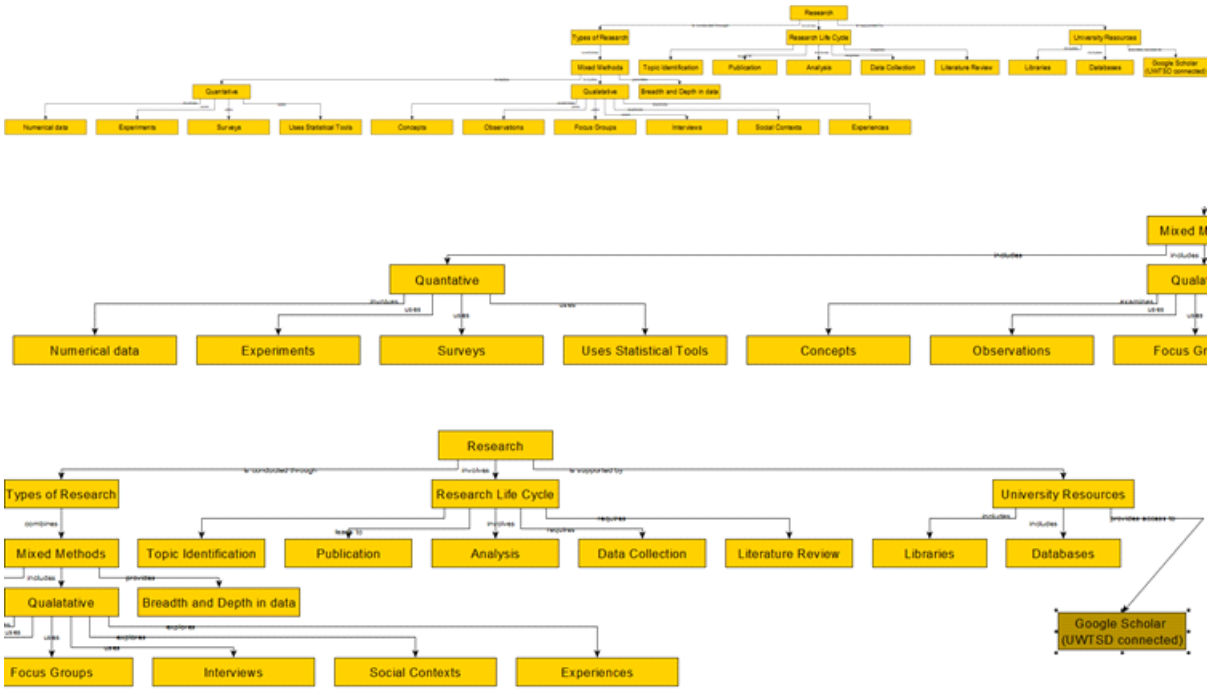
Cross links: descriptions between sub categories/sub concepts

Typically form your map around one question

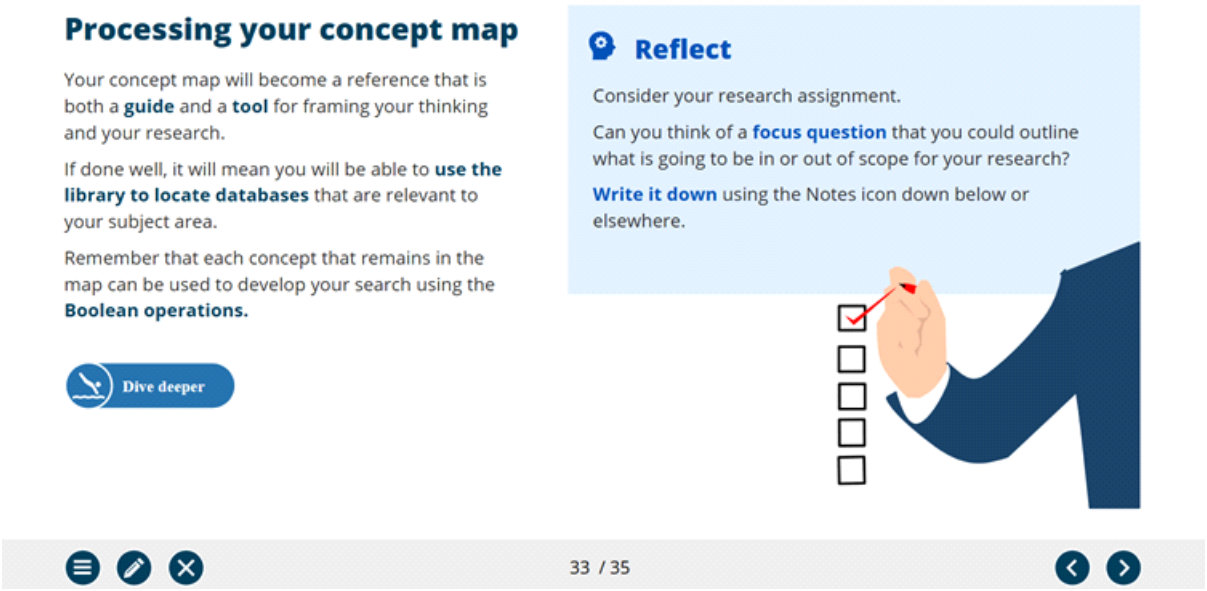
Use a ‘Car Park’ method to place words related to the subject on one side of the page.

Another software is called ‘yEd’

YEd Concept map



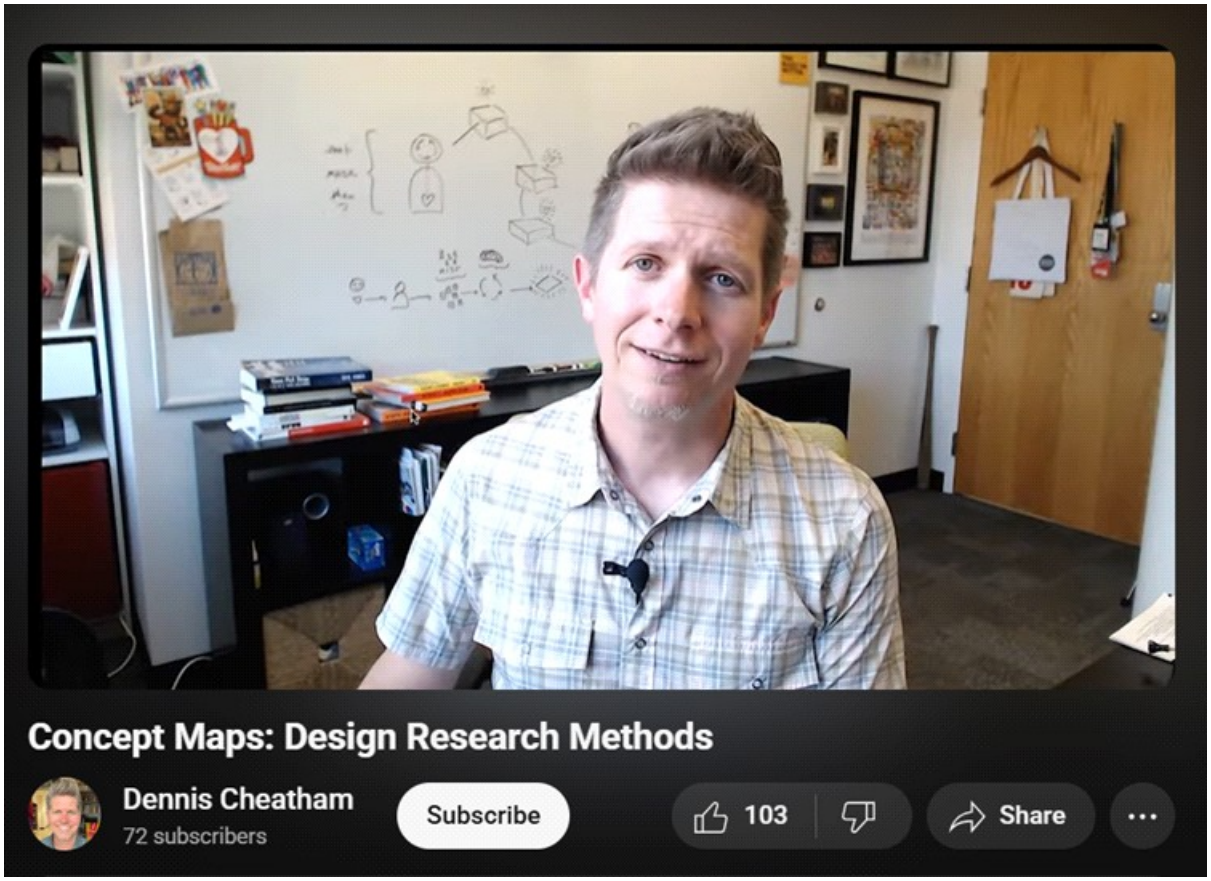
Reflect



To design and develop a digital fitness platform that integrates IoT wearables, Big Data analytics and gamification to enhance user motivation, promote physical and mental wellbeing and encourage social accountability in fitness participation.

In scope: wearable technologies, behavioural approaches towards users, health benefits for users.
Out of scope: household technology.

Dive Deeper



The video describes how concept maps read as sentences as appose to mind map which has no direction.

Initiated around a research question i.e. How do we cultivate a spirit of exploration and advancement in a culture of convenience?

Expand end points from previous notes, to delve deeper into the topic.

The end result should be; take your research question, figure out all the moving parts, visualise them one step at a time within the concept map to drive the research project.

Unit 1 Topic 4

Section 1: Finding themes for your literature review

Section 1

Finding themes from your literature review

Upon completion of this section, you will develop an understanding of how to formulate a **quality research question**.



Back

Start ›

Reflect

You have come to university to study a particular subject, but what is the **area of interest** that has caused you to take time to study this?

Enter your answer into the box below. You will revisit this later.

Coding & Software Development



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Making your research interesting

One definition of research is that it is an attempt to illustrate a **problem** and then suggest how it can be **addressed**.

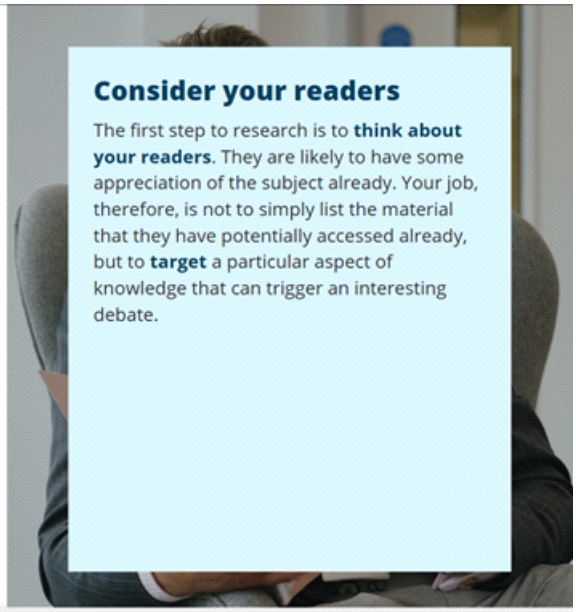
Select each of the tabs below to reveal further information on the best approach to meaningful research.

Consider your readers

Keep it brief

What interests you?

A word of warning



Consider your readers

The first step to research is to **think about your readers**. They are likely to have some appreciation of the subject already. Your job, therefore, is not to simply list the material that they have potentially accessed already, but to **target** a particular aspect of knowledge that can trigger an interesting debate.

3 / 50

Making your research interesting

One definition of research is that it is an attempt to illustrate a **problem** and then suggest how it can be **addressed**.

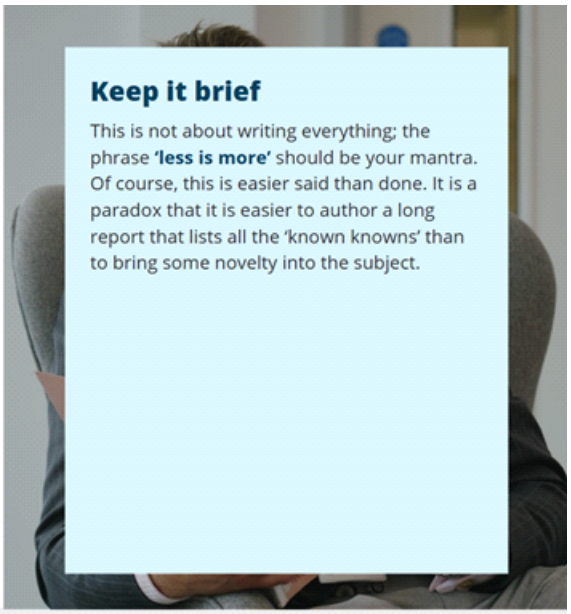
Select each of the tabs below to reveal further information on the best approach to meaningful research.

Consider your readers ✓

Keep it brief

What interests you?

A word of warning



Keep it brief

This is not about writing everything; the phrase **'less is more'** should be your mantra. Of course, this is easier said than done. It is a paradox that it is easier to author a long report that lists all the 'known knowns' than to bring some novelty into the subject.

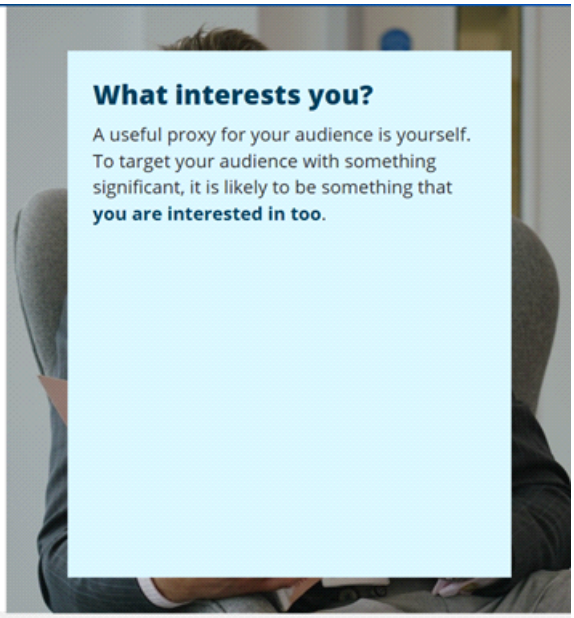
3 / 50

Making your research interesting

One definition of research is that it is an attempt to illustrate a **problem** and then suggest how it can be **addressed**.

Select each of the tabs below to reveal further information on the best approach to meaningful research.

- Consider your readers ✓
- Keep it brief ✓
- What interests you?
- A word of warning ›



What interests you?

A useful proxy for your audience is yourself. To target your audience with something significant, it is likely to be something that **you are interested in too**.

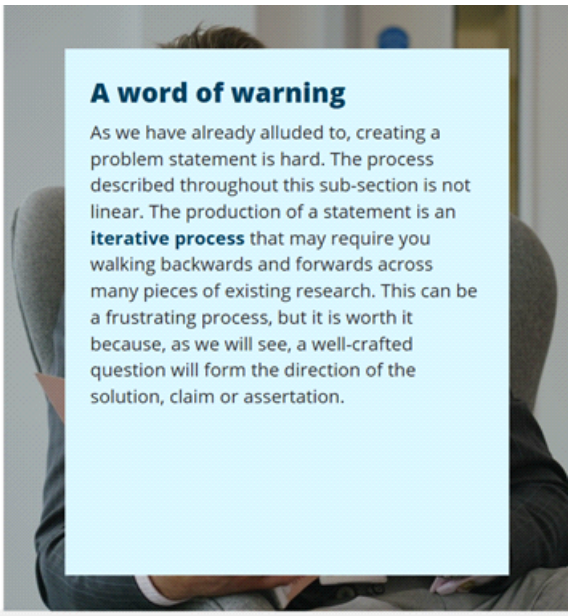
3 / 50

Making your research interesting

One definition of research is that it is an attempt to illustrate a **problem** and then suggest how it can be **addressed**.

Select each of the tabs below to reveal further information on the best approach to meaningful research.

- Consider your readers ✓
- Keep it brief ✓
- What interests you? ✓
- A word of warning



A word of warning

As we have already alluded to, creating a problem statement is hard. The process described throughout this sub-section is not linear. The production of a statement is an **iterative process** that may require you walking backwards and forwards across many pieces of existing research. This can be a frustrating process, but it is worth it because, as we will see, a well-crafted question will form the direction of the solution, claim or assertation.

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Creating a research question

As already mentioned, your research question needs to bring something **new** to the audience. The ambition in your research is to create a question that **identifies** a gap in the existing knowledge base and **suggest** ways that it could be addressed.

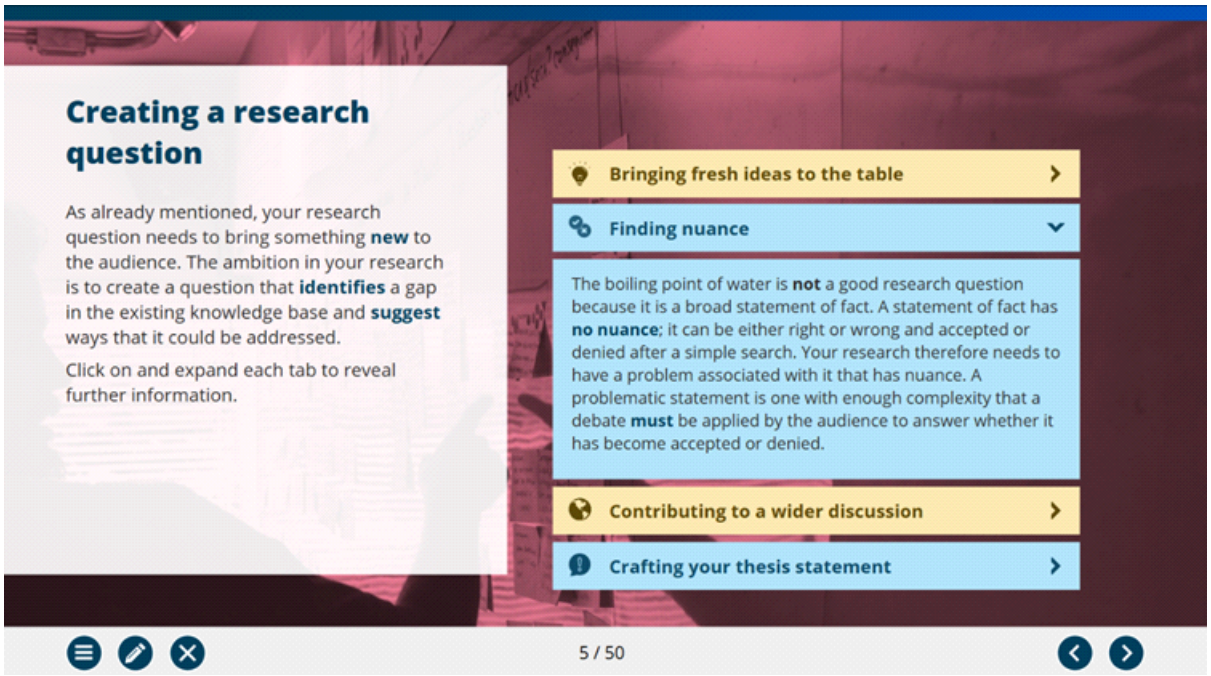
Click on and expand each tab to reveal further information.

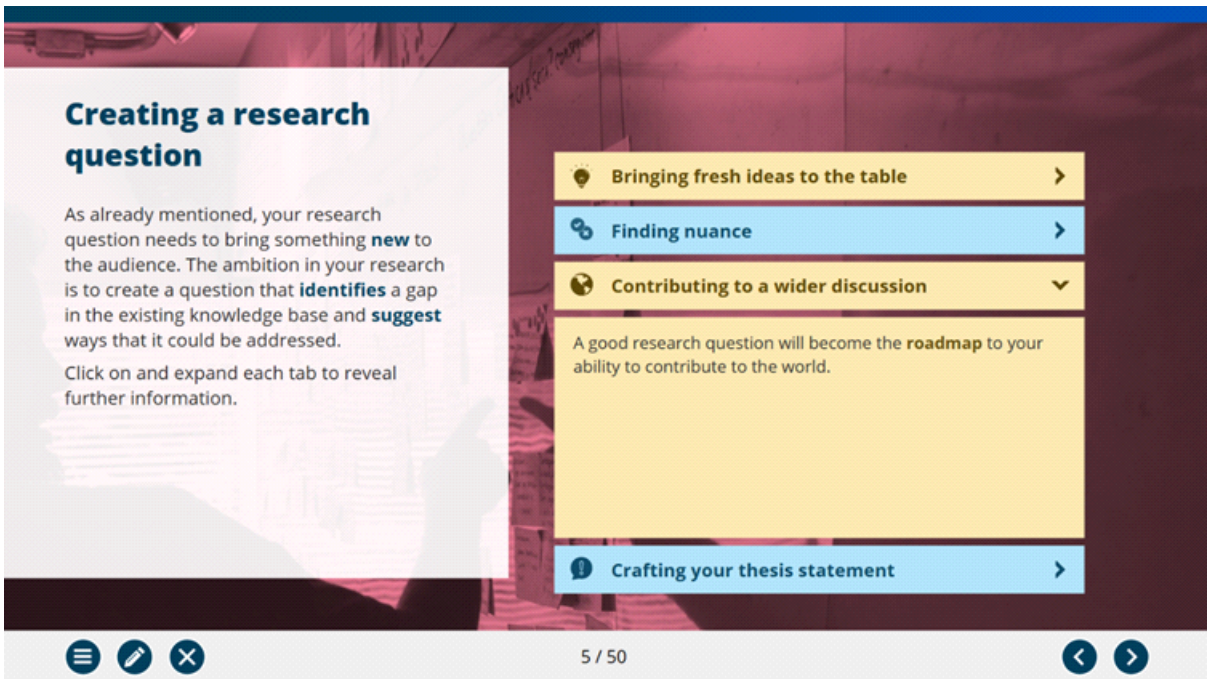
- Bringing fresh ideas to the table ⌄

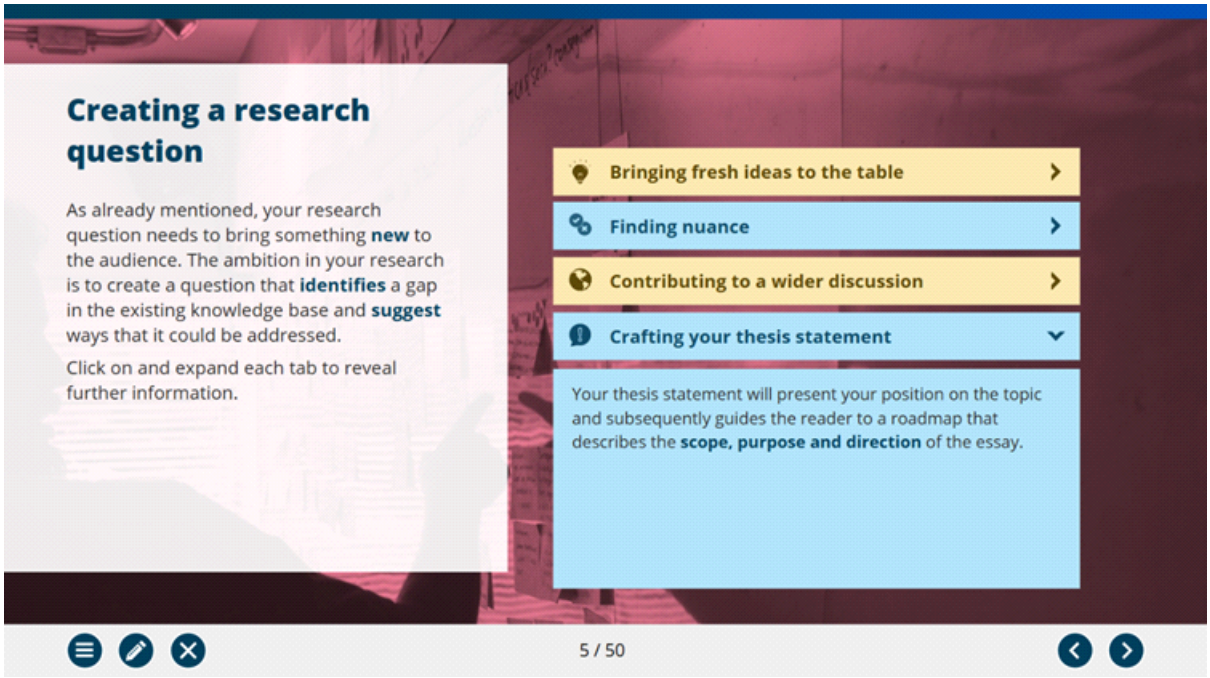
Bring something **new** to the audience means it cannot just be found by a simple search on Google. A research question needs to be what is known as **problematical** or **inspiring** of debate. For example, you could not write a piece of research on the boiling point of water. A simple Google trawl will find that it is 100 degrees centigrade.

- Finding nuance ›
- Contributing to a wider discussion ›
- Crafting your thesis statement ›

5 / 50

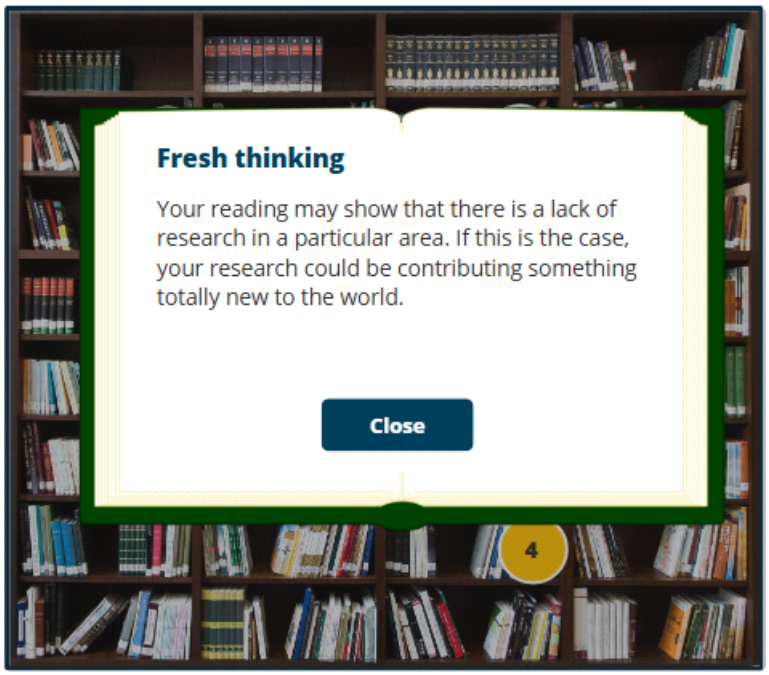

Creating a research question
As already mentioned, your research question needs to bring something new to the audience. The ambition in your research is to create a question that identifies a gap in the existing knowledge base and suggest ways that it could be addressed.
Click on and expand each tab to reveal further information.
Bringing fresh ideas to the table
Finding nuance
The boiling point of water is not a good research question because it is a broad statement of fact. A statement of fact has no nuance; it can be either right or wrong and accepted or denied after a simple search. Your research therefore needs to have a problem associated with it that has nuance. A problematic statement is one with enough complexity that a debate must be applied by the audience to answer whether it has become accepted or denied.
Contributing to a wider discussion
Crafting your thesis statement
5 / 50


Creating a research question
As already mentioned, your research question needs to bring something new to the audience. The ambition in your research is to create a question that identifies a gap in the existing knowledge base and suggest ways that it could be addressed.
Click on and expand each tab to reveal further information.
Bringing fresh ideas to the table
Finding nuance
Contributing to a wider discussion
A good research question will become the roadmap to your ability to contribute to the world.
Crafting your thesis statement
5 / 50

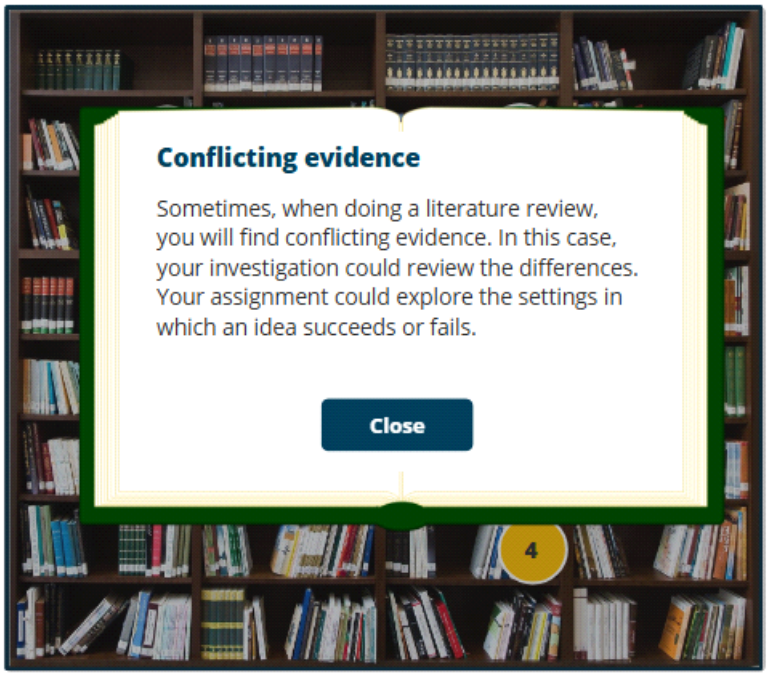


Areas of focus for your research question

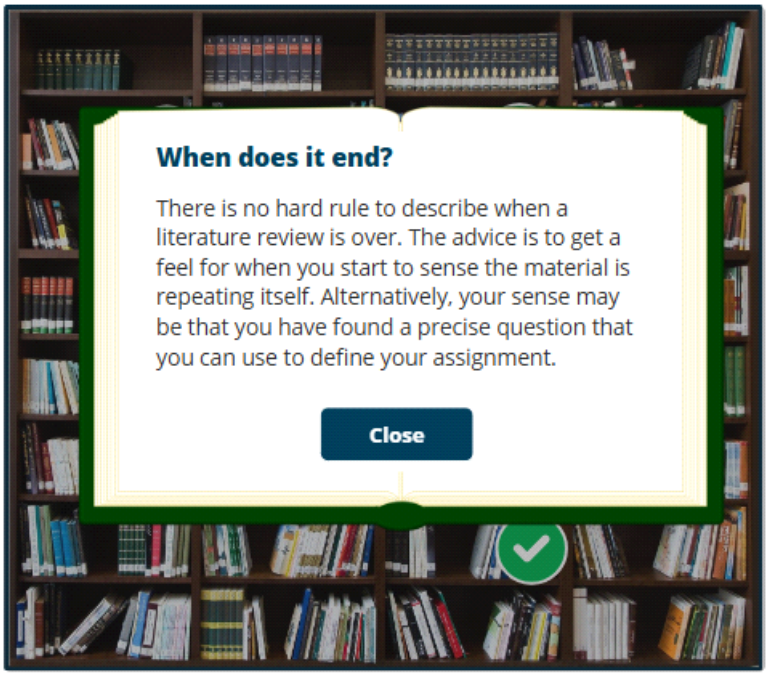
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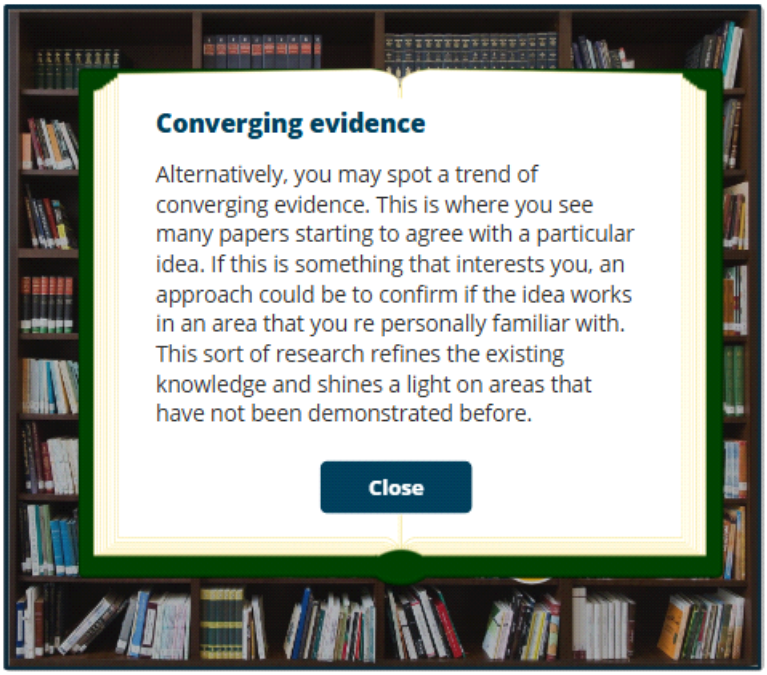


-


Conflicting evidence
Sometimes, when doing a literature review, you will find conflicting evidence. In this case, your investigation could review the differences. Your assignment could explore the settings in which an idea succeeds or fails.
Close
4

-


When does it end?
There is no hard rule to describe when a literature review is over. The advice is to get a feel for when you start to sense the material is repeating itself. Alternatively, your sense may be that you have found a precise question that you can use to define your assignment.
Close



-

Research Question

Your research question is the roadmap to your research, so it is important to make sure you have spent time working it out. It should be:

1. **Focused** on a single issue
2. **Specific** enough to be answered within the word count of your report
3. **Complex** enough to be answered without a simple trawl of the internet
4. **Relevant** in your field to be considered interesting
5. **Researchable** using primary and secondary data collection.

Check

Check

Question 1 of 3

Which of these are good research questions?

Read each set of questions as they appear below and select which you feel is the best research question of the two.

- What effect does the pandemic have on people's minds?
- What effect has the isolation of young adults had on their mental health?

Correct!

A is not specific enough. What effect? What people? Which pandemic? You can see with question B that data can be collected from primary and secondary sources and that the targets are clearly defined.

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Check

Question 2 of 3

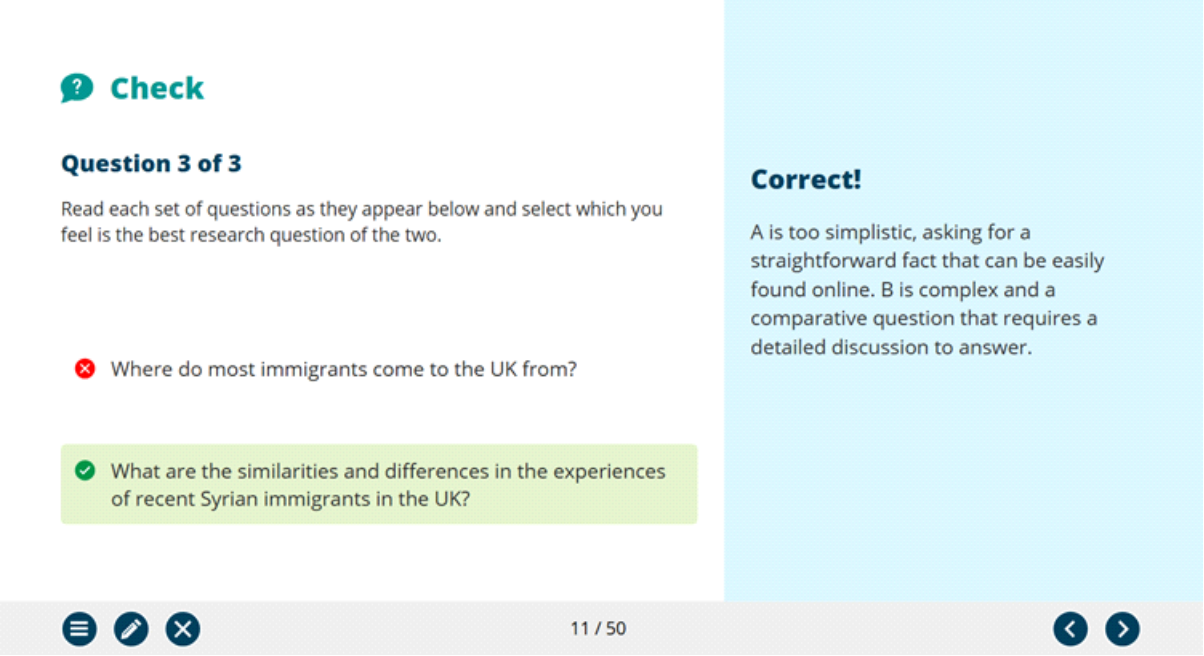
Read each set of questions as they appear below and select which you feel is the best research question of the two.

- What factors led to homosexuality being legalised in the UK in 1967?
- How do Welsh rugby fans relate to the LGTBQ+ movement since Gareth Thomas announced that he was gay?

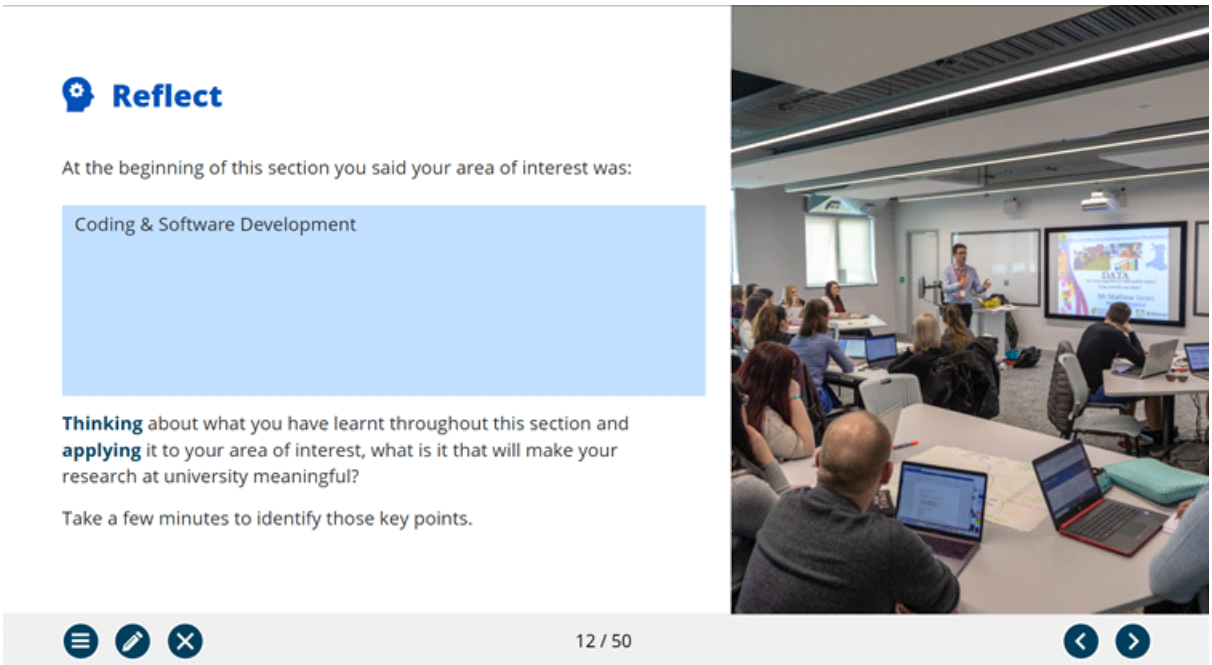
Correct!

A is too broad and has probably been researched already. B identifies an underexplored aspect of the topic that requires investigation.

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Reflect



The research at university will be meaningful as it will progress me towards my degree that boosts my performance at the workplace

Section 2 – Developing a Hypothesis

Developing a hypothesis should be sub questions under the main question that can be practically tested for answers to the main research.

Reflect

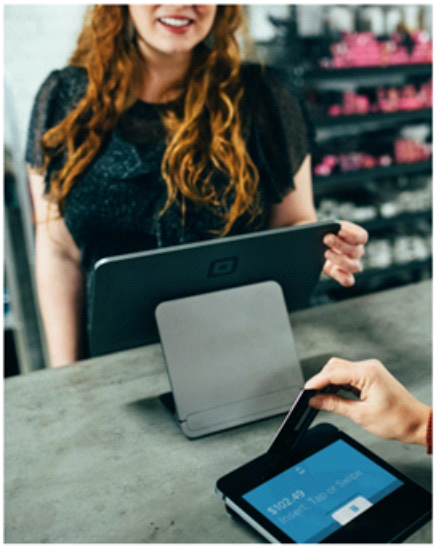
Reflect

Think back to when you made a purchase of something valuable. Maybe it was a pair of glasses, a car, a prom dress or suit. Reflect on the process that makes you decide whether to purchase it or not.

What did you do before parting with your money?

Submit your answers to the Word Cloud.

Review all answers on the World Cloud.



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I purchased my car. I discussed this with my parents and other people in my life, researched if there was better deals and then decided to buy the car.

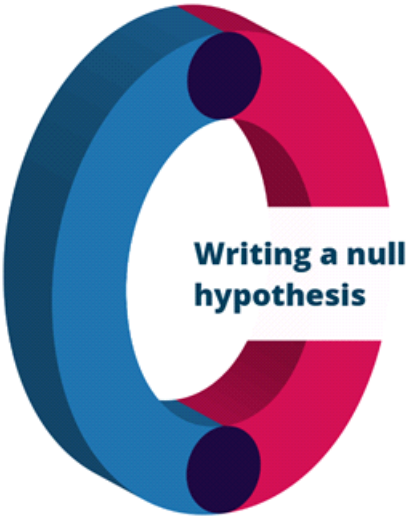
Developing tests for the question are hypotheses.

Phrasing your hypothesis

Select each of the drop-down tabs, to reveal further information on phrasing your hypothesis.

Phrasing as an IF___THEN statement	Phrasing as a correlation	Comparing two groups
In this approach to phrasing, you take the sentence structure of an **'IF THEN'** statement: '**IF** independent variable **THEN** result'. For example, if the car has five seats, then they are purchased by families who use their car on holidays.	In this approach, you spot a **correlation** where you state the **predicted relationship** between the variables. For example, cars with greater fuel economy are purchased more by families who use their car on holiday.	If you are comparing two groups, your hypothesis can state the **difference** you are expecting to find between them. For example, cars with low fuel economy are purchased less than cars with high fuel economy by people who holiday in their cars.

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If your hypothesis is using some statistics to analyse the question being answered, you will also have to write what the answer falls back to if **no association is found**. This default fallback position is called the **null hypothesis** and it is written with 'H0' before it. The subsequent tests are written with the number after it, (H1, H2, H3...). For example:

- **H0** a car's fuel economy has no effect on the purchase behaviour of people who use cars to go on holiday.
- **H1** cars with low fuel economy are purchased less than cars with high fuel economy by people who holiday in their cars.
- **H2** cars with low fuel economy are purchased more than cars with high fuel economy by people who holiday in their cars.

By using the null and at least one other hypothesis you can test your research question.

22 / 50

Example hypothesis

Select each of the research questions to reveal their **hypothesis** and **null hypothesis**. Try and apply one or all of these to your area of interest.

Research question	Hypothesis	Null hypothesis
What are the health benefits of eating an apple a day?	Increasing apple consumption in over-60s will result in decreasing frequency of doctor's visits.	Increasing apple consumption in over-60s will have no effect on frequency of doctor's visits.
Which airlines have the most delays?	Low-cost airlines are more likely to have delays than premium airlines.	Low-cost and premium airlines are equally likely to have delays.

23 / 50

Check

Check

Take a few moments to answer the following four questions to help reinforce your understanding of this section.

Question 1 of 4

True or false? A hypothesis is really a question that can be used to predict the outcome of your research.

- True
- False

Correct!

A hypothesis is really a question that can be used to predict the outcome of your research. Just like the example of buying a car, it frames an answer with a question that can be tested. As we have seen above, you may have several hypotheses that address different parts of your research.

Check

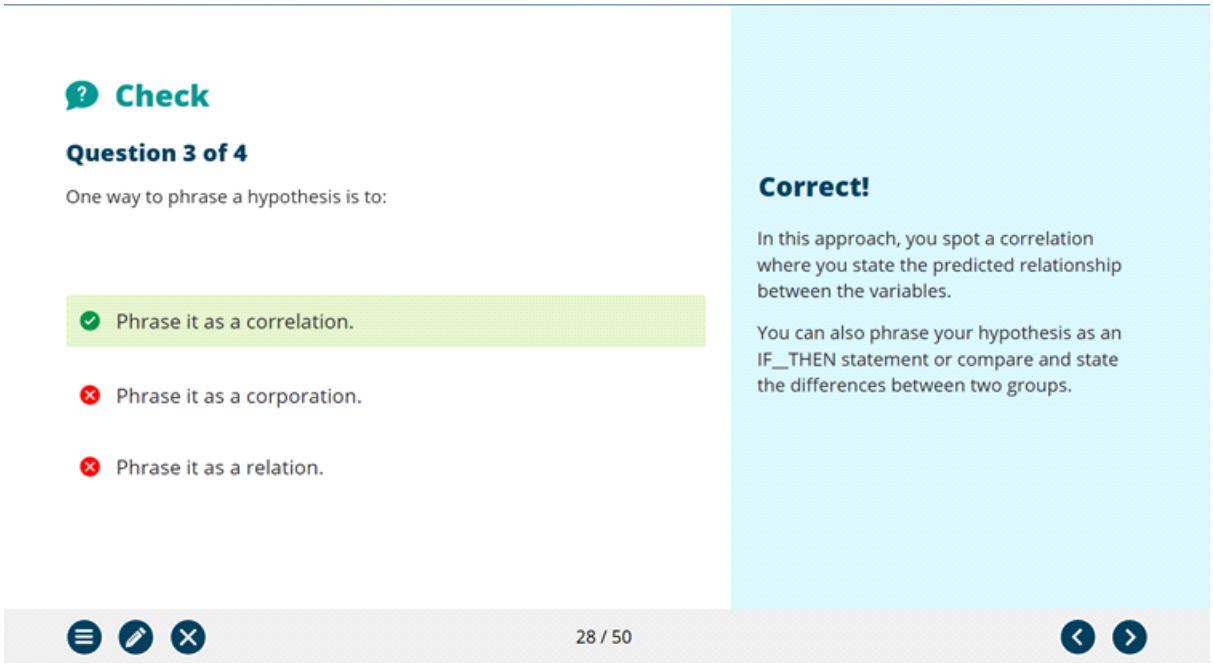
Question 2 of 4

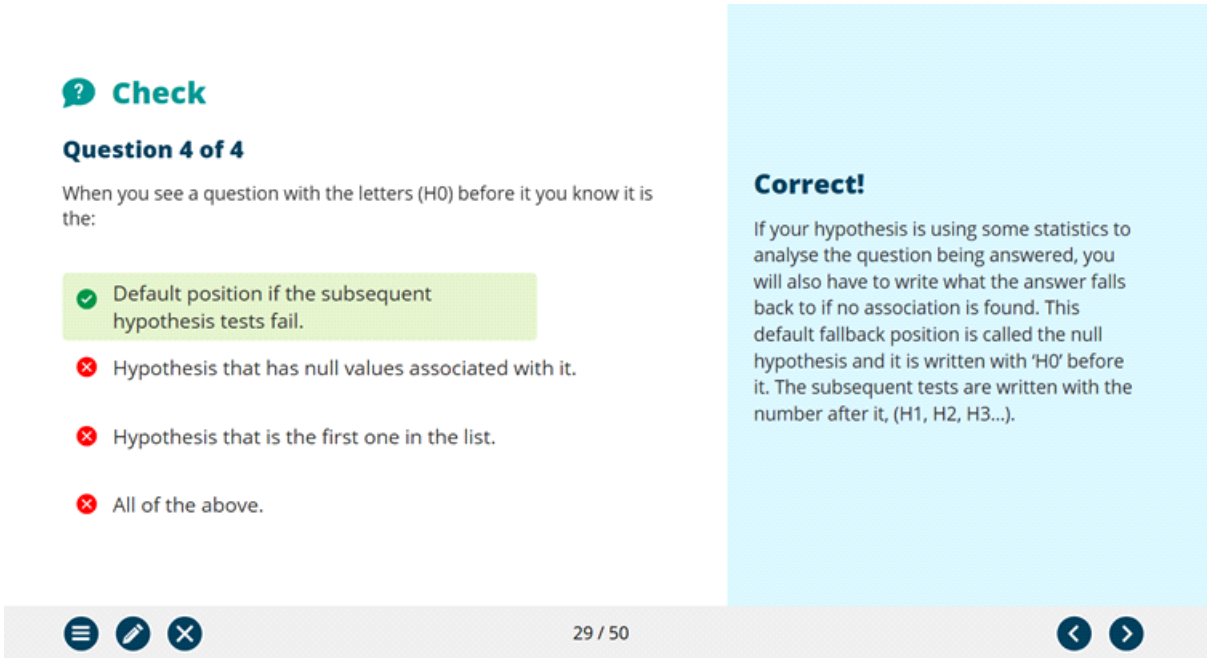
A good hypothesis should have the following:

- Relevant variables.
- A specific group.
- A predicted outcome.
- All of the above.

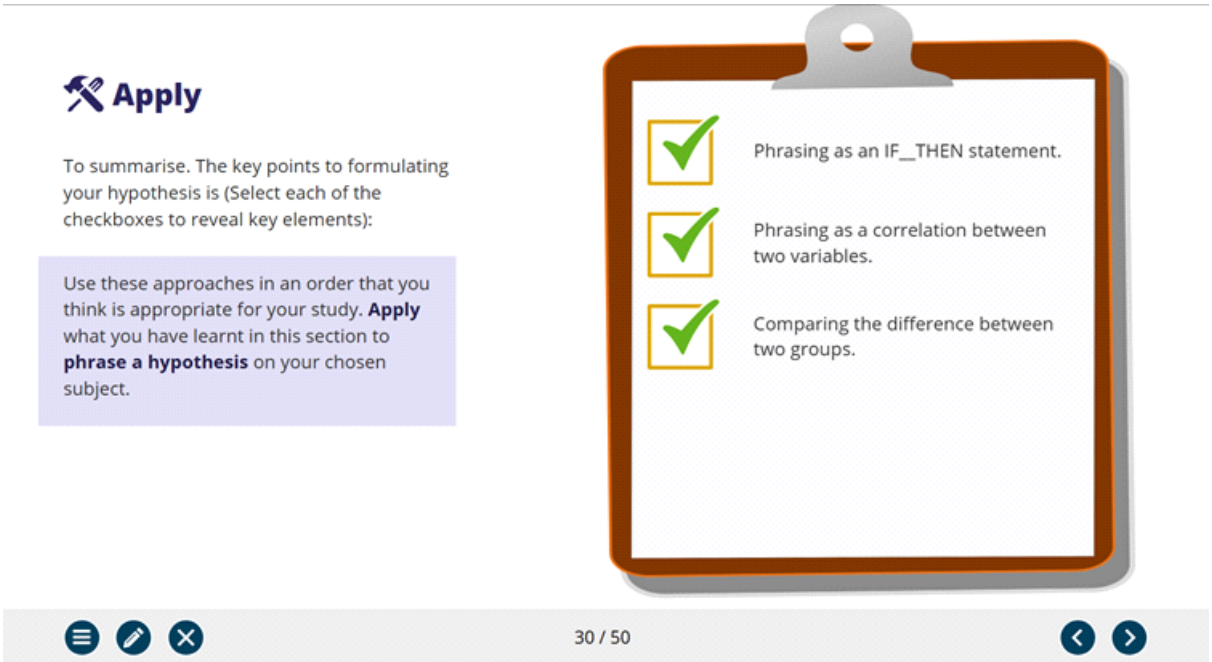
Correct!

A good hypothesis should have a way of approval or rejection with a test, that answers positively or negatively. A test could be an experiment, observation or using statistics. When using a statistical hypothesis, we weigh up the odds and come to a balanced conclusion.


Check
Question 3 of 4
One way to phrase a hypothesis is to:
Phrase it as a correlation.
Phrase it as a corporation.
Phrase it as a relation.
Correct!
In this approach, you spot a correlation where you state the predicted relationship between the variables.
You can also phrase your hypothesis as an IF__THEN statement or compare and state the differences between two groups.
28 / 50


Check
Question 4 of 4
When you see a question with the letters (H0) before it you know it is the:
Default position if the subsequent hypothesis tests fail.
Hypothesis that has null values associated with it.
Hypothesis that is the first one in the list.
All of the above.
Correct!
If your hypothesis is using some statistics to analyse the question being answered, you will also have to write what the answer falls back to if no association is found. This default fallback position is called the null hypothesis and it is written with 'H0' before it. The subsequent tests are written with the number after it, (H1, H2, H3...).
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Apply



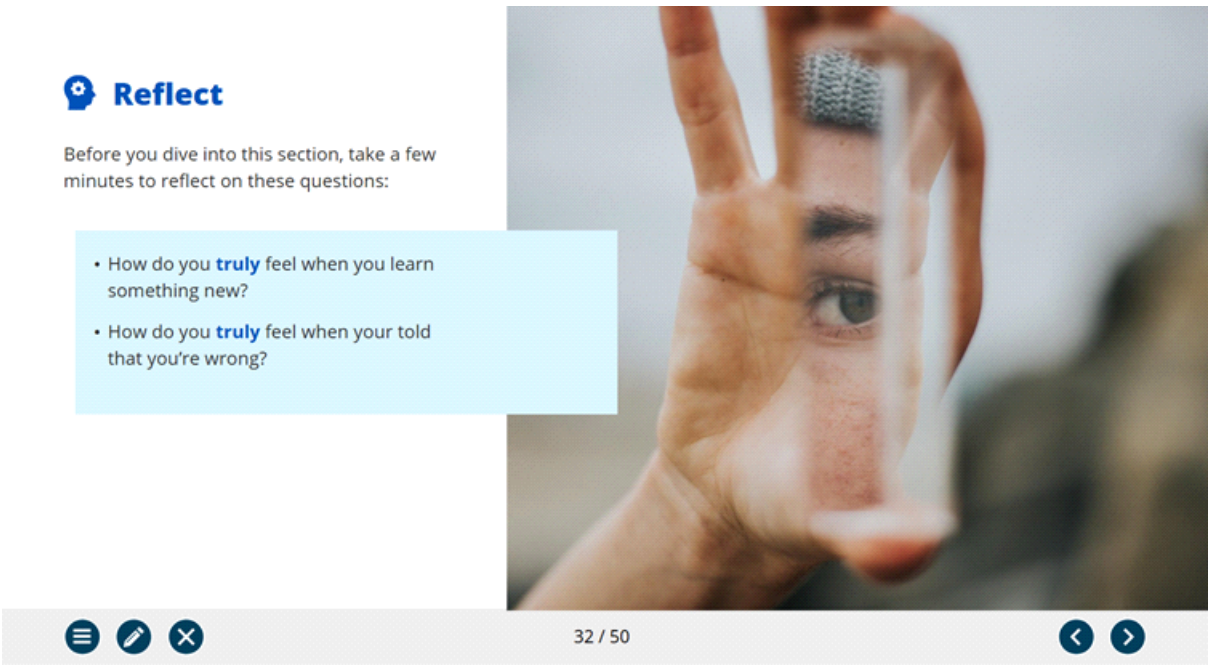
If users receive tailored and personalised feedback and gamified rewards from the fitness app then individual daily activity levels will increase over time.

There will be a negative correlation between application user inactivity and user's weekly physical performance key metrics.

Users who use the application with wearable IoT integration will report greater satisfaction and wellbeing compared to user groups without IoT wearable integration

Section 3 – Use Feedback to Improve

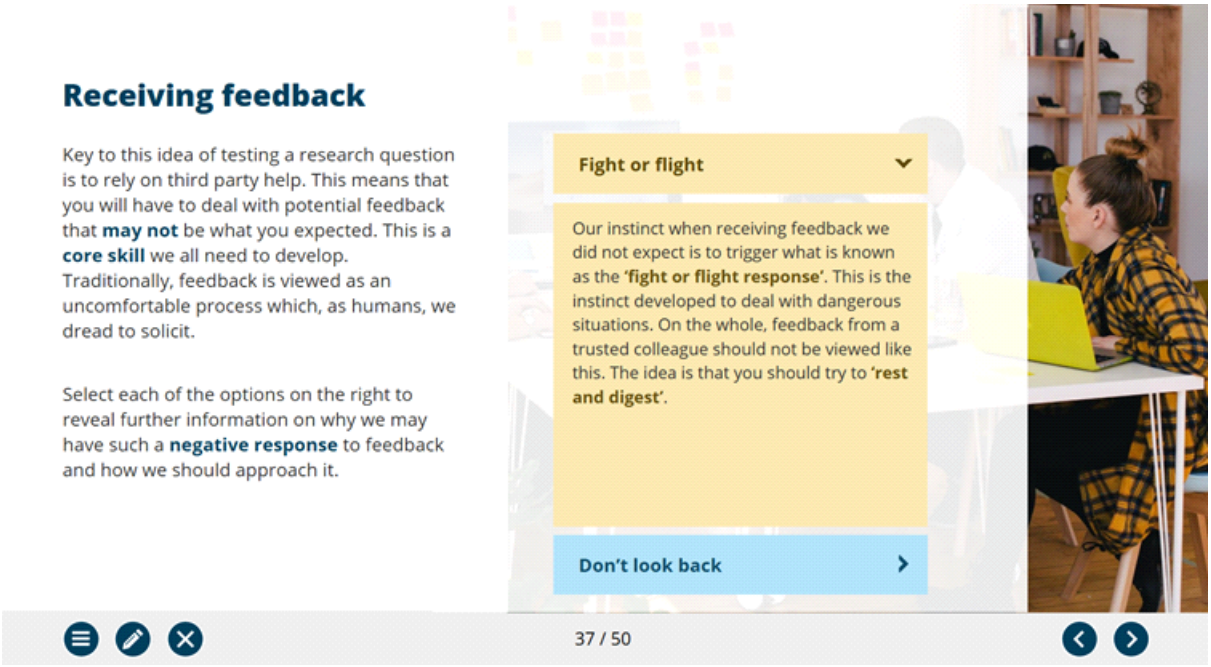
Reflect

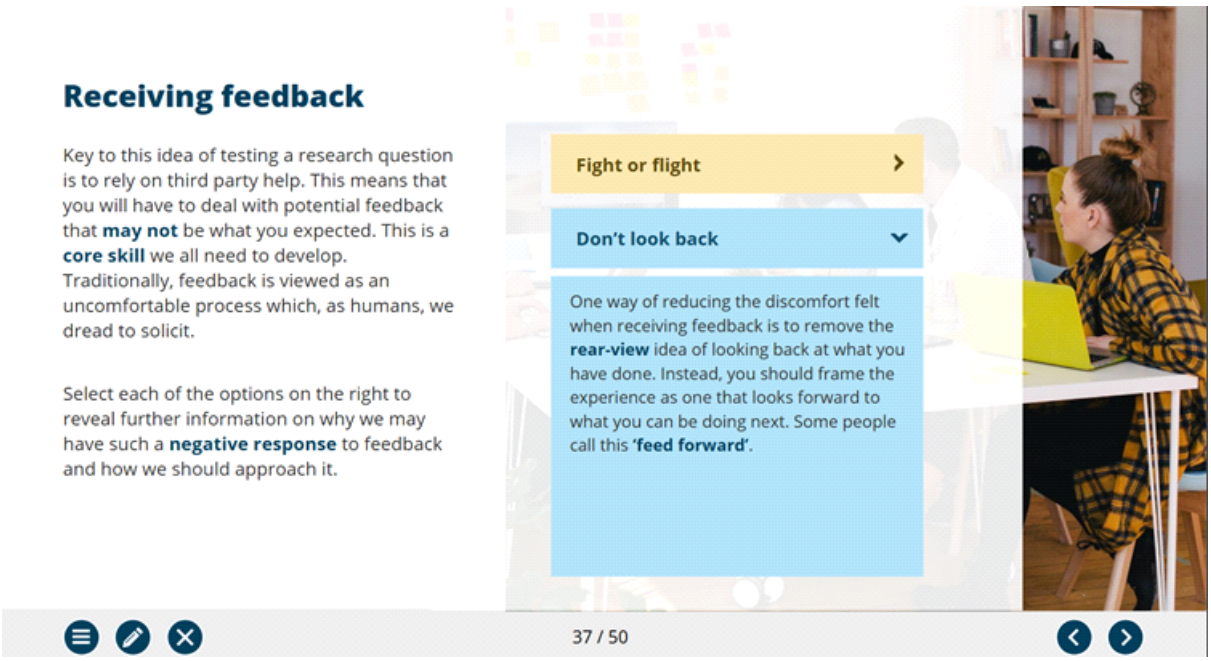


I feel anxious but also interested.

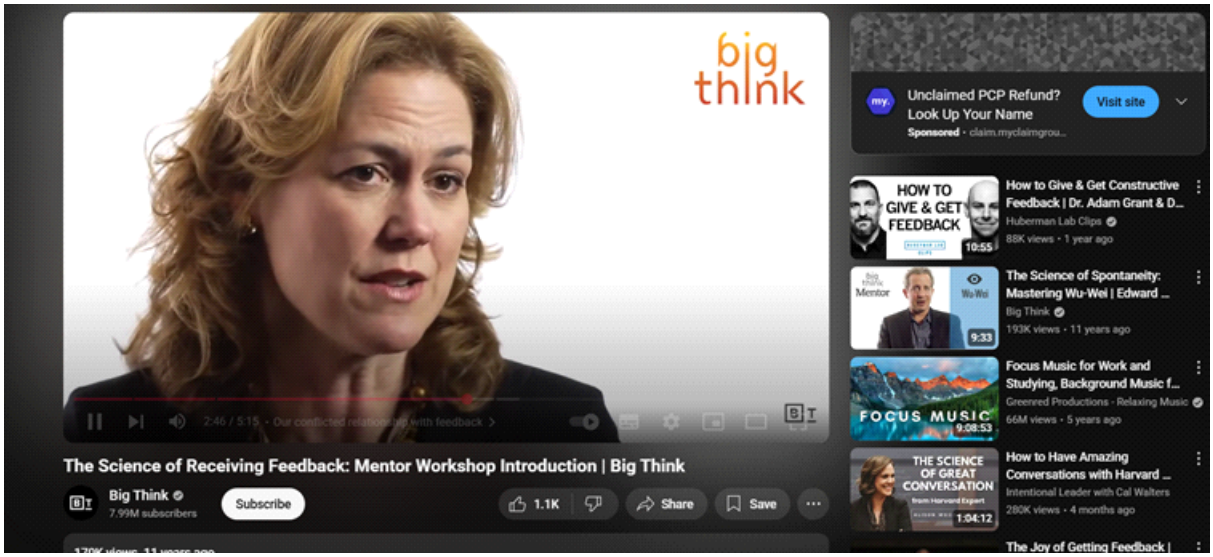
I feel interested in improving. This is a chance to learn from mistakes.

This section stresses the benefit of feedback and how you can learn from it.

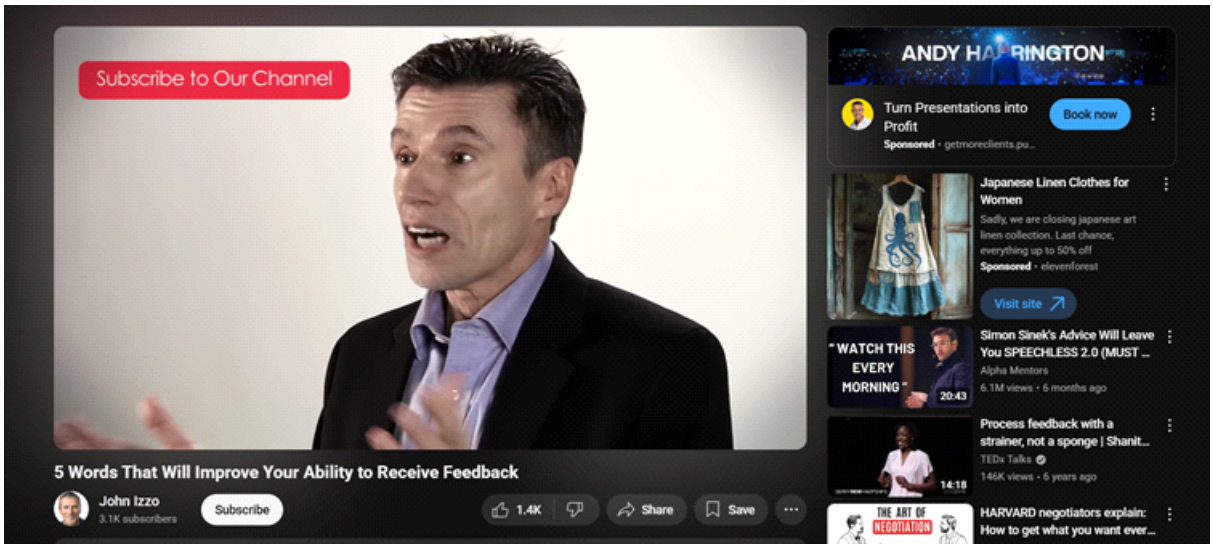




Dive deeper



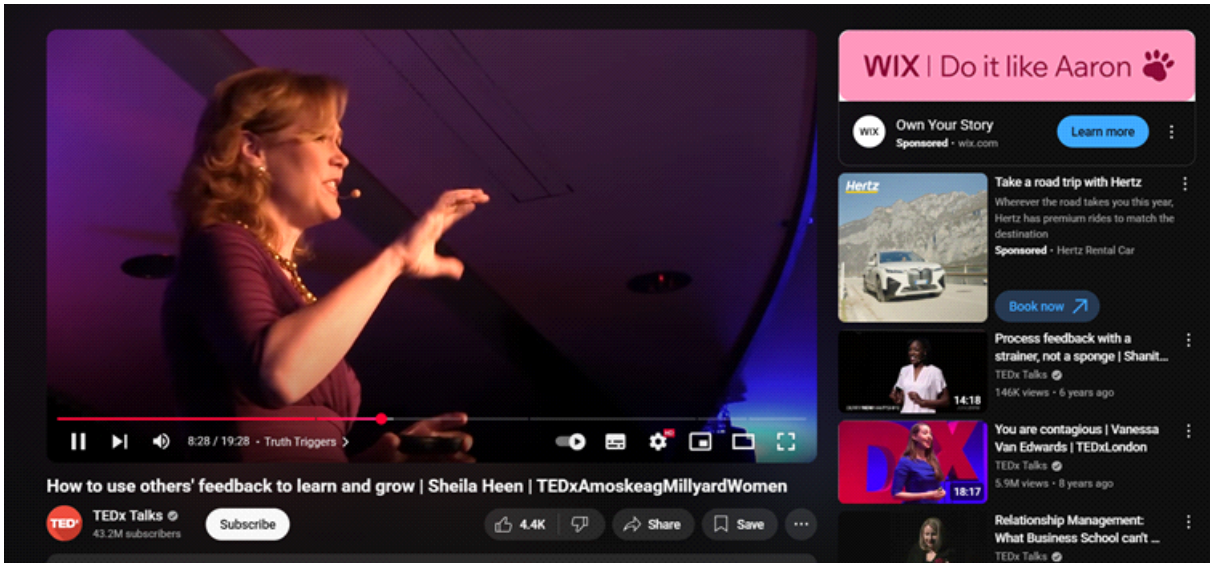
The dive deeper video demonstrates the understanding that feedback can be hated and loved is a part of being human. People who can receive and ask for feedback positively can benefit in their career, marriage, and life. Our willingness to hear, understand and take feedback in a forward thinking manner can benefit humans greatly.



Another video discussing feedback is that of John Izzo. Topics mentioned are defensiveness, how to use feedback to benefit the person, and techniques such as the “thank you, tell me more” with emphasis on asking for more detail on the matter. The perspective of someone receiving feedback should be grateful and it should be understood that the feedback giver is someone who is thinking of your success. Feedback is something to grow from.

Extract all positives and negatives from positive and negative feedback. All feedback doesn’t require you to agree but to understand and progress forward with it in mind.

Dive Deeper



This video highlights:

That receiving feedback is a skill just like giving feedback. A person should drive the uptake of this skill. Benefits to receiving feedback can be higher workplace satisfaction, the ability to adapt more quickly to new roles and higher performance reviews.

Rejecting advice for emotional reasons occur with those who lack receiving feedback skills.

Wrong spotting: a typical method of dismissing feedback as wrong where small aspects of the feedback aren't perfect. Even if feedback is likely to be 90% incorrect, you can grow from the 10% feedback that is great.

Typical reactions to feedback. Truth triggers, relationship triggers and identity triggers. Truth triggers are similar to wrong spotting in the sense the typical reaction can be a "you're wrong" reaction. Relationship triggers relate to "who are you to tell me?" questions. Identity triggers contain areas such as how long it takes someone to recover from feedback. Individuals can differ up to 3000%.

The story you tell about the feedback can influence the benefits of feedback. Each individual is unique in how they receive feedback. Each person has a baseline of how happy they are before the feedback. Each person has a different swing factor length which dictates how far you get knocked off your baseline. Finally, a factor that measures how long the person takes to return to baseline; sustain/recovery.

Don't give people feedback on how they should receive feedback.

One great feedback question is "What's one thing you see me doing, or failing to do, where I'm getting in my own way?". Apply this and do not repeat the wording but apply it to the situation. For example, how is one thing that I could change or improve on in our weekly meeting. Another example discussed is "What is one thing I could change, that would make a difference to you, about our friendship?". Don't ask is there anything but "what one thing" to promote discussion.

It's should be our aim to accept feedback and learn from the feedback rather than ignoring it or delaying it's effectiveness.

Check

Check

Question 1 of 2

Which **two instincts** are in conflict when we are learning from feedback?

- The worry of not finishing on time.
- The joy from learning something new.
- Fear of being shown up for being wrong.
- The feeling of success from completion.

Correct!

Most people will say that learning new things results in a feeling of joy. They will also report that when someone tells them that they are wrong they feel uncomfortable or upset. Overall, feedback is a vital conversation you must use to improve your ideas, but the process is not naturally joyful.

Check

Question 2 of 2

According to Heen's TED talk, the people who actively sought critical feedback were:

- Less successful.
- More successful.
- Very upset.
- Ignorant.

Correct!

According to Heen (2014), those who sought critical feedback are said to adapt more quickly to new roles, they report higher satisfaction, they get higher performance reviews, and they accelerate their own learning. This also changes the way other people see them.

Appendix 2 - Unit 2

27 October 2025 19:20

All following appendix has content from Change Makers Unit 1 to Unit 4 [33]

Topic 1

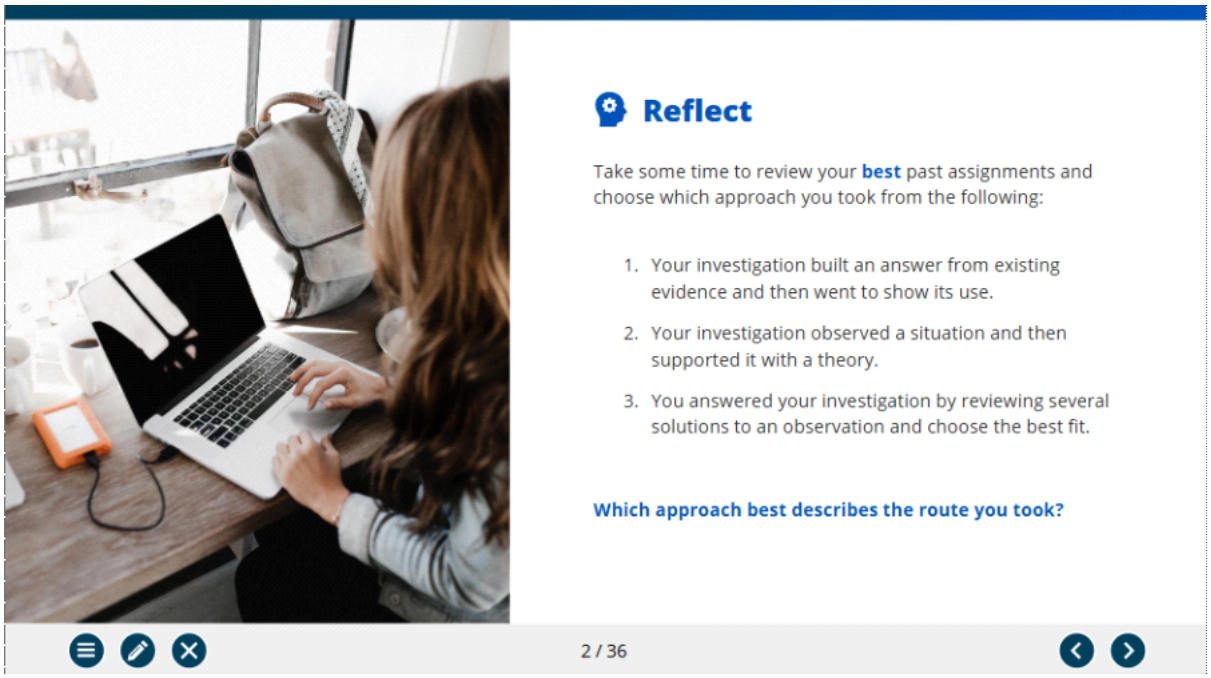
Section 1 - Awareness Investigative Process

Investigation processes and three strategies:

First approach: To see how an existing body of knowledge fits with reality.

Second approach: reverse engineer an explanation of events based on personal observation.

Third approach: Judge the reality of the subject based on a probable outcome.



I chose the approach of 1 as this was based on logical evidence.

Introduction

The way you answered the question suggests which is your preferred reasoning style:

1. **Deductive reasoning**
2. **Inductive reasoning**
3. **Abductive reasoning**

Click on each of the styles above to match it to its approach. Remember which approach you prefer, as we're going to look at them in more detail during this session.

Reflect

Take some time to review your **best** past assignments and choose which approach you took from the following:

1. Your investigation built an answer from existing evidence and then went to show its use.
2. Your investigation observed a situation and then supported it with a theory.
3. You answered your investigation by reviewing several solutions to an observation and choose the best fit.

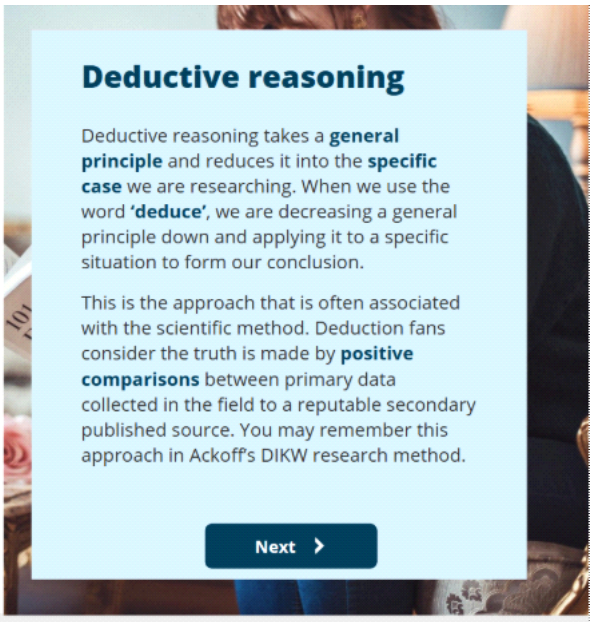
Which approach best describes the route you took?

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Reasoning approaches

Any research we do on any subject is intended to convince ourselves, and anyone reading our work, that our reasoning is **sound**. Reasoning is said to be 'sound' when we agree with all the premises or assumptions that lead to and form the **conclusion**. How we present these assumptions is called the **premise**.

In an earlier section on critical thinking, we explored these higher levels of thinking by exploring the **two forms of reasoning** around the concepts of deductive and inductive reasoning. When writing up our research traditionally we have used these forms of reasoning to frame any absolute argument that we are trying to make.



Deductive reasoning

Deductive reasoning takes a **general principle** and reduces it into the **specific case** we are researching. When we use the word **'deduce'**, we are decreasing a general principle down and applying it to a specific situation to form our conclusion.

This is the approach that is often associated with the scientific method. Deduction fans consider the truth is made by **positive comparisons** between primary data collected in the field to a reputable secondary published source. You may remember this approach in Ackoff's DIKW research method.

Next

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Problems with deductive and inductive research

Both deductive and inductive arguments can end up being **wrong**. Select each of the options below, to reveal further information on the **problems** associated with these types of research.

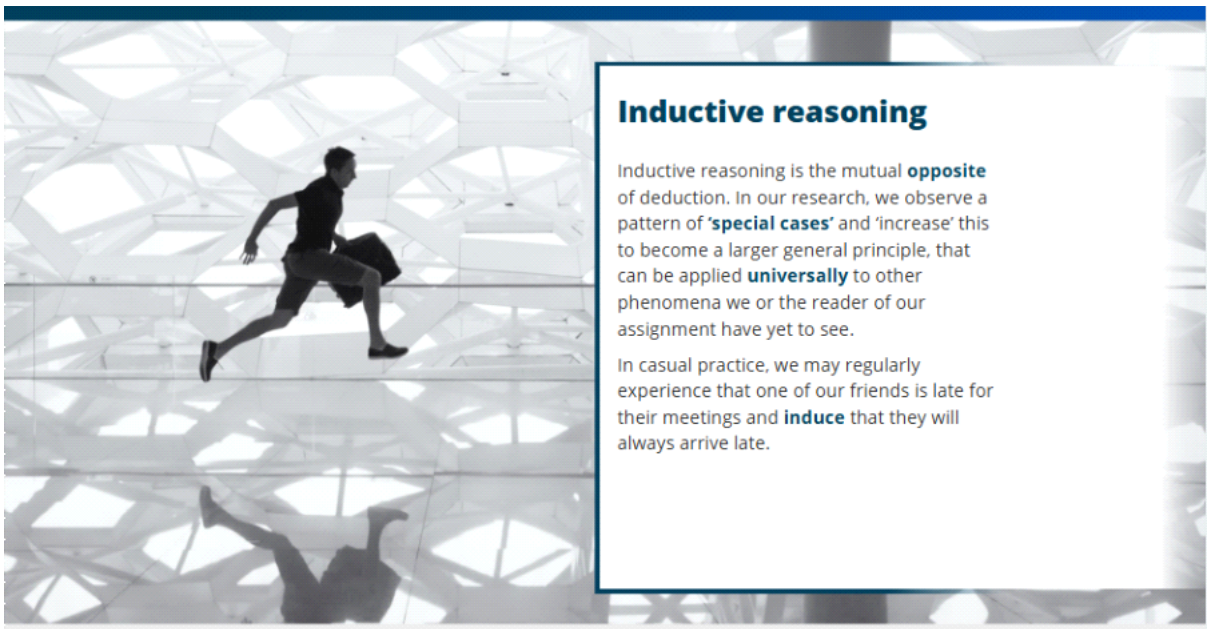
Deductive ›

Inductive ›

Deductive logic can be criticised, as its premise is that **all disciplines** are represented by general rules that may not be applicable to the case we are studying. So, for example, If our research says all chickens 'cluck', then when we hear a 'cluck', we deduce there must be a chicken in earshot. However, we could have been fooled by someone playing a recording of a chicken on their mobile phone.

Deduction plays into the hands of **cognitive bias**. This is where our in-built rules of thumb turn out to be wrong. One such rule of thumb we are all susceptible to is **'confirmation bias'**. This is our propensity to look for the similarities rather than the differences, or the things that are present rather than those missing. This means **we must be careful** of deductive based research.

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Inductive reasoning

Inductive reasoning is the mutual **opposite** of deduction. In our research, we observe a pattern of **'special cases'** and 'increase' this to become a larger general principle, that can be applied **universally** to other phenomena we or the reader of our assignment have yet to see.

In casual practice, we may regularly experience that one of our friends is late for their meetings and **induce** that they will always arrive late.

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Problems with deductive and inductive research

Both deductive and inductive arguments can end up being **wrong**. Select each of the options below, to reveal further information on the **problems** associated with these types of research.

Deductive ›

Inductive ›

On the other hand, inductive research attempts to base its conclusions on **patterns** that are **observed over time**. The assumption assumes that what has happened when we were observing will continue to happen in the future. So, deciding to research the frequency of 'the number 6 bus' by observing its arrival time over a day means we can induce that the bus arrival times are every 30 minutes.

However, what would happen if the observations were made on a day when the buses were unusually busy? Our research would be **flawed** because we made a conclusion based on the **wrong set of observations**.

Alternatively, we could make the right observation but **see the pattern incorrectly**. Imagine the research a turkey induces about the farmer being a 'nice person' because they observe he feeds them every day. However, the turkey's research does not consider that it is being fattened for Christmas.

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An alternative approach can be one that oscillates between deductive and inductive.

Abductive reasoning: a conclusion is either true or false.

Conclusions fall into two categories of argument: logic and judgement.

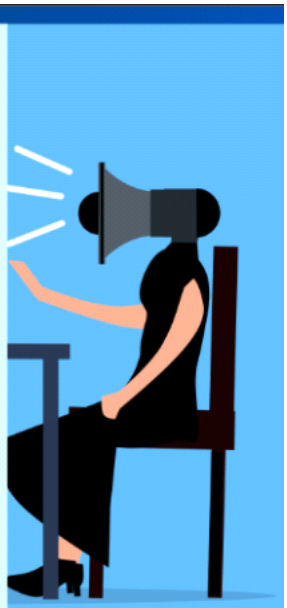
Conclusion

There are broadly two forms of argument that your research will make, and they fall into two categories of argument: **logic and judgement**. Click on both of the icons to explore these categories of argument in further detail.

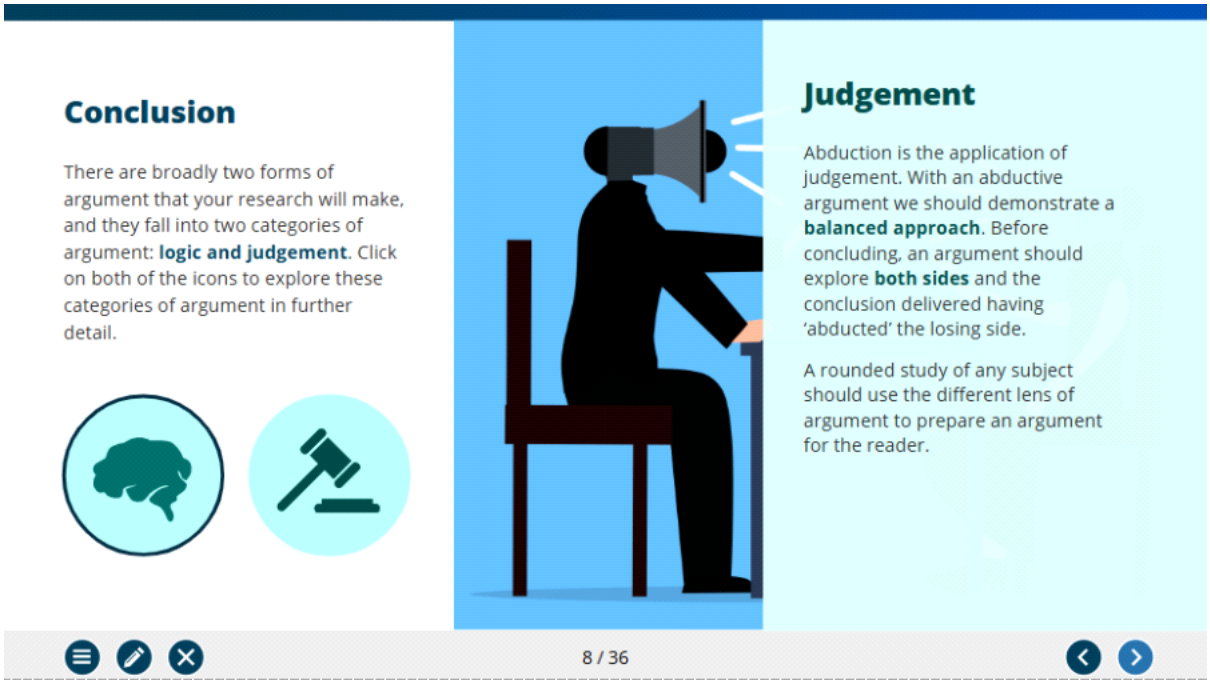
Logic

Induction and deductions are the thinking that you would attribute to Mr. Spock, the character in Star Trek. They use **logical narrative** to prove something is either true or false. This approach is modelled on mathematics and theoretical physics and clearly works in these environments, but can be challenging if your field of study is not so precise.

Subjects that have a more real-world context are much more messy than pure subjects like maths, philosophy and theoretical study. **It is rare to find** field evidence that can categorically be attributed to a particular theory or law. As such, a more nuanced approach to argument needs to be made.



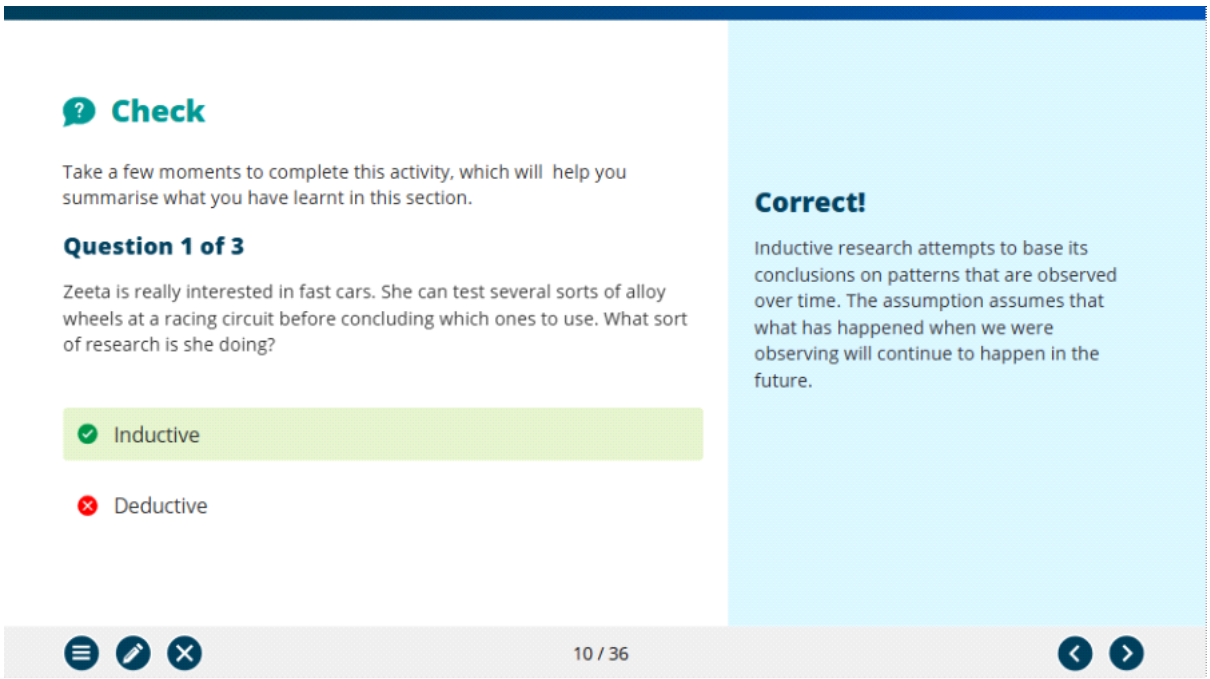
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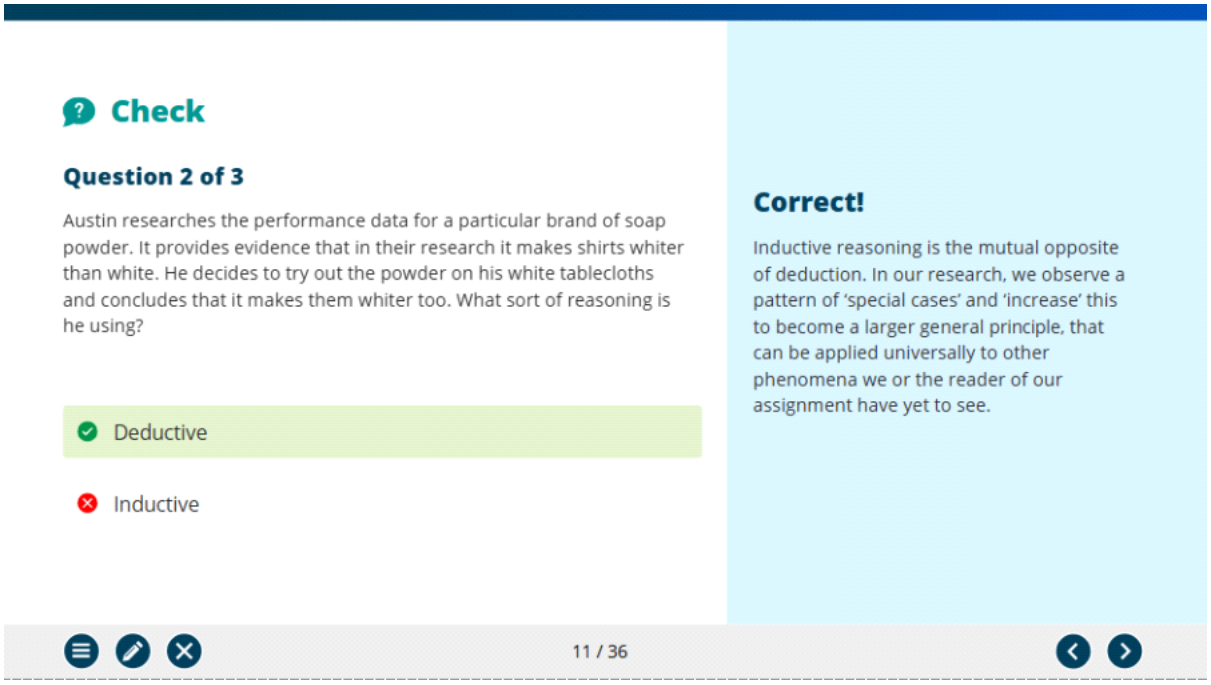


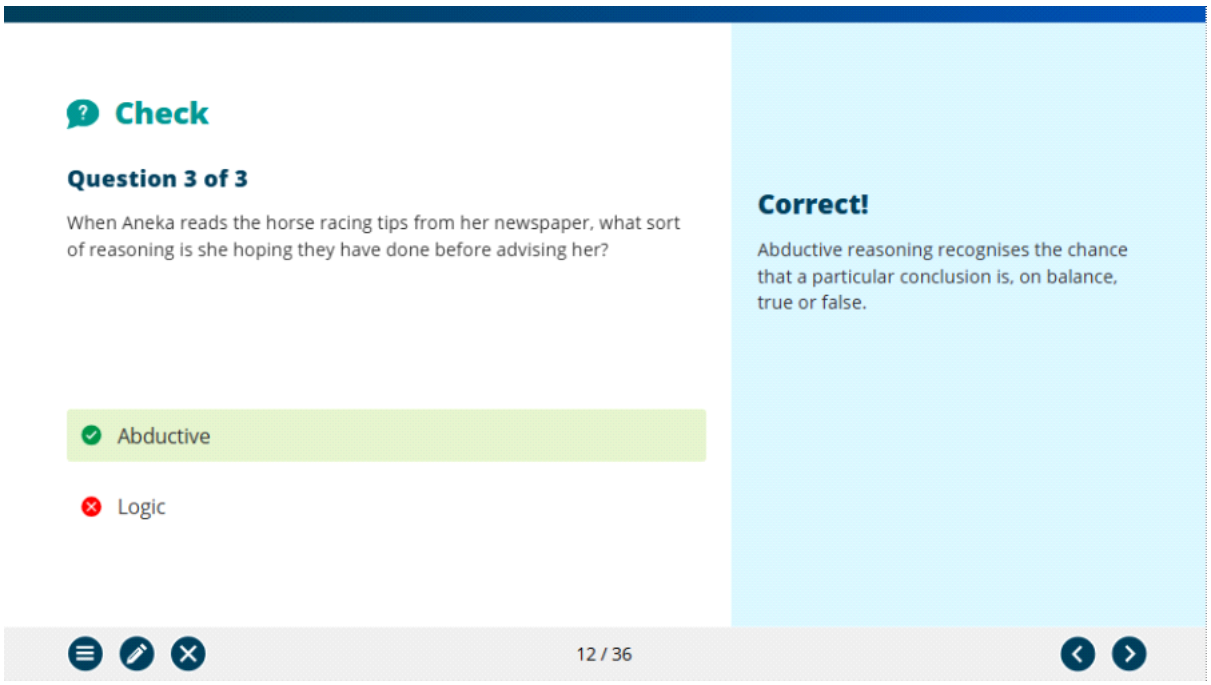
Further research:

Look into priori, posteriori, Bayesian inference.

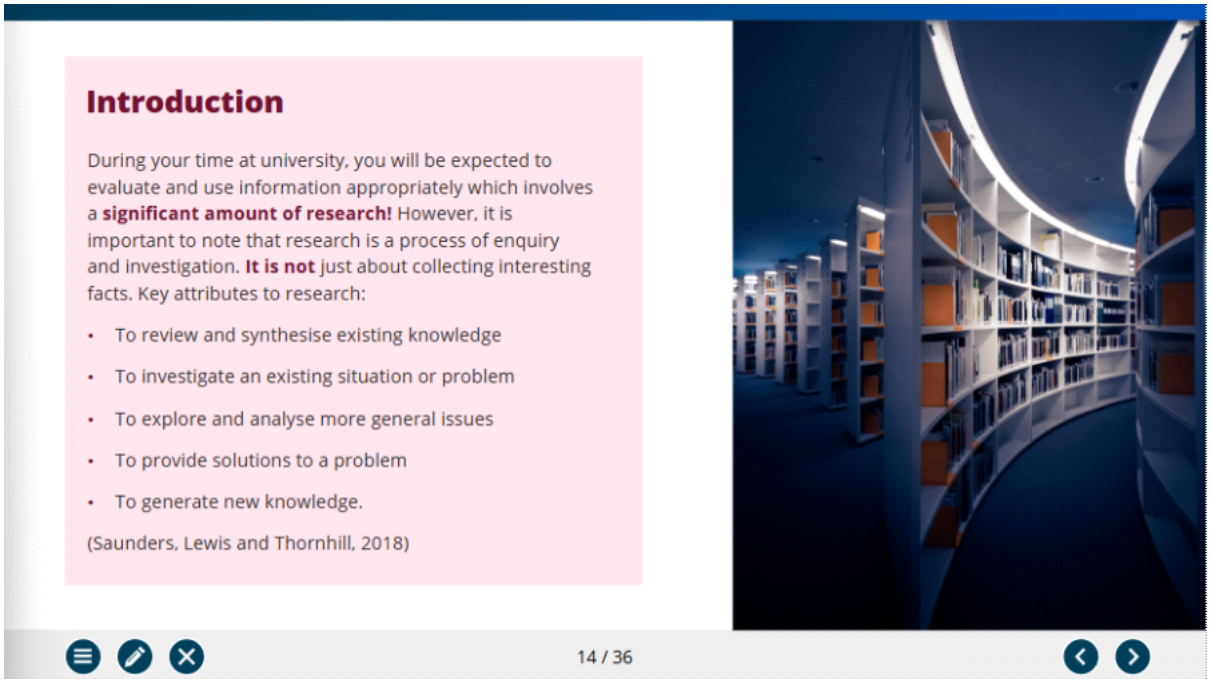
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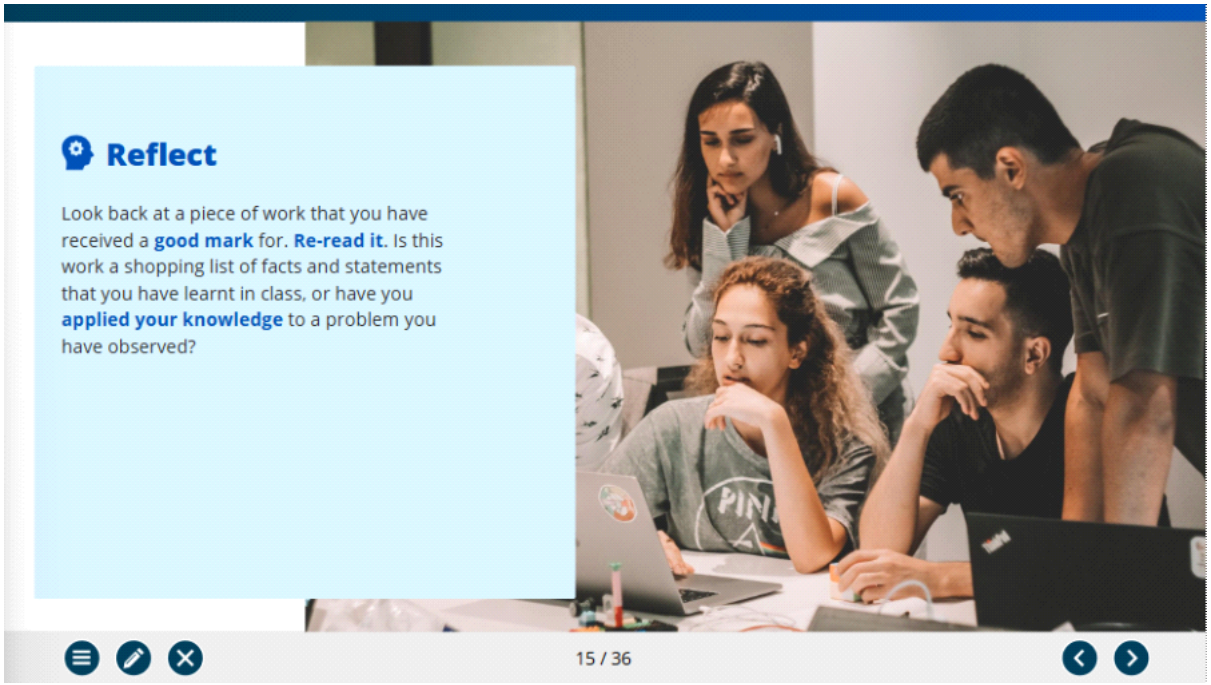




Section 2: Identifying the purpose and approach to your research.



Reflect



I have applied knowledge to the problem by using research from academic sources.

Notes:

Purpose of your research is to express your interest in a phenomenon.

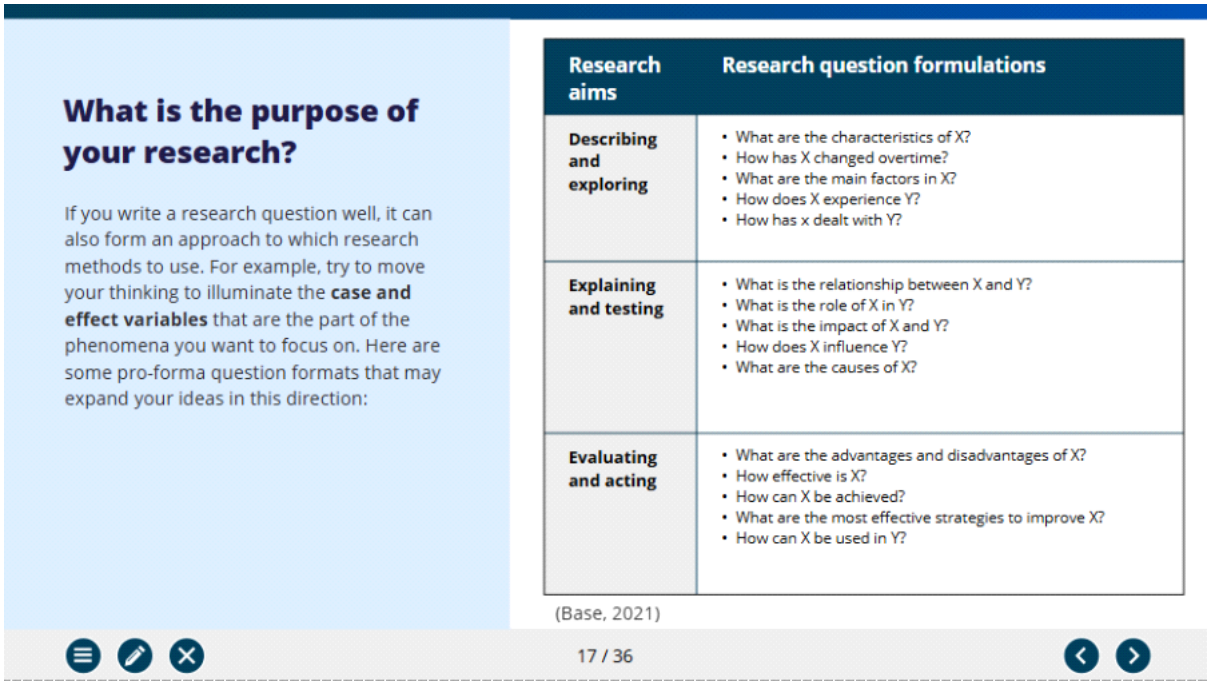
To define the problem that you are researching, follow these steps:

Step 1: Choose a broad topic that also triggers your personal interest.

Step 2: Do some reading around the subject.

Step 3: Narrow down your thinking to a specific niche. Do not be too wide but instead have a focused topic.

Step 4: Narrow down to a problem you see practically or one that occurs from a theoretical point of view.



What is the purpose of your research?

If you write a research question well, it can also form an approach to which research methods to use. For example, try to move your thinking to illuminate the **case and effect variables** that are the part of the phenomena you want to focus on. Here are some pro-forma question formats that may expand your ideas in this direction:

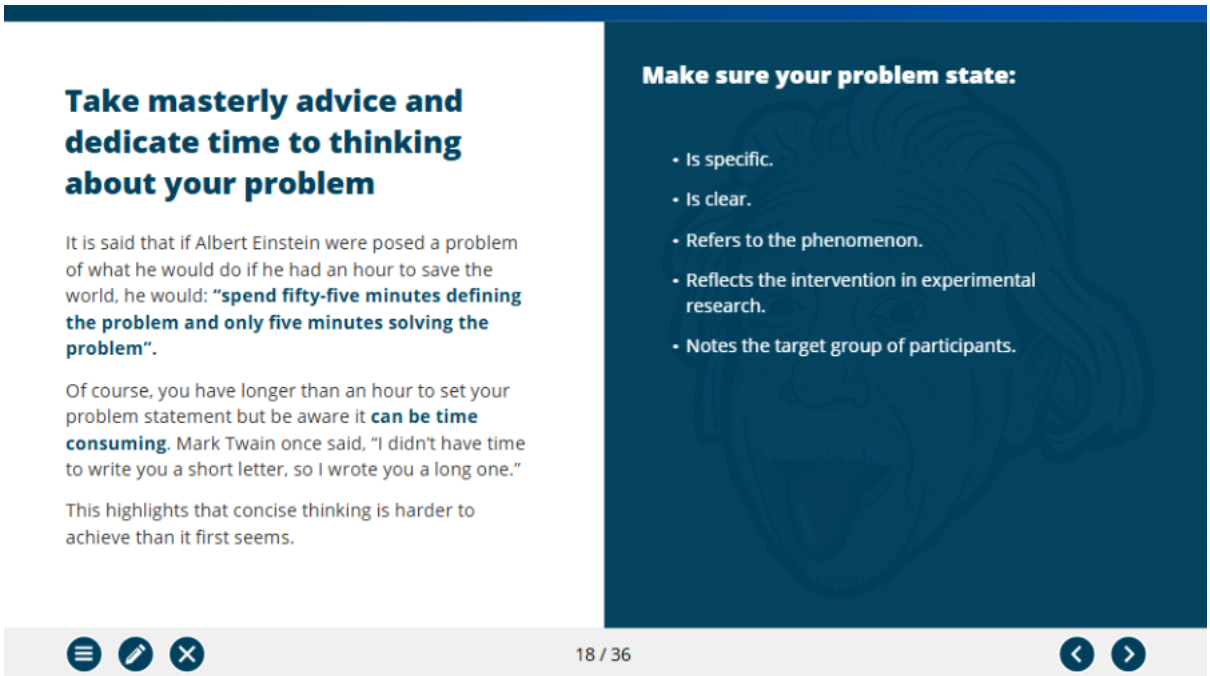
Research aims	Research question formulations
Describing and exploring	• What are the characteristics of X? • How has X changed overtime? • What are the main factors in X? • How does X experience Y? • How has x dealt with Y?
Explaining and testing	• What is the relationship between X and Y? • What is the role of X in Y? • What is the impact of X and Y? • How does X influence Y? • What are the causes of X?
Evaluating and acting	• What are the advantages and disadvantages of X? • How effective is X? • How can X be achieved? • What are the most effective strategies to improve X? • How can X be used in Y?

(Base, 2021)

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Which attracts you the most?

- Describing and exploring.



Take masterly advice and dedicate time to thinking about your problem

It is said that if Albert Einstein were posed a problem of what he would do if he had an hour to save the world, he would: **"spend fifty-five minutes defining the problem and only five minutes solving the problem".**

Of course, you have longer than an hour to set your problem statement but be aware it **can be time consuming**. Mark Twain once said, "I didn't have time to write you a short letter, so I wrote you a long one."

This highlights that concise thinking is harder to achieve than it first seems.

Make sure your problem state:

- Is specific.
- Is clear.
- Refers to the phenomenon.
- Reflects the intervention in experimental research.
- Notes the target group of participants.

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Check

Check

In this knowledge check activity you will be presented with three research questions. Using what you have learnt in this topic, select whether the question is good or bad.

Question 1 of 3

Do students who engage in the additional revision classes perform significantly differently on tests than students who do not participate?

- Good
- Bad

Not quite...

Really? Why do you think it is a bad question? It seems to be specific and clear.

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Check

Question 2 of 3

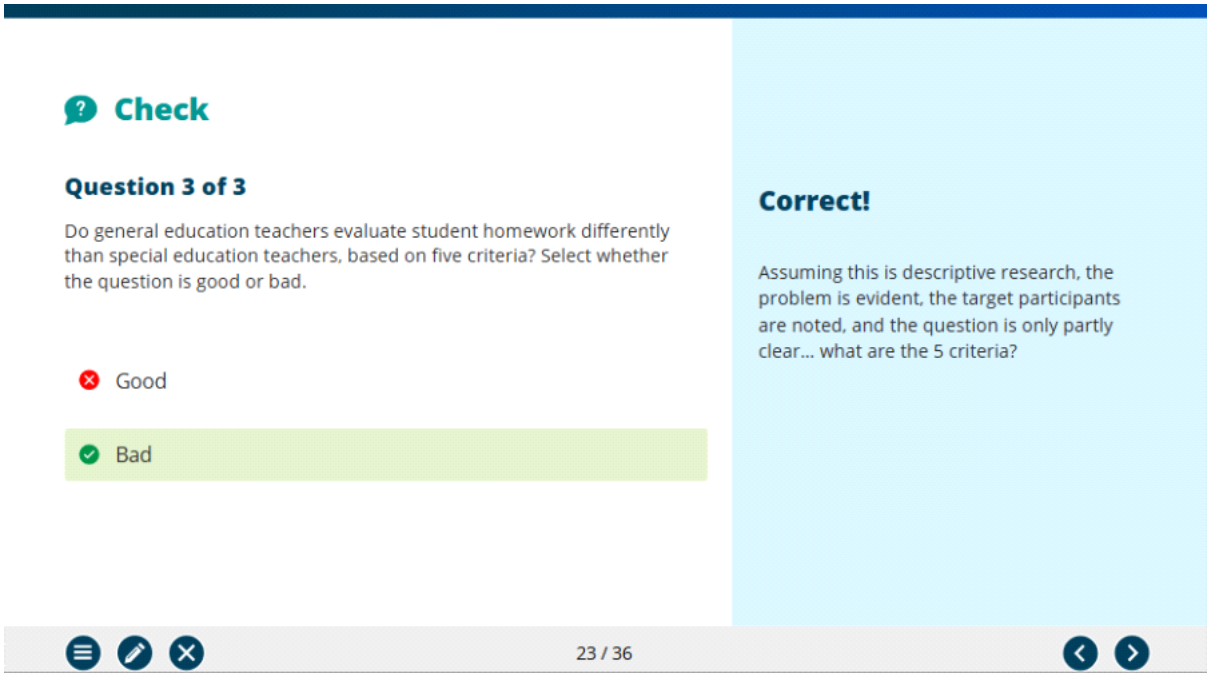
Why do students seem so apathetic? Select whether the question is good or bad.

- Good
- Bad

Correct!

This is not specific or clear, nor does it reflect an intervention, if one is planned, or a target group of participants. Better questions might be: Are science students more engaged in class discussions when a response strategy is used? What are the reasons for apathy among various groups of high school students?

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How to develop a strong research question

Step 1: Choose a broad topic. I.e. social media.

Step 2: Primary reading.

Step 3: Narrow down to a specific niche. I.e. attention span.

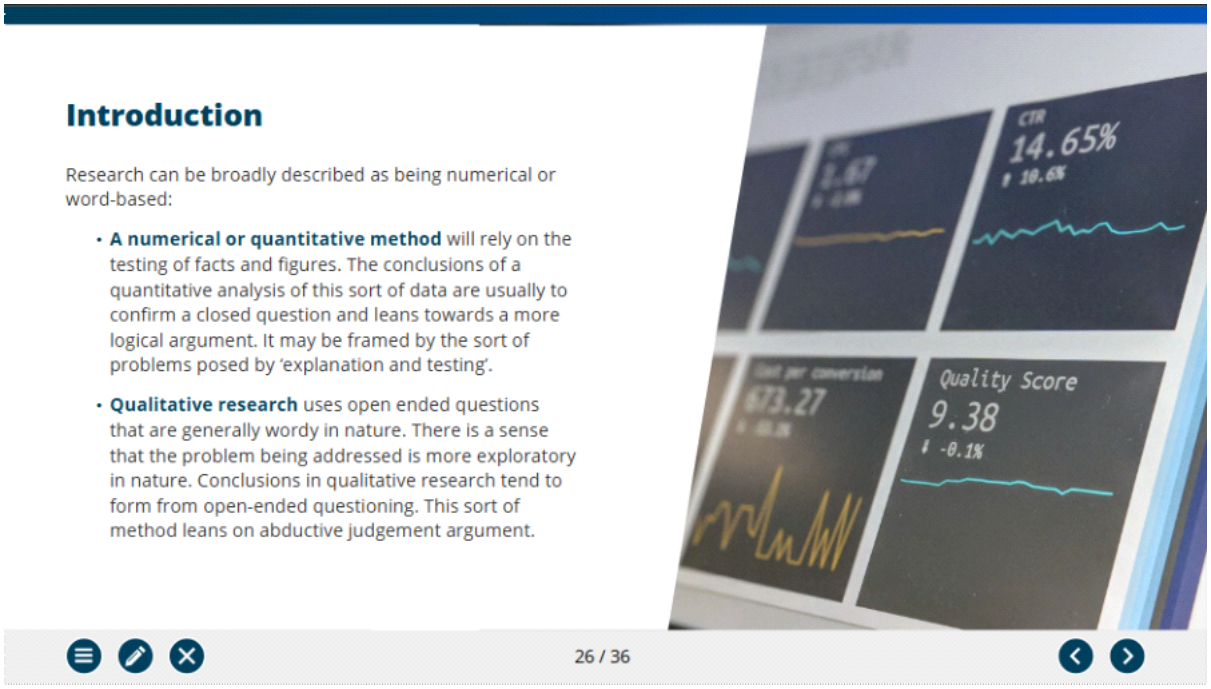
Step 4: Identify a research problem.

Step 5: Write your research question.

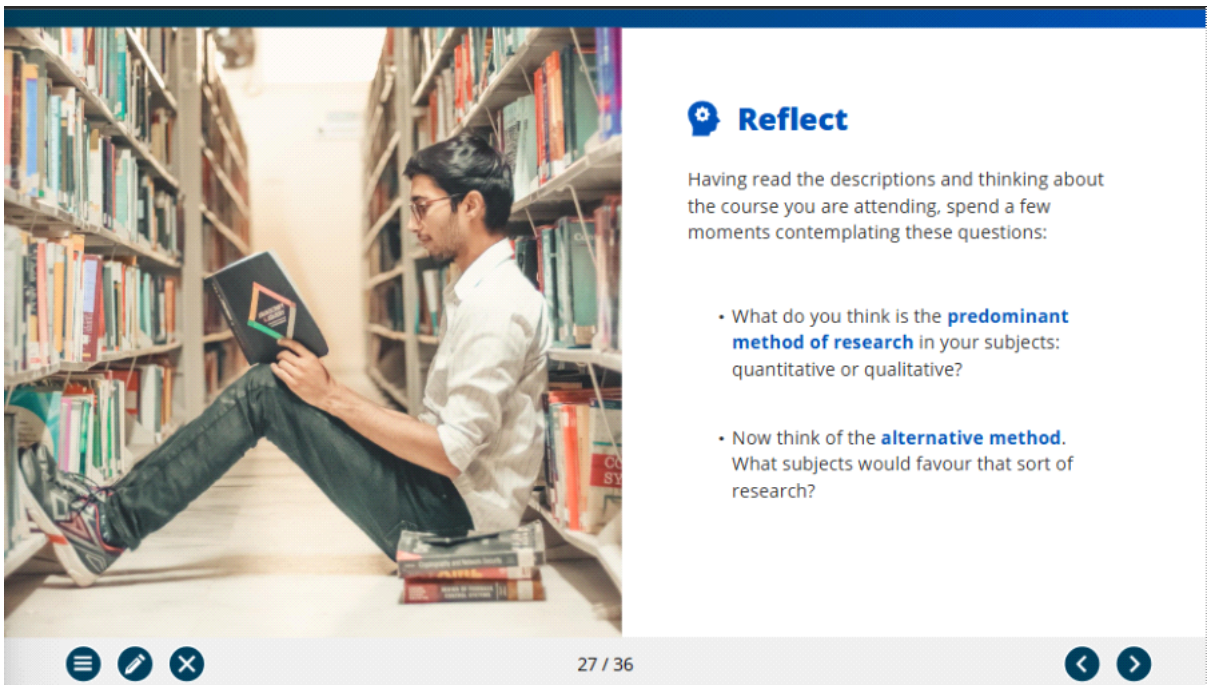
A good research question should be:

- Focused.
- Researchable.
- Feasible.
- Specific.
- Complex.
- Relevant.

Section 3 – Compare and contrast quantitively and qualitative research methods.

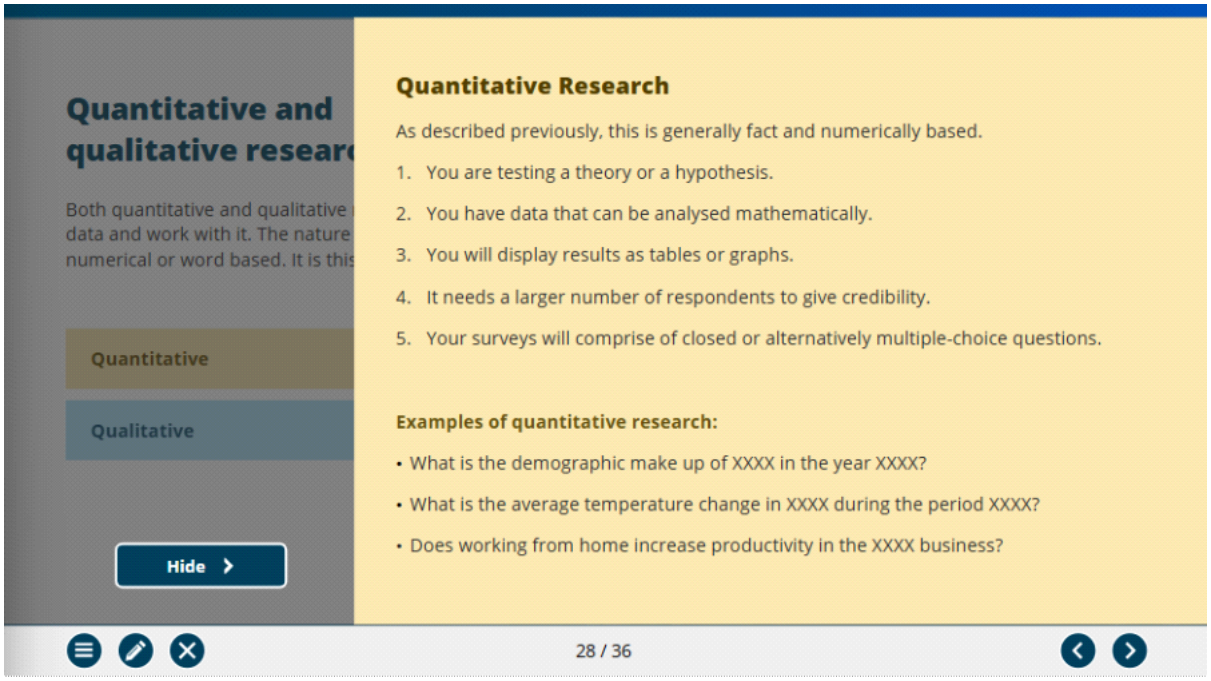


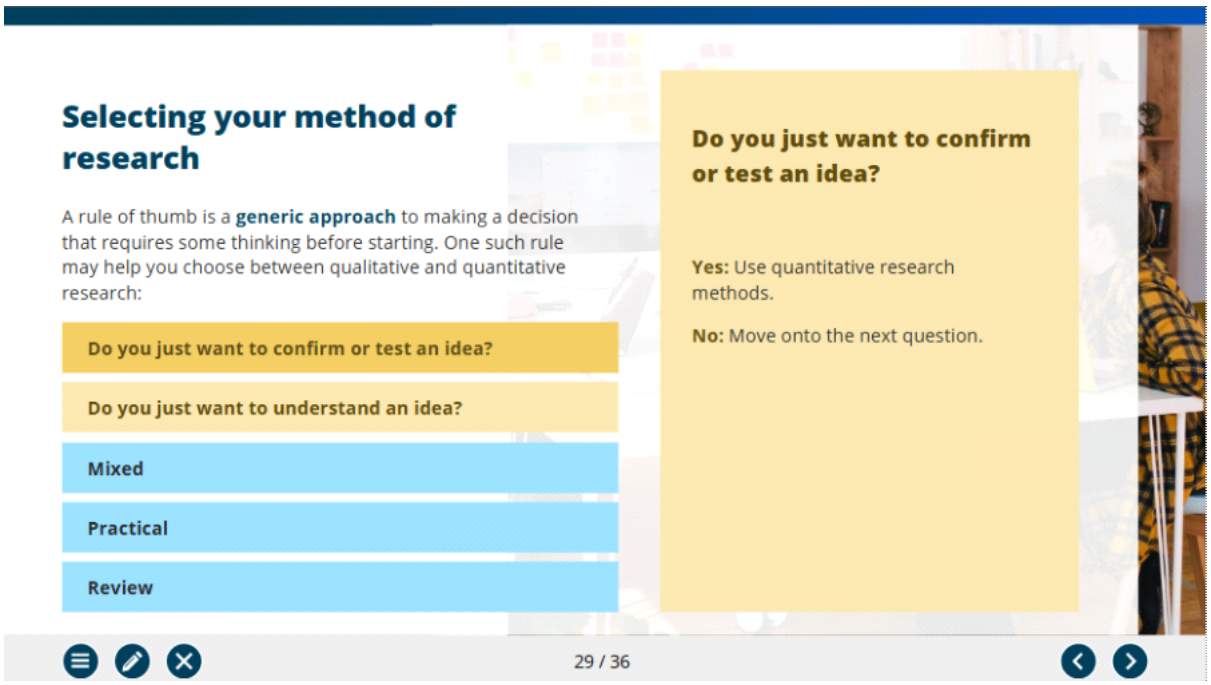
Reflect

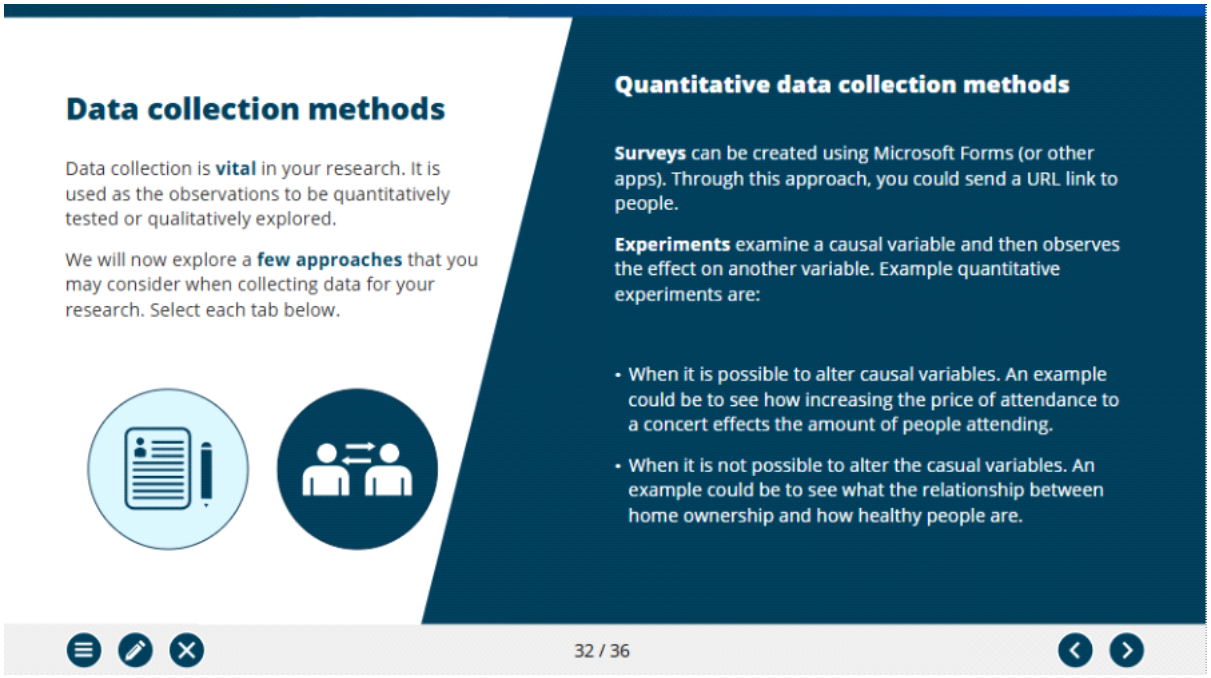


1. Quantitative: as there is an abundance of quantitative research for software development.
2. Qualitative research is prone to subjects like: psychology, sociology, social science where the focus is on understanding experiences, behaviours, and contextual factors through interviews, observations, and case studies.

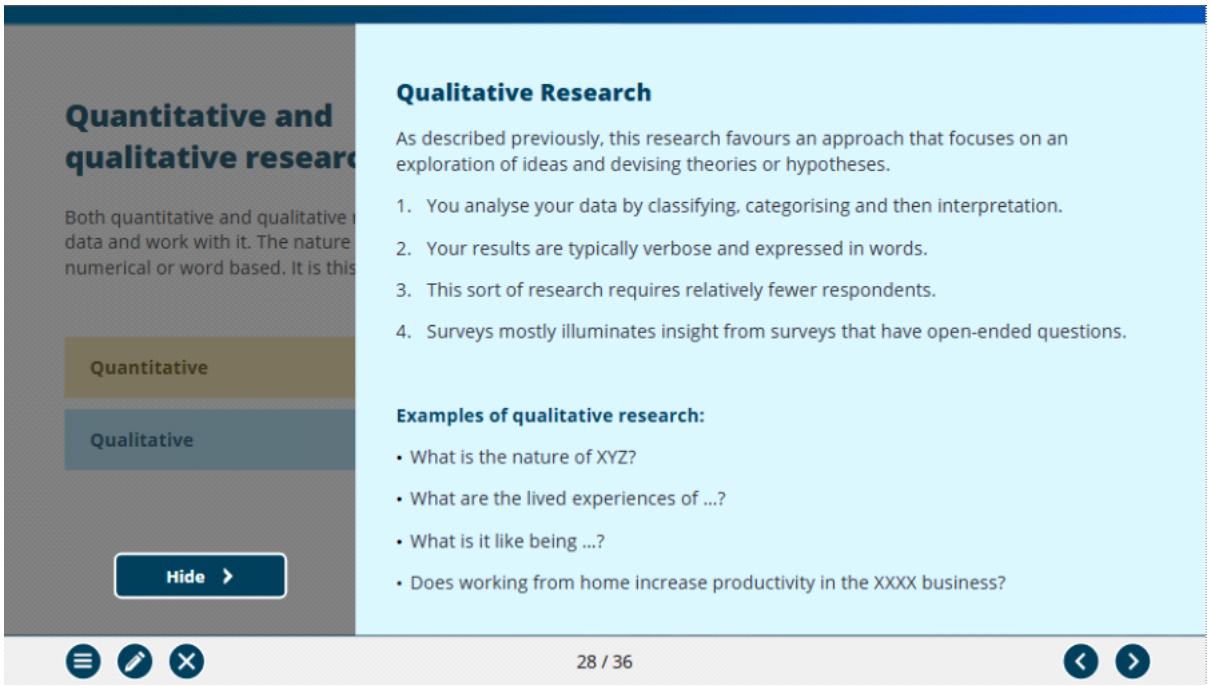
Quantitative

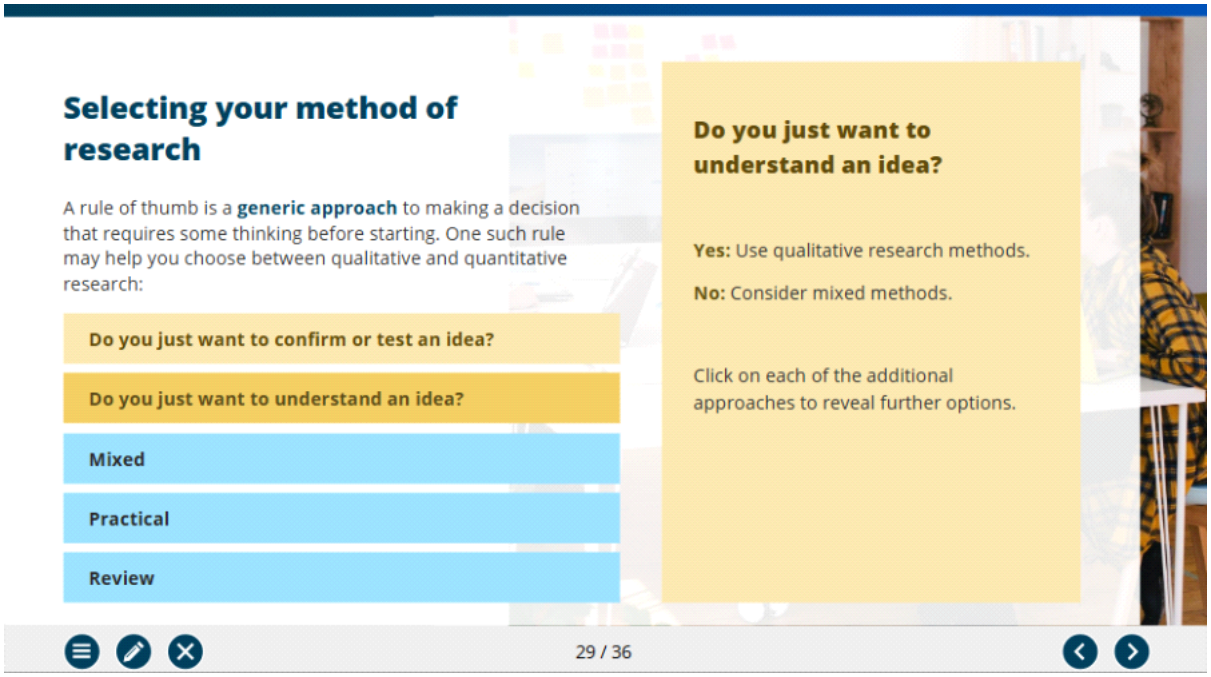

Quantitative and qualitative researc
Both quantitative and qualitative
data and work with it. The nature
numerical or word based. It is this
Quantitative
Qualitative
Hide
Quantitative Research
As described previously, this is generally fact and numerically based.
1. You are testing a theory or a hypothesis.
2. You have data that can be analysed mathematically.
3. You will display results as tables or graphs.
4. It needs a larger number of respondents to give credibility.
5. Your surveys will comprise of closed or alternatively multiple-choice questions.
Examples of quantitative research:
• What is the demographic make up of XXXX in the year XXXX?
• What is the average temperature change in XXXX during the period XXXX?
• Does working from home increase productivity in the XXXX business?
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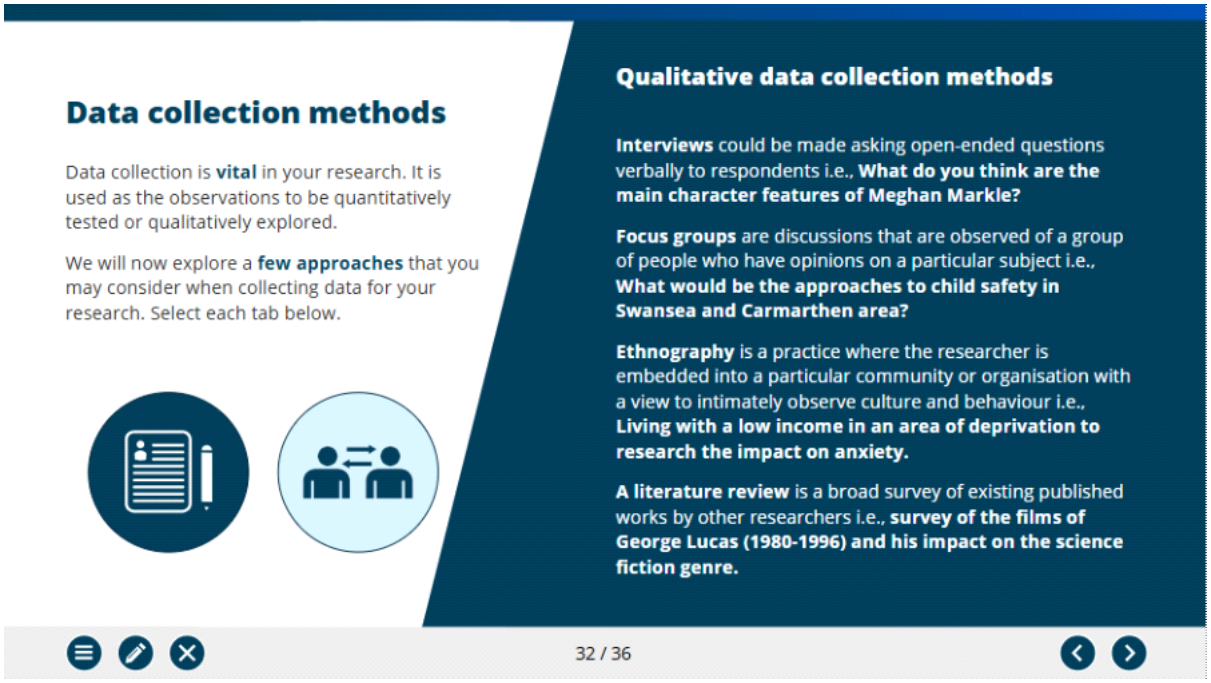

Selecting your method of research
A rule of thumb is a generic approach to making a decision that requires some thinking before starting. One such rule may help you choose between qualitative and quantitative research:
Do you just want to confirm or test an idea?
Do you just want to understand an idea?
Mixed
Practical
Review
Do you just want to confirm or test an idea?
Yes: Use quantitative research methods.
No: Move onto the next question.
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Qualitative







Other methods

Selecting your method of research

A rule of thumb is a **generic approach** to making a decision that requires some thinking before starting. One such rule may help you choose between qualitative and quantitative research:

- Do you just want to confirm or test an idea?
- Do you just want to understand an idea?
- **Mixed**
- Practical
- Review

Mixed

As indicated on the previous page, it may be applicable to approach your research using a **combination** of both quantitative and qualitative research. For example, a qualitative survey may reveal an insight that you can drill down into with a second iteration of quantitative analysis.



29 / 36

Selecting your method of research

A rule of thumb is a **generic approach** to making a decision that requires some thinking before starting. One such rule may help you choose between qualitative and quantitative research:

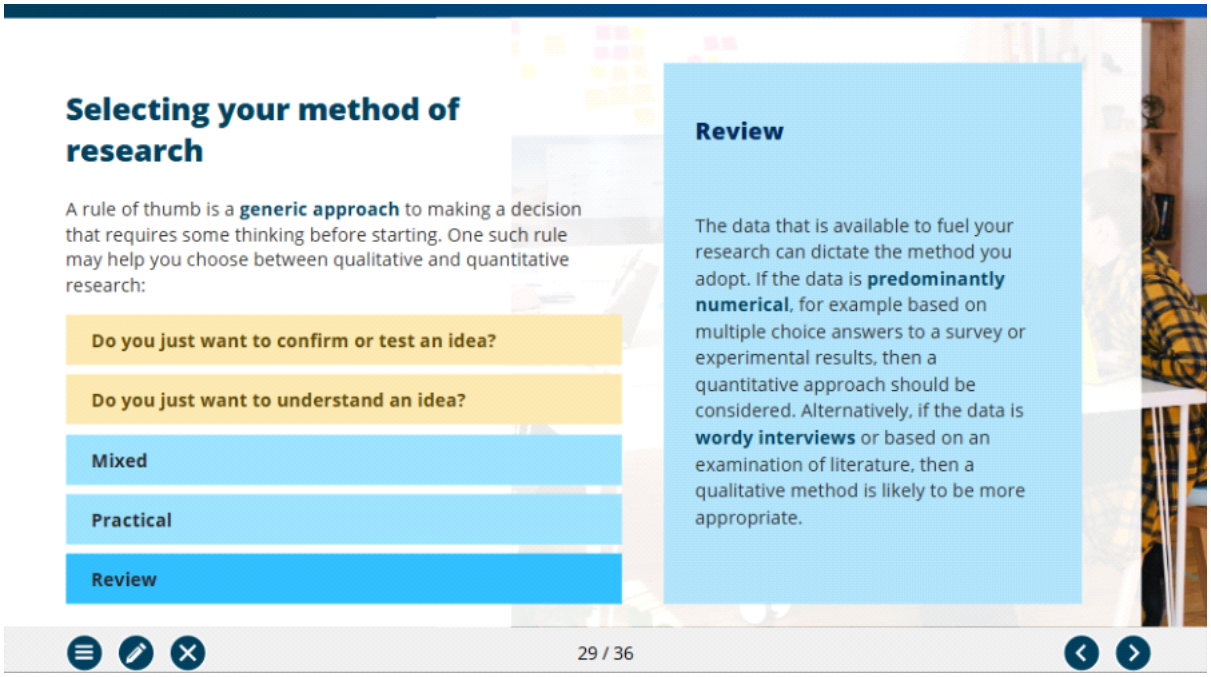
- Do you just want to confirm or test an idea?
- Do you just want to understand an idea?
- Mixed
- **Practical**
- Review

Practical

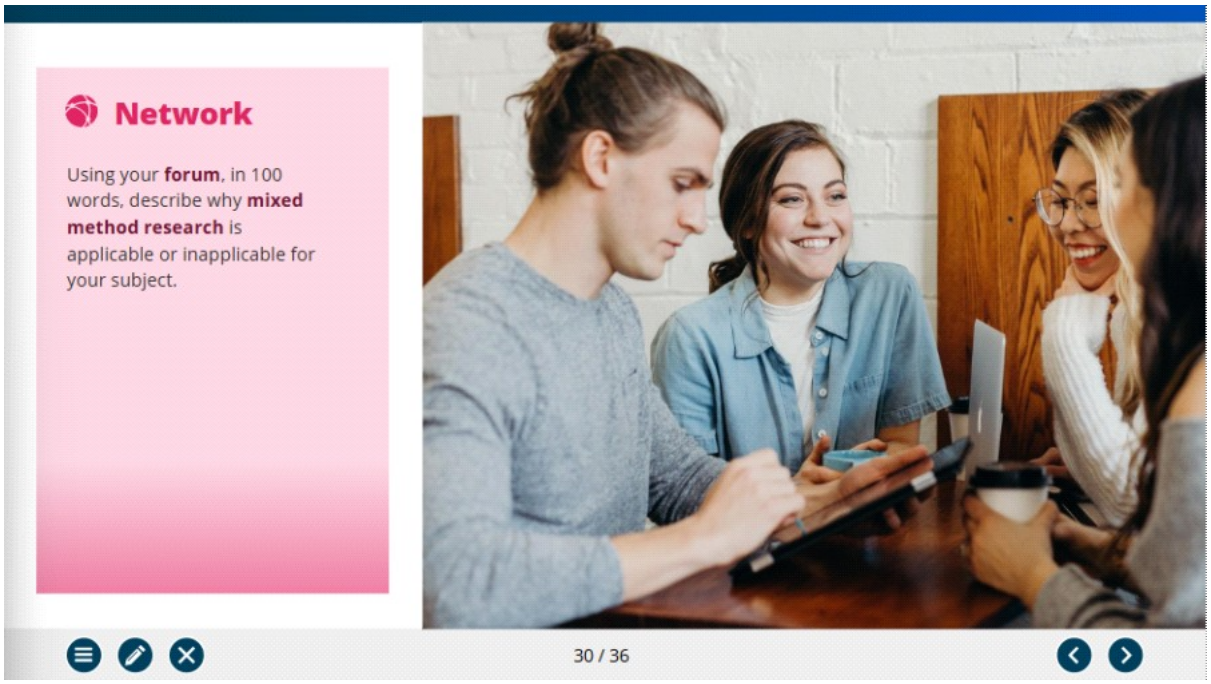
Of course, the method you choose is also directed by **the inductive, deductive and abductive** reasoning described earlier. It may also be framed by the problem you have identified in Section 2. Be mindful that your research is likely to have constraints that include time, access, and availability of data and access to people you are interviewing.



29 / 36

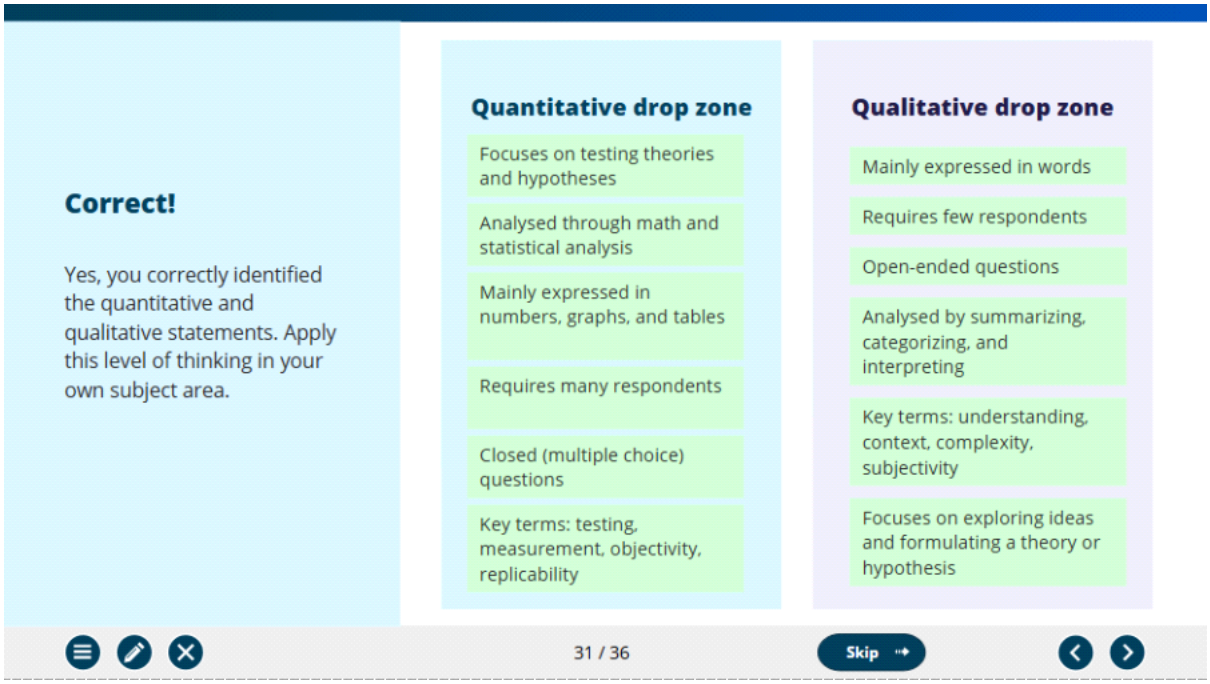


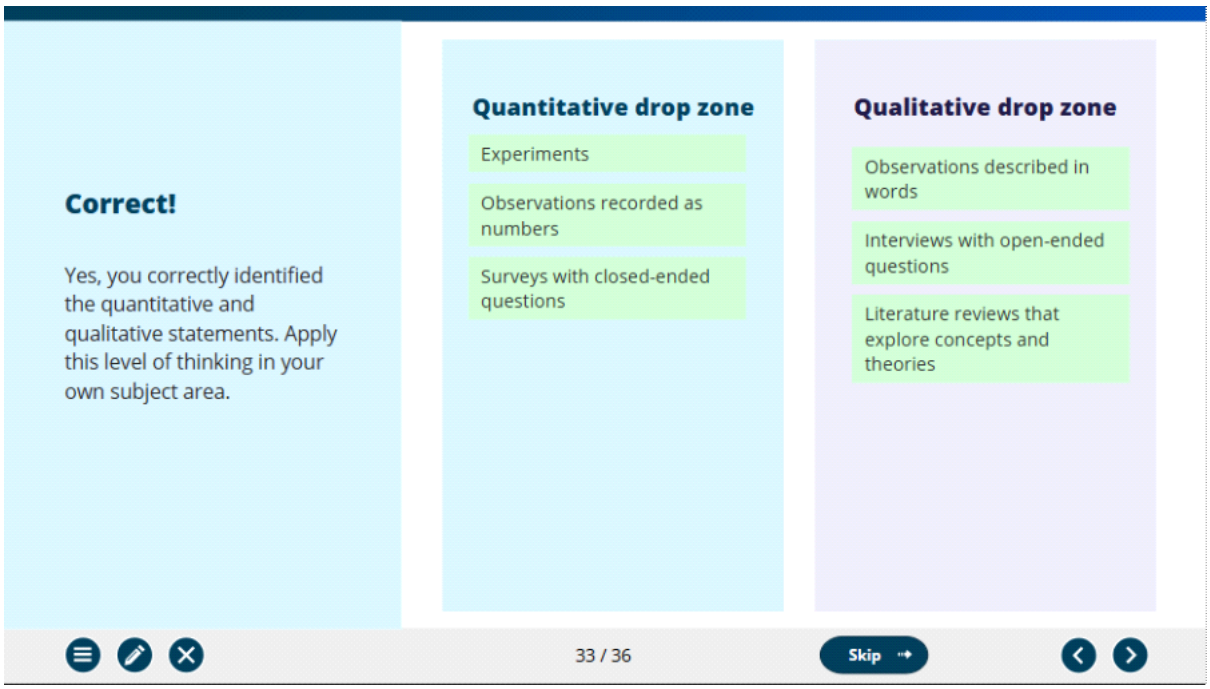
Network (activity)



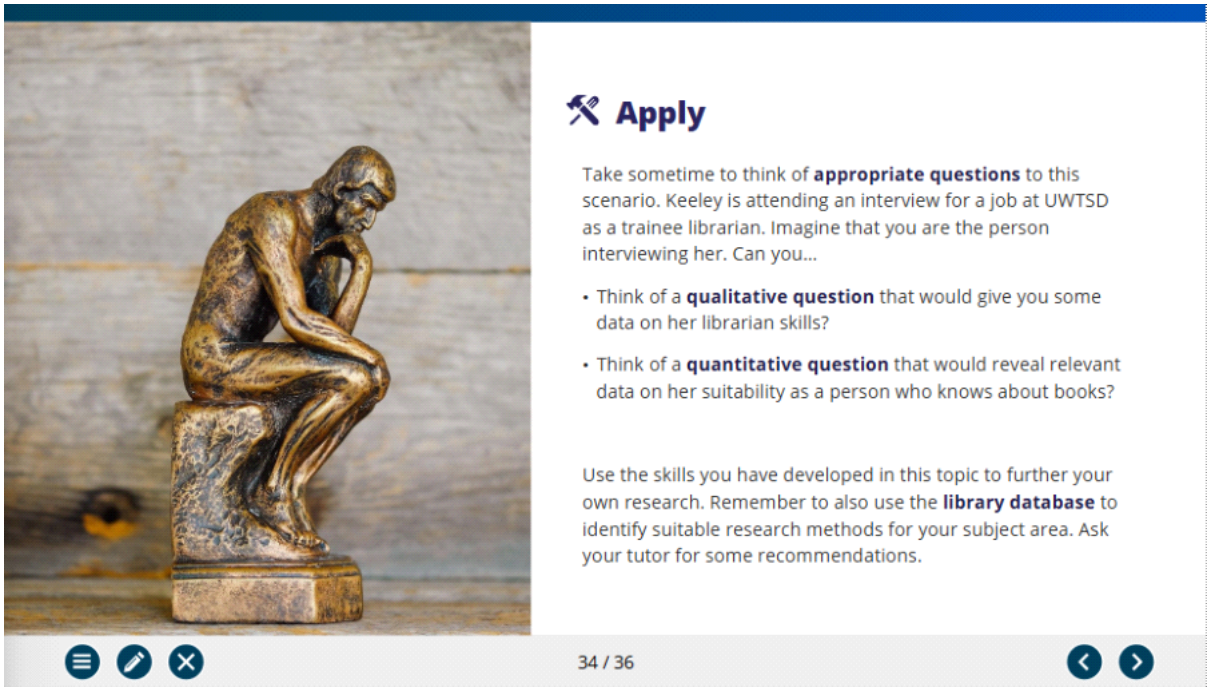
In software development, in particularly my chosen topic, mixed method research suits software development as it uses both quantitative and qualitative approaches. Qualitative data like performance metrics and user analytics and on the other hand qualitative data from interviews are great for developing an understanding on contextual understanding.

Check


Correct!
Yes, you correctly identified the quantitative and qualitative statements. Apply this level of thinking in your own subject area.
Quantitative drop zone
Focuses on testing theories and hypotheses
Analysed through math and statistical analysis
Mainly expressed in numbers, graphs, and tables
Requires many respondents
Closed (multiple choice) questions
Key terms: testing, measurement, objectivity, replicability
Qualitative drop zone
Mainly expressed in words
Requires few respondents
Open-ended questions
Analysed by summarizing, categorizing, and interpreting
Key terms: understanding, context, complexity, subjectivity
Focuses on exploring ideas and formulating a theory or hypothesis
31 / 36
Skip


Correct!
Yes, you correctly identified the quantitative and qualitative statements. Apply this level of thinking in your own subject area.
Quantitative drop zone
Experiments
Observations recorded as numbers
Surveys with closed-ended questions
Qualitative drop zone
Observations described in words
Interviews with open-ended questions
Literature reviews that explore concepts and theories
33 / 36
Skip

Apply

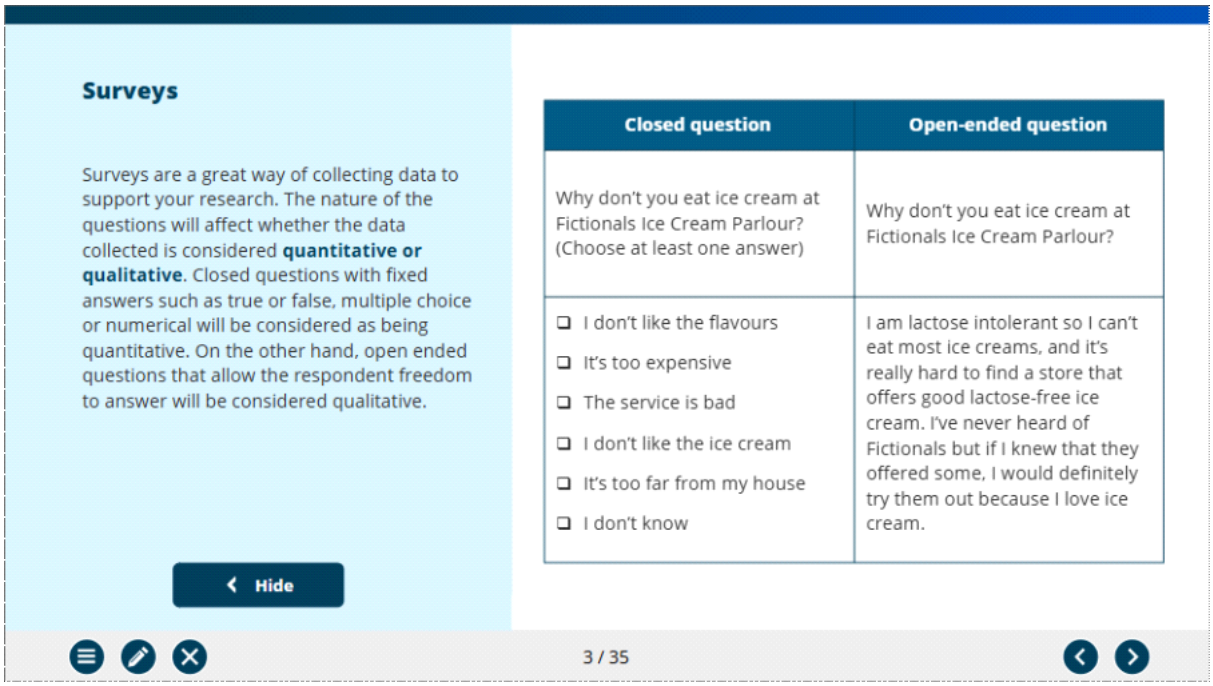


How many years have you worked as a librarian?

Which genre of book would you suggest we invest in as a library?

Topic 2

Section 1 – Awareness of different research choices and data collection methods



Individual interview

An individual interview is merely a structured conversation held between people that attempts to address the problem statement you have defined. The intention is to **extract** the interviewee's knowledge and perspectives on the problem. They are useful ways of exploring an individual's **beliefs, values and attitudes**.



Hide

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Focus groups

A focus group is a formal discussion of around 7 people for whom the problem you are researching is relevant. Attendees are given the opportunity to **discuss** what the group thinks about the problem. Baseline rules are established that allow people to agree and disagree. This allows you to witness inconsistencies and variation on the entire range of opinions.



Hide

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Observations

Qualitative observation

This is the form of direct observation where your research is based upon passively watching the subjects of your problem. Notes can be taken along with photographs, video or audio.

Quantitative observations of experiments

Data can also be collected as a result of an experiment. These could be based on computers using technology such as the Internet of Things, or from measuring devices such as thermometers, rulers, scales etc.

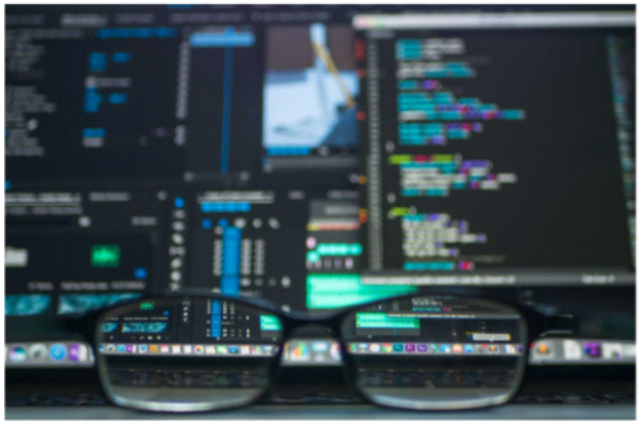


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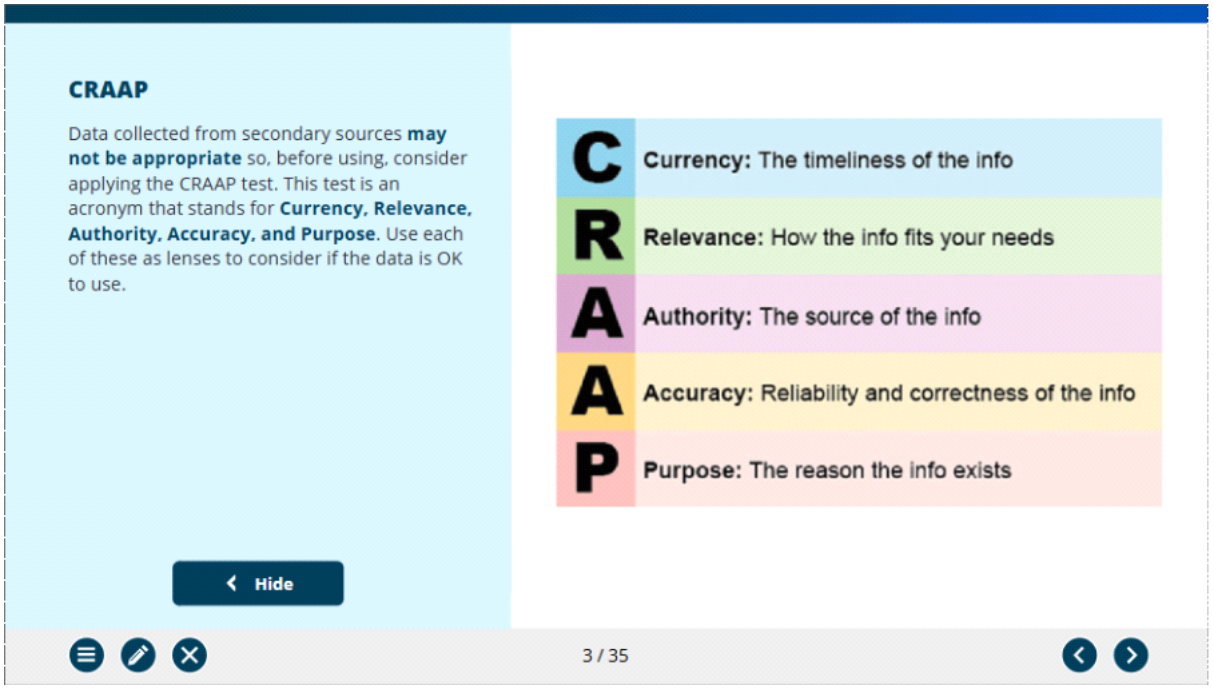
Secondary data

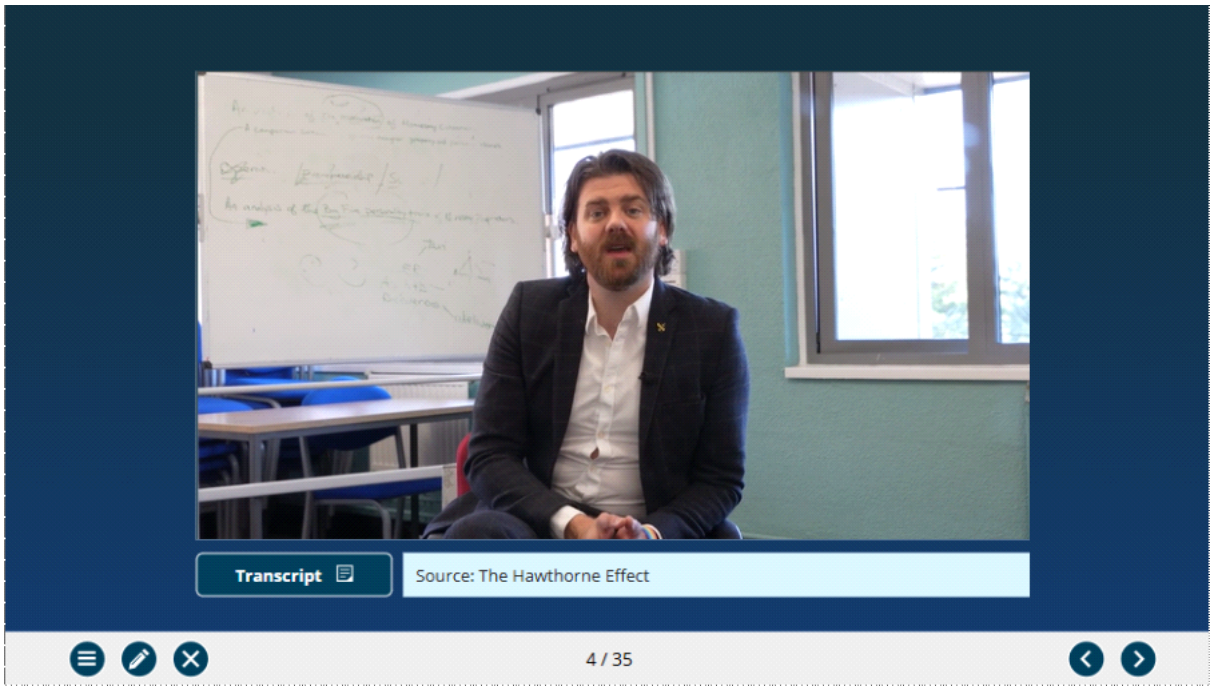
Collecting data by yourself is called primary data. This sort of data can be considered the most valuable to the researcher as they can guarantee its authenticity. However, as noted beforehand, research can be constrained by time and resource, meaning that primary data may be too difficult to collect. In this case, it is possible to collect data from a secondary source such as **databases or websites**.



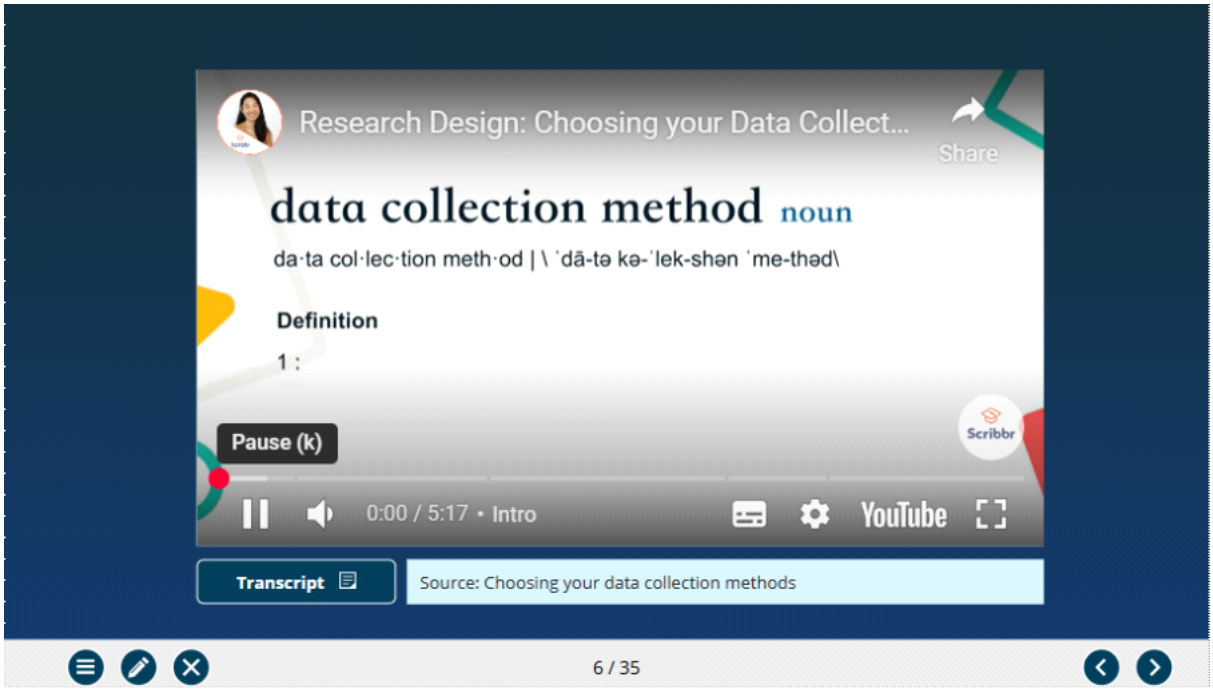
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3 / 35



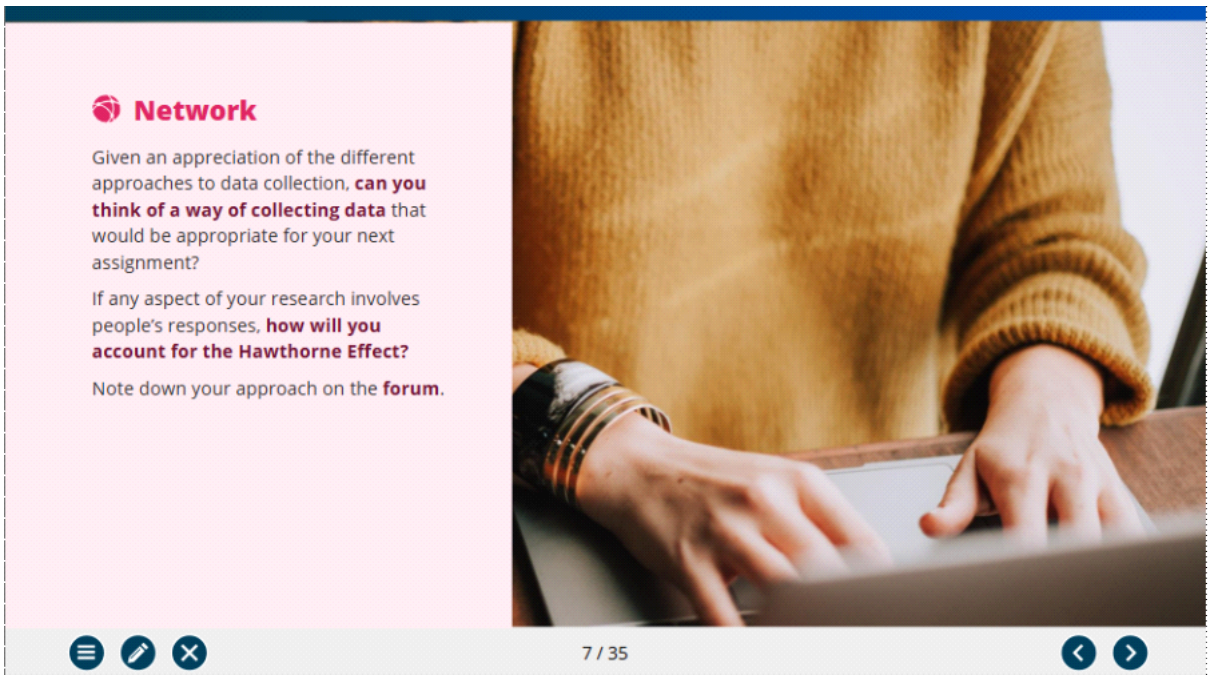


This video describes the Hawthorne effect: people perform better under observation.



This video describes data collection methods. Discussed: surveys, questionnaires, observations, quantitative observations, qualitative observations, and delves into secondary data from data that already exists.

Network



Surveys. To avoid the Hawthorne effect I will conduct surveys and make them anonymous to negate the effect.

Section 2 – Develop appropriate sampling strategies to enhance validity, reliability, and generalisability

Census: office of national statistics (ONS) who consistently collect data.

Qualitative research data

Qualitative research data

Identifying participants for qualitative research, such as interviews and focus groups, often focuses on a limited number of respondents. This is for a number of reasons, for example:



- Your time and resources may be stretched
- There are limited people who have experiences that you are studying
- There are limited people with the knowledge or expertise in the area you are studying

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Qualitative research data

To select the people in your survey, there are a **number of approaches and explanations** for narrowing the research to accommodate either small samples of qualitative data or the constraints of your research. Select each of the tabs below to reveal different examples of sampling.

- **Typical case sampling**
- **Unusual case sampling**
- **Snowball sampling**
- **Random sampling**

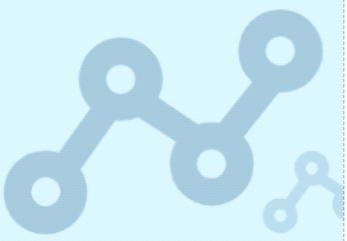
Typical case sampling

You could take your learning from the **typical** instance. For example, research on child poverty could focus on the average responses of children who struggle with hardship.

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Qualitative research data

To select the people in your survey, there are a **number of approaches and explanations** for narrowing the research to accommodate either small samples of qualitative data or the constraints of your research. Select each of the tabs below to reveal different examples of sampling.



- Typical case sampling
- **Unusual case sampling**
- Snowball sampling
- Random sampling

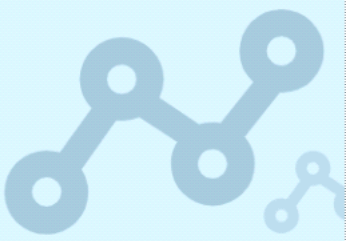
Unusual case sampling

Your research could take an unusual case and **unpack it**. A study on child poverty may consider just the children who appear to succeed despite extreme hardship.

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Qualitative research data

To select the people in your survey, there are a **number of approaches and explanations** for narrowing the research to accommodate either small samples of qualitative data or the constraints of your research. Select each of the tabs below to reveal different examples of sampling.

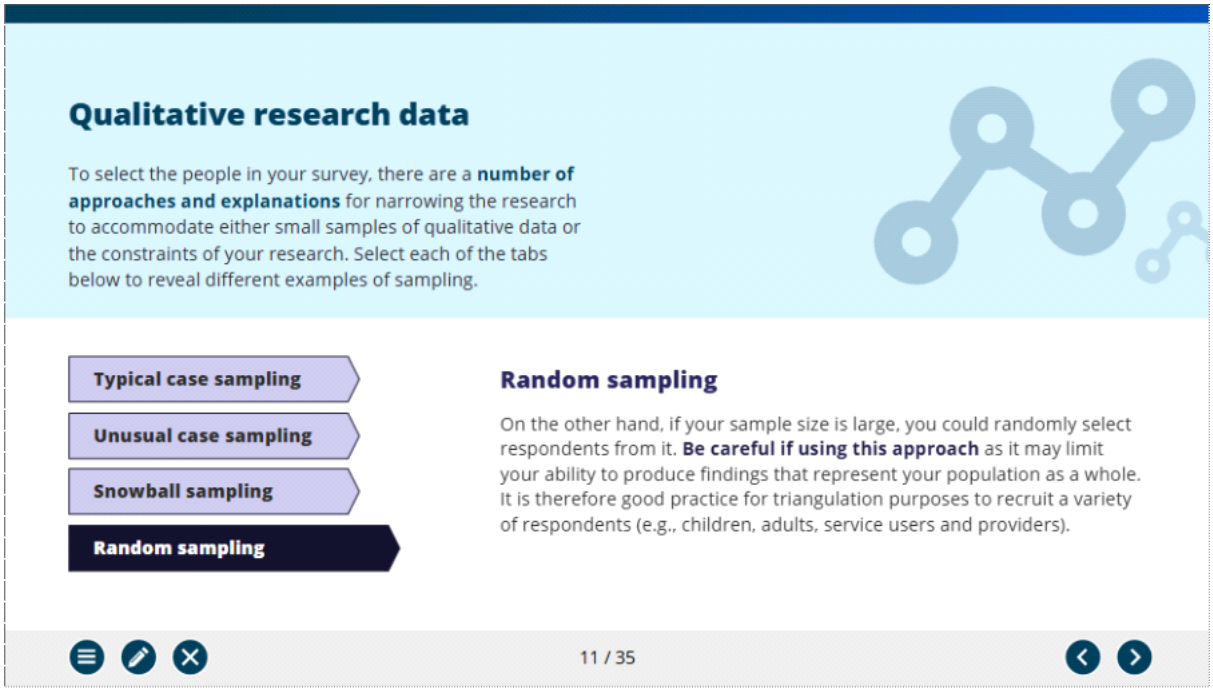


- Typical case sampling
- Unusual case sampling
- **Snowball sampling**
- Random sampling

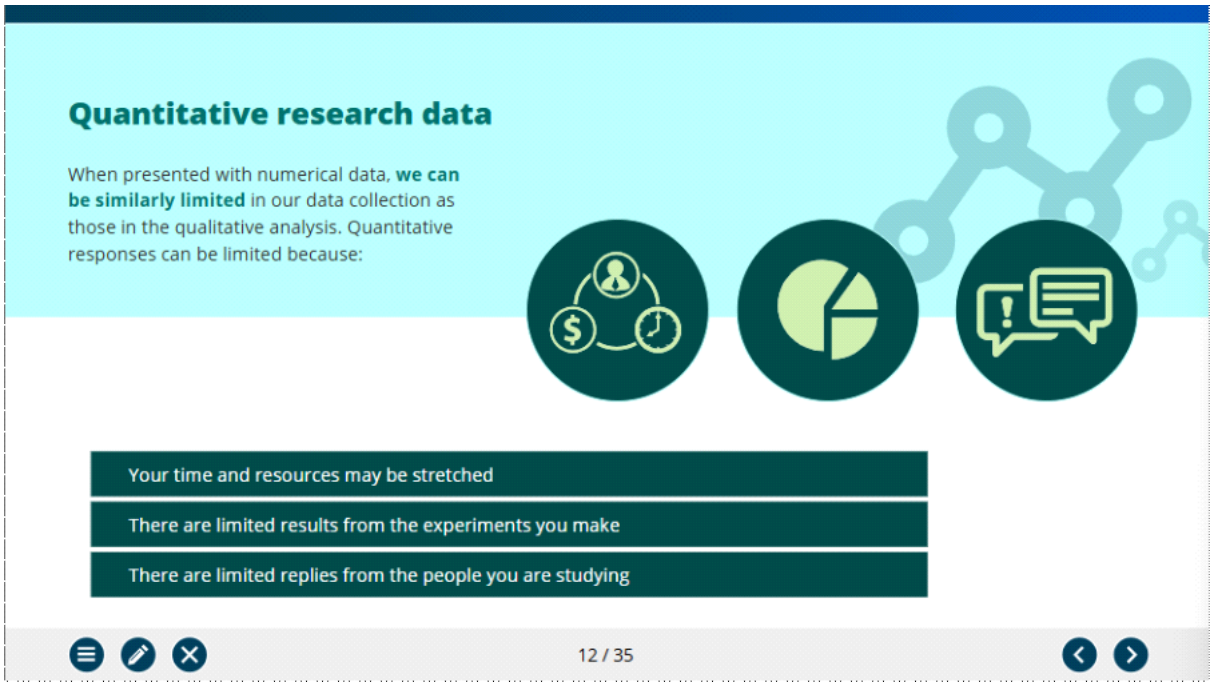
Snowball sampling

If your research fails to identify a significant number of interviewees, your research questioning could **ask the respondent to identify** other people who will have a similar in-depth understanding about the issue under study. For example, you may ask street children to identify other street children you can talk to.

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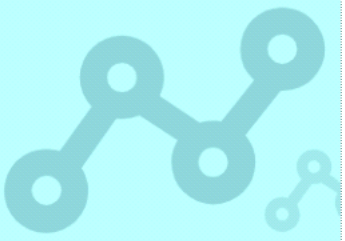


Quantitative



Quantitative research data

To select the people in your survey, there are a **number of approaches and explanations** for narrowing the research to accommodate either small samples of qualitative data or the constraints of your research. Select each of the tabs below to reveal different examples of sampling.



- **Random sampling**
- Systematic sampling
- Stratified sampling
- Cluster sampling

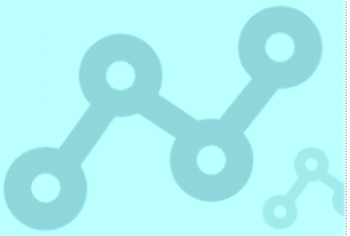
Random sampling

In this approach, every piece of data is considered to be equally relevant. This means if you include it in your research it is based on a **random chance** whether it's included or excluded from the sample you study. So, for example, the children who appear in your child poverty research could be allocated a number and whether they are included or not is down to the roll of a dice.

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Quantitative research data

To select the people in your survey, there are a **number of approaches and explanations** for narrowing the research to accommodate either small samples of qualitative data or the constraints of your research. Select each of the tabs below to reveal different examples of sampling.

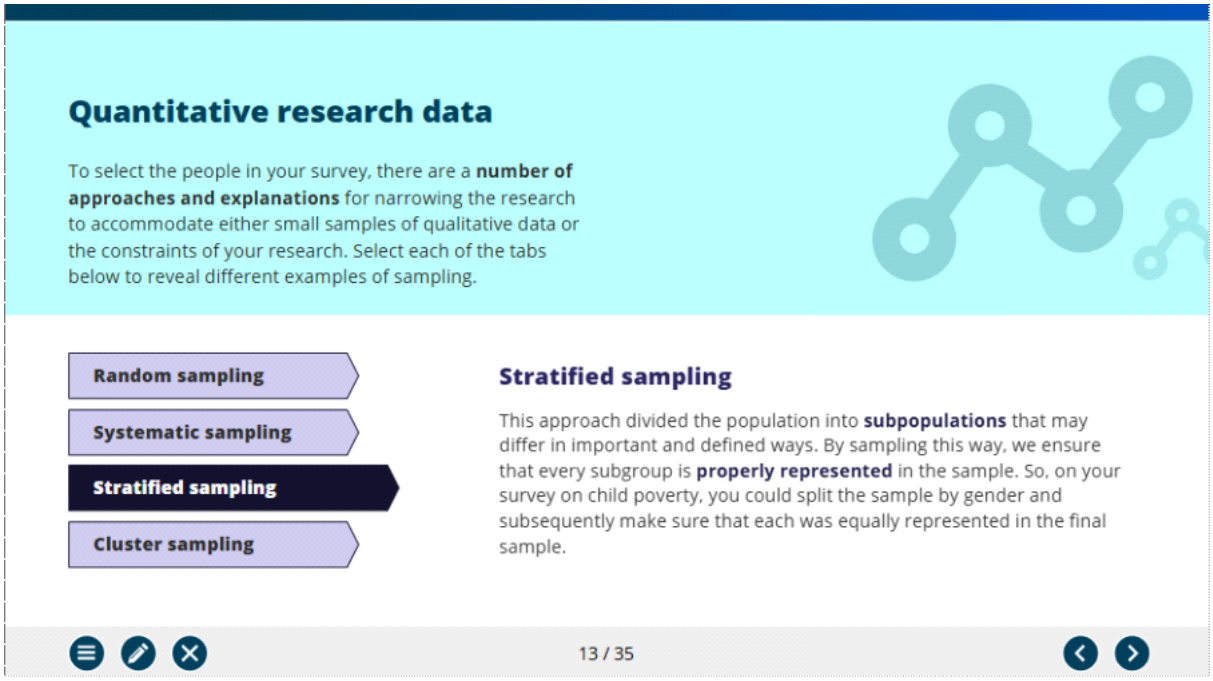


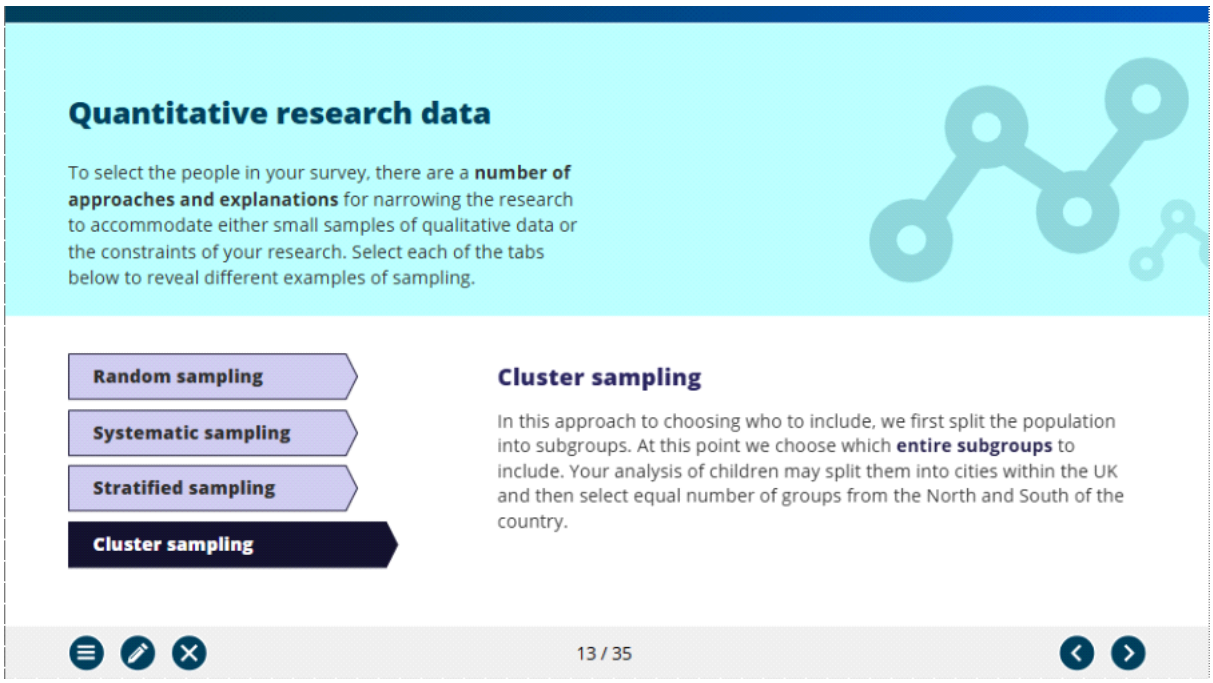
- Random sampling
- **Systematic sampling**
- Stratified sampling
- Cluster sampling

Systematic sampling

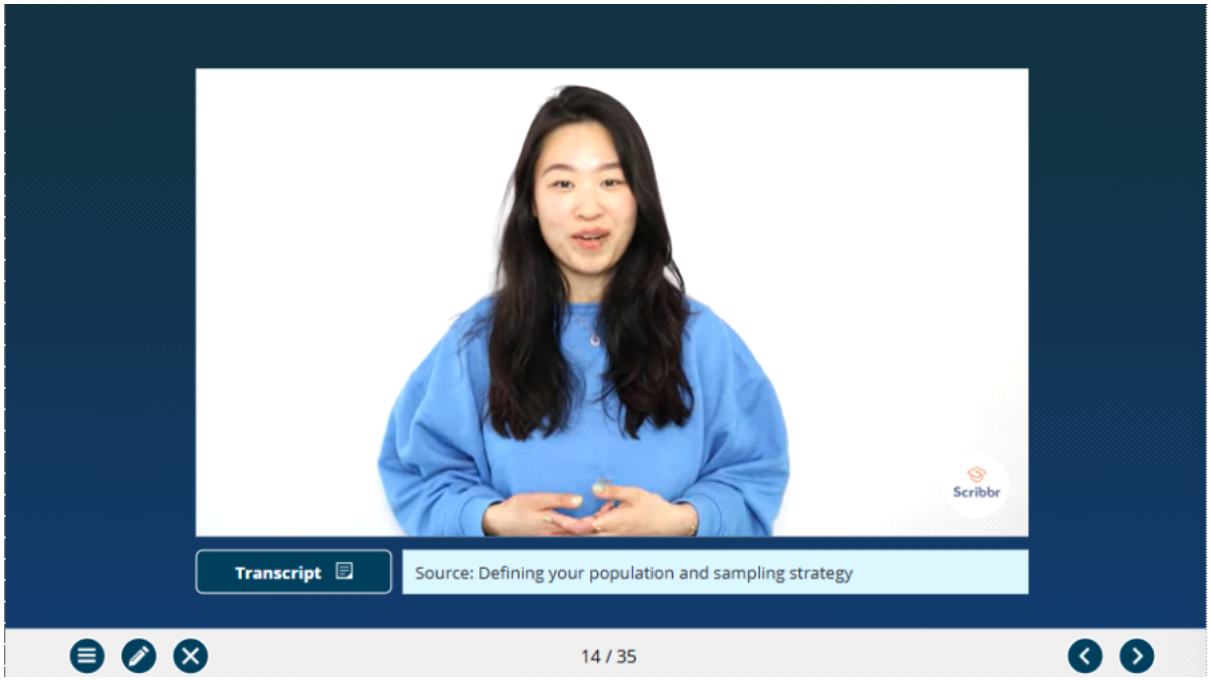
This is a similar approach to random sampling but is **generally easier to construct**. In the case of child poverty described above, instead of choosing the children at random, we take every 10th one for our analysis.

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Defining your population and sampling strategy



Define the population clearly, identifying who or what your study focuses on.

A sample is a smaller group drawn from the population for data collection.

Probability sampling uses random methods, is more representative, and is common in quantitative research.

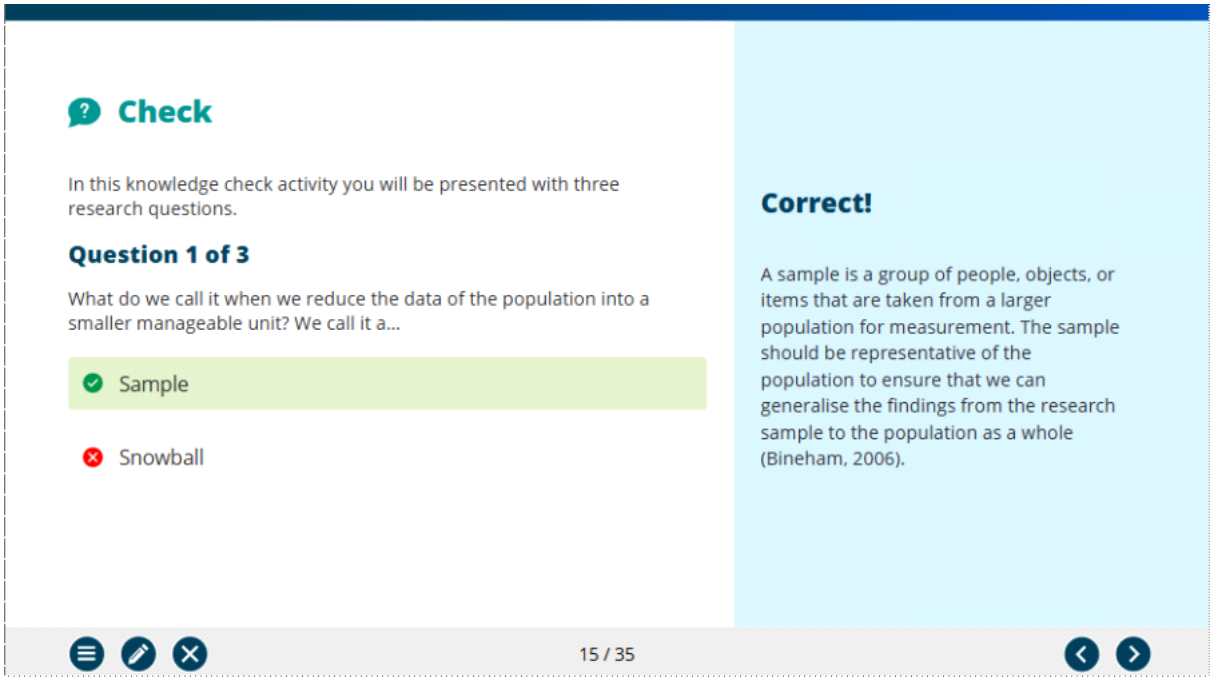
Non-probability sampling uses non-random methods, is easier, but more prone to bias.

Examples of probability sampling include simple random, stratified, and cluster sampling. Examples of non-probability sampling include convenience and volunteer based sampling.

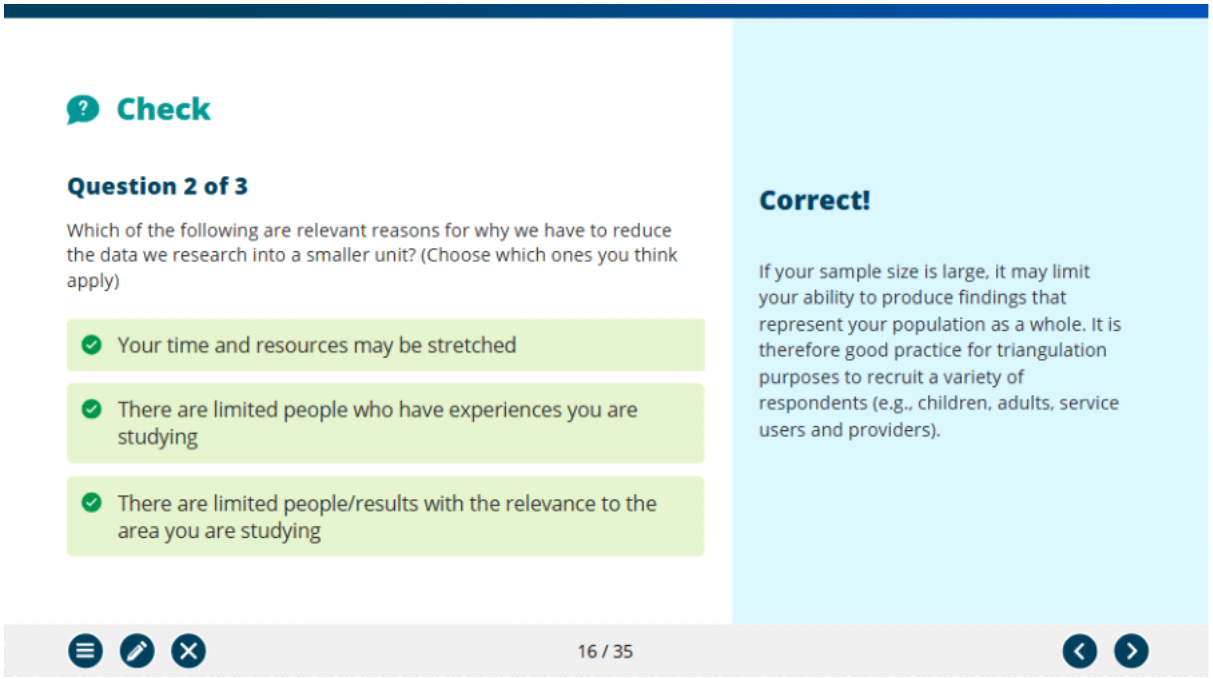
Qualitative designs like case studies and ethnographies often focus on specific contexts rather than broad sampling.

The sampling strategy should align with research goals and consider potential limitations.

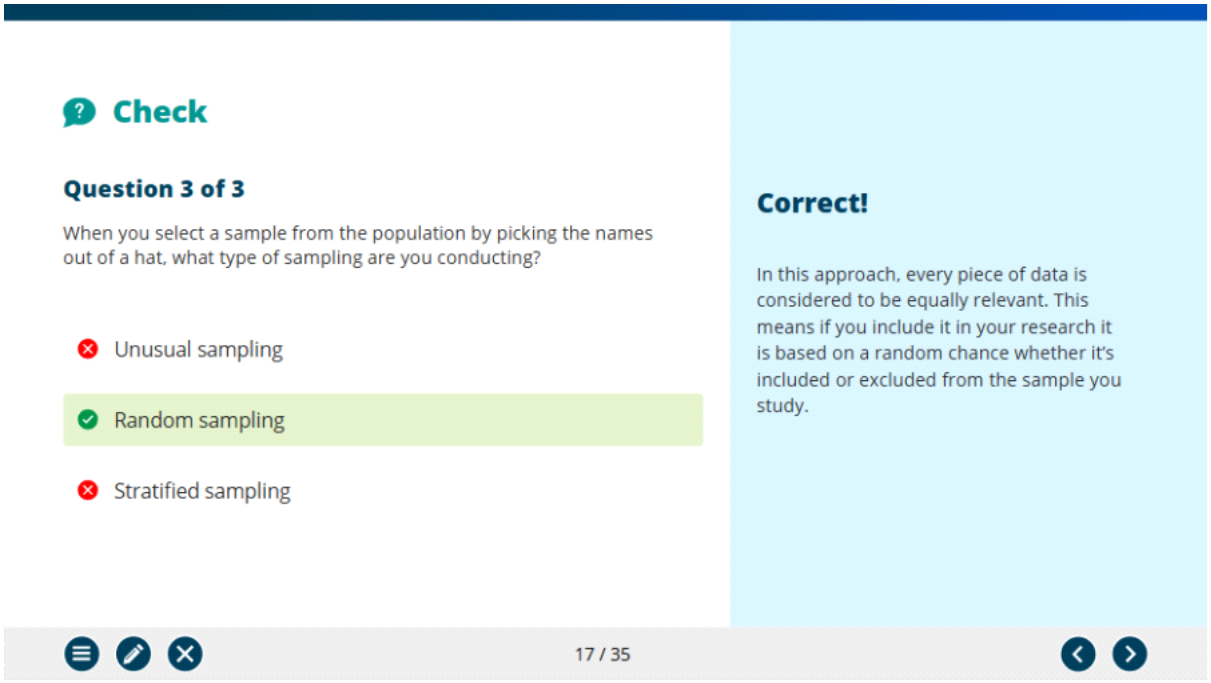
Check (1)



Check (2)

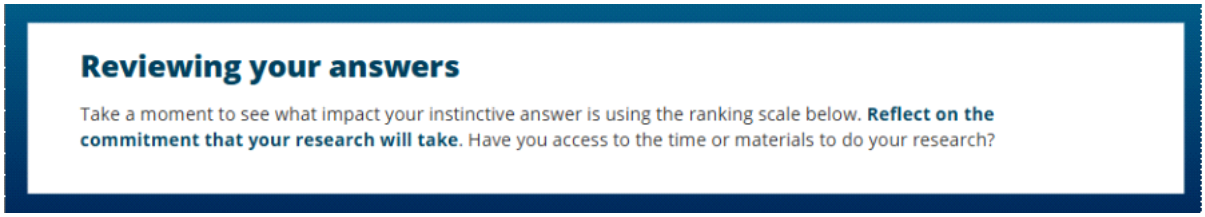


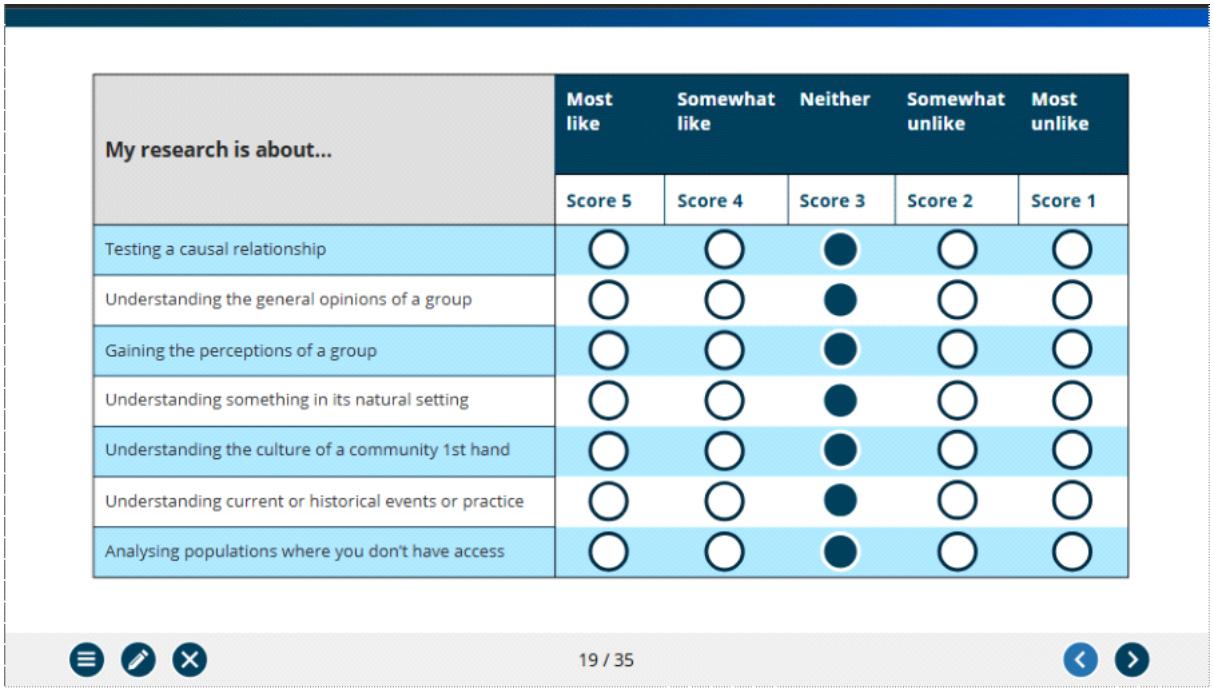
Check (3)



Section 3 – Design a data collection method appropriate to investigate a given problem

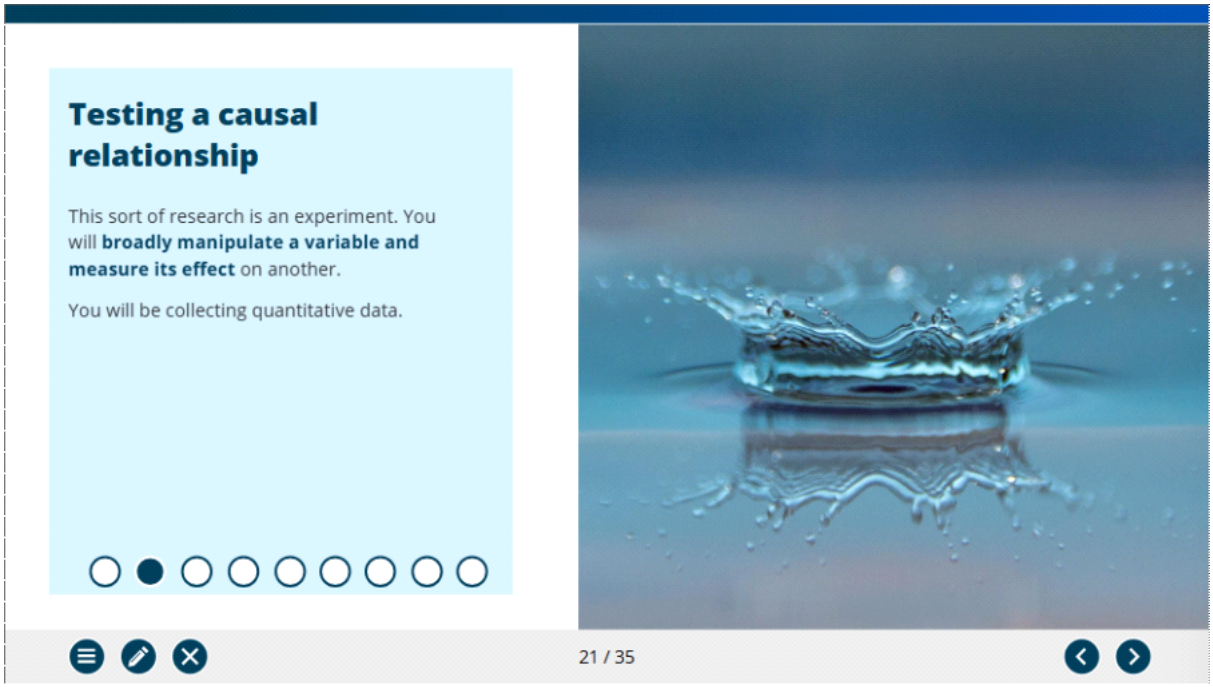
Reflect

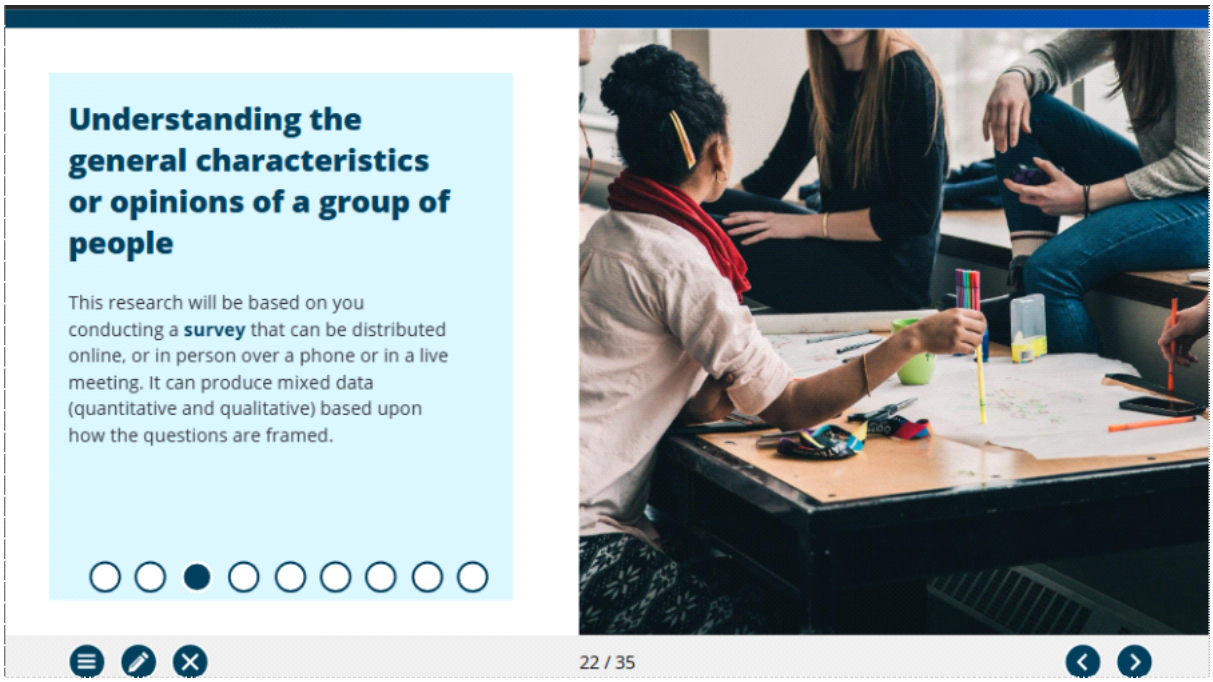




I currently do not have research plans.

Types of research





Gaining an in-depth understanding of perceptions or opinions of a topic

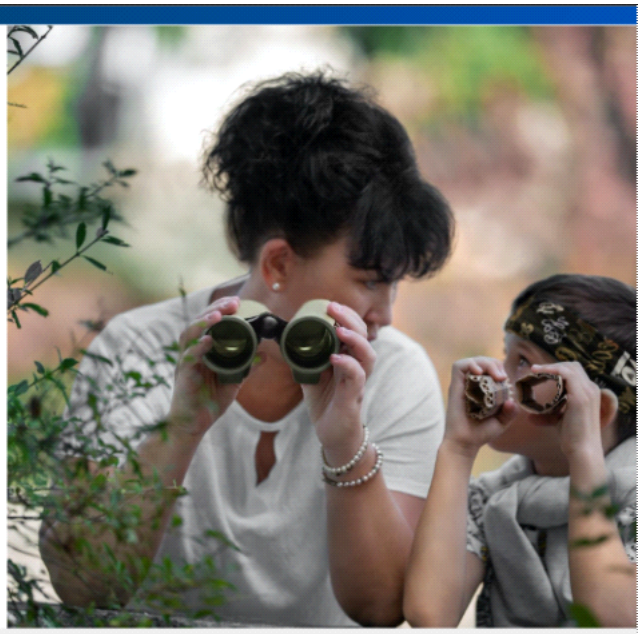
Your research will reveal qualitative data. This will be collected by a focus group or an interview. You will **verbally** ask participants open ended questions and **record** their answers.



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Understanding a subject in its natural setting

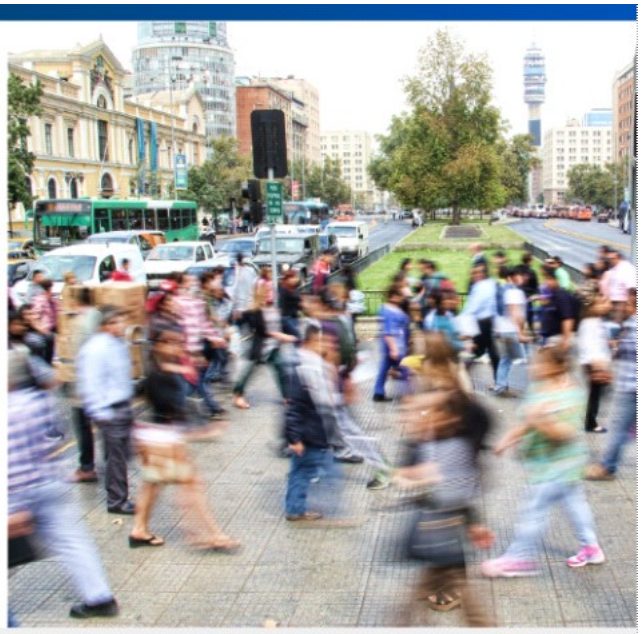
In this research you will record data by **observing without intervention**. This sort of data collection is called observation.



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To study the culture of a community first-hand

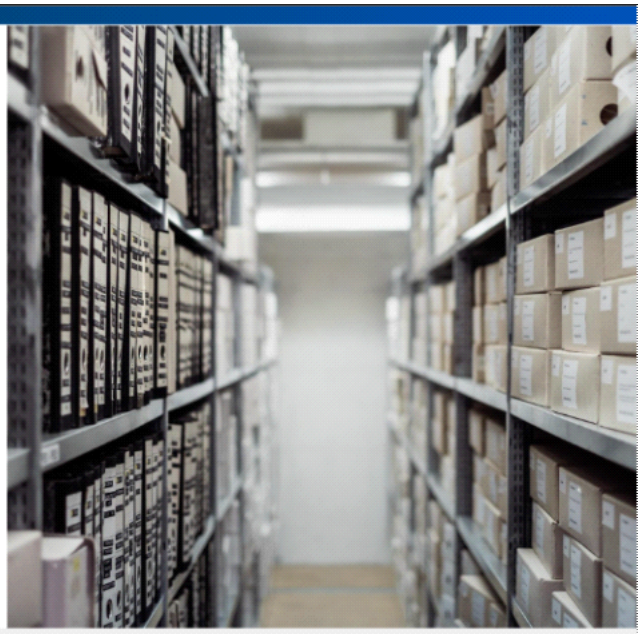
This kind of data collection is called **ethnography.** It requires you to be embedded in an organisation and record your personal reflections or observations.



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To understand historic or current conditions, events or practice

In **archival research** you will need access to library, repository or online records to collate your data.



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To analyse data from populations that you can't access first-hand

This sort of research is called **secondary data collection**. It means you need access to **previously collected data sets** (like the census). These are generally available from government or research agencies.



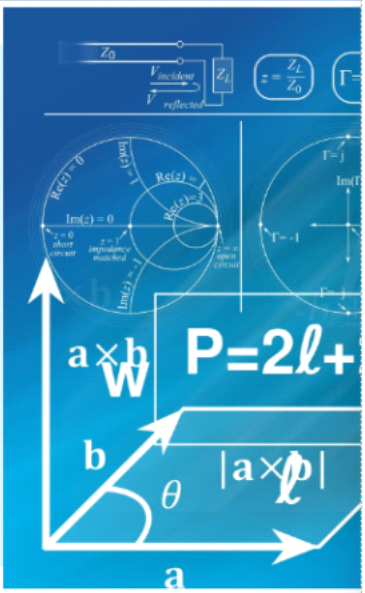
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Defining the variables

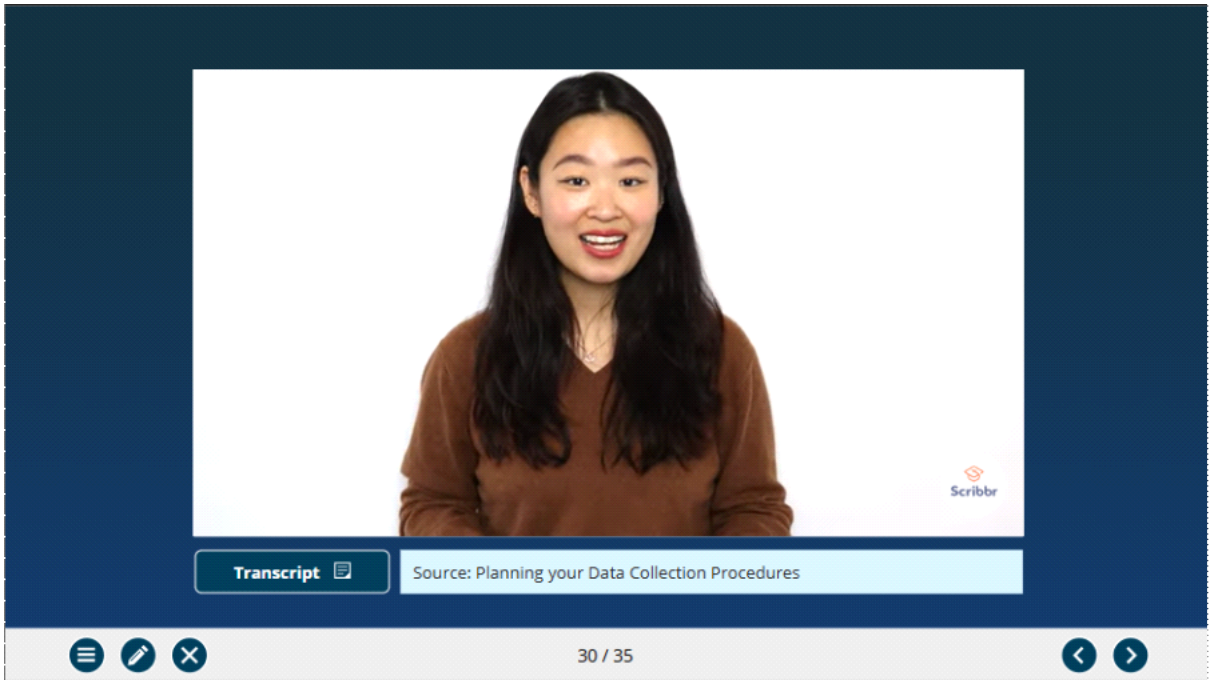
When you have an idea of what sort of data collection you are going to collect, you now need to establish **how you are going to implement it**. Take a moment to think about how you are going to **consider the variables**. Some variables like age, weight and height will be easy to consider, but how happy or successful a subject is may prove more difficult.

As part of your design, you may need to consider these fuzzy concepts and devise ways that they can be defined in a measurable way. For example, you could measure how happy people are by observing how many times they laugh in a meeting.

When creating surveys, spend time thinking what questions you will ask and consider what answers would be expected. A good solution to measuring success would be to consider a **'Likert scale'**. A Likert scale is a five-point answer like the one you have used in the previous 'research approach' activity.



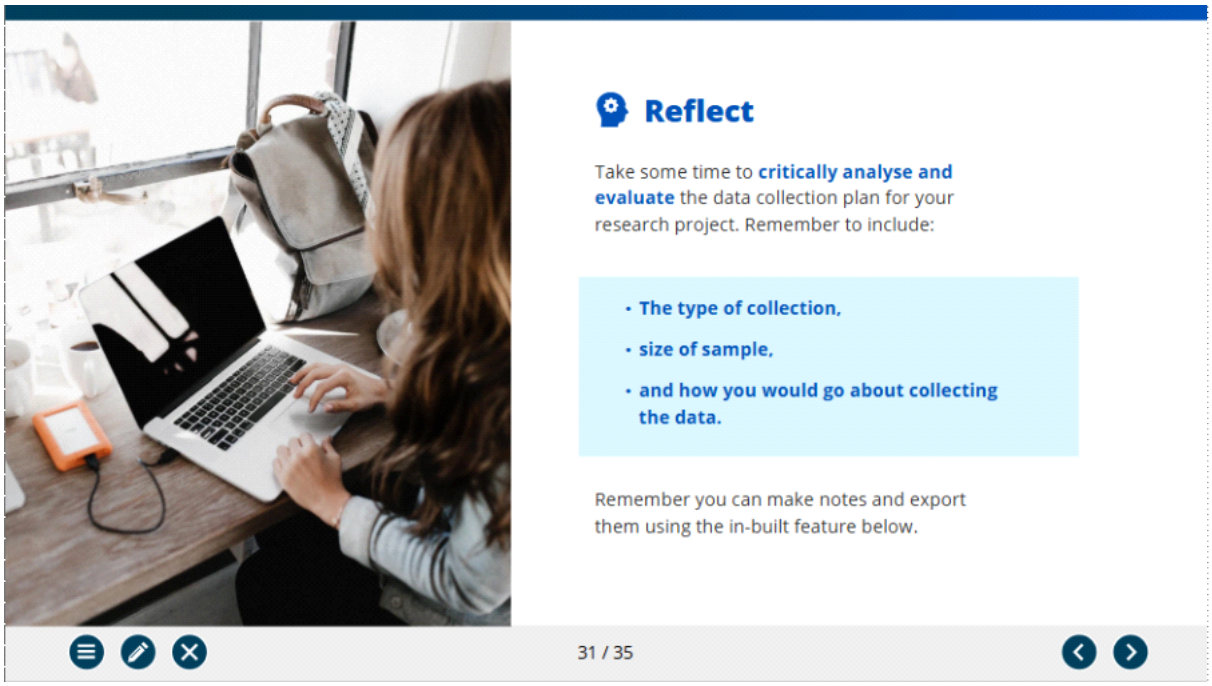
28 / 35



Video detail:

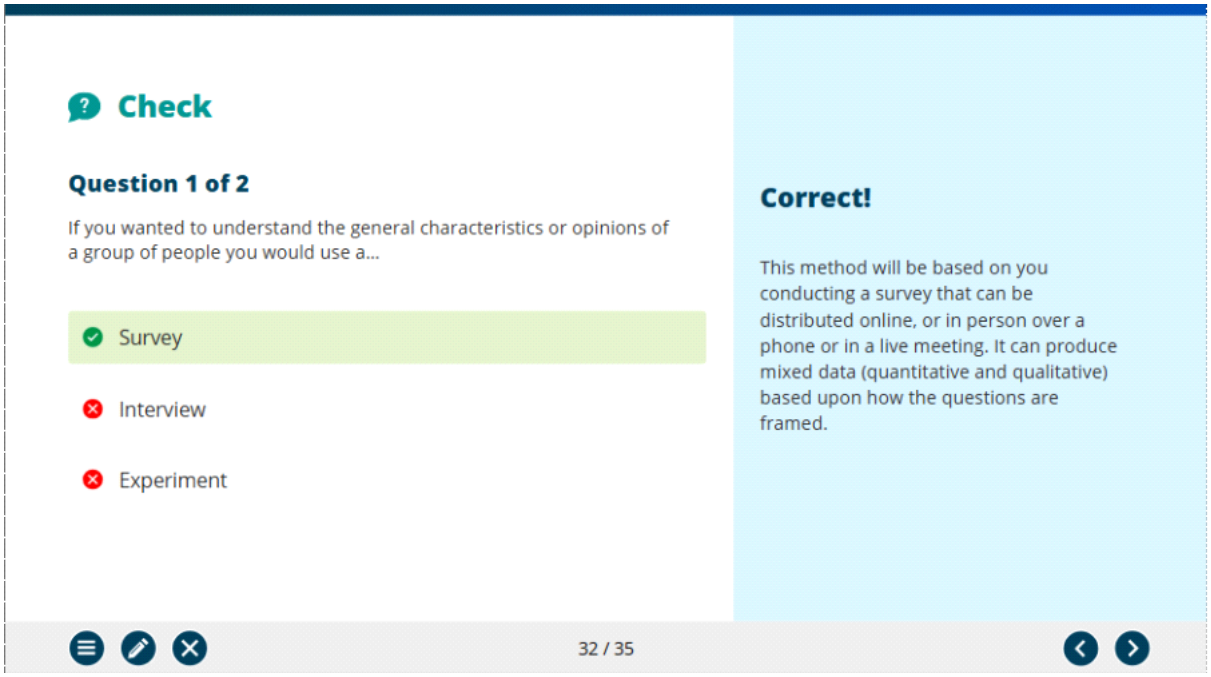
Define how each variable will be measured, especially abstract concepts, by operationalising them into clear, observable indicators. Ensure measurement validity (measuring the intended concept) and reliability (consistency across participants), possibly through pilot testing. Plan how to recruit your sample, determine the required size, set inclusion and exclusion criteria, choose contact methods, and address potential bias or non-response.

Reflect

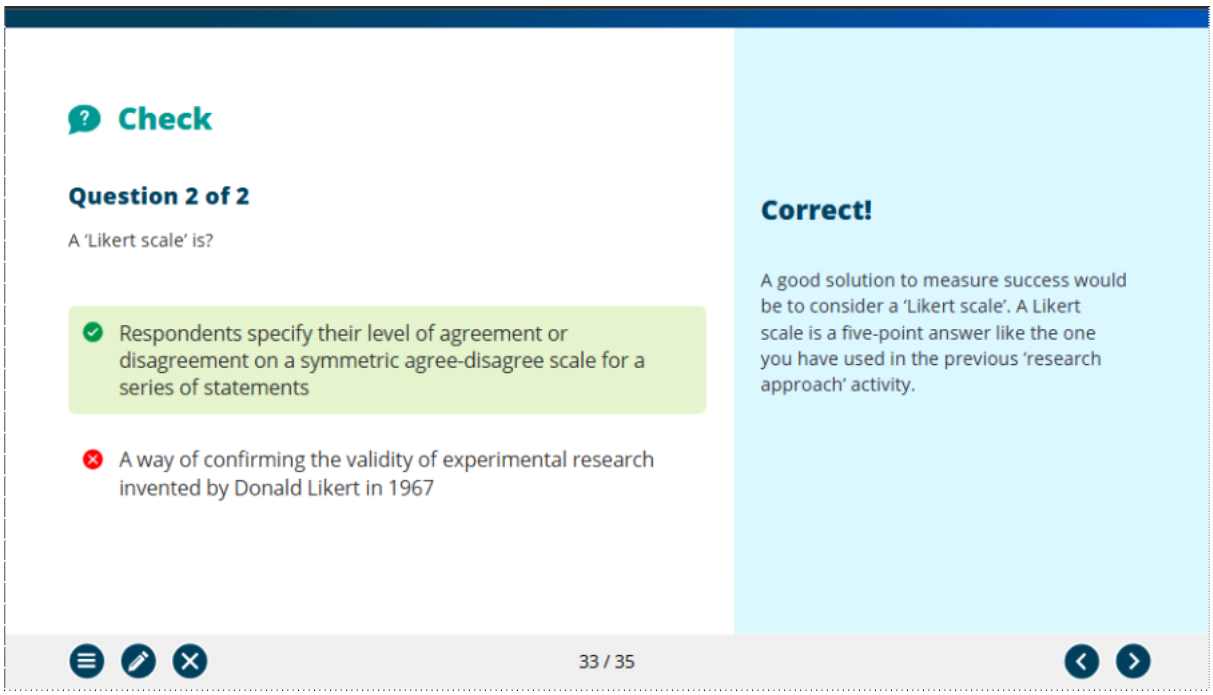


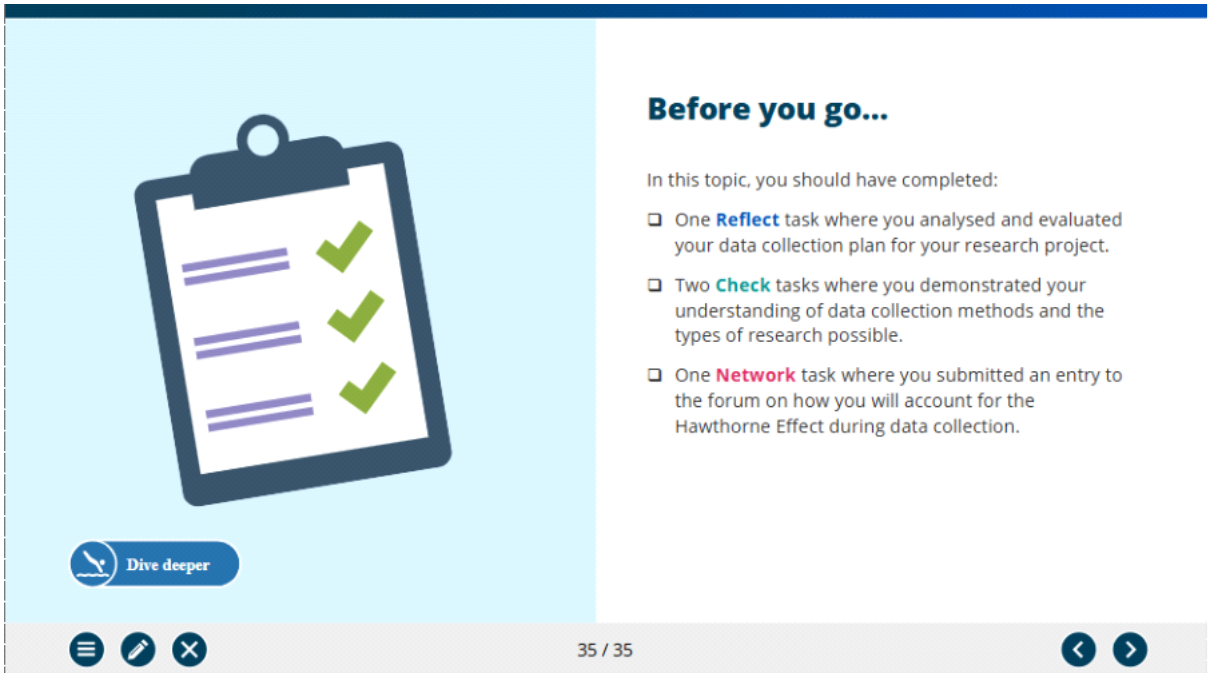
I will collect with interviews. I'll have a sample size of 10 interviews as these will take longer to conduct. I'll collect the data in person and online (including surveys).

Check (1)


Check
Question 1 of 2
If you wanted to understand the general characteristics or opinions of a group of people you would use a...
Survey
Interview
Experiment
Correct!
This method will be based on you conducting a survey that can be distributed online, or in person over a phone or in a live meeting. It can produce mixed data (quantitative and qualitative) based upon how the questions are framed.
32 / 35

Check (2)

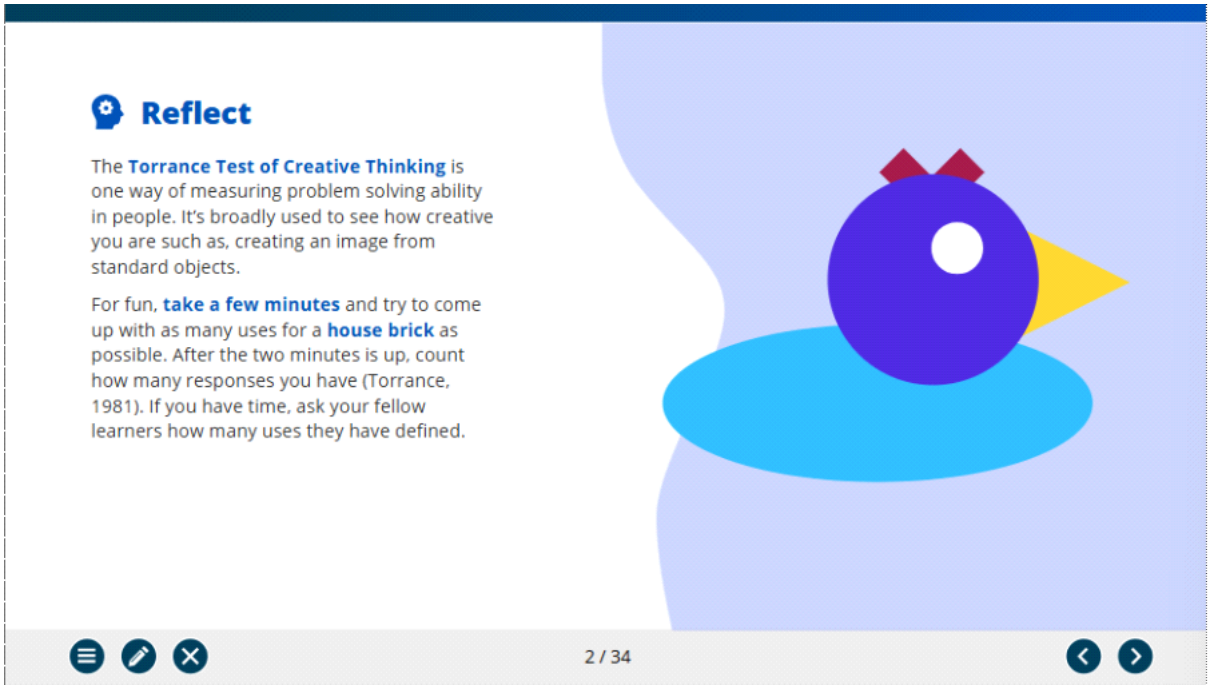

Check
Question 2 of 2
A 'Likert scale' is?
Respondents specify their level of agreement or disagreement on a symmetric agree-disagree scale for a series of statements
A way of confirming the validity of experimental research invented by Donald Likert in 1967
Correct!
A good solution to measure success would be to consider a 'Likert scale'. A Likert scale is a five-point answer like the one you have used in the previous 'research approach' activity.
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Topic 3: Now for the solutions

Section 1: Effective techniques for generating ideas

Reflect



Stacking

Building

Farming

Industrial.

Analysing the results of your Torrance Test

The Torrance test is used as a way of working out how creative children are and has been used since the 1960s (Torrance, 1981). Don't worry if you did not consider many ways.

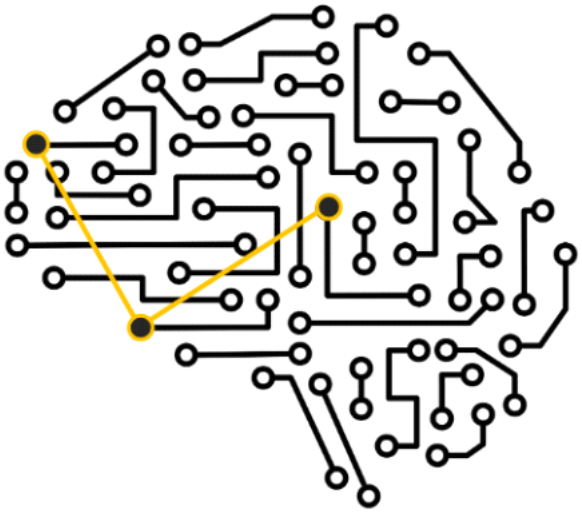


There is a saying often referred to as **Maslow's Hammer**; that if all you have is a hammer, everything looks like a nail (Maslow, 1962). This observation and your experience in working out what to do with a house brick are examples of behaviours all human beings possess called **cognitive bias**.

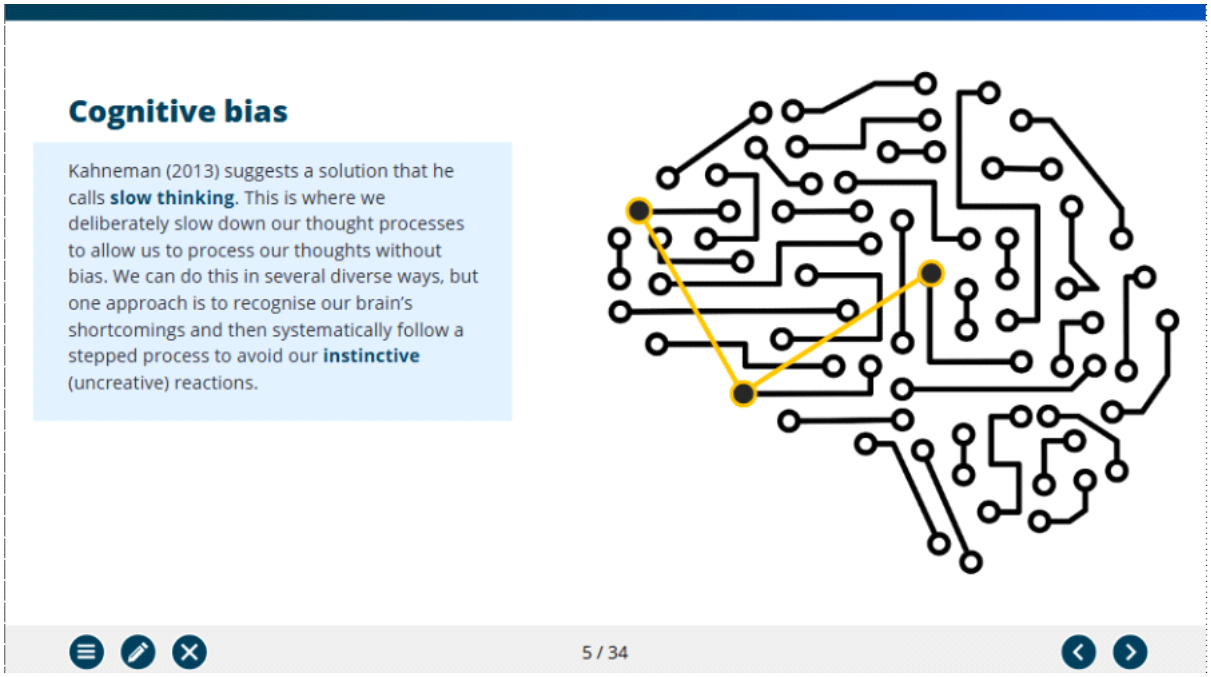
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Cognitive bias

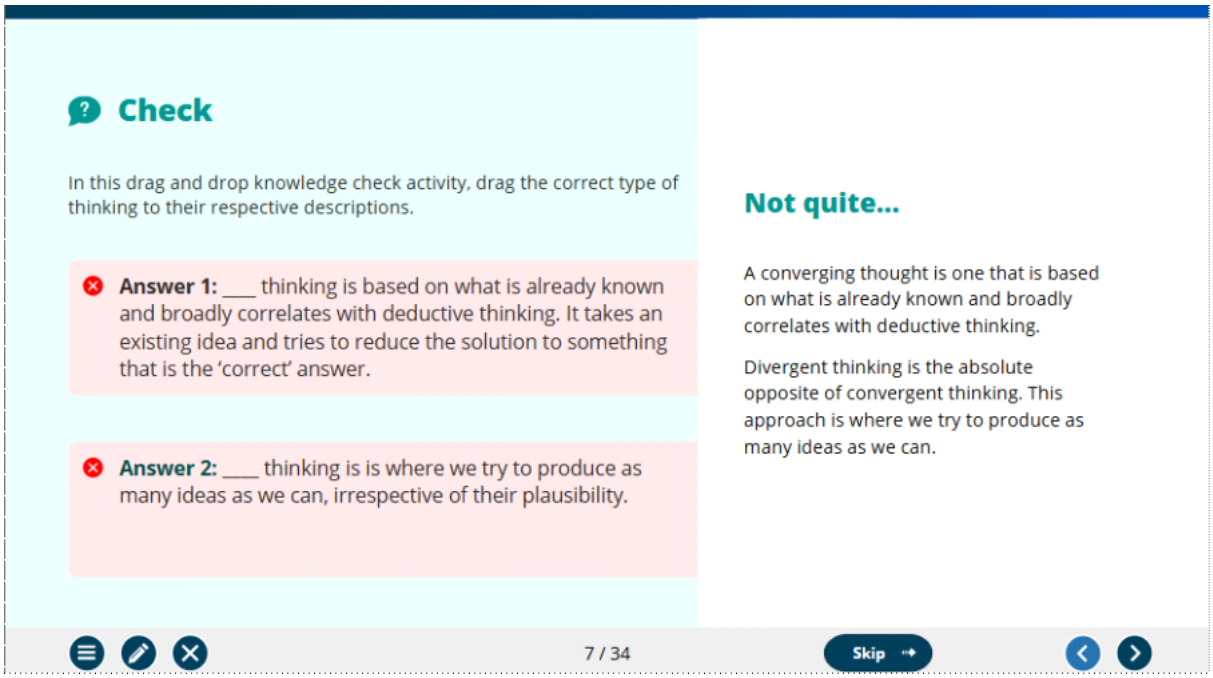
A cognitive bias is effectively a **shortcut** that our brains do to make our lives simple, but can, in effect, block the way of developing creative thinking (Kahneman, 2013). According to Kahneman, when our brains are presented with a problem, our instinct is to deal with it as quickly as we can so we can move on to the next issue that is to be dealt with. The problem with this approach is that our instincts gain their speed by making **assumptions**. It is these assumptions that cause us to assume that everything has a single purpose... so a hammer is only for hitting nails. These assumptions in short are **bad** for creativity.



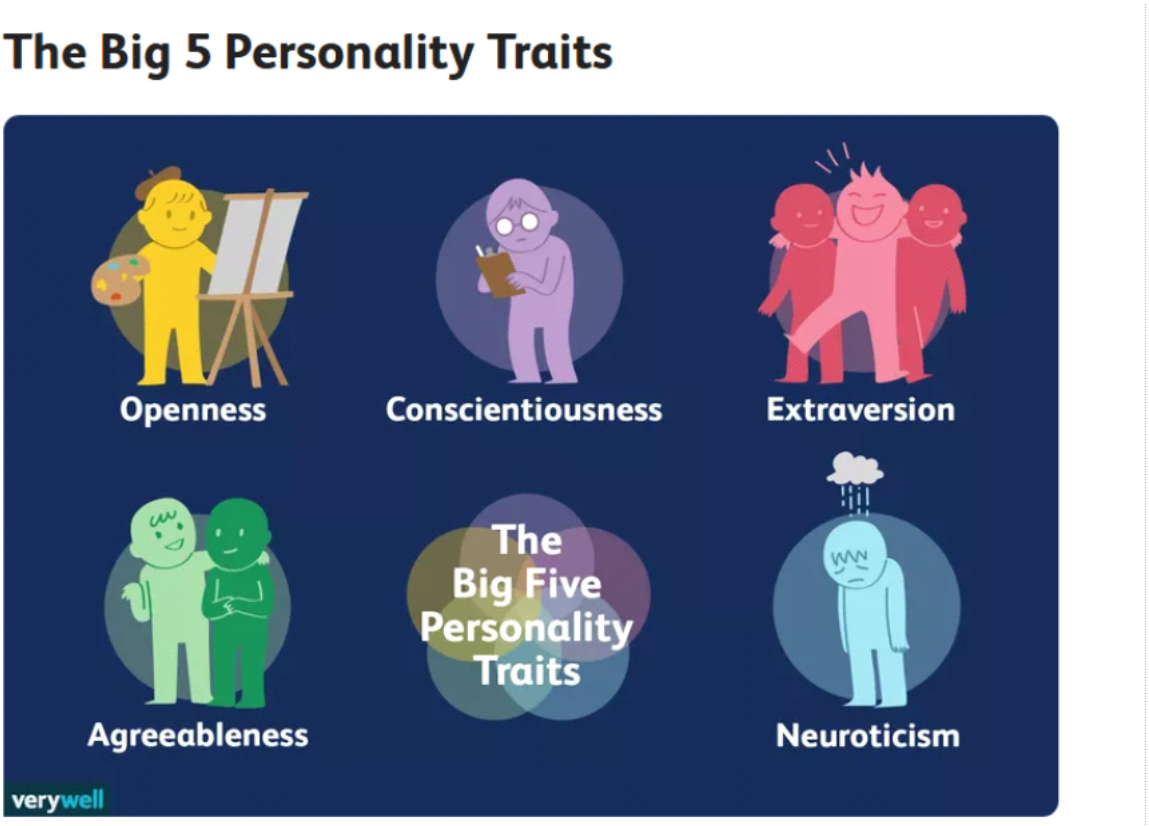
4 / 34



Check (1)

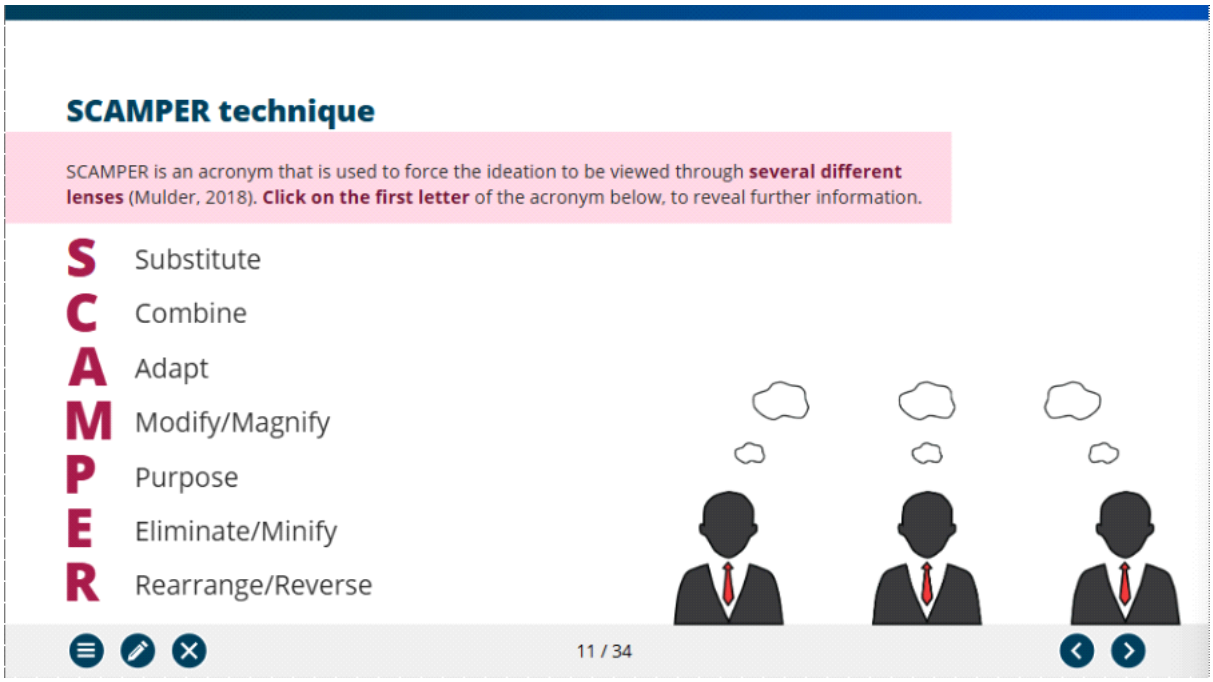


Dive deeper



Credit: Verywell / Joshua Seong

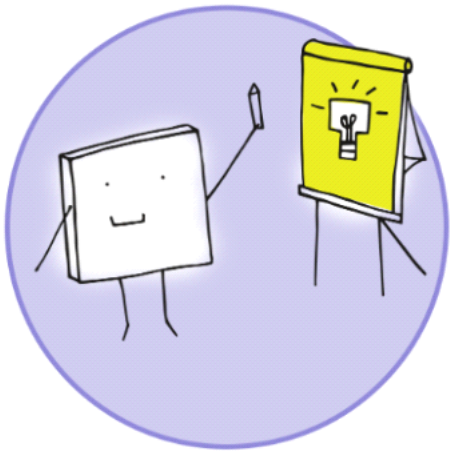
SCAMPER technique



Substitute

- Which other ideas can be used to improve your thinking?
- Which parts of the idea could be replaced?
- Can your idea be applied in an unusual way?

Back Next



12 / 34

Combine

- What would happen if your idea combined with another person's thinking? Would that lead to a new insight?
- Could your idea be used along with another to produce something new?

Click next to reveal the last example question.

Back Next



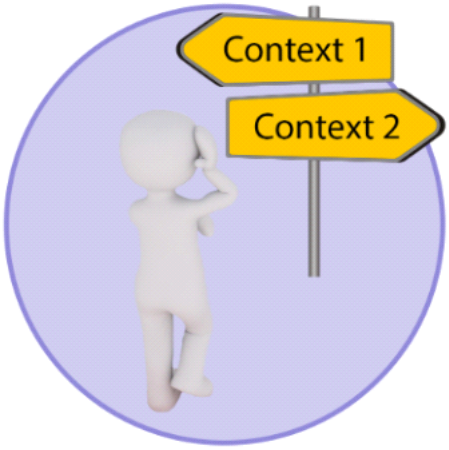
12 / 34

Adapt

- Can this idea be adapted to another context?
- In which different context could your idea be placed?
- How can your idea be adapted to make it apply to more things?

Click next to reveal the next example question.

Back Next



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Modify/Magnify

- How could present your idea in a way that is different to how it is normally done?
- What could be added to your idea?
- What would happen if you increased the best bits of the idea?
- Which part of your idea can be changed to create something new?

Click next to reveal the next example question.

Back Next



12 / 34

Purpose

- Can your idea be used for a different purpose?
- Who else would be interested in the idea?
- How would you explain your idea to someone with a completely different context?

Click next to reveal the next example question.

Back Next



12 / 34

Eliminate/Minify

- How would you describe the idea in 300 words?
- What parts of the idea could be removed?
- What would happen if we only focused on part of the idea?

Click next to reveal the next example question.

Back Next



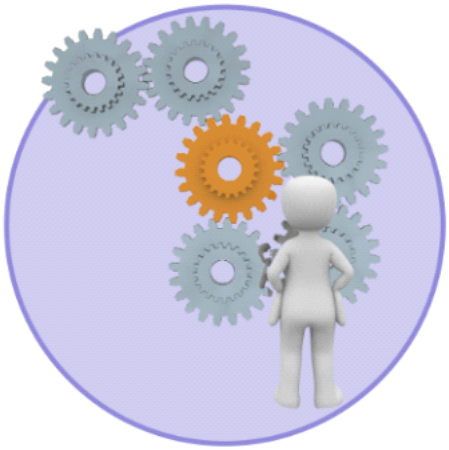
12 / 34

Rearrange/Reverse

- What would happen if you viewed the idea from the opposite point of view?
- What would happen if parts of the idea were described in a different order?

Click next to reveal the next example question.

Back | Close



12 / 34

Video unavailable

Watch on YouTube

Source: Queen – Bohemian Rhapsody (Official Video Remastered)

Bohemian Rhapsody

(an example of modify and magnify)

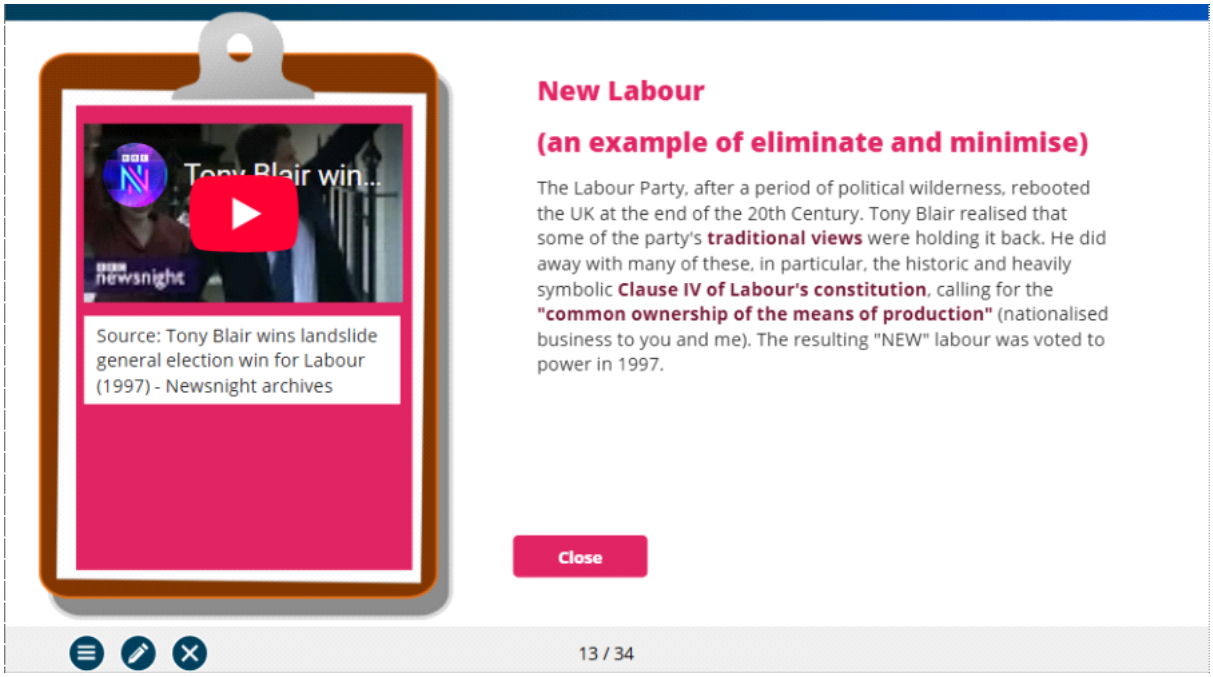
When Freddie Mercury and the band Queen created the album **'A night at the Opera'**, they took the ideas of rock music and opera. Their single Bohemian Rhapsody is one of the best selling singles of all time.

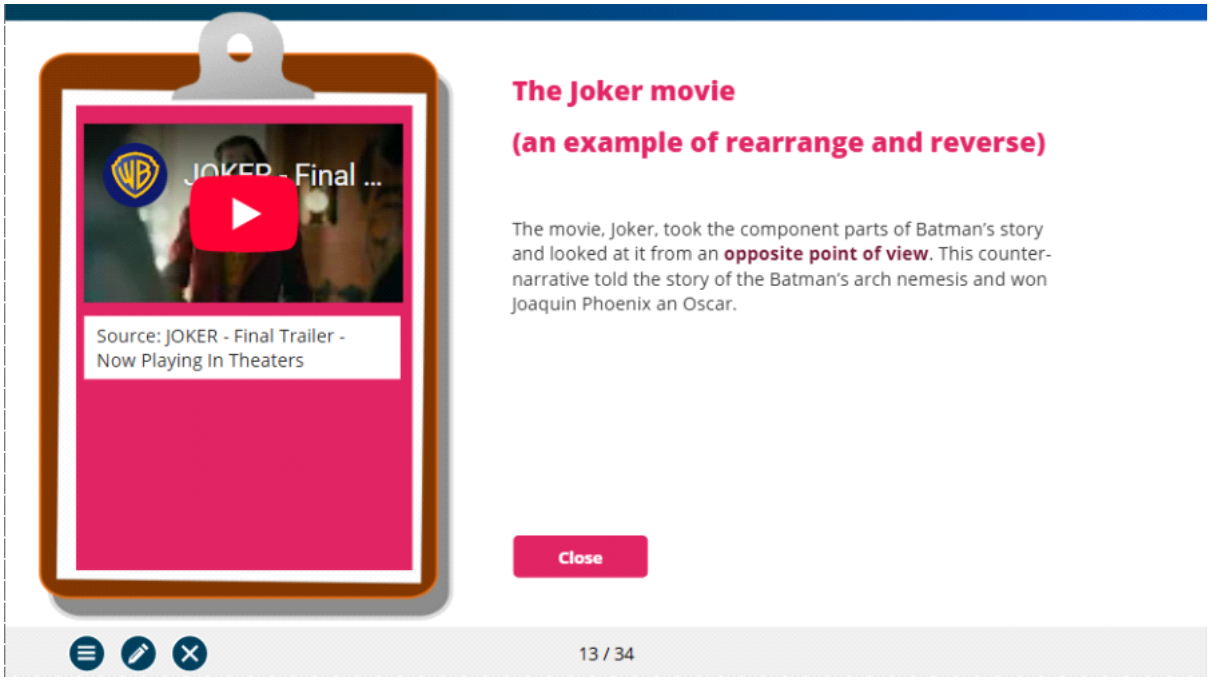
"I always wanted to do something operatic. I wanted something with a mood setter at the start, going into a rock type of thing which completely breaks off into an opera section, a vicious twist and then returns to the theme. I don't really know anything about opera myself. Just certain pieces. I wanted to create what I thought Queen could do. It's not authentic... certainly not. It's no sort of pinch out of Magic Flute. It was as far as my limited capacity could take me"

(Turner, 1976, quoted in Queen Archives, 2019).

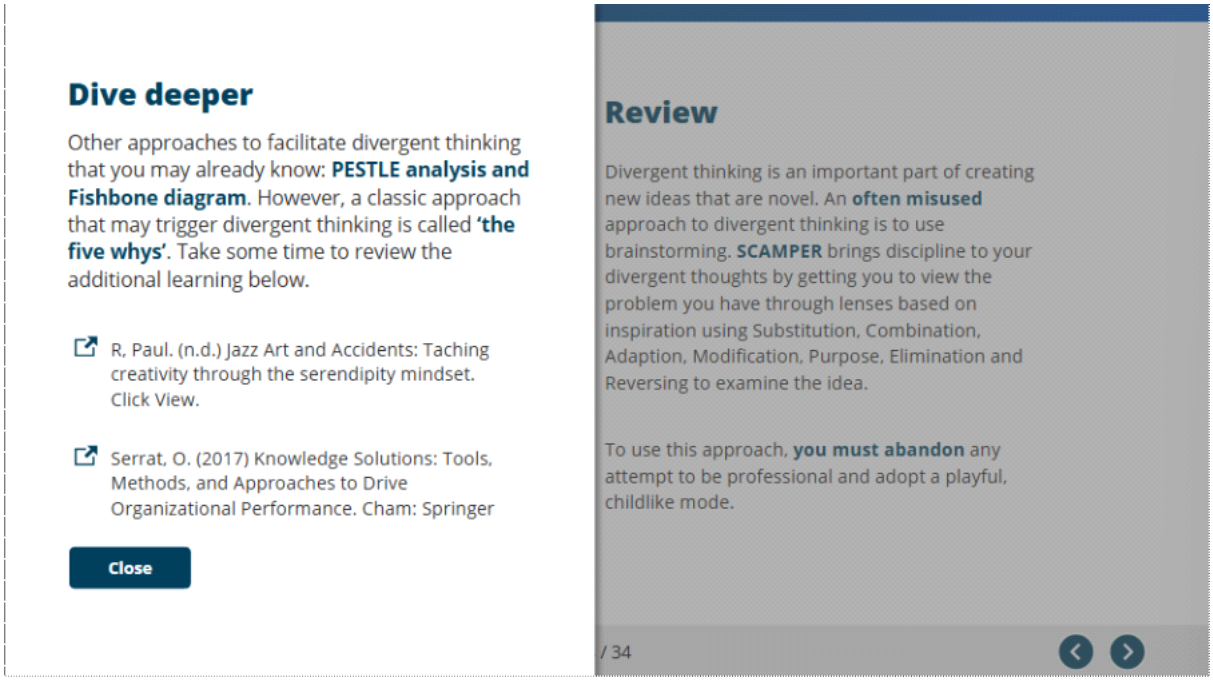
Close

13 / 34

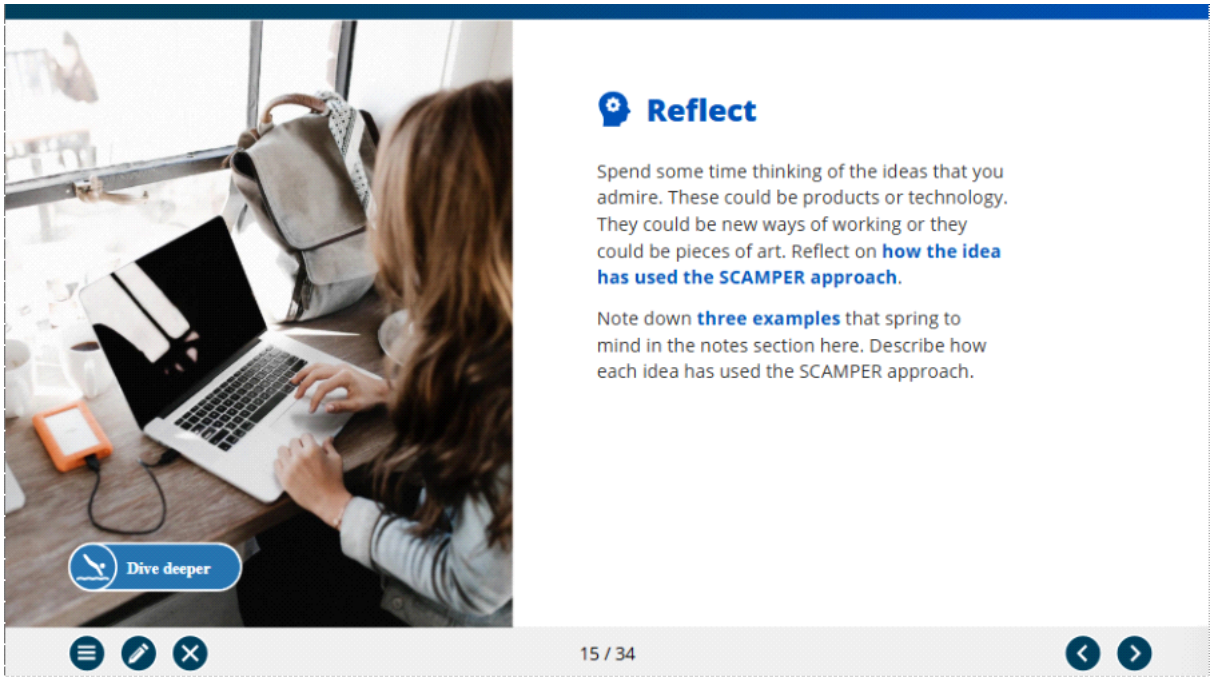

Tony Blair win...
newsnight
Source: Tony Blair wins landslide general election win for Labour (1997) - Newsnight archives
New Labour
(an example of eliminate and minimise)
The Labour Party, after a period of political wilderness, rebooted the UK at the end of the 20th Century. Tony Blair realised that some of the party's traditional views were holding it back. He did away with many of these, in particular, the historic and heavily symbolic Clause IV of Labour's constitution, calling for the "common ownership of the means of production" (nationalised business to you and me). The resulting "NEW" labour was voted to power in 1997.
Close
13 / 34


JOKER - Final ...
Source: JOKER - Final Trailer - Now Playing In Theaters
The Joker movie
(an example of rearrange and reverse)
The movie, Joker, took the component parts of Batman's story and looked at it from an opposite point of view. This counter-narrative told the story of the Batman's arch nemesis and won Joaquin Phoenix an Oscar.
Close
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Dive deeper



Reflect



Idea: The initial iPhone launch

Substitute: Apple changed how users interacted with internet and cellular devices by substituting physical keyboards on devices (laptops, handheld phones) with touch screens. This changes the user interaction for the industry.

Combine: Apple combined multiple of their, and other, existing technologies; a phone, iPod, internet access device, camera. This simplified user experience into one device.

Adapt: The layout of the first iPhone used features from their previous technology; the iPod; and thus adapted this technology. For example, scroll functions and minimal buttons.

Modify/magnify: They magnified the user experience by changing the market with an

intuitive interface.

Purpose: the iPhone became a multipurpose device in the form of a phone which was typically just a communication device. They rebranded its purpose making it a lifestyle product for multidisciplinary use cases; productivity, entertainment and typical phone features.

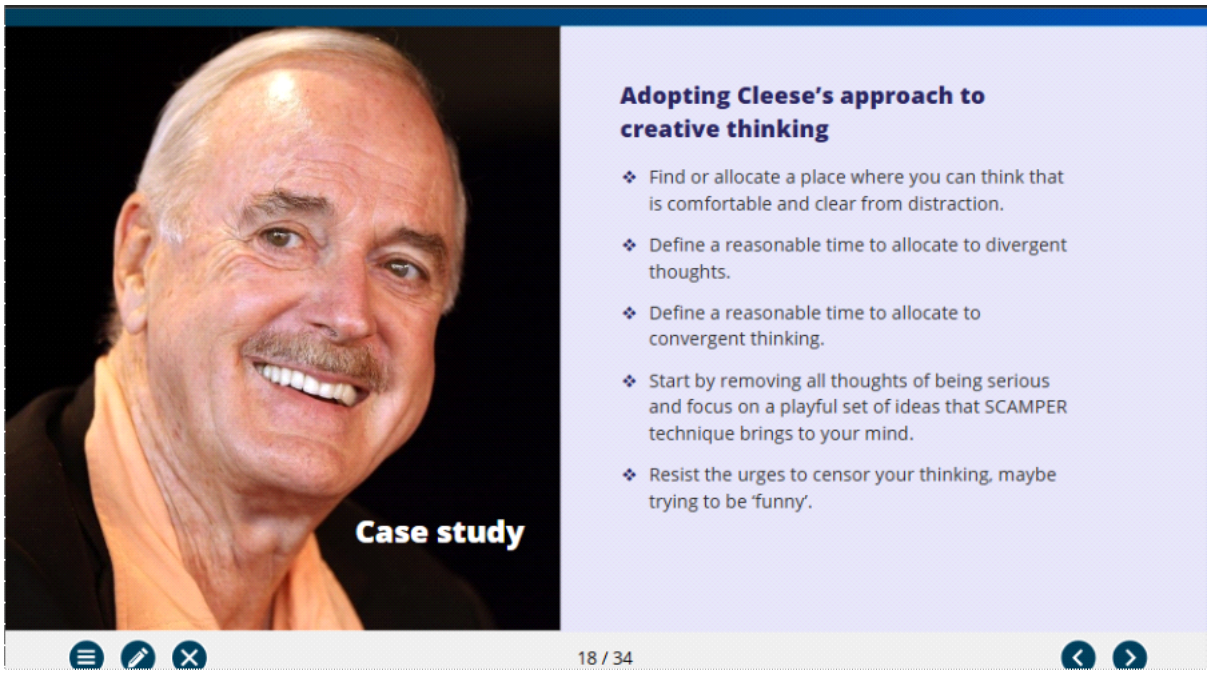
Eliminate: removed unnecessary buttons, styluses and other features.

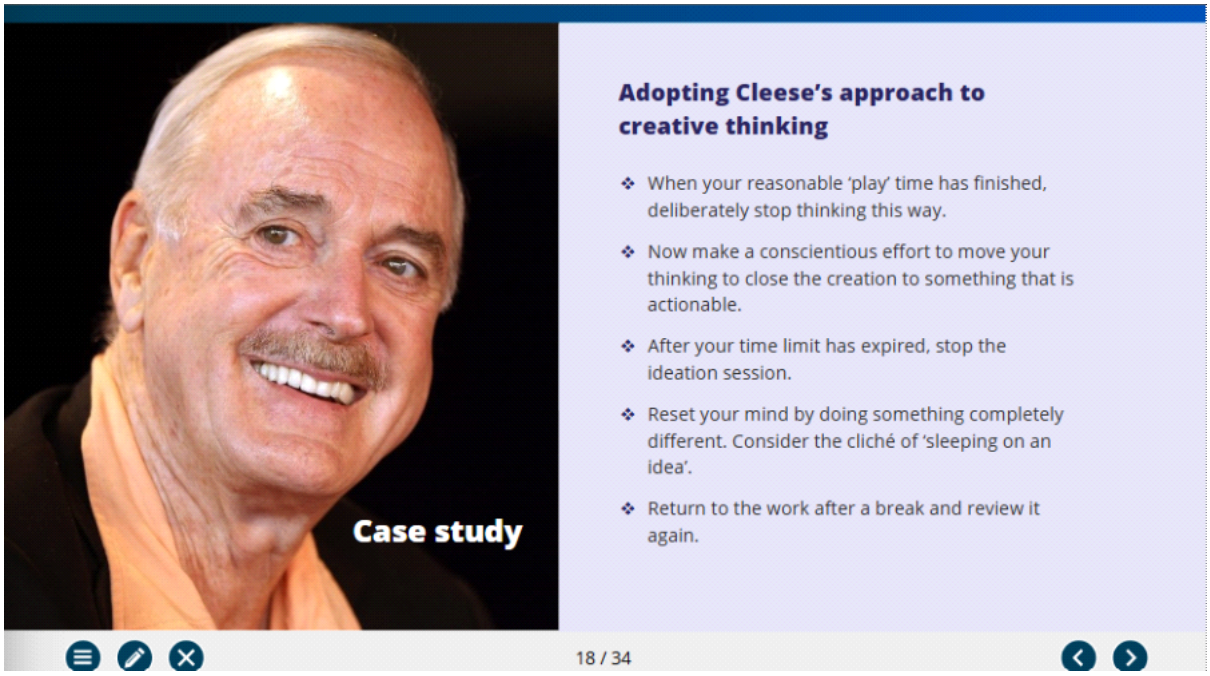
Rearrange/reverse: Reversed industry thinking by focusing the design around the user.

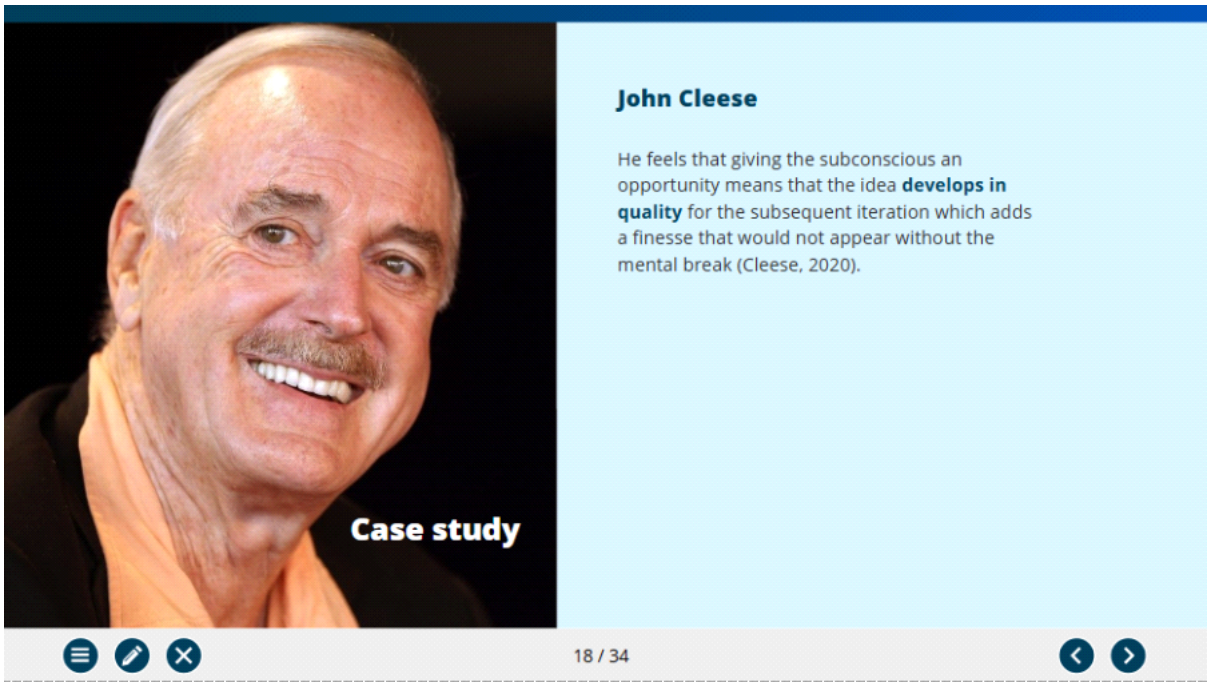
Section 2 – Effective techniques for identifying appropriate solutions

To narrow down ideas, SWOT analysis can be used to determine the value of a solution.

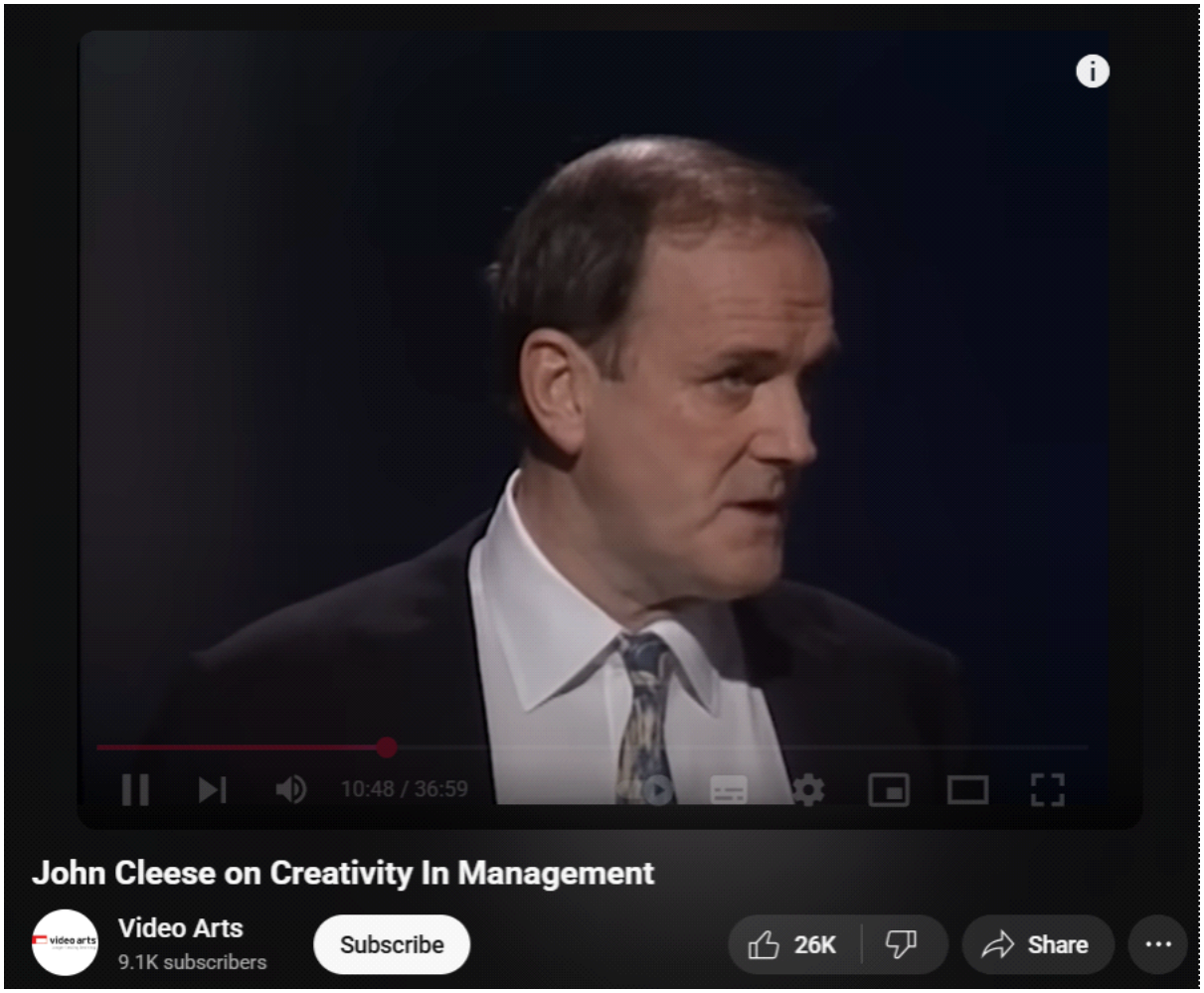
A solution to developing quality ideas could also be:




Case study
Adopting Cleese's approach to creative thinking
When your reasonable 'play' time has finished, deliberately stop thinking this way.
Now make a conscientious effort to move your thinking to close the creation to something that is actionable.
After your time limit has expired, stop the ideation session.
Reset your mind by doing something completely different. Consider the cliché of 'sleeping on an idea'.
Return to the work after a break and review it again.
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Case study
John Cleese
He feels that giving the subconscious an opportunity means that the idea develops in quality for the subsequent iteration which adds a finesse that would not appear without the mental break (Cleese, 2020).
18 / 34

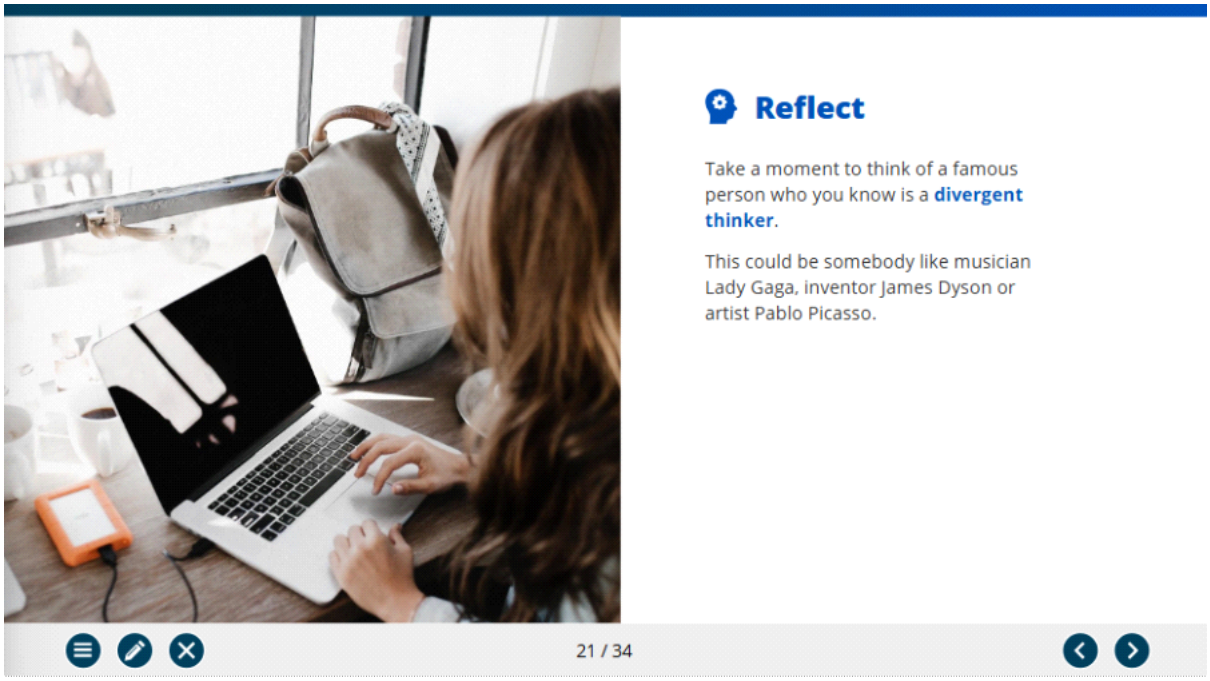
Dive Deeper



John Cleese on Creativity In Management



Reflect



Bill Gates.

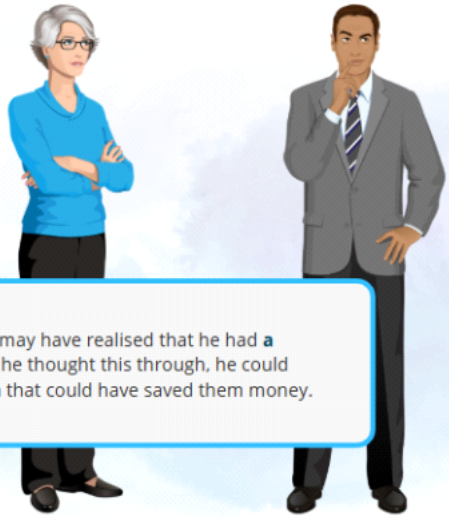
Section 3 – Creating a problem definition

Reflect



The problem of the being professional with interview attire rather than dressing for the unique occasion.

Often, we jump to solutions without thinking about the problem. When questioned about the expensive suit, Gawain may have said **"it's for an interview"**.



If you unpacked his argument, he may have realised that he had **a desire to look professional**. Had he thought this through, he could have found an alternative solution that could have saved them money.

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Transcript

Source: Laura Beinerts: The Expert (Short Comedy Sketch)

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The 'Four Ws'

One approach to unpacking these obfuscated problems is called the 'Four Ws': **Who**, **What**, **Where** and **Why**.

It is a tool used in journalism to get to the heart of a story and can be used to get to the core problems presented to you in any narrative.

What is affected by the problem?

Your problem may be set by your lecturer, a colleague, an employer or customer. Use this lens to **investigate** the motivations behind the problem from the point of view of the persona and demographic of the person affected.

What is the problem?

Where does it happen?

Why does it matter?

The 'Four Ws'

One approach to unpacking these obfuscated problems is called the 'Four Ws': **Who**, **What**, **Where** and **Why**.

It is a tool used in journalism to get to the heart of a story and can be used to get to the core problems presented to you in any narrative.

What is affected by the problem?

What is the problem?

What is the **struggle** that the problem is pushing against? Is there a task that needs to be accomplished? Try to identify, as you did in the introduction, the pain point that needs to be relieved.

Where does it happen?

Why does it matter?

29 / 34

The 'Four Ws'

One approach to unpacking these obfuscated problems is called the 'Four Ws': **Who, What, Where** and **Why**.

It is a tool used in journalism to get to the heart of a story and can be used to get to the core problems presented to you in any narrative.

What is affected by the problem? ›

What is the problem? ›

Where does it happen? ⌄

Your problem is set in a context that is unique. This context will inspire **different solutions** and you need to spend some time thinking about it. A solution at work will be different to one done at university or at home.

Why does it matter? ›

The 'Four Ws'

One approach to unpacking these obfuscated problems is called the 'Four Ws': **Who, What, Where** and **Why**.

It is a tool used in journalism to get to the heart of a story and can be used to get to the core problems presented to you in any narrative.

What is affected by the problem? ›

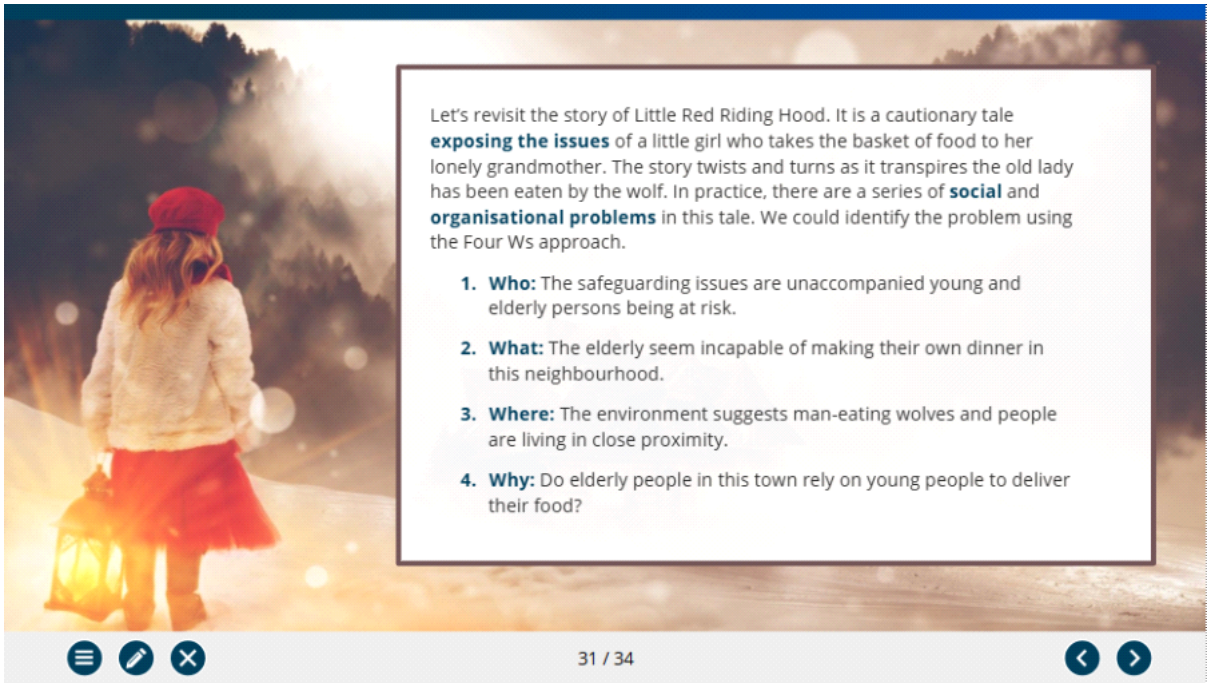
What is the problem? ›

Where does it happen? ›

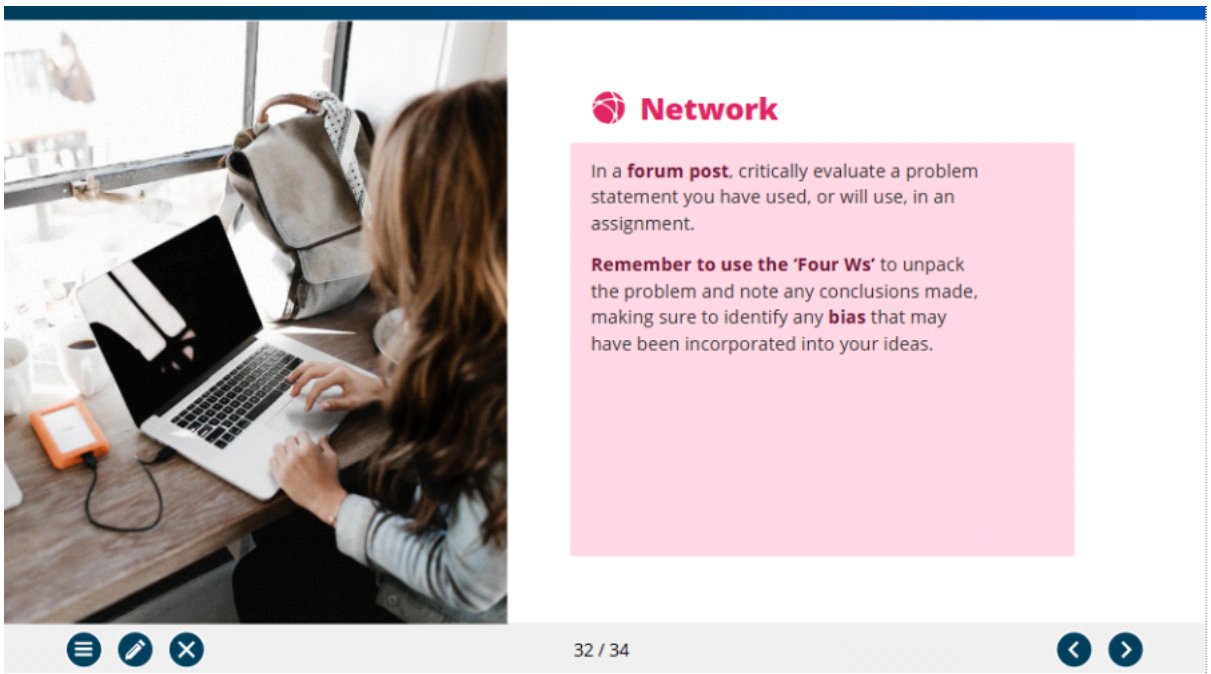
Why does it matter? ⌄

Finally, you must ask yourself **why** is this problem worth solving? **What** value does it bring to the person for whom you are presenting your idea?

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Network

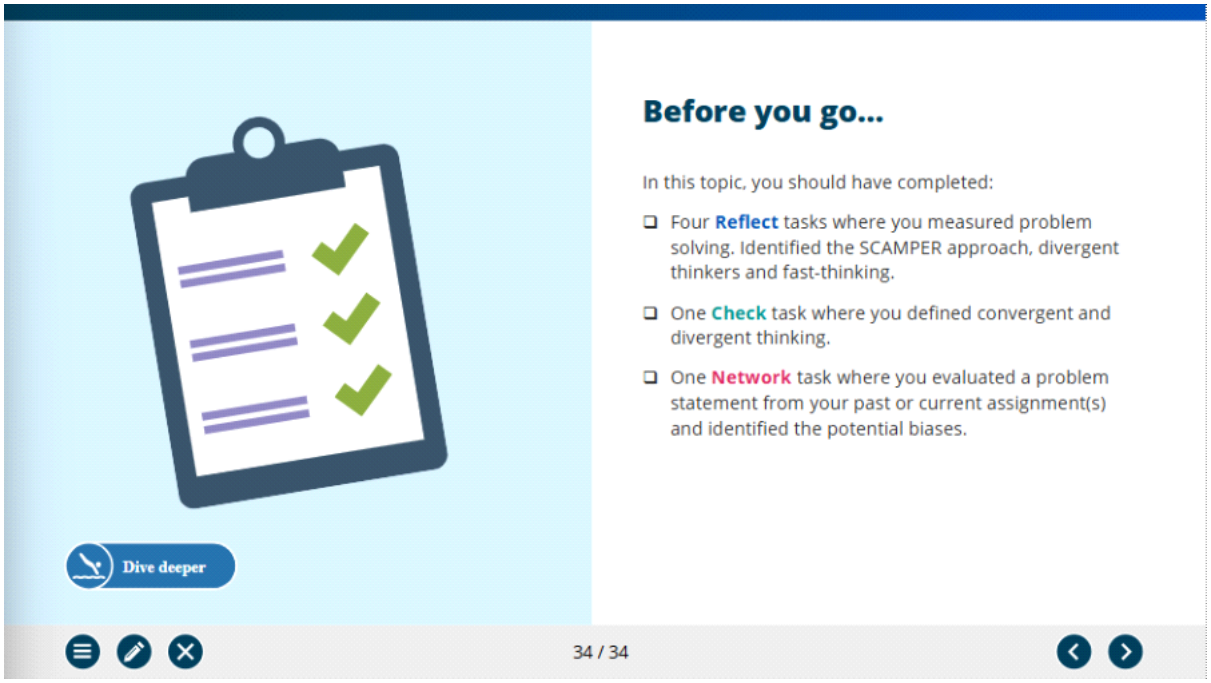


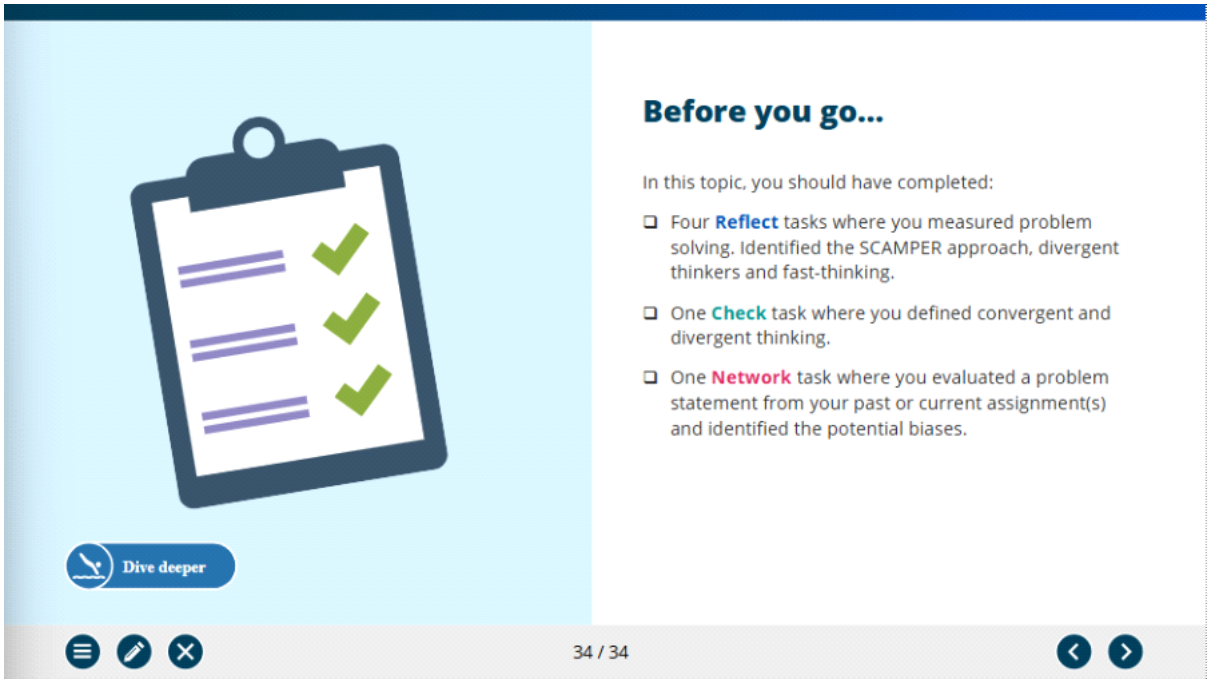
Who: Adventure Bike Company

What: Build a bike sales platform using SQL.

Where: Online for the store.

Why: To deal with increasing sales and analytic needs.

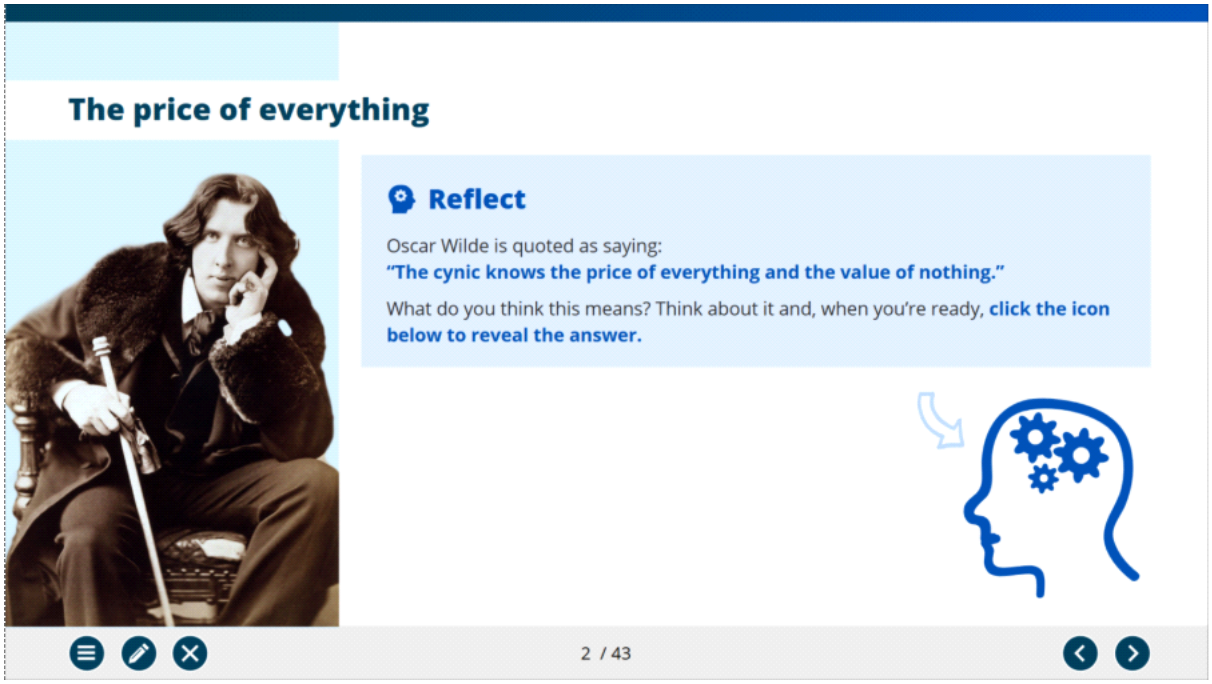




Topic 4: Creating Value

Section 1: How Value is created

Reflect



The likely means a person who is cynical can focus on the wrong thing, the price and monetary cost but ignore intrinsic worth.



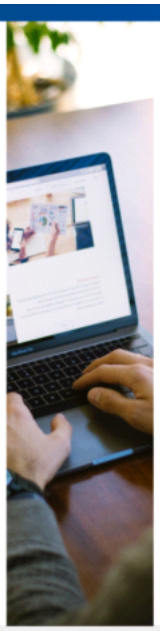
Classic economical appreciation of value

A popular view of how value works comes from the 1980s perception of business **where greed is good.**

This idea has evolved from a passage in a seminal book by the founder of modern economics, Adam Smith (1776, p. 7): "It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest".

The most common interpretation of this passage is that when interacting in the market, people only do things for their own benefit; they operate in a system that **rewards and encourages greed.**

This is known as the **utilitarian position** that was developed by **Bentham** (1776, p. ii), who stated that what is deemed valuable should be guided by people's perceived pleasures and pains, and that society therefore should strive for **"the greatest happiness for the greatest number."**



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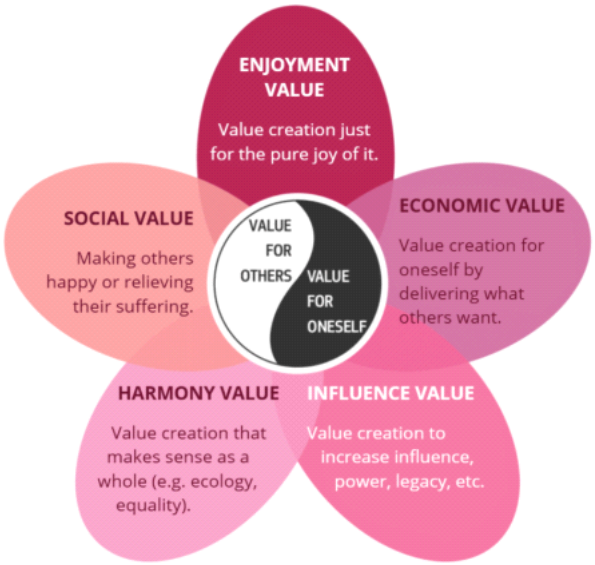
The five dimensions of value

One idea is that value is really a **multi-dimensional concept** with no hard line, defining a precarious balancing act between **selfish** and **selfless** ideas of value that individuals find hard to articulate from moment to moment.

Here is it is demonstrated as a diagram (Lackéus, 2018).

So the idea is that value can be divided into **five** main dimensions; **enjoyment value, economic value, influence value, harmony value and social value.**

Click each segment to see more.



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Tsunesaburo Makiguchi

Another way of describing value comes from the teaching of Tsunesaburo Makiguchi, who developed an approach based on **40 years of Buddhist teaching.**

Makiguchi's educational purpose was to develop in his students a philosophical appreciation of the ideas of **beauty, benefit** and **good.**

Click the tabs to see the definition of each.

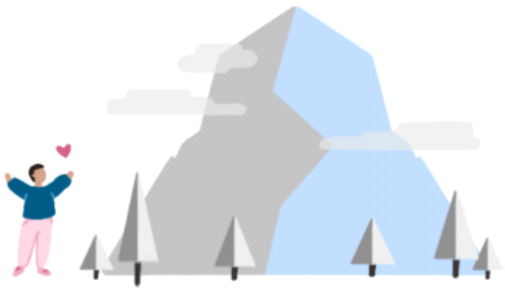
Beauty ✓

Benefit ✓

Good ✓

Requires a **sensory response** from an individual.

This can lead to an appreciation of physical space for dwelling, learning and visiting or simply an appreciation of a physical object.



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Tsunesaburo Makiguchi

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Click the tabs to see the definition of each.

Beauty ✓

Benefit ✓

Good ✓

Attempts to **extend** and **expand** the experience of the individual so that it is better.

Ideally the experience should result in a positive transformation.



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Tsunesaburo Makiguchi

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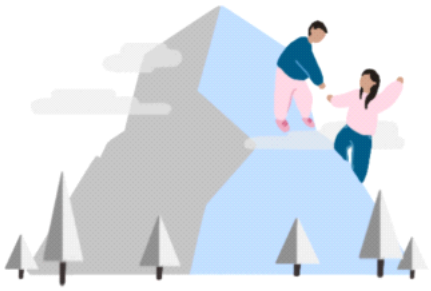
Click the tabs to see the definition of each.

Beauty ✓

Benefit ✓

Good ✓

Attempts to contribute to the positive development of the individual **AND** society.



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Transcript

Source: Steve Jobs Insult Response

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The Triple Bottom Line

Businesses have tried to accommodate the ideals of value creation described by **Lackéus** and **Makiguchi** by defining it in their accounting procedure.

Usually broadly defined in their accounts, the process is meant to highlight that the business is primarily driven by values other than economic value. It does this with declarations of impact on **People**, **Profit** and **Planet - social, economic** and **environment –** otherwise known as **'The Triple Bottom Line'.**

In recent years, however, even its creator, John Elkington, has sidelined this approach as a gimmick aimed at painting the business favourably, sometimes called **'greenwashing',** while still pursuing a profit as its first agenda (Elkington, 2021).



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B-Corps

Some businesses understand the different forms of value creation, and increasingly these are becoming legally incorporated across the world. Such businesses are called **Beneficial Corporations** or B-Corps.

B Corporations **declaration of interdependence** is:



- ☑ That they must be the change we seek in the world
- ☑ That all business ought to be conducted as if people and place mattered
- ☑ That, through their products, practices, and profits, businesses should aspire to do no harm and benefit all
- ☑ To do so requires that they act with the understanding that we are each dependent upon another and thus responsible for **each other and future generations.**

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The Sustainable Agenda
In a United Nations resolution, the 2030 Sustainable Development Goals were defined.
This blueprint described 17 interlinked goals that were targets for a sustainable future for all people of the world.
No poverty
Zero hunger
Good health and well-being
Quality education
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
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1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS
See all

The Sustainable Agenda

This agenda frames the world's problems and views them through the lenses described in the **New Ideas.**

While we are not all going to run companies, we can use these goals to **improve value** in all its dimensions to the benefit of our entire society.

When looking to improve and make changes we must consider the way we create value.



However, value is a concept that is popularly considered as being the **mere price of goods and services.** When examined in detail this is a **vulgar concept that forgets that value can be found in enjoyment, influence, social and harmony too.**

"The cynic knows the price of everything and the value of nothing."
Oscar Wilde

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The Sustainable Agenda

This agenda frames the world's problems and views them through the lenses described in the **New Ideas.**

While we are not all going to run companies, we can use these goals to **improve value** in all its dimensions to the benefit of our entire society.

When looking to improve and make changes we must consider the way we create value.

B-Corps are the current way an organisation can declare a passion for **planet, people, and profit.**

The world is at a decisive point in history and the United Nations has attempted to define the most **pressing issues** it faces in the **Sustainable Development Goals.** An approach to making value that would be appreciated by society would be to address problems framed by this Agenda.

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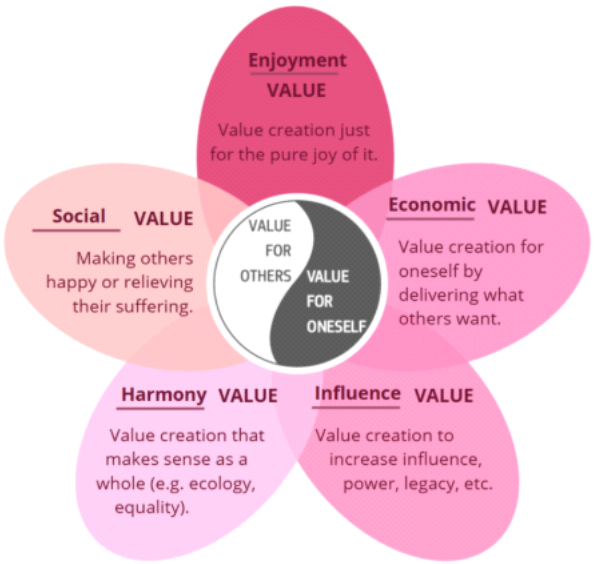
Check (1)

Check

Correct

That's right! You selected the correct response.

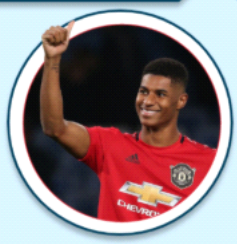
Enjoyment value: Value creation just for the pure joy of it.
Economic value: Value creation for oneself by delivering what others want.
Influence value: Value creation to increase influence, power, legacy, etc.
Harmony value: Value creation that makes sense as a whole (e.g. ecology, equality).
Social value: Making others happy or relieving their suffering.



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Apply (1)

Marcus Rashford 10



Enjoyment value	5
Economic value	5
Influence value	5
Social value	5
Harmony value	5

Apply

Take a moment to review **Marcus Rashford,** the Manchester United Football star.

Think about the children's game of Top Trumps try to explain the value that he gives to the world in the **5 dimensions defined by Lackéus.** Give a score of up to 5 in the table for each type of value you feel that Rashford encourages.

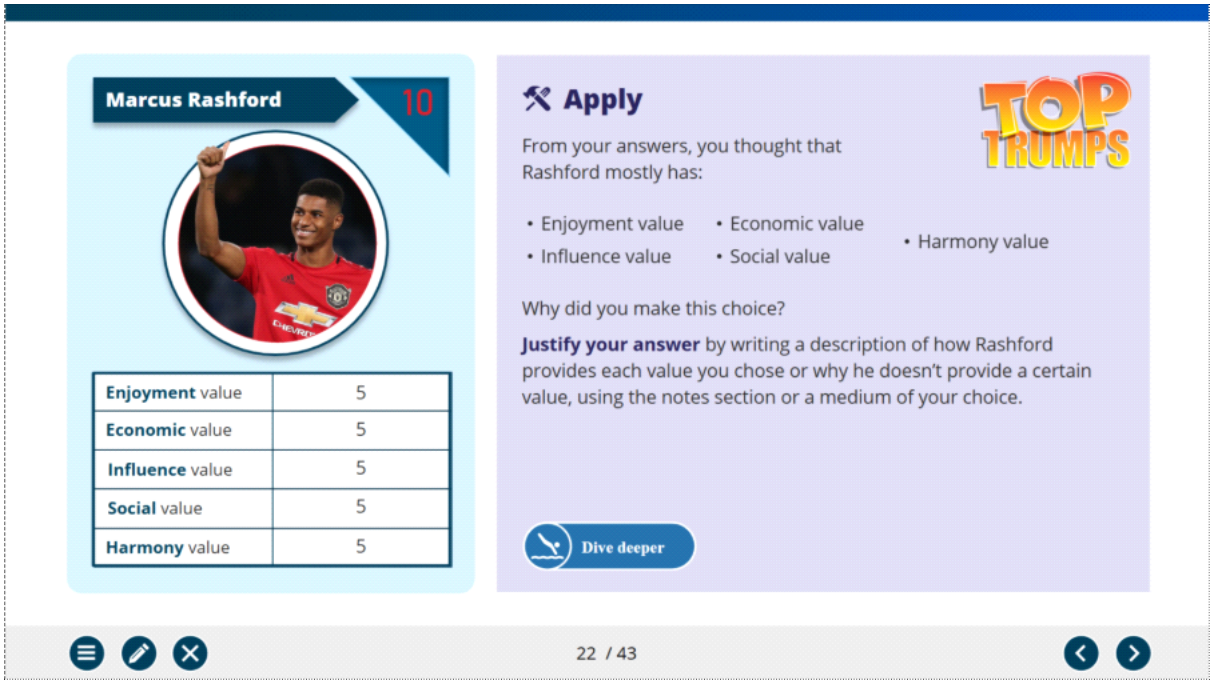
Use the link below to a **BBC article** to start your research.

Enter your score for each value in the grid to the left.

Check the Lackéus diagram and its descriptions to help.

Marcus Rashford: Feeding Britain's Children - inside his campaign to tackle child hunger

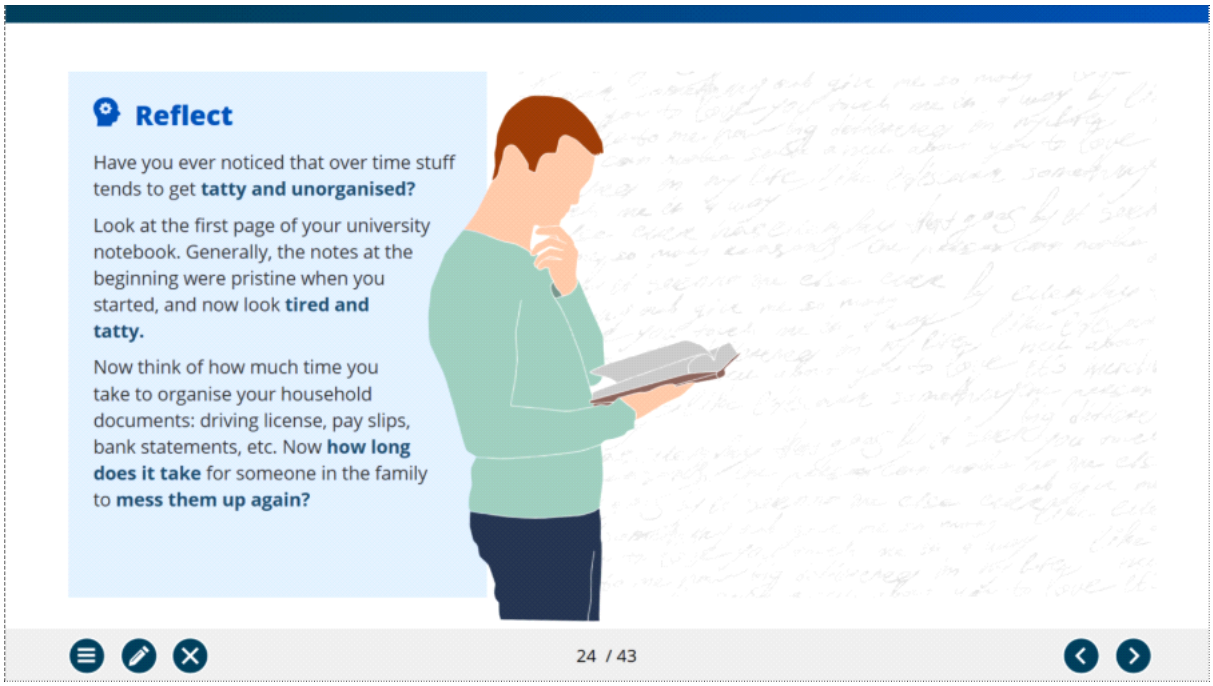
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He's an inspiration to many of his fans, inspires charitable giving, he has influenced the policy on free school meals, and has promoted compassion from his campaigns.

Section 2 – Identify attributes associated with change making and value creation

Reflect (1)



It usually takes a few weeks.

Entropy

Entropy is the word given to **the measure of disorder** and is a phenomenon described in the second law of thermodynamics.

To put it another way, as you hopefully identified in the previous activity, **we are affected by it in almost everything we do:** we clean, organise and fix things only to find that over time the things become **unclean, disorganised and broken again.**

A law is a **rule that has been deduced from observation of a natural phenomenon** and occurs whenever the conditions are present.

For example, we all recognise the law of gravity: we let go of an object from a height and it will drop towards the floor. The law of thermodynamics recognises that entropy is a by-product of all work.

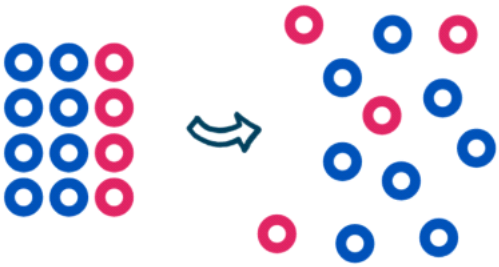


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Entropy

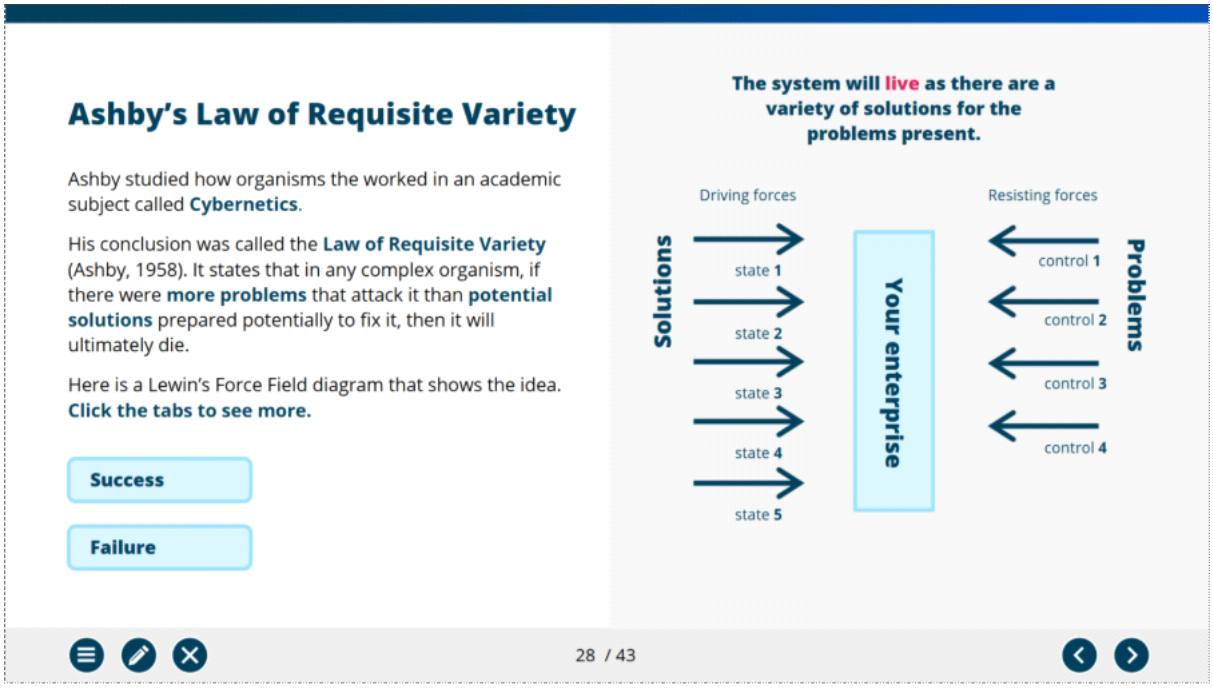
This is a scientific way of explaining why our once clean cars become dirty again; our once-immaculate notebook gets tired and dog-eared; the household documents become disorganised. **The unintended consequence of using them for what they were intended makes them dirty, disorganised and broken.**

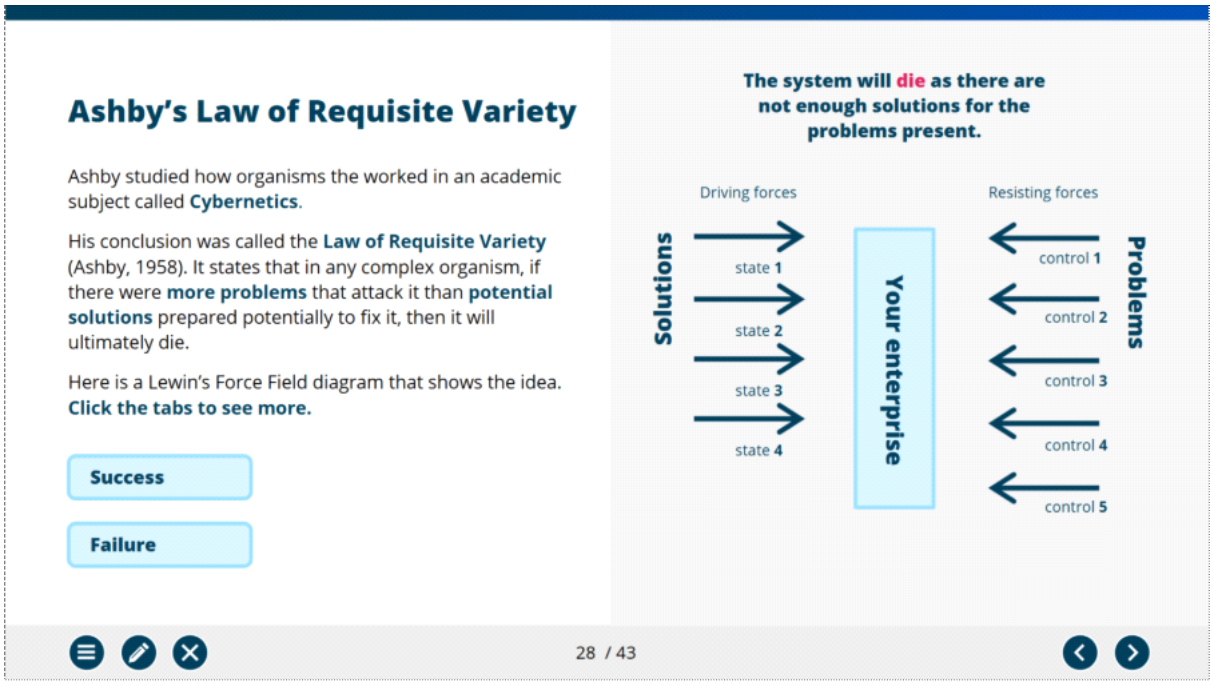
The upshot of this is that we need to spend effort in maintaining value of any 'thing', because without us working to maintain the balance, **the value we have added leaks away as an unintended consequence.**



The degree of disorder (entropy) of any system will **never decrease** (Whitrow, 2003). This includes any project that you are involved in.

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A set of competencies that deal with entropy: Entrecomp 15 different competencies.

Section 3: Articulate how your solution or research will create value

Reflect (1)

Introduction

To some people, it can be difficult to articulate value in our work, but it is an important thing to consider when creating or doing anything.

We have developed an understanding of the concept of value using two different frameworks.

Lackéus suggests that value for any project can be divided into five different dimensions: economic, enjoyment, influence, social and harmony.

Makiguchi's approach is more spiritual, he argues that any project brings beauty, benefit and good.



Reflect

Click the tabs below to remind yourself of the two different frameworks.

Which framework do you prefer to use, and why you think it matches your ideas of creating value?

Lackéus Five Dimensions of Value

Tsunesaburo Makiguchi

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Lacheus: as it relies more on a structured approach rather than hoping a project brings benefit.

Why you should think about value in your domain

In high school, you were attending school to learn about universal facts and ideas. The knowledge behind reading, writing and arithmetic are applicable in all practical areas of life.

When you move into higher education things change.

The domain you are practicing becomes more specific. You start to use more **inductive** or **abductive** reasoning.

Considering the value of your project can be a taxing.

It is at this point people start to **diverge on the valuable aspect of their education.** These are broadly split between a traditional view of education and a modern or progressive view of education.

1. Simplicity vs complexity

Some people perceive their education as a world view where things can be broken into smaller parts. This approach considers a knowledge of the minutia can be expected to understand the whole. Others consider the world as a whole system where and learning is based on the complex interconnections.



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2. Individual vs social

Individual and social educationalists argue where the centre of understanding should be. This could be on how people or society views 'reality'. In this view of learning, there is duality of opinion that is split over a subjective and objective point of view of how the world works.



Why you should think about value in your domain

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3. Content vs process

Some argue that their education is about the content, or the 'what' that the course material covers. On the other hand, others believe that their education should have a focus on 'how' the content is acquired.



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Why you should think about value in your domain

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4. Detached vs engaged

A traditional educational fan emphasises the objective pursuit of truth without regard for values. A progressive educationalist, however, would prefer that the learners engage on an emotional level to have a 'feel' for their subject too.



Why you should think about value in your domain

In high school, you were attending school to learn about universal facts and ideas. The knowledge behind reading, writing and arithmetic are applicable in all practical areas of life.

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Considering the value of your project can be a taxing.

It is at this point people start to **diverge on the valuable aspect of their education.** These are broadly split between a traditional view of education and a modern or progressive view of education.

5. Theory vs practice

The final age-old argument. Some people who want to be aware of what is actually done in the real world and argues with what is taught in a school is somehow highbrow and separate from this reality. Academics, of course, argue that practice is informed by theory.



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Cognitive dissonance

These competing views represent an idea called **cognitive dissonance.**

This is a description of the uncomfortable state where both thoughts on either side of the argument, while inconsistent, **are still considered to be true.**

This can be an uncomfortable position for new adult learners. **How can two opposing arguments be simultaneously right?**

In essence, just because you do not agree with an idea does not make it wrong.

Broadly the difference between the two approaches to education seems to fall on the idea of **acquiring** an education and **participating** in an education. Again, it is hard to argue against the idea that an education requires both approaches (Lackéus *et al.*, 2021).



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Effectuation



This approach is called **'effectuation'** and has us understand that the gap between two ideas could be bridged by considering the ideas of **cause and effect.**

Applying the rules described in a recipe is an example of causal thinking (you **cause** the dinner/education to happen), whereas using the existing contents of a fridge is effectual thinking (your meal is an **effect** of contents).

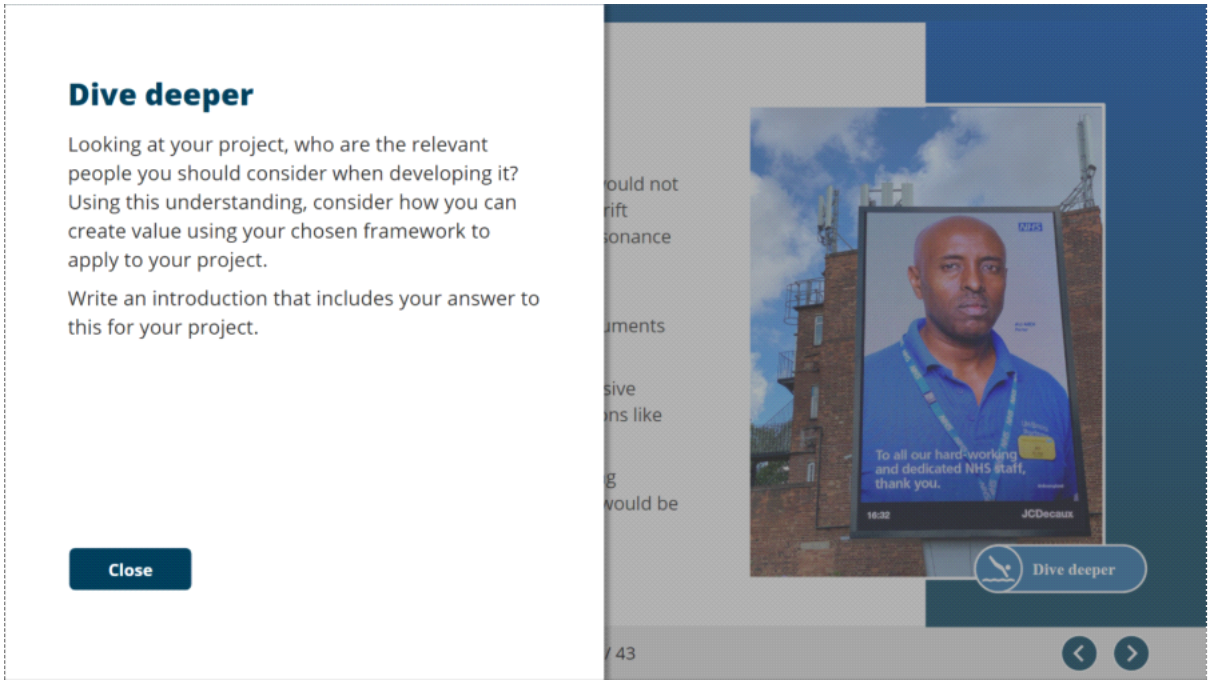




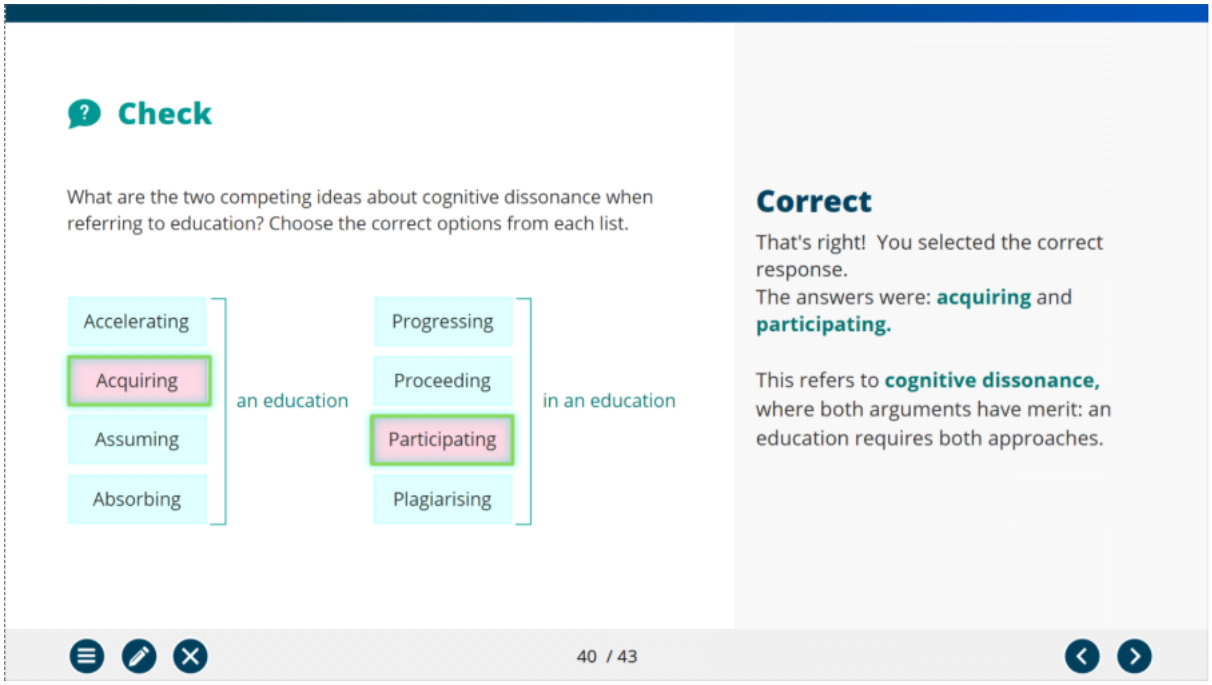
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The Nesta programme discussed in the modules indicates a programme that concludes that value is defined as the demonstrable, scalable, and co-created impact of an approach that is informed by evidence. This is responsive to stakeholder needs and capable of influencing systems and practice for lasting change.

Dive Deeper



Check (1)



Check (2)

Check

The approach called "effectuation" is an appreciation that events can be viewed from two different points of view. What are they called?

Create		Earn
Cost	and	Effect
Cause		Educate
Check		Elect

Correct

That's right! You selected the correct response.
The answers were: **cause** and **effect.**

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Before you go...

In this topic, you should have completed:

- Three **Reflect** tasks: the first where you reflected on the difference between price and value; one where you thought about how disorder affects everything we do; and one where you considered which value framework would you rather adopt.
- One **Apply** task where you considered Lackéus' five dimension of value in relation to the work of Marcus Rashford.
- One **Check** task consolidating knowledge of definitions in Section 3.

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Appendix 2 - Unit 3

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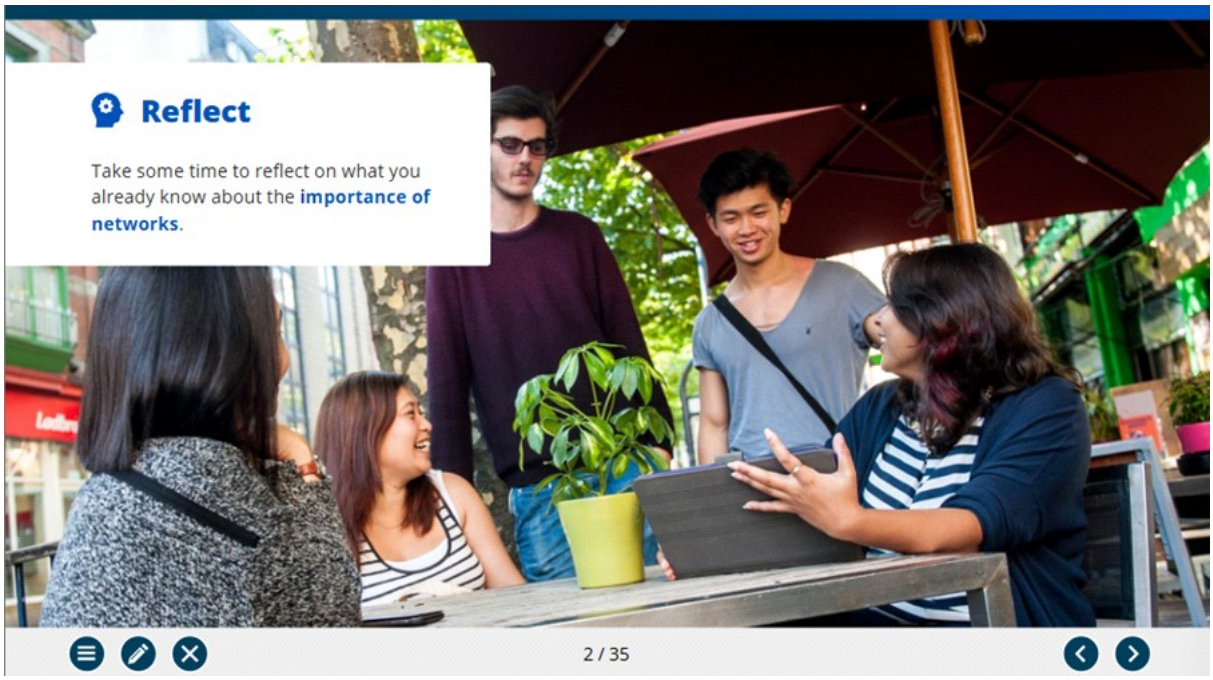
All following appendix has content from Change Makers Unit 1 to Unit 4 [33]

Unit 3 – Making it happen

Topic 1: The power of networks

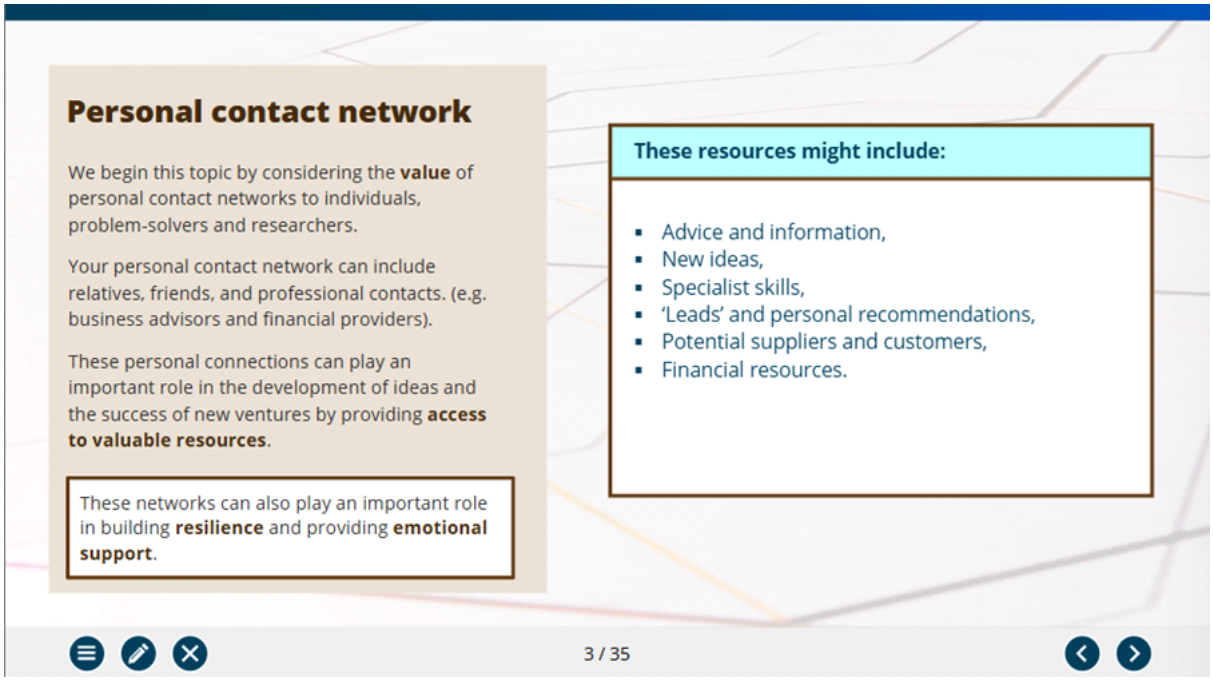
Section 1: Let's come together

Reflect



Personal contact network: great for boosting feel-good emotions, boost health.

Work network: great at providing workplace opportunities



Networking is not working



Summary:

Doug argues that innovation comes from strangers and not within our usual circles of people.

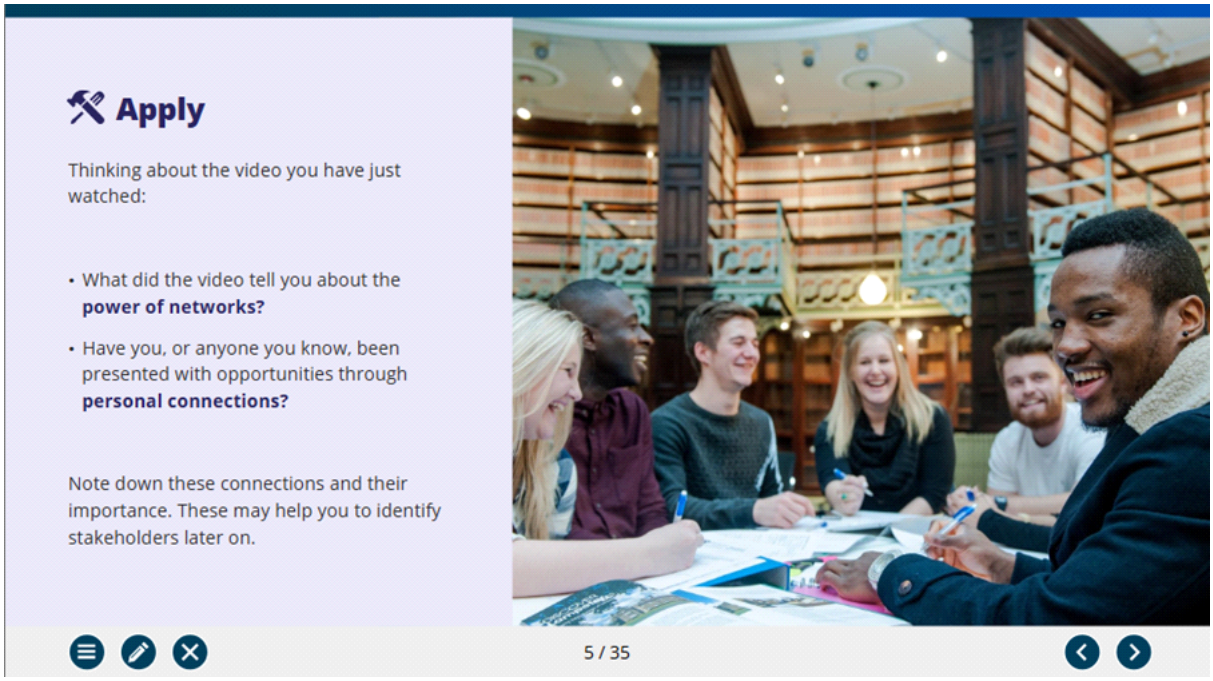
Most people build networks around their job, organisation or trade called a “work sphere” that limits diversity of thought. This is good for execution but rarely sparks true innovation.

Using strangers fixes this issue by them offering different perspectives.

To tap into their value:

1. Meet them.
2. Actively listen.
3. Adapt what they’re saying and extract the underlying principles from others’ success. Do not copy them outright.
4. Apply their inspiration into practical value.

Apply

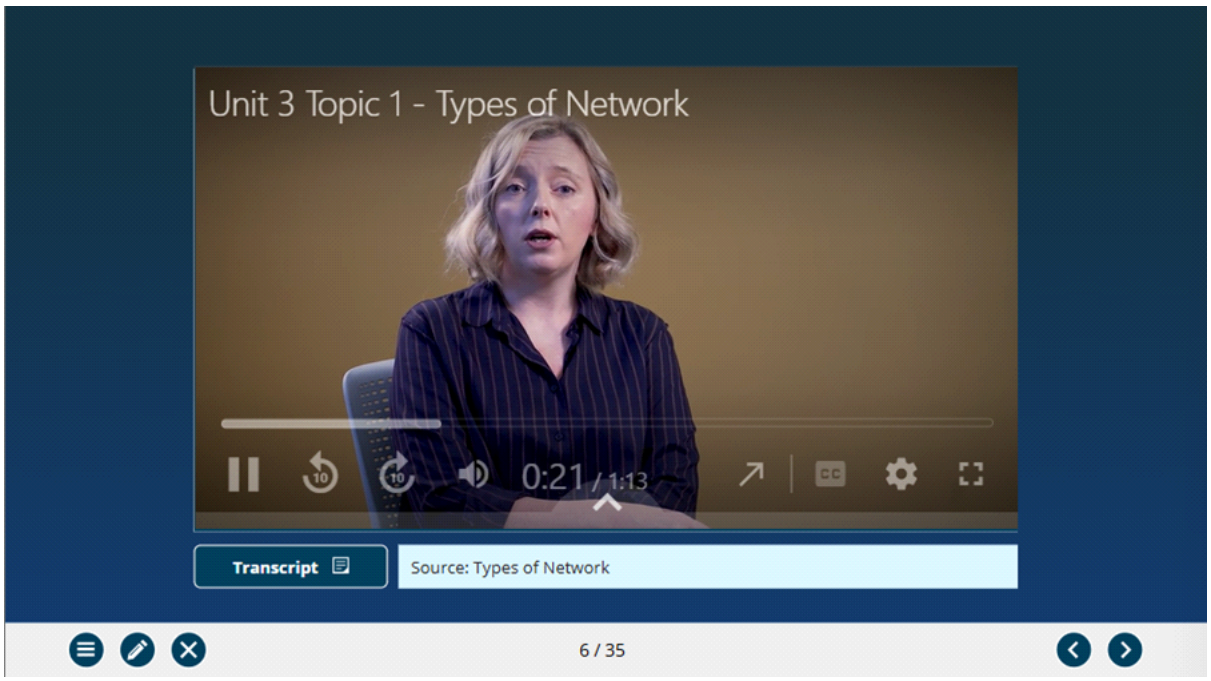


1. Innovation thrives through diversity.
    a. Basic and common workplace networks can limit thinking.
    b. Using networking strategically is intentional to expand creativity.
2. I have connected both my recent careers with connecting to new people and through personal connections.

Types of networks

Active: mutually beneficial relationships, high levels of trust and disclosure and strong commitment and regular contact. I.e. Close colleague, friends and families.

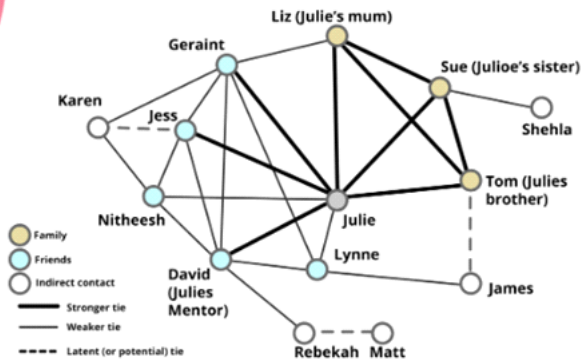
Latent: weaker connections, one sided relationships, low levels of trust with sporadic contact. You see these people on rare occasions.



Types of network

The graph in the video showed how Julie is connected to others in a variety of ways. For example, she has a **direct link** (strong ties) to several people (her friends and family); this is her **active network**. She also has some **indirect links** (weak ties) to others which are **latent** ties in the network.

We'll explore some key elements of active and latent networks next.



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Check (1)

Check

Take a few moments to answer the following questions to help you summarise what you have learnt in this section.

Question 1 of 4

Valuable resources that a good personal connection could bring include (Choose the resources you think are applicable):

- Leads and personal recommendations
- Potential suppliers and customers
- Financial resources

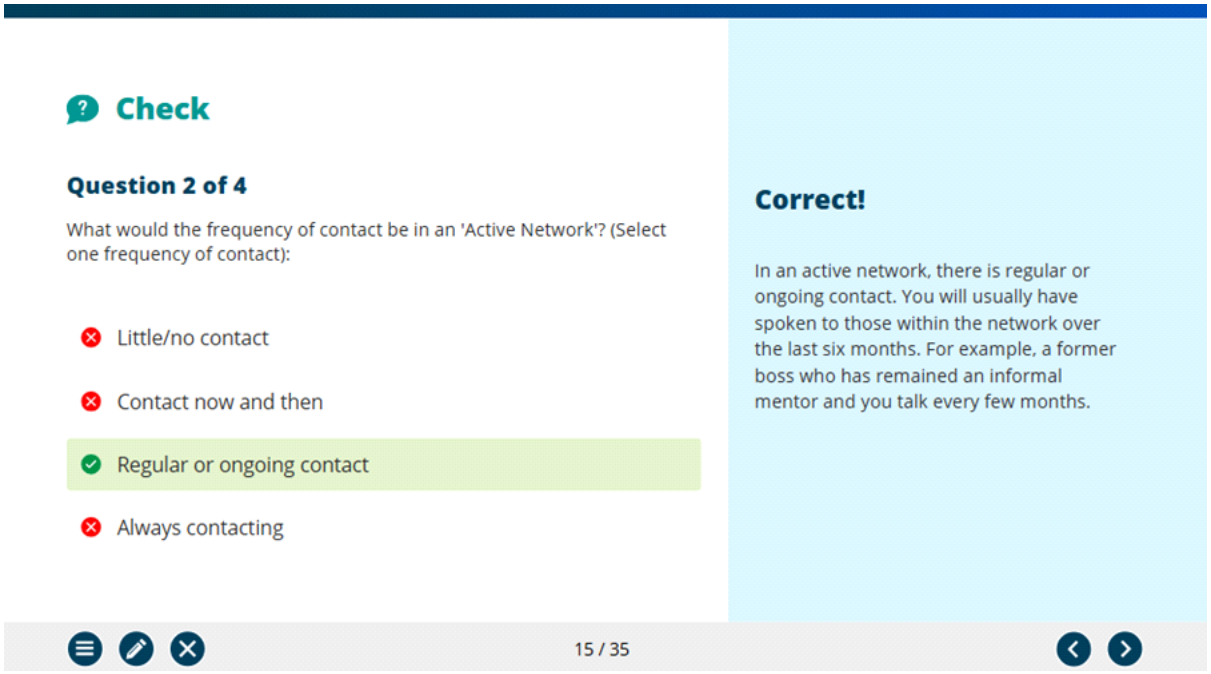
Correct!

Personal connections can play an important role in the development of ideas and the success of new ventures by providing access to valuable resources including:

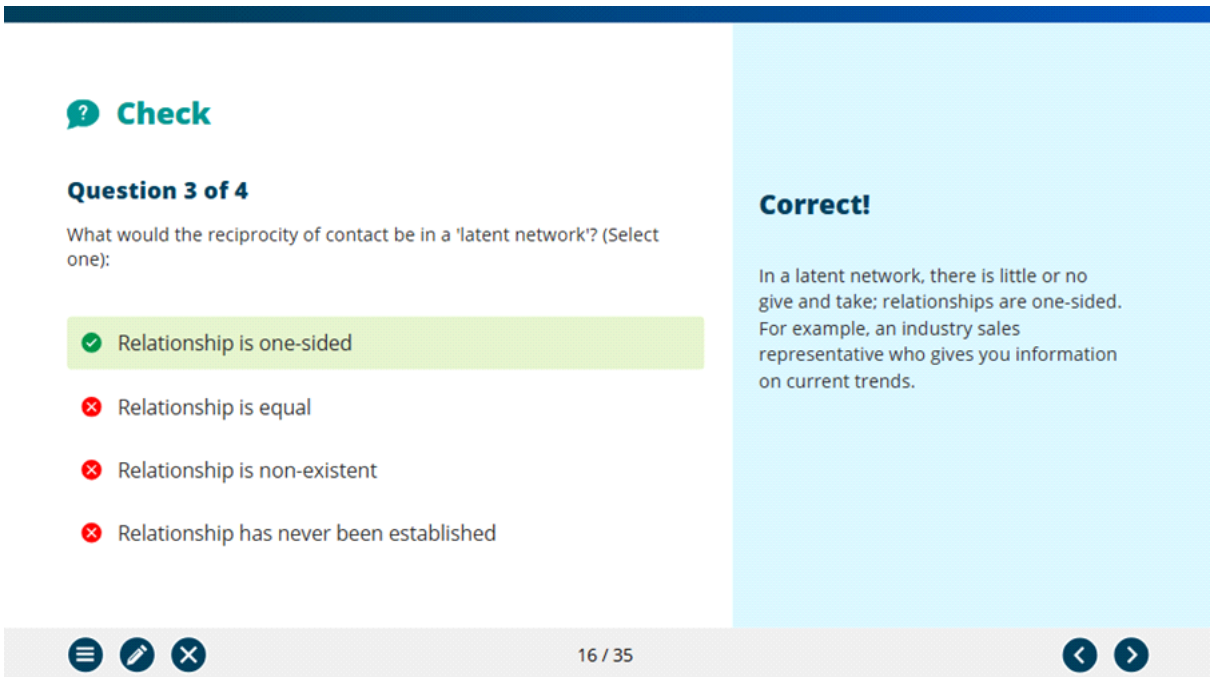
- Leads and personal recommendations,
- Potential suppliers and customers,
- Financial resources.

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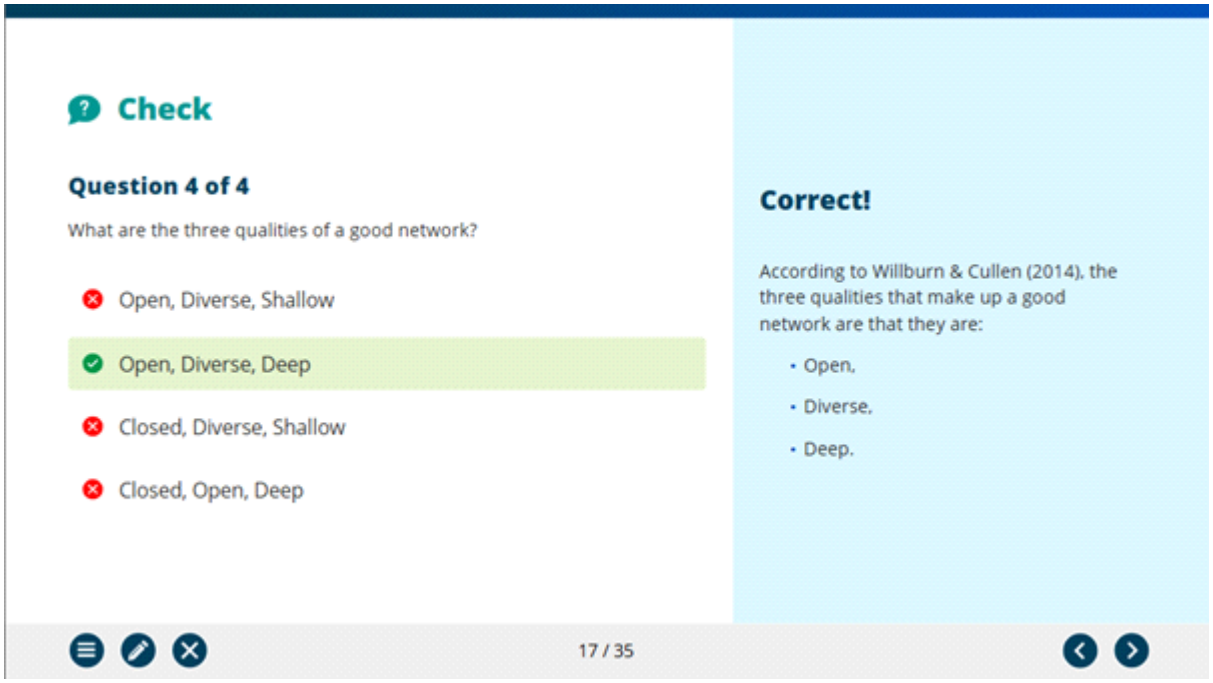
Check (2)



Check (3)

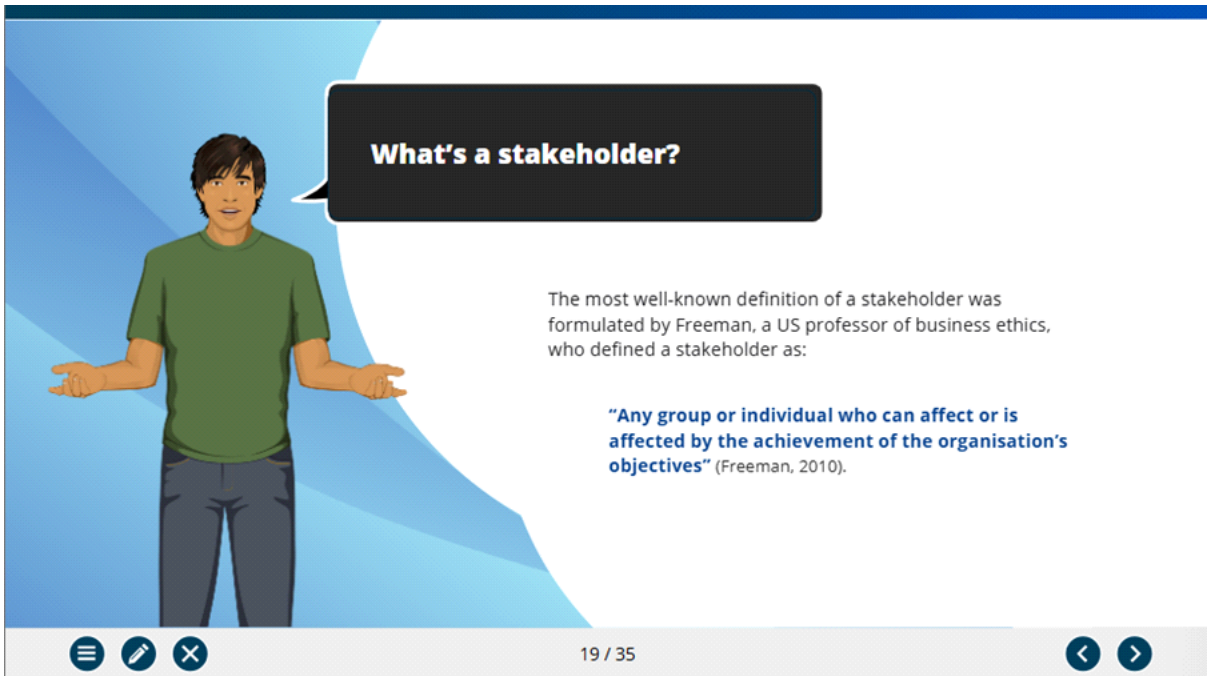


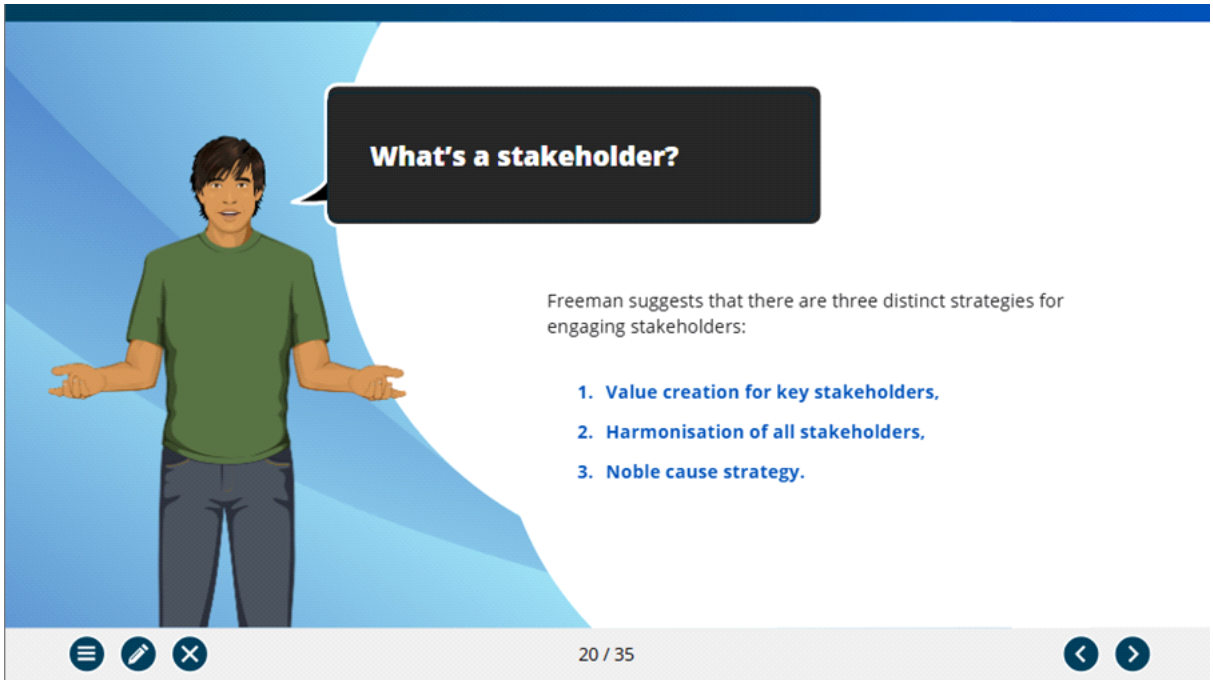
Check (4)



Section 2 – Who's at stake?

Stakeholders







Video Summary:

Managing stakeholders effectively requires starting from an enterprise level strategy clarifying purpose and values first before tailoring strategies to individual stakeholder like customers, employees, or suppliers.

Strategy for stakeholders starts with enterprise purpose and then specific stakeholder strategies that comes after this initial purpose.



Stakeholder analysis

Stakeholder analysis is commonly used to **identify relevant stakeholders** and their interests in a given situation or circumstance. According to Bryson (2004), stakeholder analysis should include an **assessment** of who the stakeholders are, along with their interests and beliefs.

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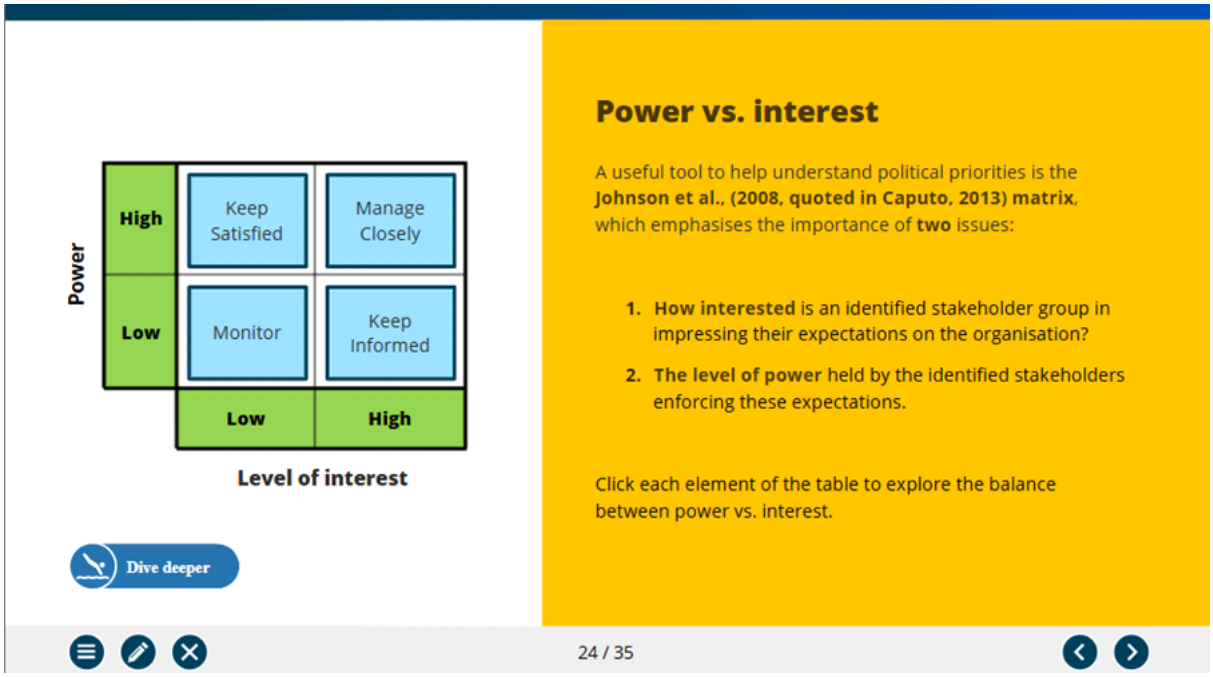
Identifying stakeholders

Stakeholder mapping is the visual process of laying out all the stakeholders of a product, project or idea on one single map. The map will give you a visual representation of all the people who can influence your project and how they are connected.

In the example we can see what a stakeholder map might look like for UBER, the ride hailing company.



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Dive Deeper

What is a stakeholder analysis?



Helps identify and understand stakeholders in a given project.

Identify: list the stakeholders i.e. marketing, sales, executive team and customers.

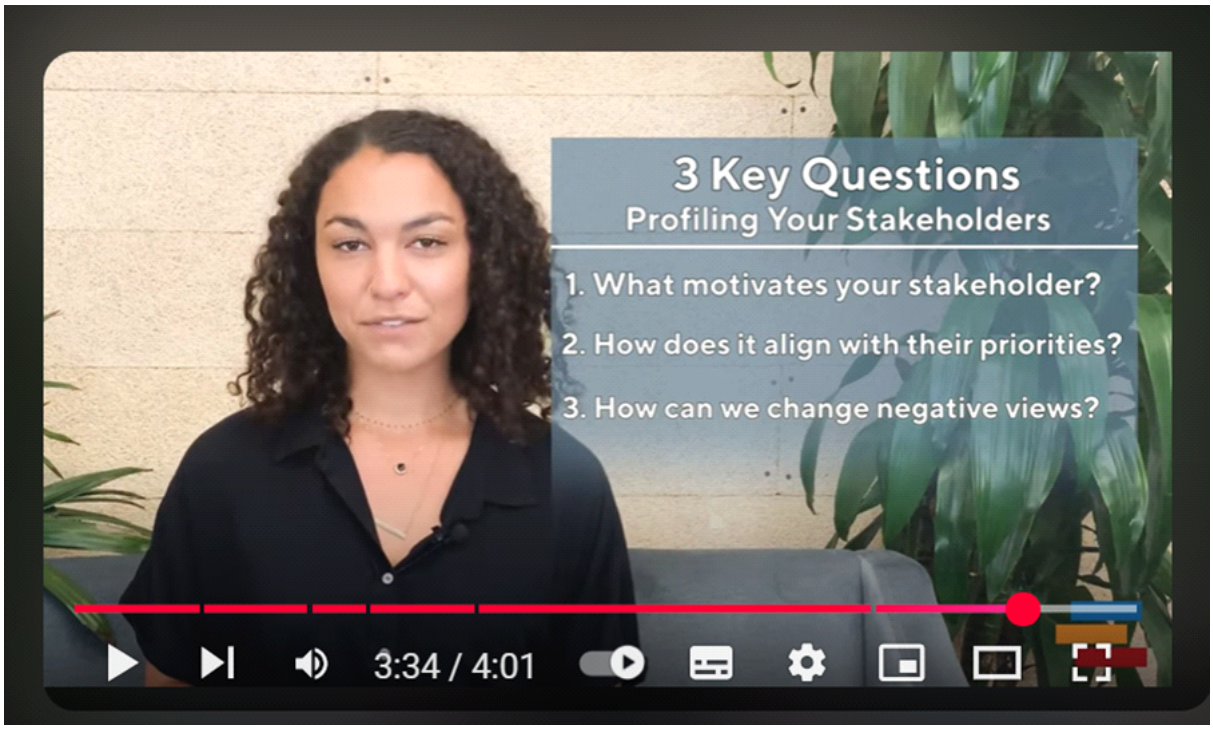
Prioritise: use the power/interest matrix to understand how to communicate with stakeholders on an individual basis.



Additionally, you could use the matrix as below with different categories:

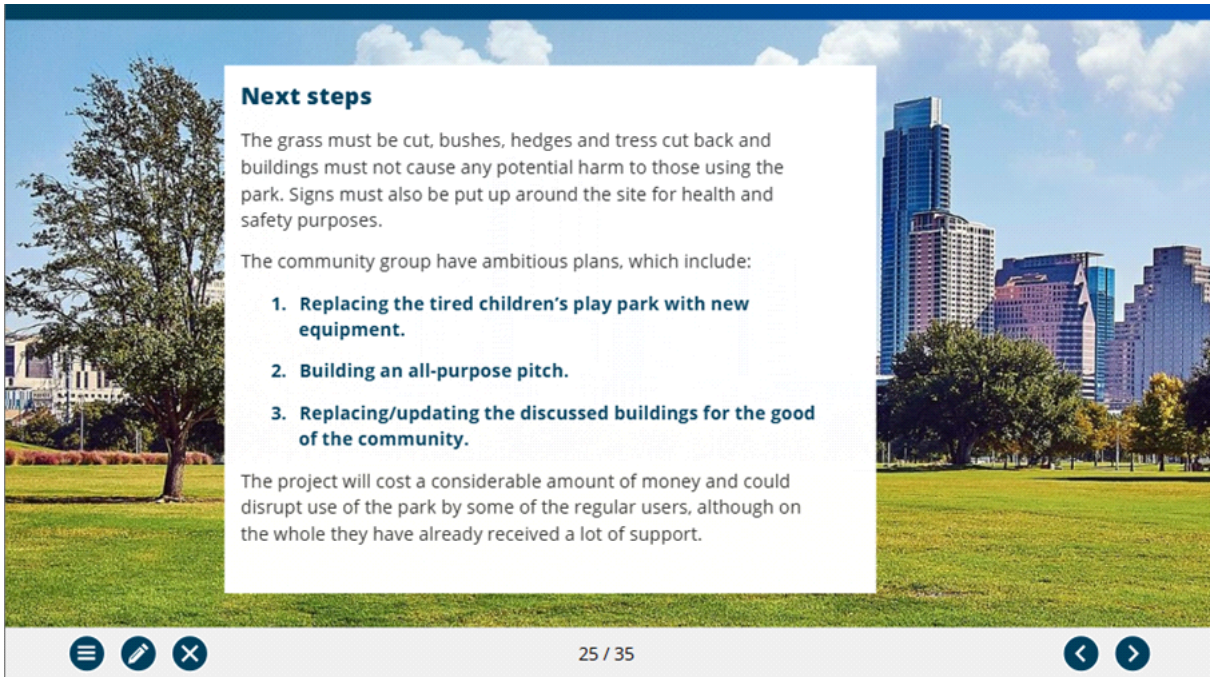


Understanding: how to communicate with each stakeholder using 3 key questions to profile your stakeholder.

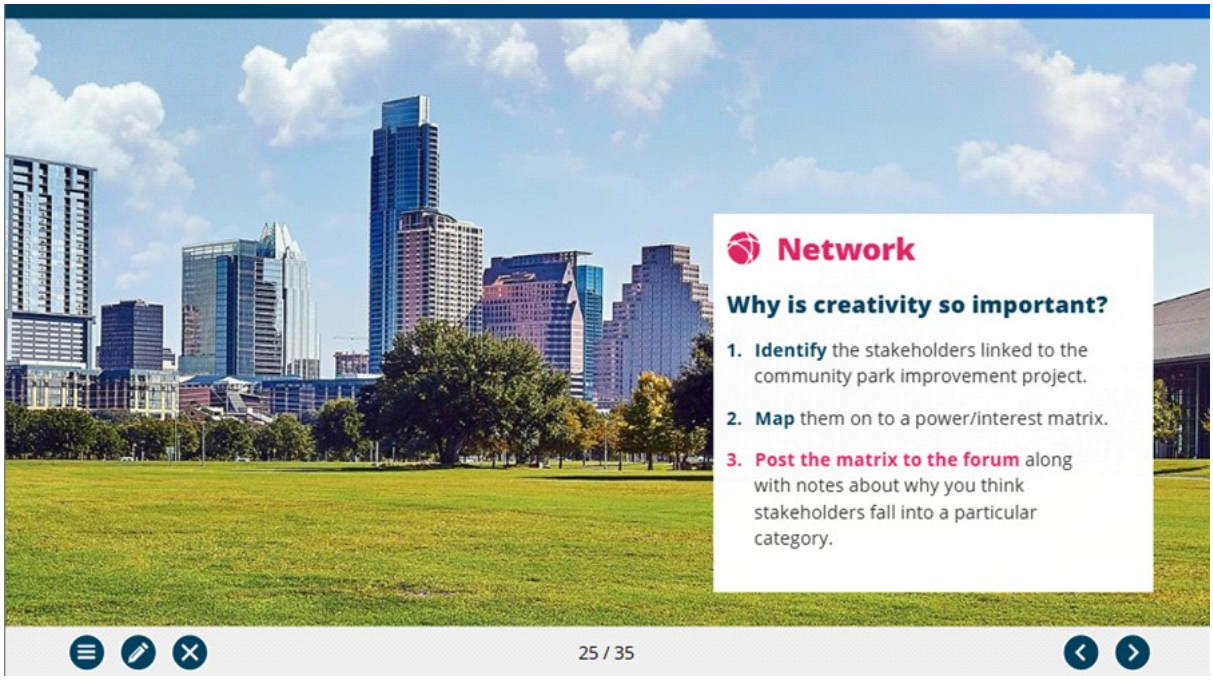


From this, you can move forward and create a stakeholder communication plan.





Network



3. Local community such as residents, park users, local schools, businesses, volunteers and environmental groups.
4.

Stakeholder	Power	Interest	Category
Residents	Medium	High	Keep Informed
Park users	Low	High	Keep Informed
Local schools	Medium	High	Keep Informed
Local businesses	Low-Med	Medium	Monitor
Volunteers	Medium	High	Key Players
Environmental groups	Medium	Medium	Keep Satisfied

5. Residents: Live nearby and care about safety and access. They have high interest in

the project's success, but limited power.

Park users: Frequent users of the space (i.e. dog walkers, sports and game players, families).

Local schools: Use the fields and facilities. They have a strong interest in safe, upgraded areas for students and moderate influence through local partnerships.

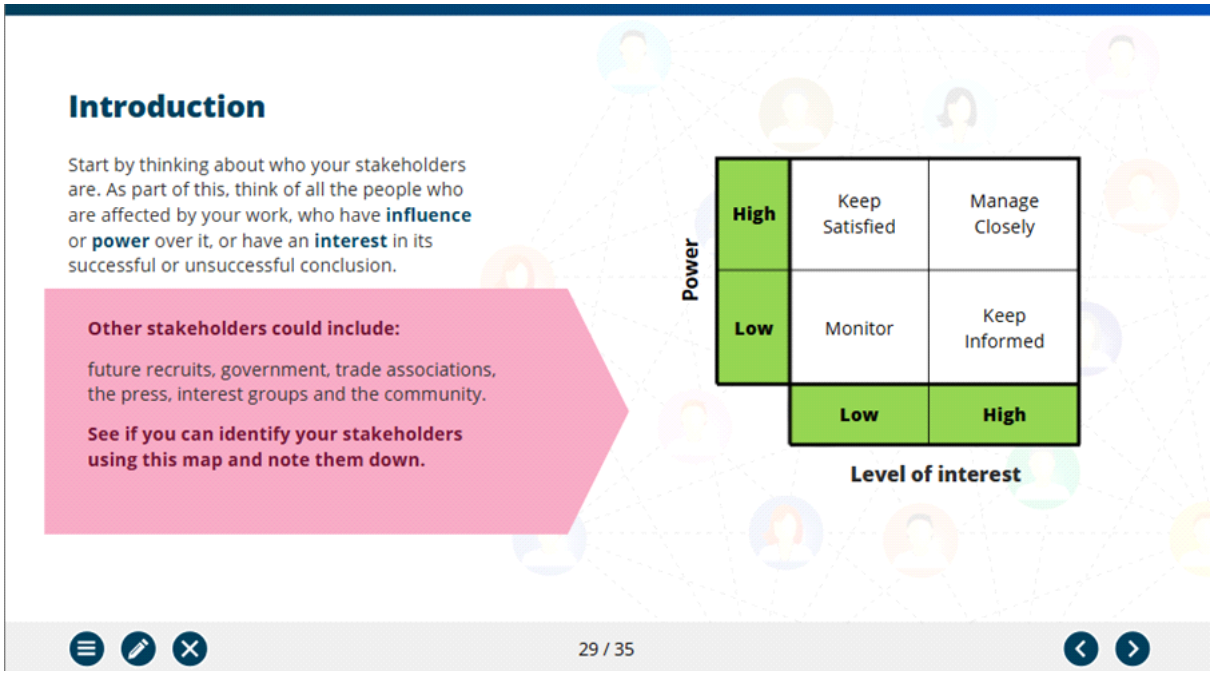
Local businesses: May benefit from increased footfall or visibility. They have medium interest, especially if asked to contribute but limited influence without formal involvement.

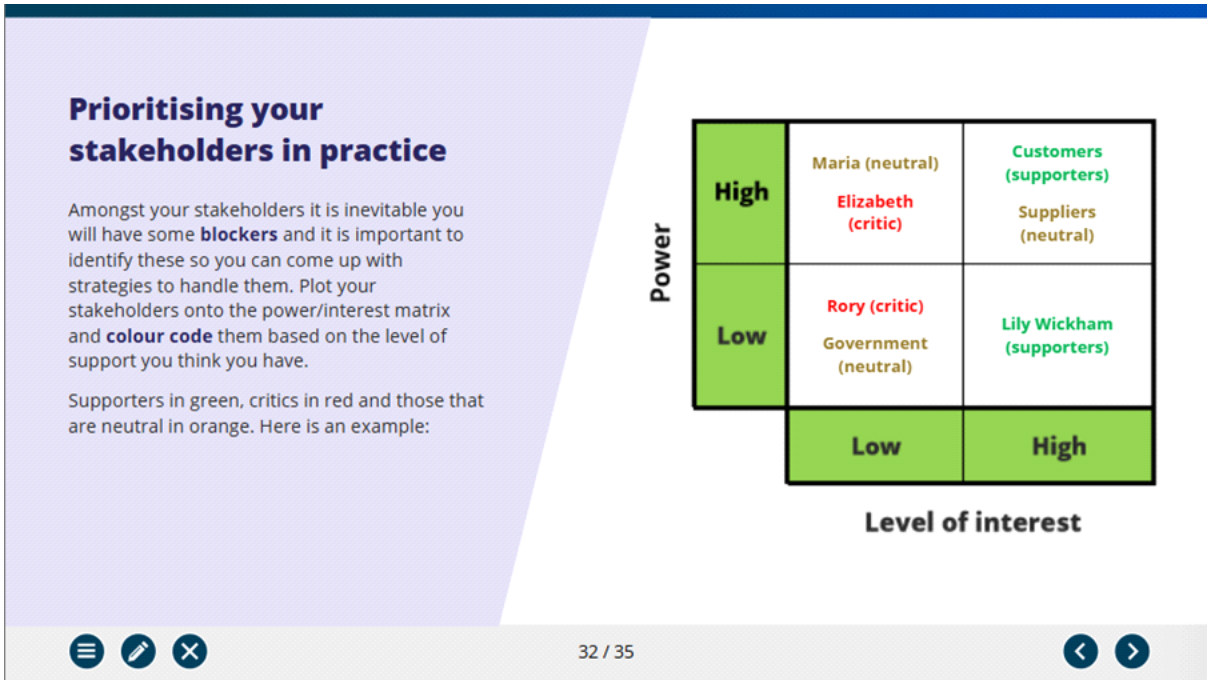
Volunteers: Required for delivering the work with community feeling like they are involved. They are highly engaged and influential in shaping or supporting the project's delivery, key players in making it happen.

Environmental groups: Interested in preserving green space and biodiversity. They may have some power through public pressure or environmental expertise and should be kept in the loop.

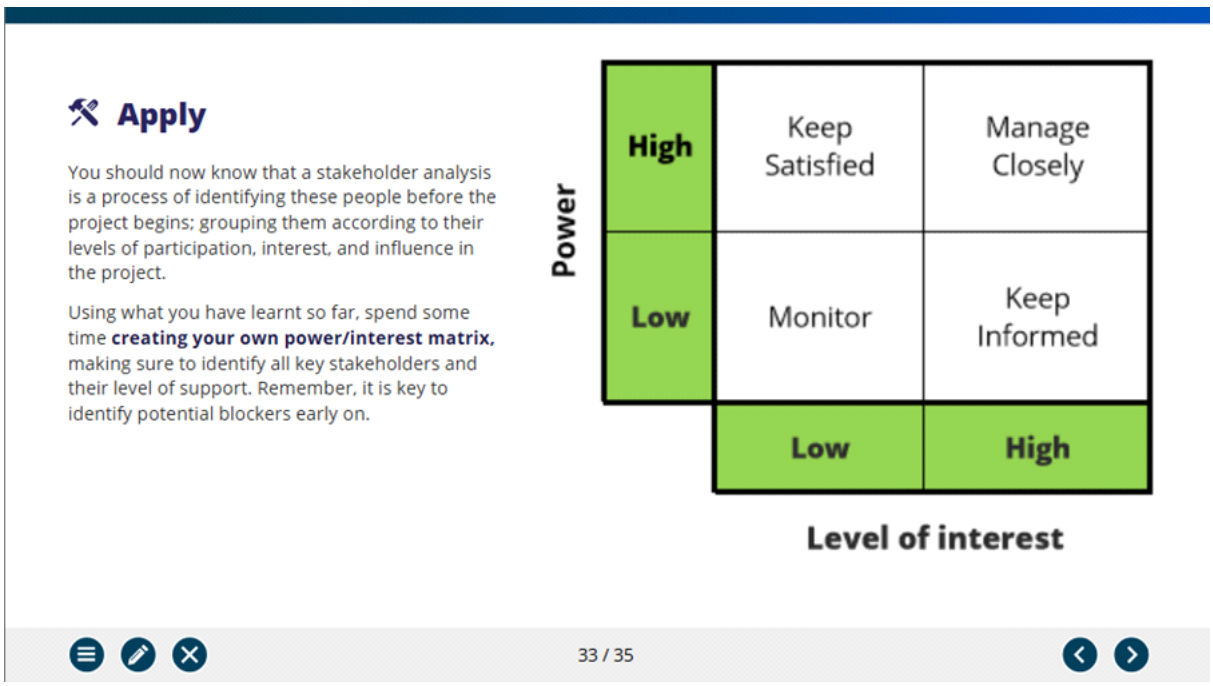
Section 3: Map it out

Introduction





Apply



High Power, Low Interest: Investors and potential future partners

High Power, High Interest: Application developers and other technical people

Low Power, High Interest: Application users

Low Power, Low Interest: Class mates and other peers

Understand your stakeholders

You need to discover how your key stakeholders feel about your project. You also need to work out how best to engage them, and how to communicate with them.

The table here presents some **sample questions** that you can use to interrogate your understanding. Make sure to note down any further questions that come to mind.

Sample questions to ask to better understand stakeholders include:
What financial or emotional interest do they have in the outcome of your work? Is it positive or negative?
What information do they want from you, and what is the best way of communicating with them?
Who influences their opinions generally, and influences their opinion of you? Do some of these influencers therefore become important stakeholders in their own right?
If they aren't likely to be positive, what will win them around to support your project? If you don't think that you will be able to win them around, how will you manage their opposition?
What motivates them most of all?

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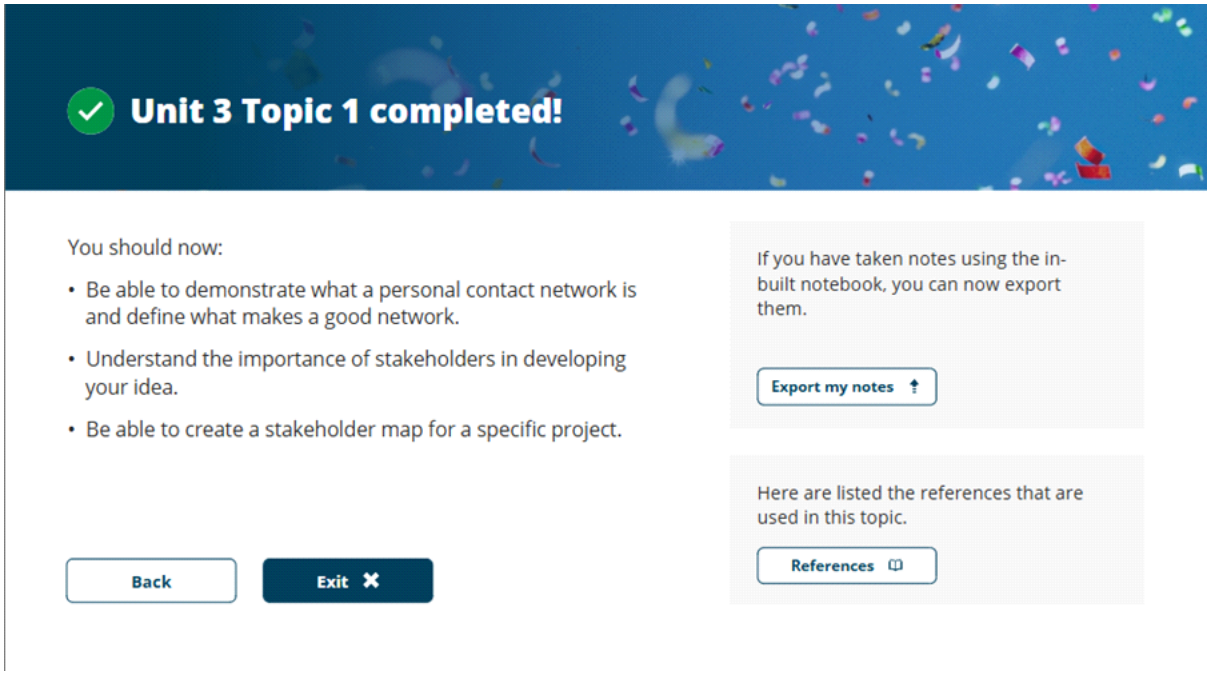
Before you go...

In this topic, you should have completed:

- ❑ One **Reflect** task where you analysed your previous understanding of networks and their importance.
- ❑ One **Check** task where you have demonstrated your understanding of what makes a good personal connection, active and latent network.
- ❑ Two **Apply** tasks where you analysed your personal connections and evaluated their importance, then demonstrated your understanding of the topic by creating a stakeholder analysis matrix of your chosen project.
- ❑ One **Network** task where you have identified key stakeholders for the park project on a matrix, along with notes about why you think stakeholders fall into a particular category and posted this to the forum.

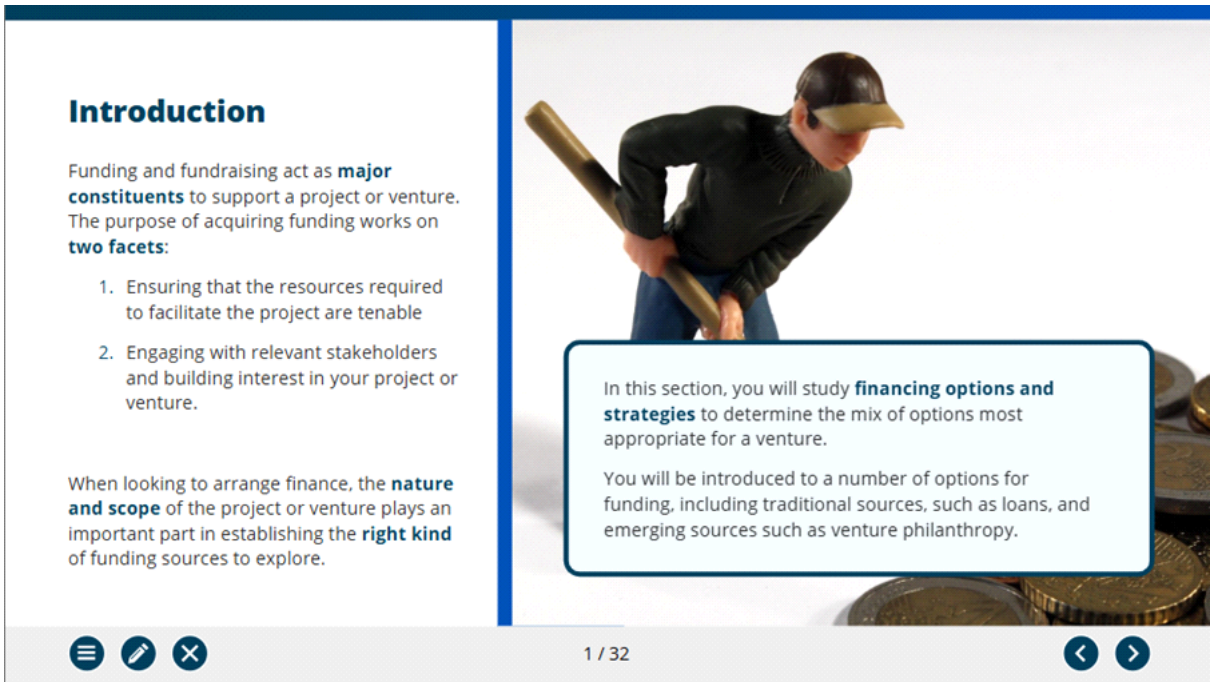
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Topic Purpose



Unit 3 Topic 2 – Show me the money!

Section 1: Sources of funding



Reflect



I needed to approach my father when needing to purchase a car in my late teens. I needed funding off him.

I chose my father over banks or other loan services because there was 0% interest.

Funding bodies

When looking at applying for funding, you must be aware of the different funding bodies available and their areas of interest.

UK Research Councils

Research councils in the UK provide funding for different subjects of academic research. The seven councils are:

- Arts & Human Research Council (AHRC)
- Biotechnology & Biological Sciences Research Council (BBSRC)
- Engineering & Physical Sciences Research Council (EPSRC)
- Economic & Social Research Council (ESRC)
- Medical Research Council (MRC)
- Natural Environment Research Council (NERC)
- Science & Technology Facilities Council (STFC)

Government Departments

The UK government funds research in universities through what is known as the ‘dual support’ mechanism.

This comprises:

- An annual grant from the funding councils to support the research infrastructure
- Specific project grants from the research councils to fund particular pieces of research.
- Non-departmental public bodies
- UK Research and Innovation (UKRI) is the national funding agency investing in science and research in the UK.
- It operates across the whole of the UK with a combined budget of more than £6 billion.

- UKRI brings together the 7 Research Councils, Innovate UK, and Research England.

UK charities

Charities are an underrated funding resource, and often make awards to students of any subject and any nationality.

Securing funding also boosts your CV, particularly if you are considering an academic career.

Types of funding

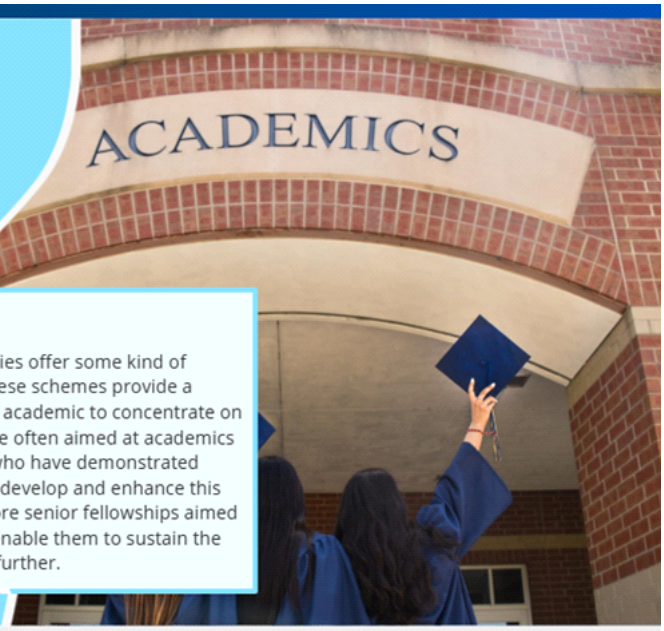
- Loans
- Bootstrapping
- Venture capital
- Angel Investors
- Venture philanthropy
- Accelerators
- Incubators
- Crowdfunding
- Research funding
    - Early career research grants
    - Fellowships
    - Project grants (managed)
    - Project grants (responsive)
    - Research network

Research funding



Research funding

As well as exploring funding options for business ventures, we can also explore what options are available to fund a **research project**. Click next to explore these:



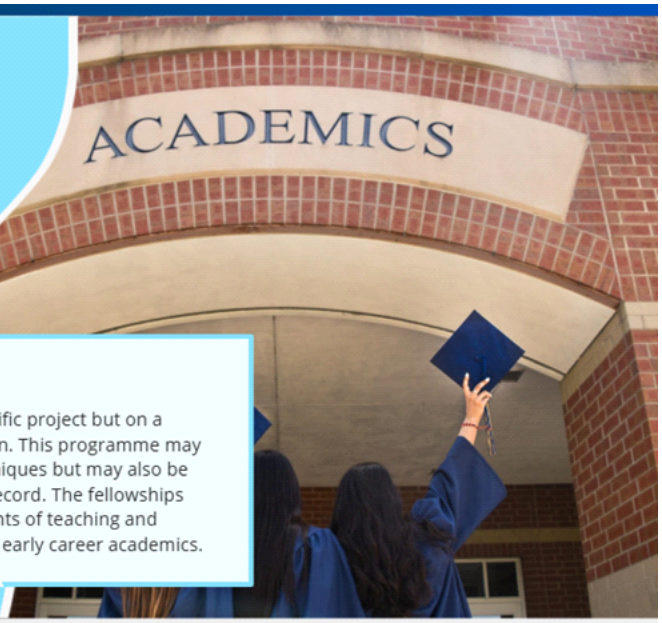
Fellowships

Most of the Research Councils and the major charities offer some kind of **fellowship scheme** to postdoctoral candidates. These schemes provide a salaried period of anything from 1 to 5 years for an academic to concentrate on research activity and to develop their skills. They are often aimed at academics in the **early stages of their postdoctoral career** who have demonstrated clear potential as a researcher and are intended to develop and enhance this potential. There are, however, also a number of more senior fellowships aimed at those with a proven track-record in research to enable them to sustain the quality of their research and to develop their skills further.

6 / 32

Research funding

As well as exploring funding options for business ventures, we can also explore what options are available to fund a **research project**. Click next to explore these:



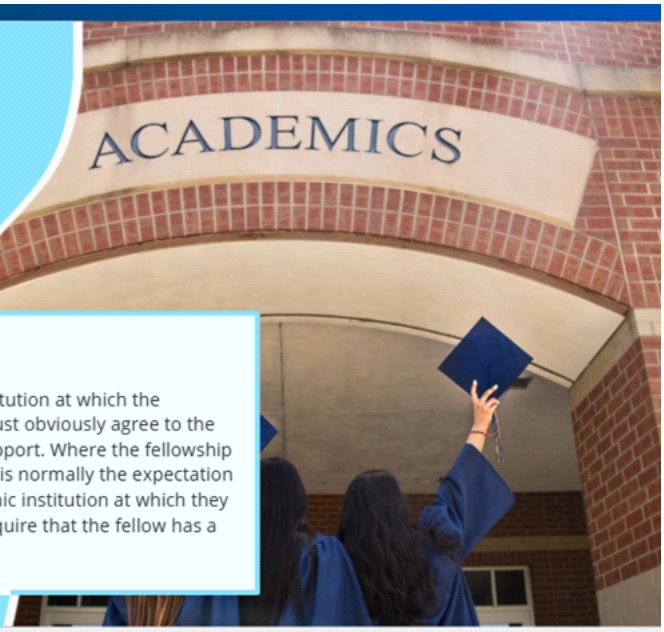
Fellowships (continued)

The fellowships are normally focused not on a specific project but on a programme of work to be outlined in the application. This programme may include specific training in advanced research techniques but may also be focused on enhancing the academic's publication record. The fellowships normally allow the holder to engage in small amounts of teaching and supervision, particularly those fellowships aimed at early career academics.

6 / 32

Research funding

As well as exploring funding options for business ventures, we can also explore what options are available to fund a **research project**. Click next to explore these:



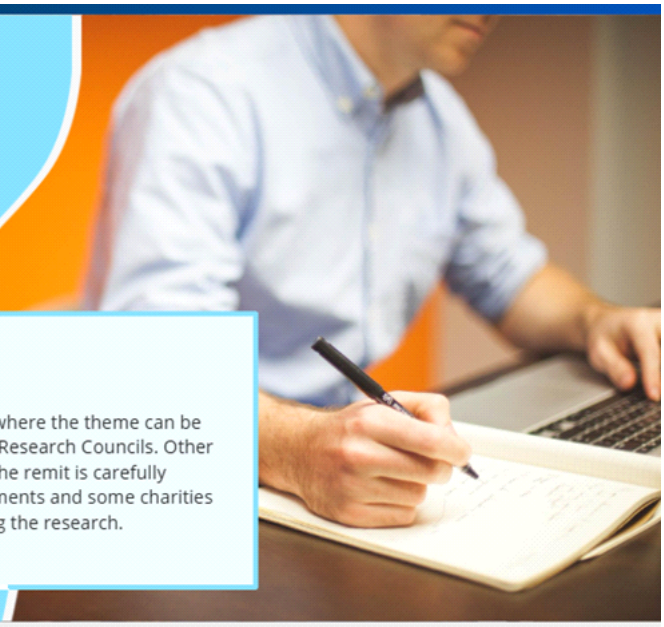
Fellowships (continued)

It is normally up to the applicant to identify an institution at which the fellowship is to be held, although the institution must obviously agree to the terms of the fellowship and offer the necessary support. Where the fellowship is aimed at those in a permanent academic post, it is normally the expectation that the fellowship will be held at the same academic institution at which they hold the post. Early career fellowships normally require that the fellow has a nominated mentor at the institution.

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Research funding

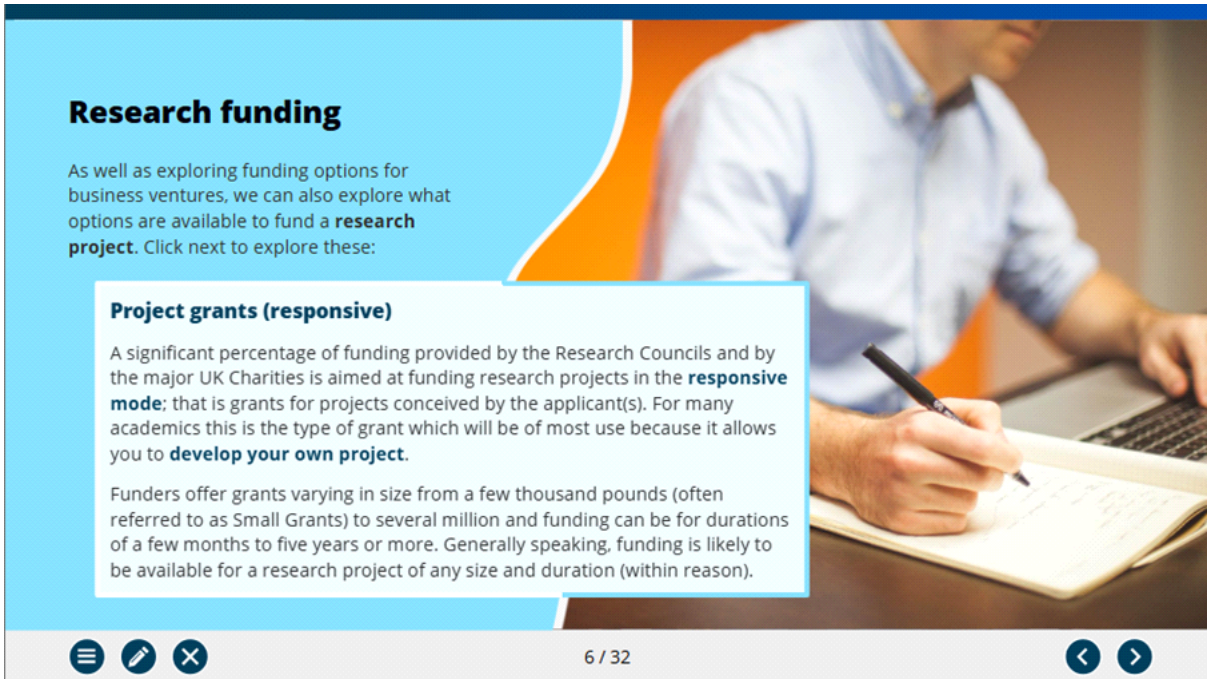
As well as exploring funding options for business ventures, we can also explore what options are available to fund a **research project**. Click next to explore these:



Project grants (managed)

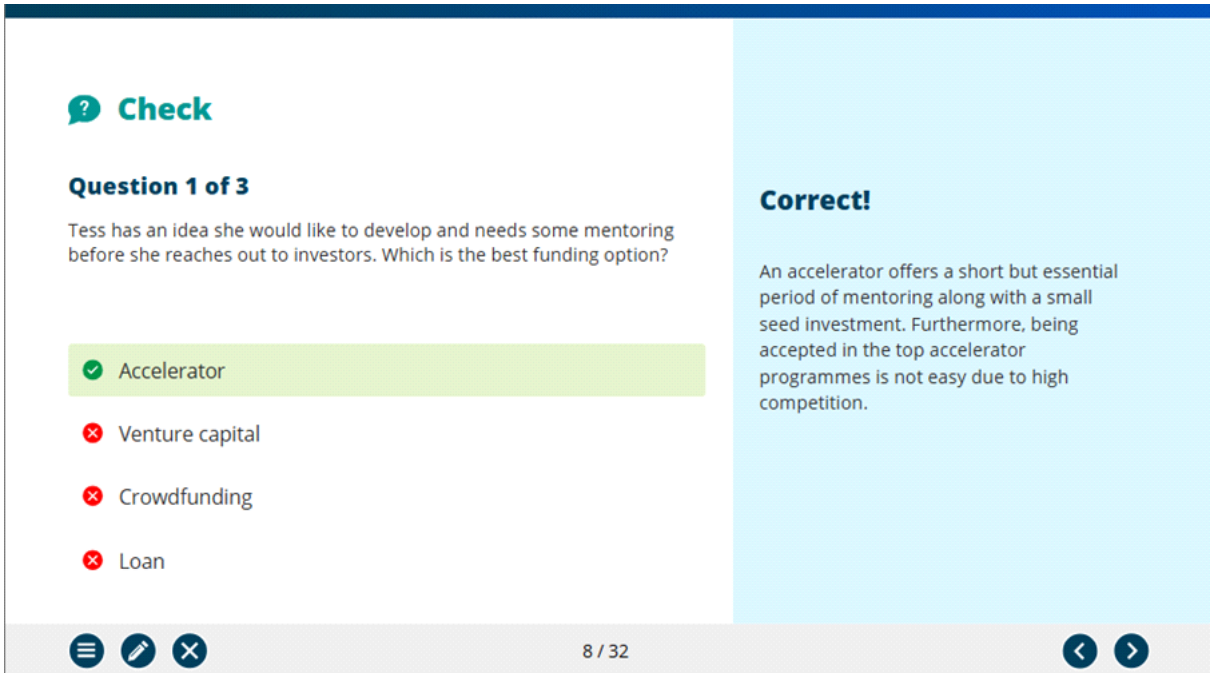
Some funders offer project grants under **themes**, where the theme can be broad or narrow. This is particularly true of the UK Research Councils. Other funders offer grants for a **specific project**, where the remit is carefully specified. This is often true of Government Departments and some charities who have a very specific objective in commissioning the research.

6 / 32

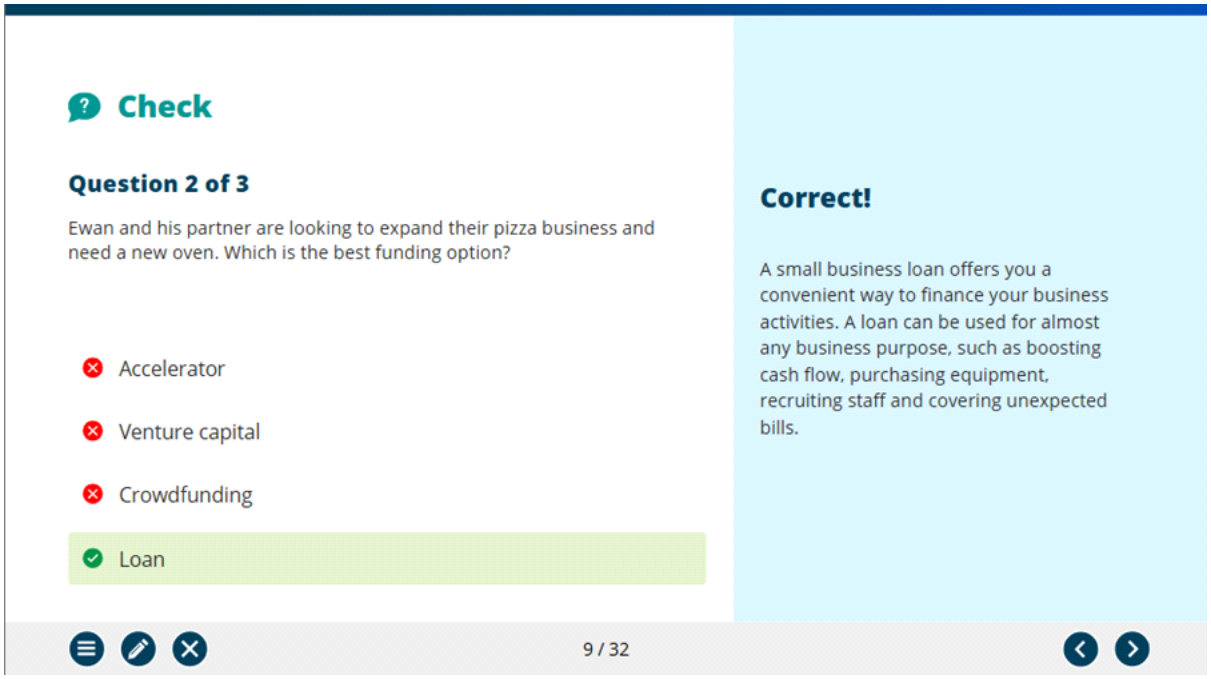

Research funding
As well as exploring funding options for business ventures, we can also explore what options are available to fund a research project. Click next to explore these:
Project grants (responsive)
A significant percentage of funding provided by the Research Councils and by the major UK Charities is aimed at funding research projects in the responsive mode; that is grants for projects conceived by the applicant(s). For many academics this is the type of grant which will be of most use because it allows you to develop your own project.
Funders offer grants varying in size from a few thousand pounds (often referred to as Small Grants) to several million and funding can be for durations of a few months to five years or more. Generally speaking, funding is likely to be available for a research project of any size and duration (within reason).
6 / 32


Research funding
As well as exploring funding options for business ventures, we can also explore what options are available to fund a research project. Click next to explore these:
Research network
A number of funders provide funding to establish research networks or clusters that encourage collaboration across universities, between countries and between the university and commercial/industrial sectors. There is a particular focus on establishing conferences and seminars as the focus for these networks but also on establishing the exchange of researchers and of skills and knowledge through training networks. The European Commission is particularly active in this area.
6 / 32

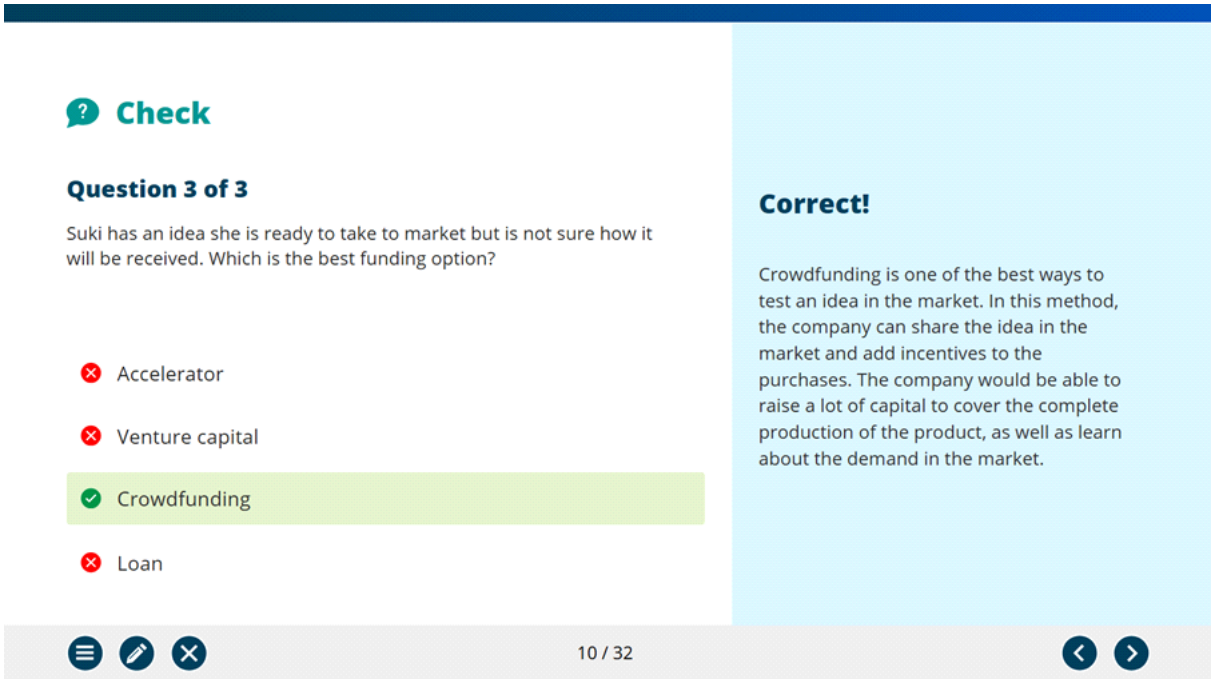
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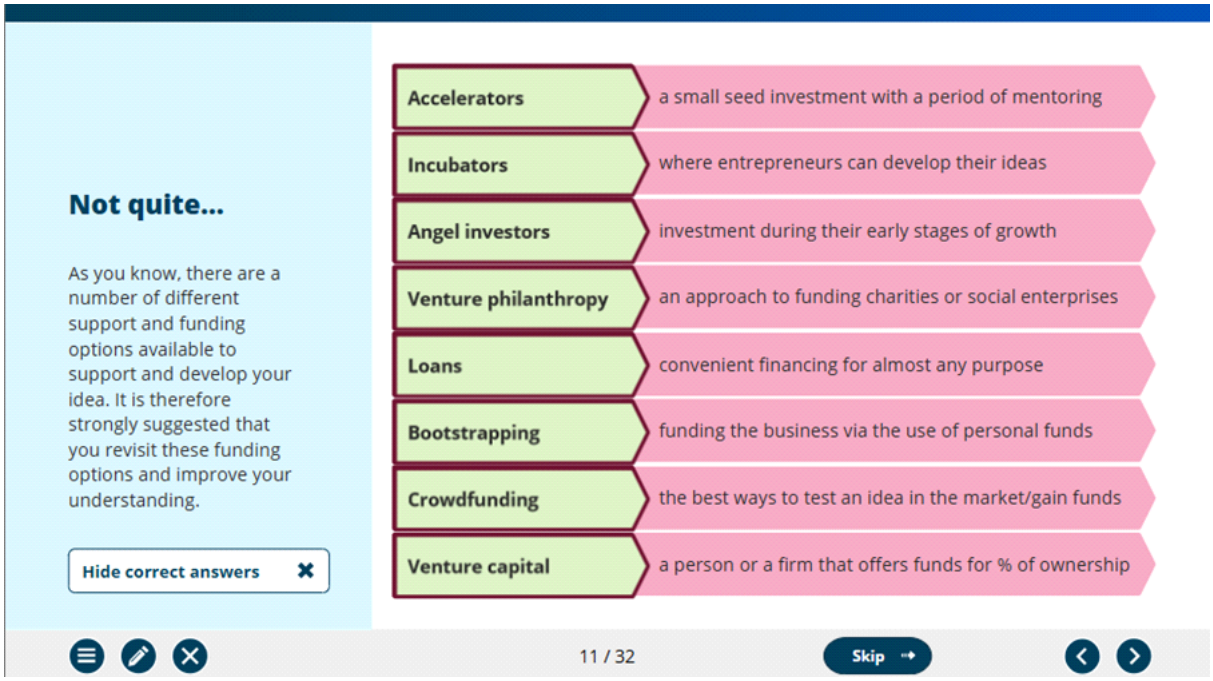
Check (3)



Check (4)



Correct answer:



Section 2: Adding value





Consider benchmarking in research as a means to establish what is known.

Added value refers to the positive results obtained from actions undertaken following benchmarking, or when compared to a ‘business as usual’ approach.

There are a number of ways in which we can view added value within the organisation or business context:

Process

Financial

Process

The difference between the purchase price of a product or service and the cost of producing it (profit).

Financial

The difference between maintaining ‘business as usual’ and acting upon benchmarking to drive continuous improvement.

Example of organisational benchmarking and added value

1. Overview of organisation and products/service

ALTO manufacturing is a small plastics manufacturing company based just outside of the city.

They produce bottles and components for a number of multi-national organisations.

Over the past couple of years, the business has stagnated and the bottom line has been impacted.

2. Benchmarking of costs/processes

By reviewing the processes and networks associated with the production of the materials, ALTO manufacturing was able to establish its own benchmarks and those of its direct competitors.

This provided the organisation with the ability to visualise its actions and where value is added or lost.

3. Routes to increase efficiencies

By establishing these benchmarks and visualising where value is added or lost, the organisation has been able to identify pathways to streamline production processes and identify local stakeholders, that can increase productivity and reduce lead times for its main customers.

4. Outcomes / added value

By measuring and comparing their performance and improving processes and relationships, ALTO manufacturing has been able to:

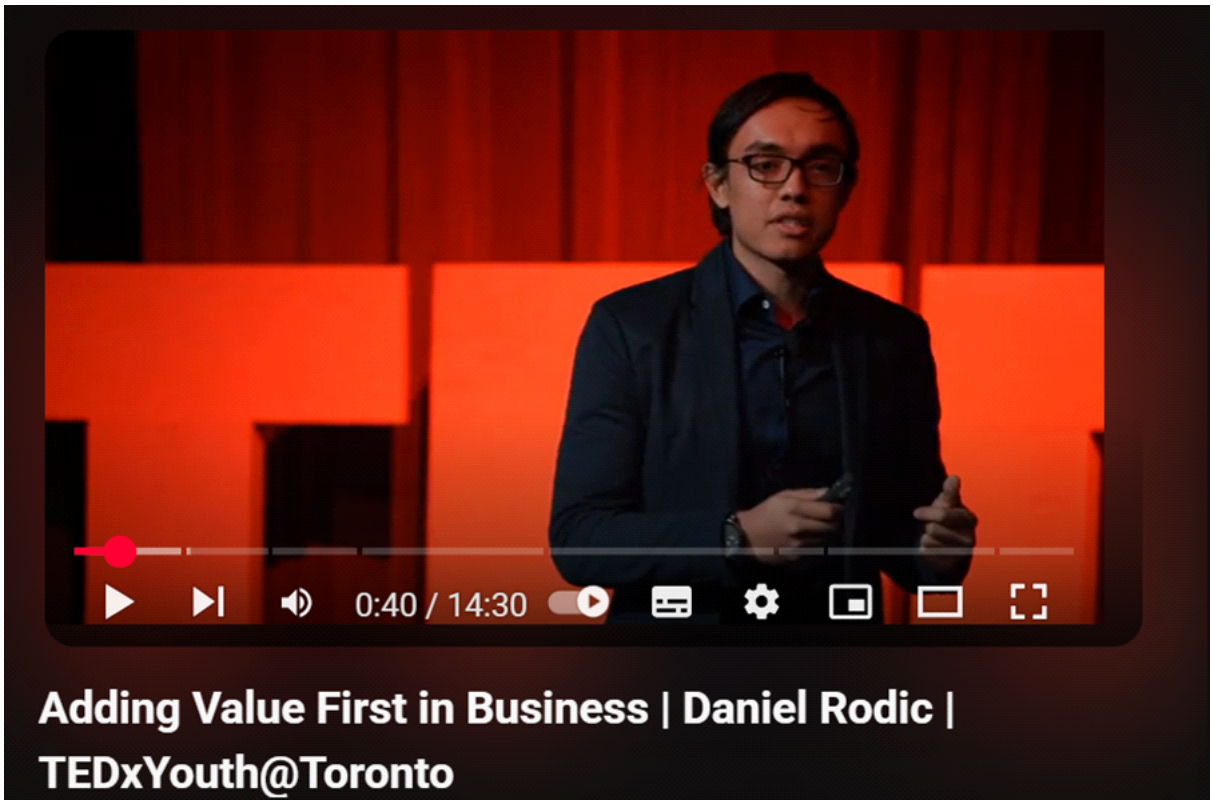
Reduce lead time by 10%

Increase profit by 6%

Increase brand reputation by 5%

Each of these statistics represents added value that the organisation has created.

Dive Deeper



Summary:

Be successful by adding value first: do not view other businesses as competitors to be “crushed”.

An example was discussed including the value Tesla brings to the market by keeping their focus on value i.e. changing the world from fossil fuels to electricity powered cars. If you add value to people or the sector you’re in, “everything else will follow”.

You can add value by connecting communities together.

Time is an asset.

How to provide value to a particular person:

1. Before you meet someone, guess how you might help.

2. Use open-ended questions to validate your guesses.

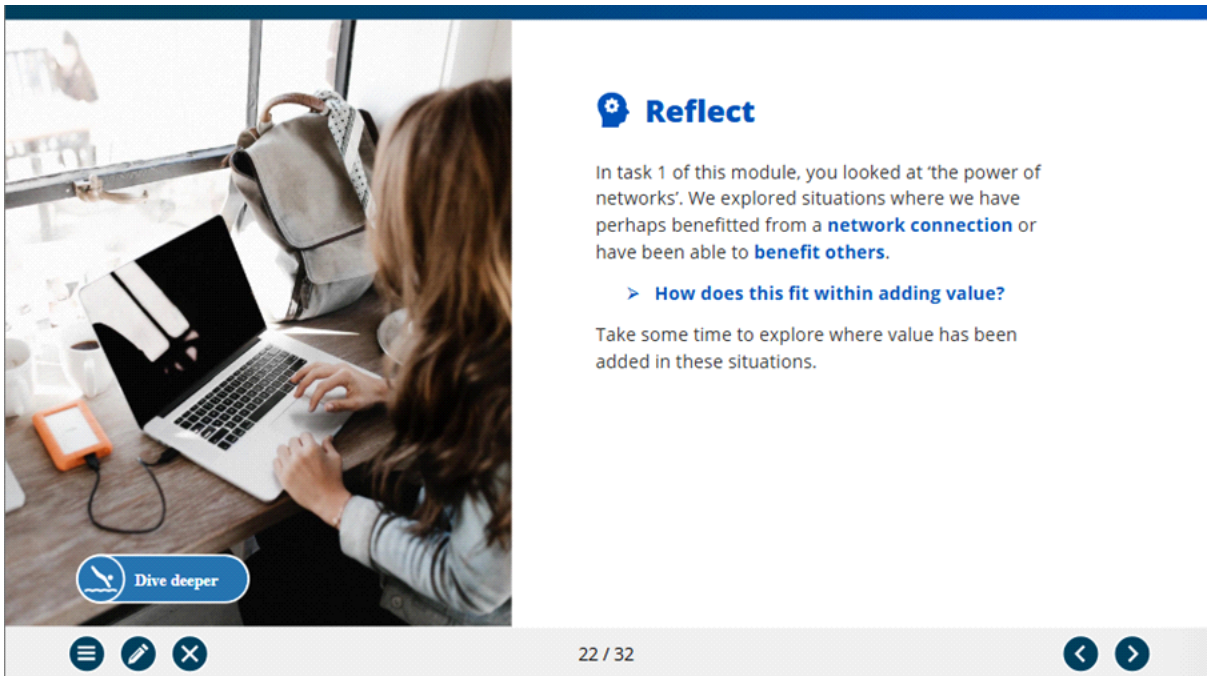
3. End the conversation by committing to help

4. Follow up, and deliver on your commitments.

5. Practice with as many people as possible.

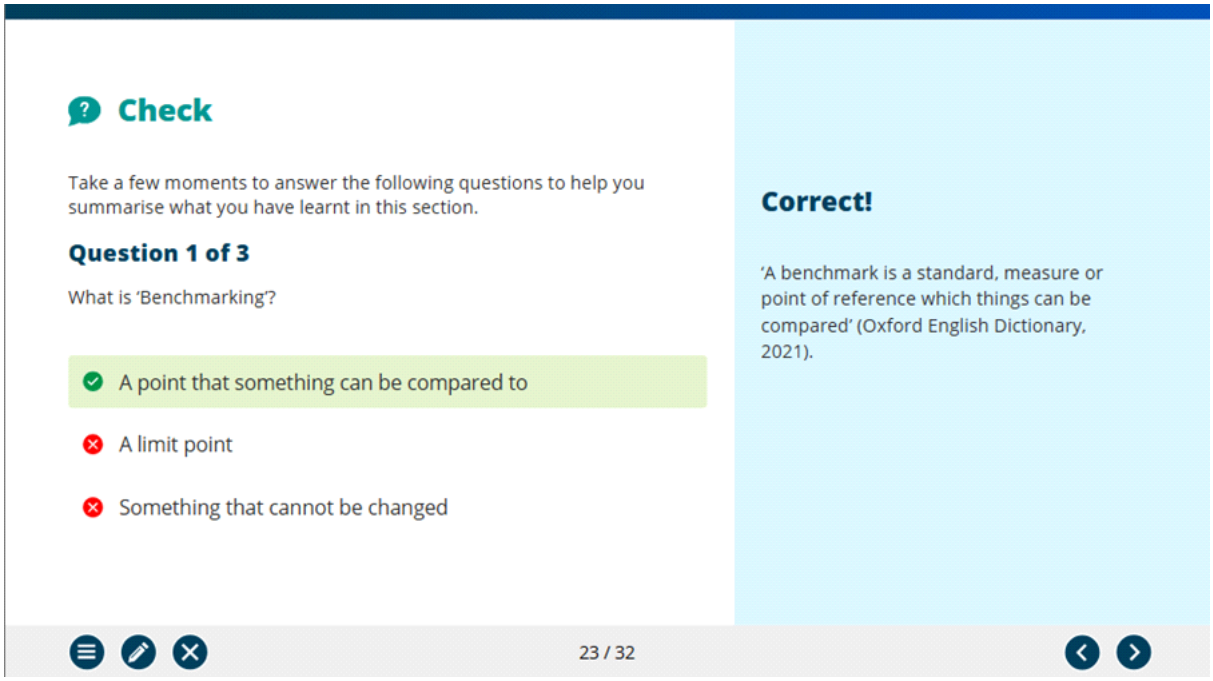
6. What's keeping you busy?
7. Help people by providing value to as many people as possible even if it means there is no initial immediate value.

Reflect

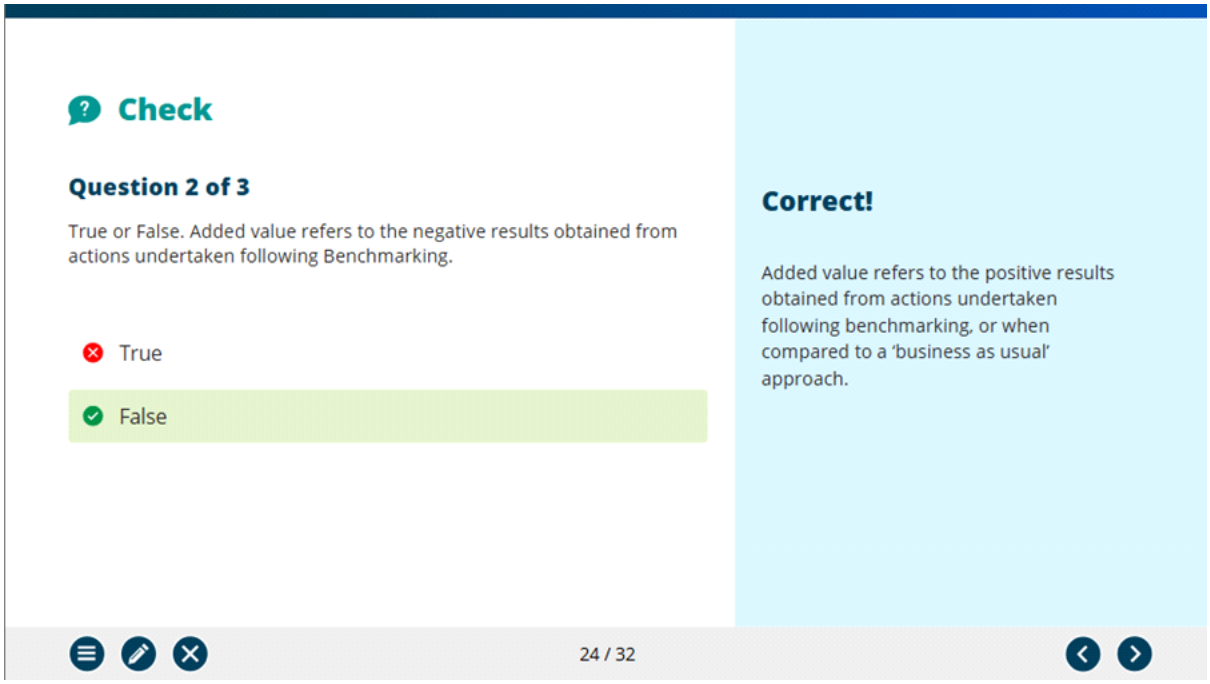


I benefit from their support and I, as a result, can offer them assistance.

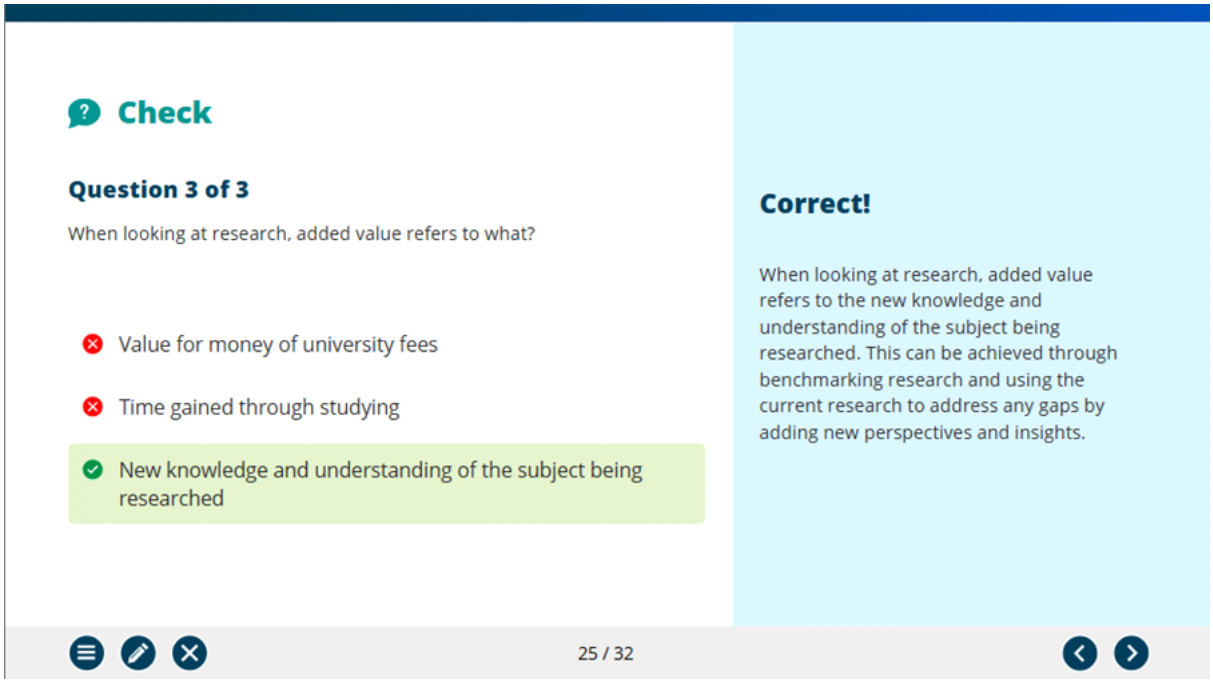
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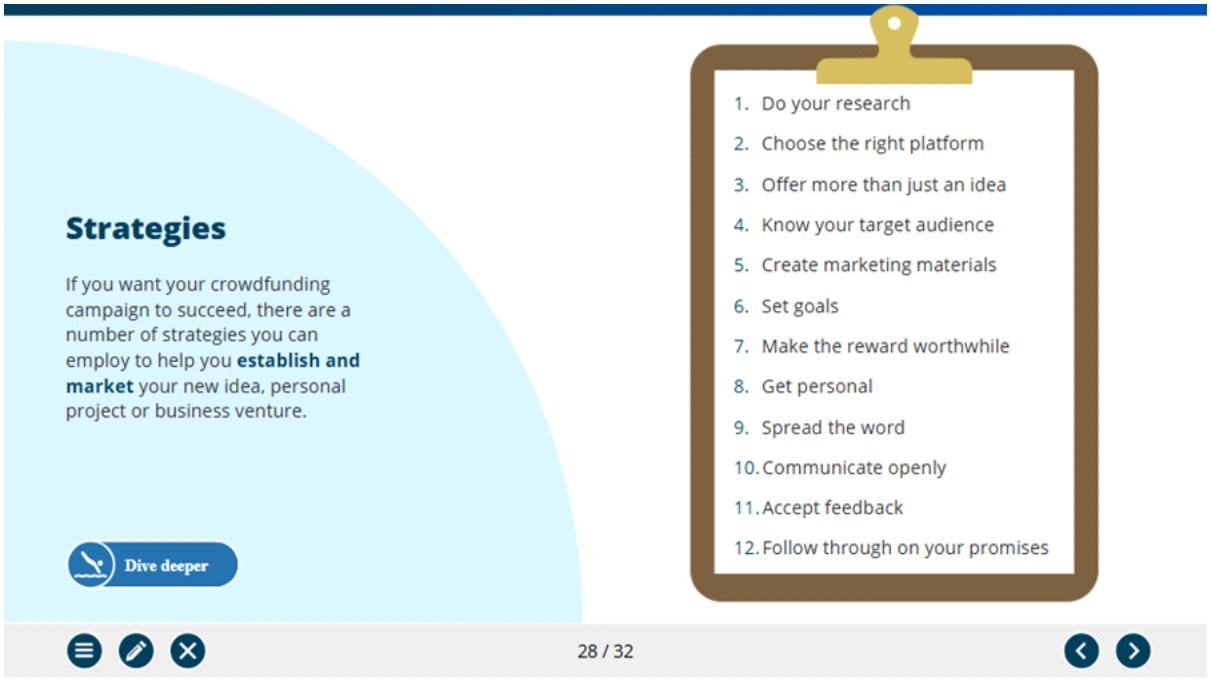
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Section 3: Crowdfunding



Unit 3 Topic 3 – What's the story!

Section 1: Using storytelling for engagement and persuasion

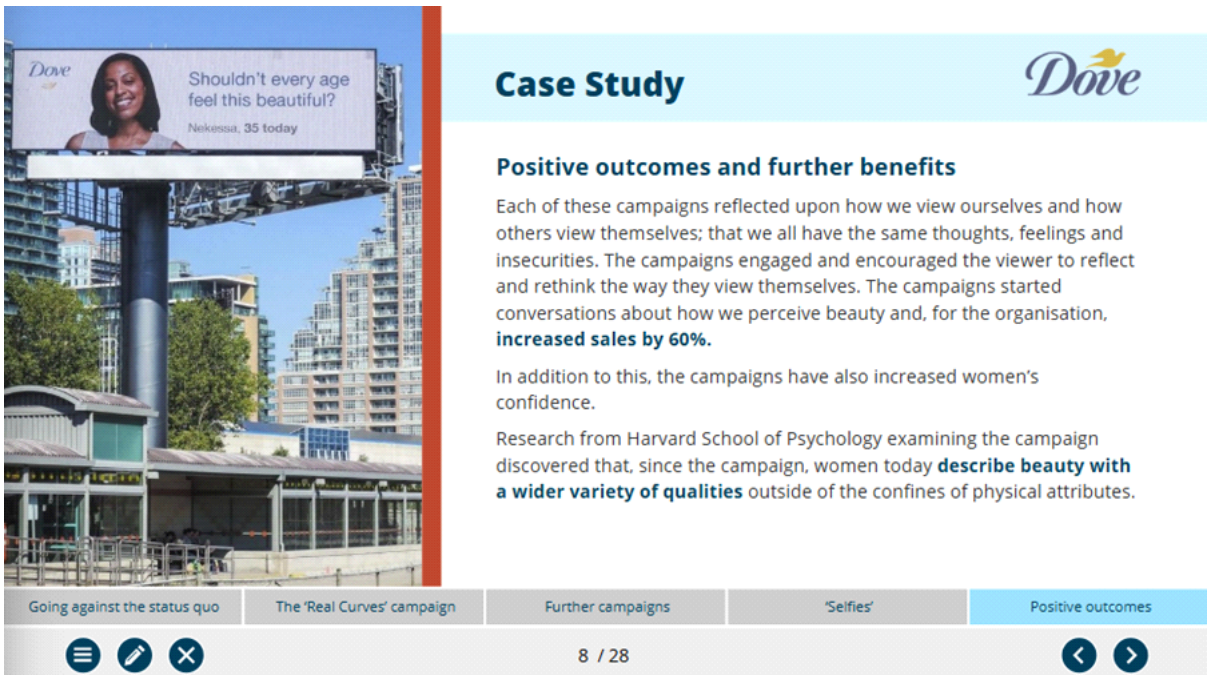
How can story telling help us grow?

Reflection - A process of self-examination and enhancing self-awareness to help us gain personal insights and how to move forward.

Empathy - Allows us to build social connections with others. By understanding what people are thinking and feeling we can respond and engage in an appropriate and beneficial manner.

- **Affective empathy** - The ability to respond to other people's emotions appropriately.
- **Somatic empathy** - The ability to feel what another person is feeling.
- **Cognitive empathy** - The ability to understand someone's response to a situation.

Creativity - Allows us to view the bigger picture and from different perspectives. Creativity can also help motivate, build confidence, clarify thoughts and feelings and problem-solving.



The Dove beauty awareness campaign is strong for various of reasons:

evokes strong emotions in all viewers,

Engages viewers and makes them think of their own perceptions and,

Challenges their previous ways of thinking.

A key takeaway: telling stories rather than reiterating the product/company can have a greater effect on sales.

How can you persuade using storytelling?

Summary:

We judge stories by:

Narrative coherence: Does the story make logical sense?

Narrative fidelity: Does it align with real-life experiences and human nature?

To persuade:

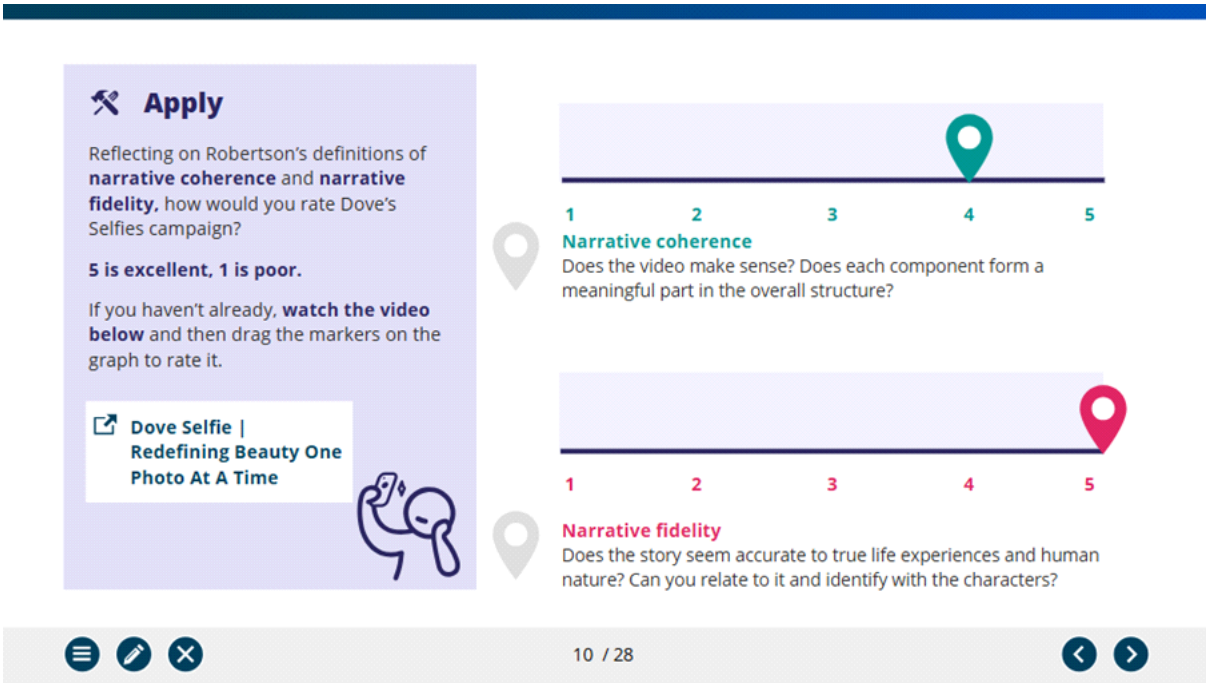
Tell a story that illustrates a concept.

Ensure the audience identifies with the protagonist's worldview.

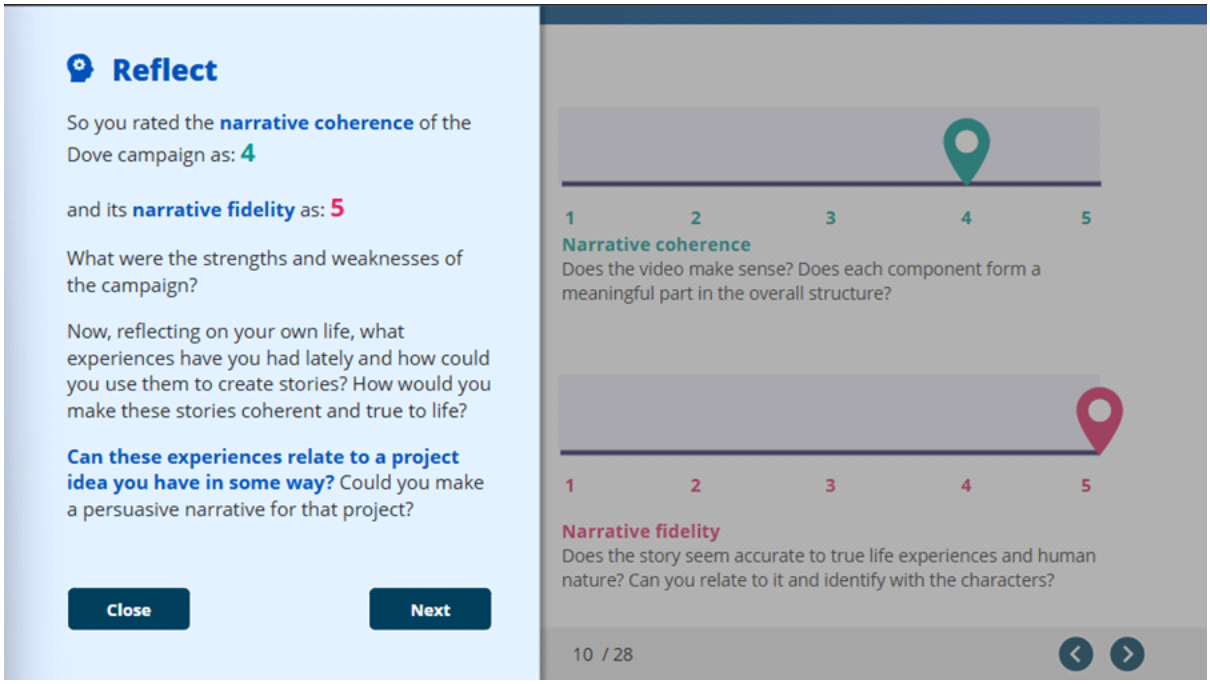
Show the protagonist experiencing something meaningful, leading the audience to adopt their perspective.

Persuasion is stronger when people connect emotionally with a relatable character whose experiences shape their own beliefs and actions.

Apply



Reflect

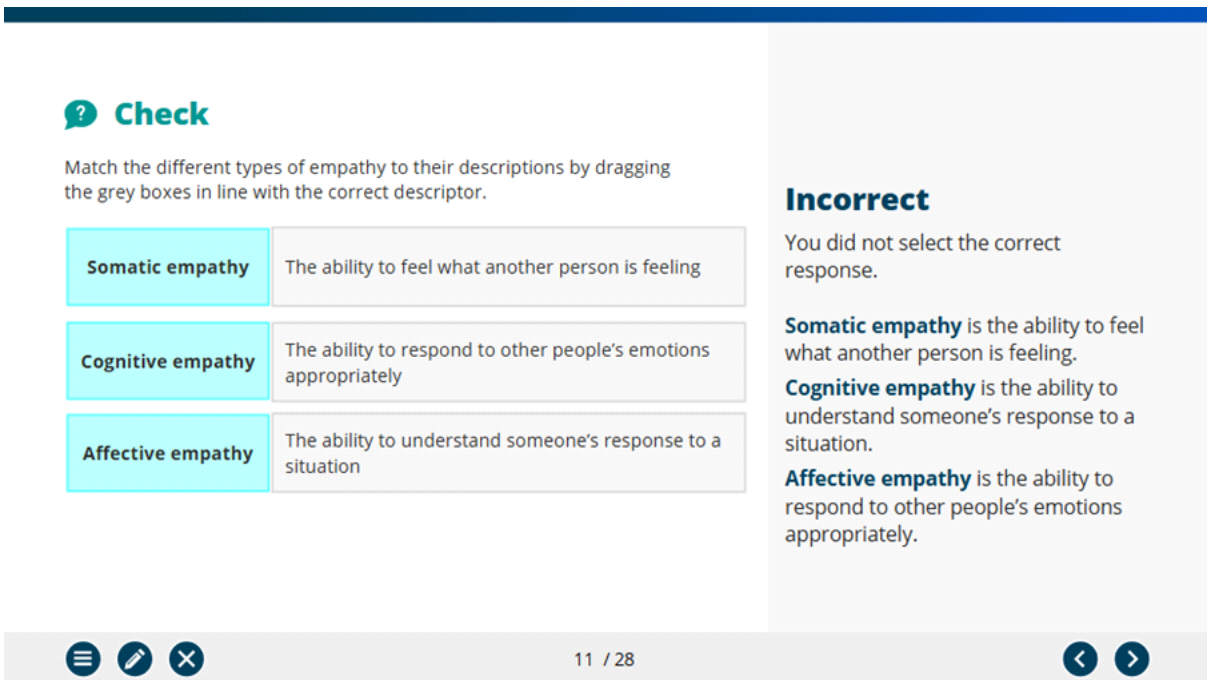


Strengths: emotional element, high authenticity, clear theme, socially relevant, especially to females.

Weaknesses: The story may not connect with males which is why I rated the coherence a 4 and a wide message which can dilute the depth of the message for certain viewers.

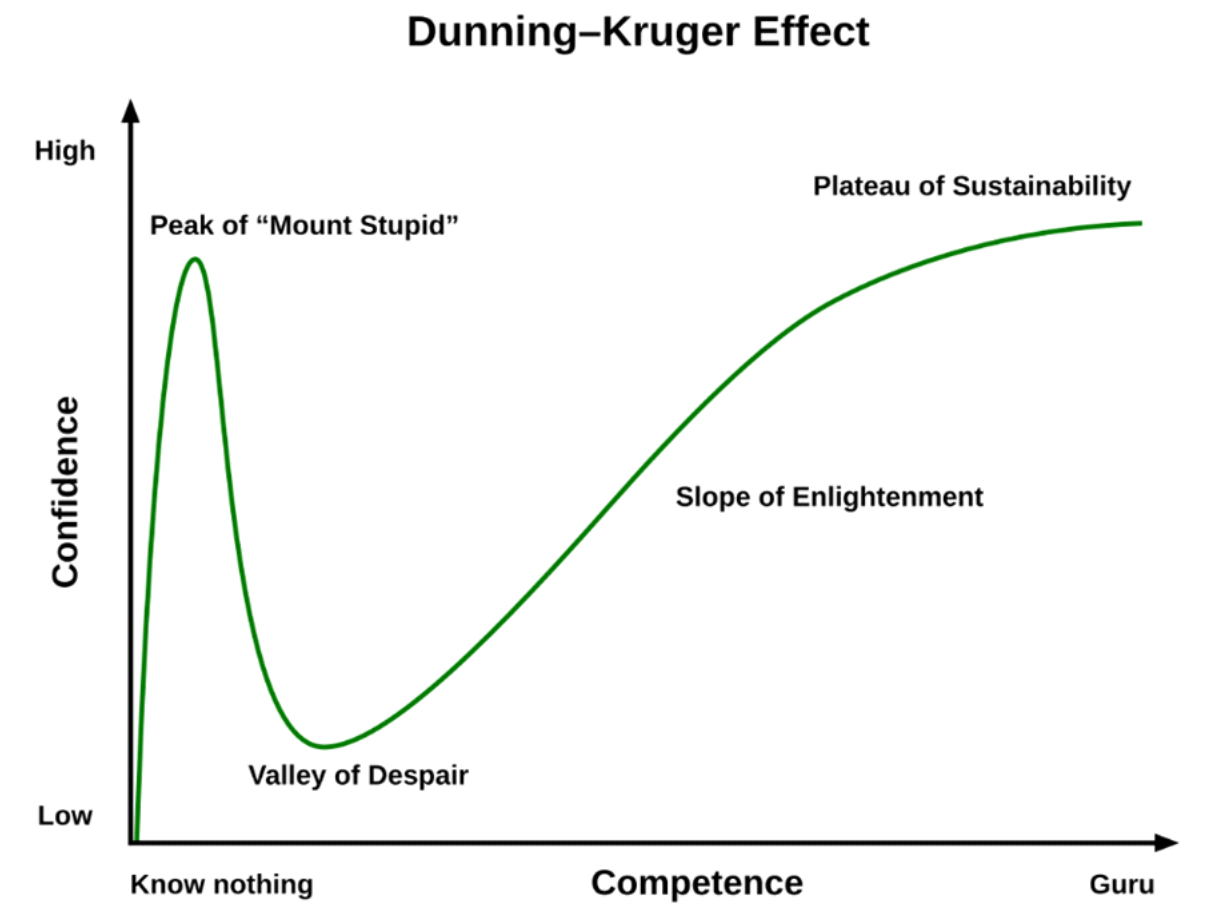
In my personal training social accountability platform, I can create a persuasive narrative by showing real member journeys that reflect powerful emotions. These include overcoming self-doubt, finding belonging, building resilience after injury, experiencing empowerment through achievement, and feeling shared pride in group success. Stories will also highlight the joy in small, steady progress, the motivating effect of accountability pressure, the inspiration drawn from others' wins, the care received during setbacks, and the pride of transforming into a stronger, more confident version of themselves.

Check



Section 2: Developing self-confidence and authenticity

Confidence:



Self-confidence:



Key takeaways: reflect on personal professional life, small incremental changes are more likely to be successful and easier to manage, and once you have the momentum you can start to increase your commitment and make bigger goals.

For example, before starting a business and gaining a business loan, start initially by planning aspects of the business, writing a business plan, explore competitors, etc.



Summary: Authentic Leadership Model (Bill George, 2017)

Authentic leaders are guided by five key dimensions:

Purpose / Passion: they know their direction and are deeply motivated by what they do.

Values / Behaviour: they understand and uphold their values, acting consistently in line with them.

Relationships / Connectedness: they build trust by sharing experiences, listening, and staying connected with others.

Self-discipline / Consistency: they stay focused, determined, and calm under pressure, showing reliability.

Heart / Compassion: they show empathy, care for others' needs and offer help willingly.

How to Implement in Life or a Project

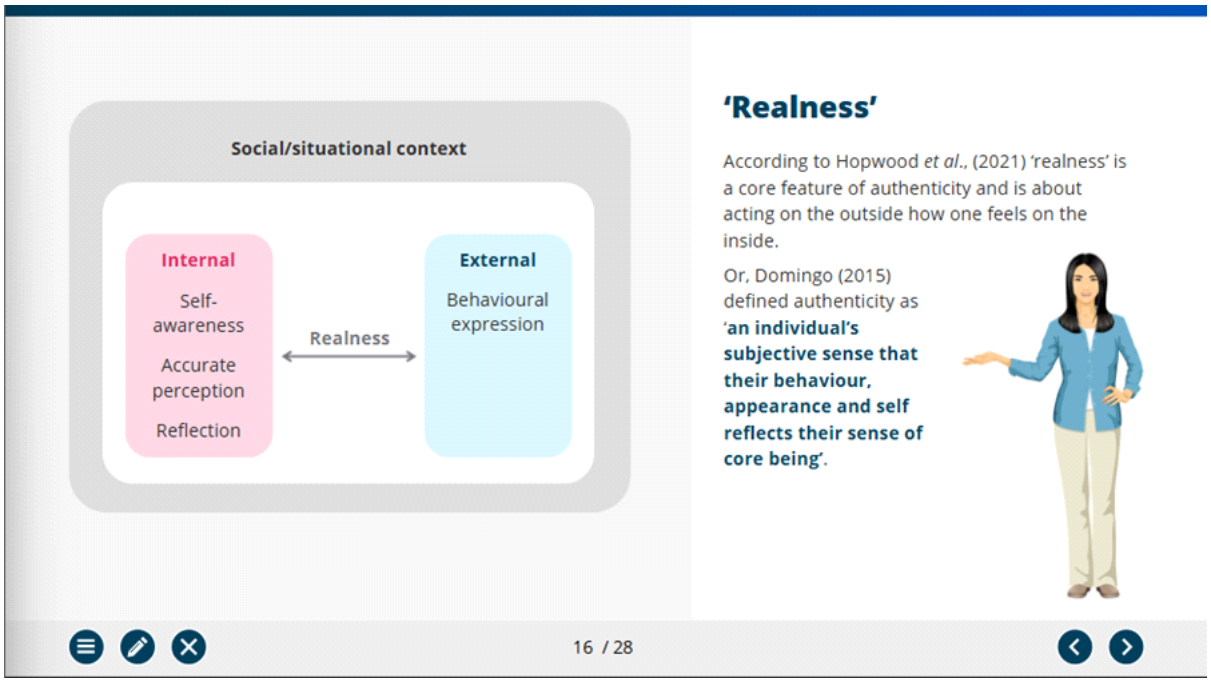
Clarify Purpose: define your "why" before starting; align your project goals with personal or organisational values.

Live Your Values: identify key principles and ensure decisions and actions reflect them.

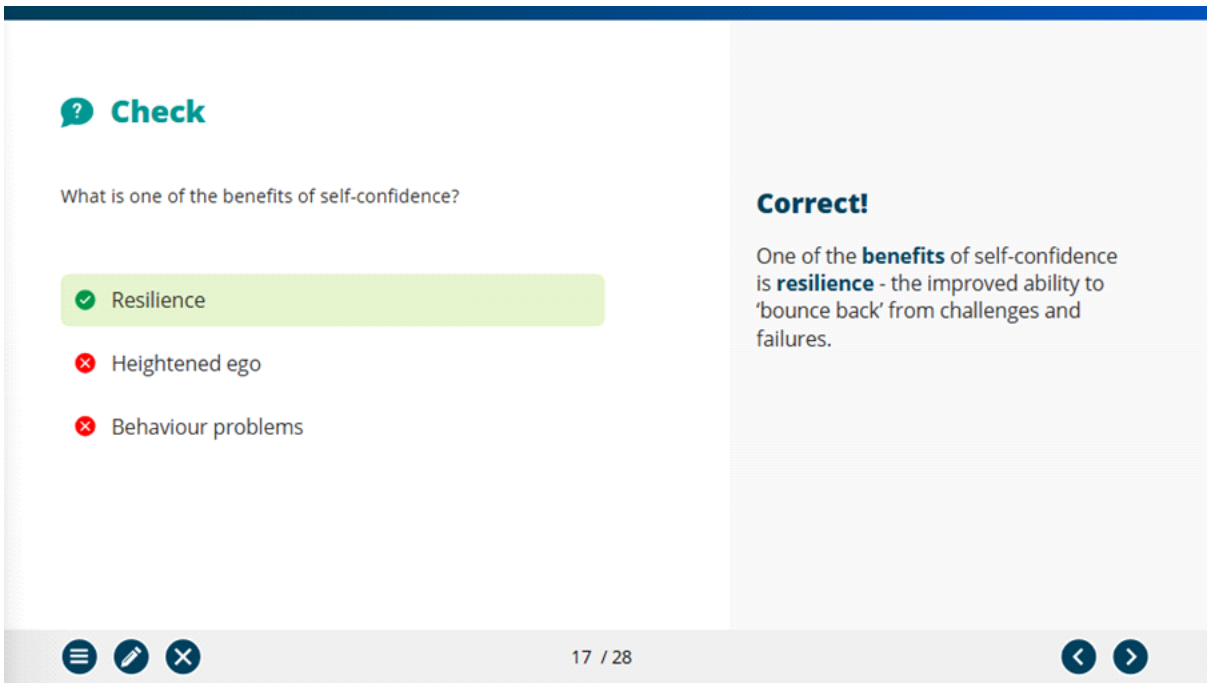
Build Relationships: actively listen to stakeholders, share insights openly, and foster trust.

Stay Disciplined: keep focus on priorities, set measurable milestones, and maintain consistency even when challenges arise.

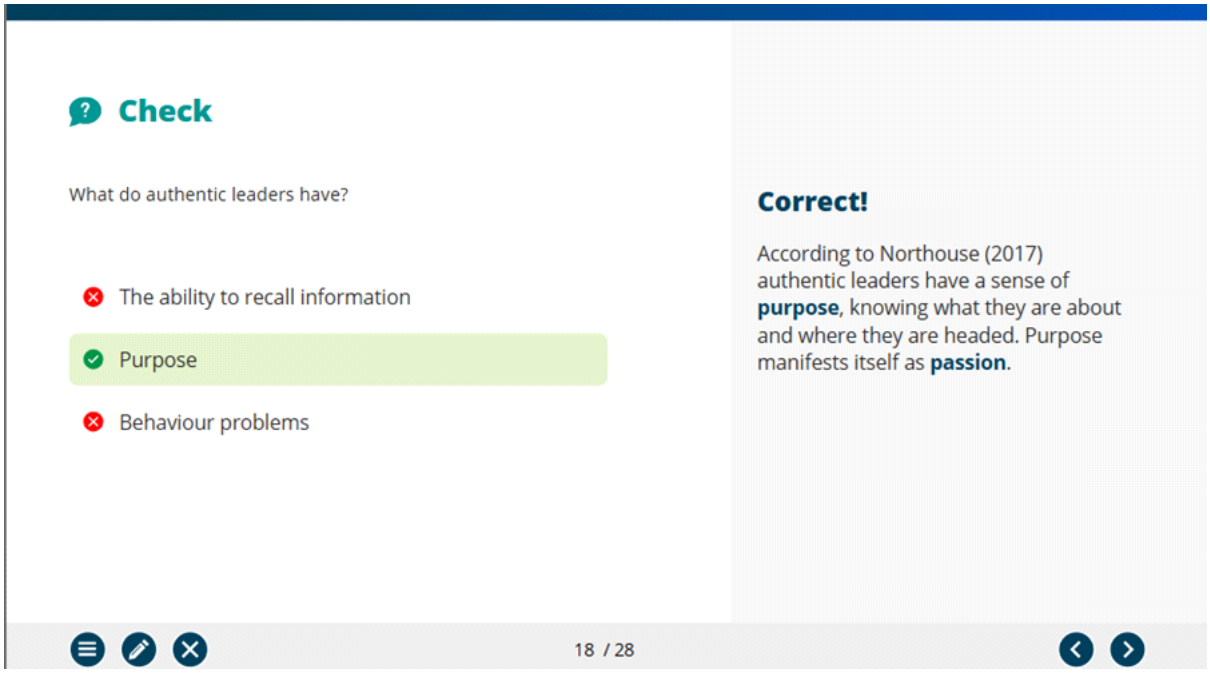
Lead with Compassion: understand team members' perspectives, offer support, and create an environment where people feel valued.



Check (1)



Check (2)



Section 3: Delivering a kick-ass presentation



Summary:

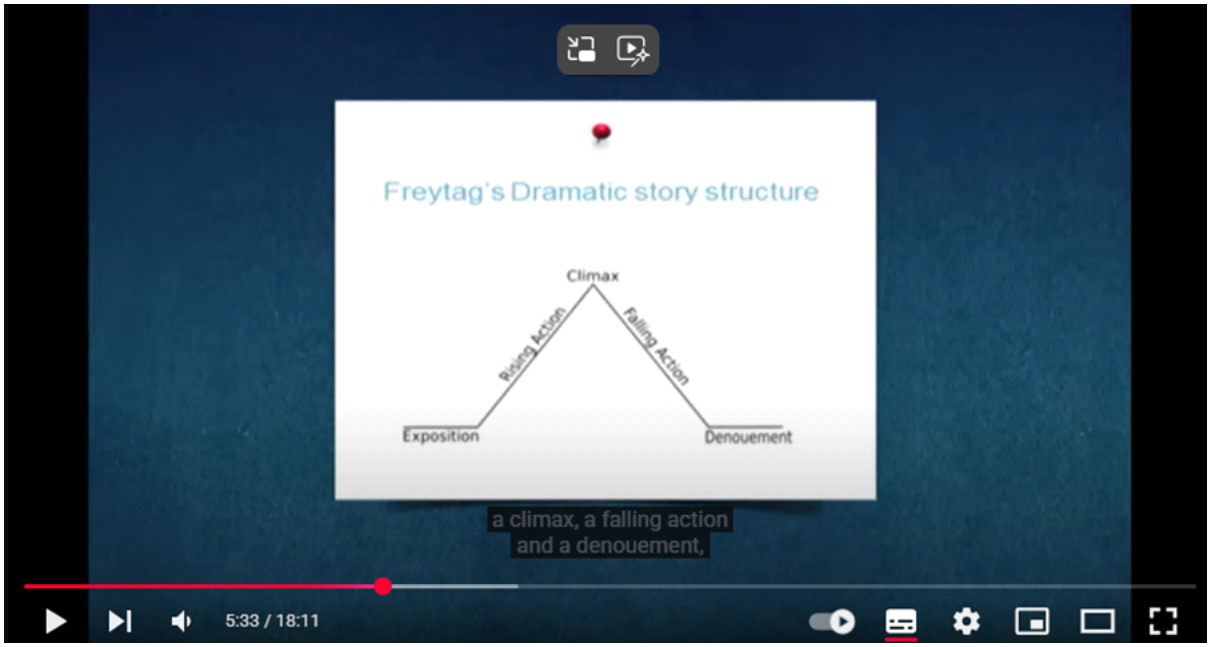
An idea can change the world but an idea itself is powerless.

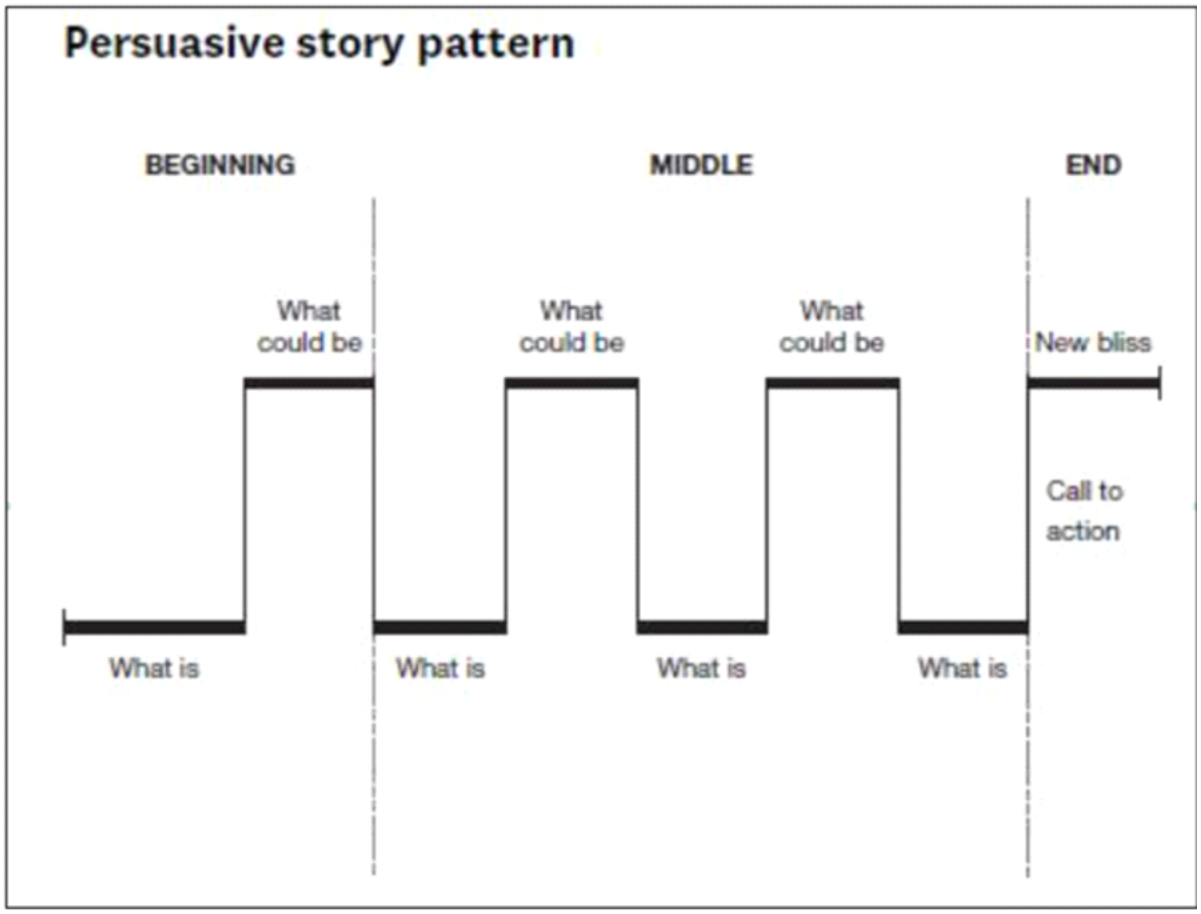
Communicating an idea in a way that resonates with people can influence how the idea is adopted.

Incorporating a story into a presentation makes it more digestible.

The hero is the audience member of the presentation.

The role of the presenter: lays out the “ordinary world” to the audience, sets a “call to adventure”, at first people do not accept the idea and require a mentor, then a meeting with the mentor in order to cross the “threshold” of an idea. The presenter is the mentor. The presenter helps the audience move from one idea into the idea your explaining.





Finish with a call to action to explain your idea in the form of a “new bliss”.

Start the presentation with an expectation of what the audience should react like i.e. Steve Jobs explaining how he’s excited for the product which makes the audience

excited.

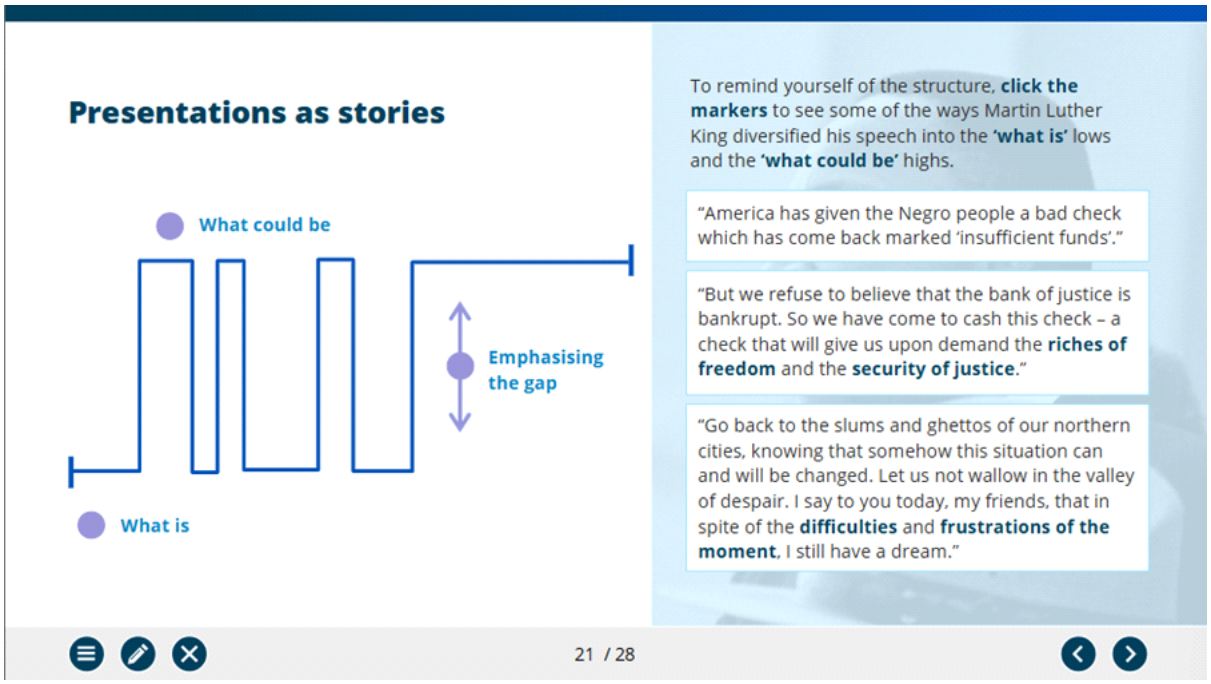
Add a part to the presentation that you intend to shock the audience and create a moment that they will remember forever.

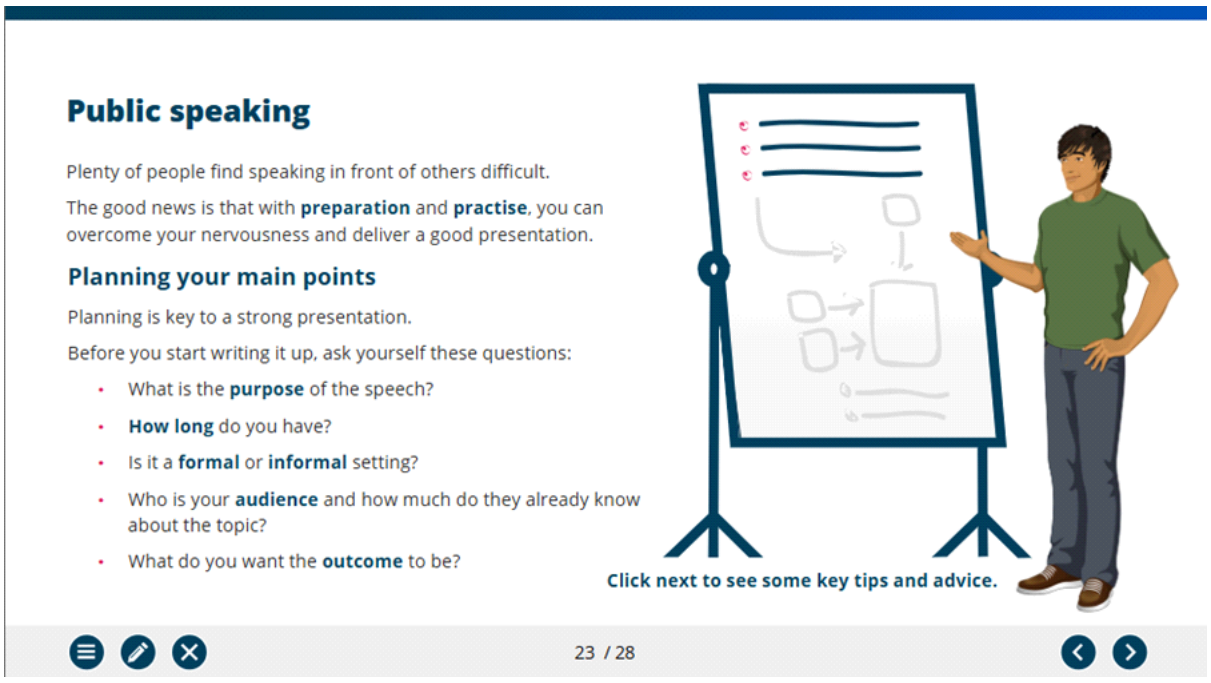
End with a call to action much like Steve Jobs to show the audience of the “bliss” of the new idea.

From Martin Luther King, finishing each “what is” and “what can be” section strong by summarising what is and what can be.

Reference to the typical flow from movies are made: likeable hero, encounters roadblocks, emerges transformed.

The future is what you create.





Public speaking

Plenty of people find speaking in front of others difficult.

The good news is that with **preparation** and **practise**, you can overcome your nervousness and deliver a good presentation.

Planning your main points

Choosing your main points

You can now define the main points of your presentation - **three is a good number.**

Then, identify information to support and clarify your points.

Making a **mind map** can help you organise ideas and see patterns.



Click next to see some key tips and advice.

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Public speaking

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Planning your main points

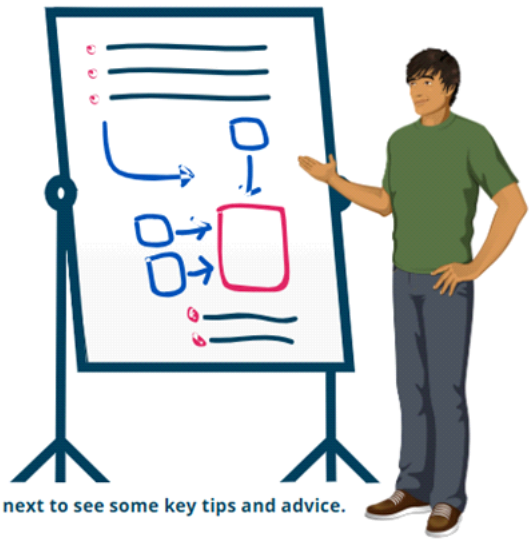
Choosing your main points

Opening and closing statements

Opening statements are like a headline: they need to grab the attention of your audience. Closing statements allow you to sum up, conclude and possibly give a provocation.

Make these **interesting** and **innovative**.

To help with an informal presentation, make sure you include quotes, jokes and something about yourself to help the audience establish a connection with you.



Click next to see some key tips and advice.

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Network



My experience: I had to present a Power App that I've been working on to the department I was working with. I was nervous, I used filler words but the application was presented and all features were discussed with stakeholders.

Comparison: comparing to the TEDx and Dragons Den pitch, their presentations had flow and each portion was well thought out. I'd like to incorporate the lack of filler words into my presentation.

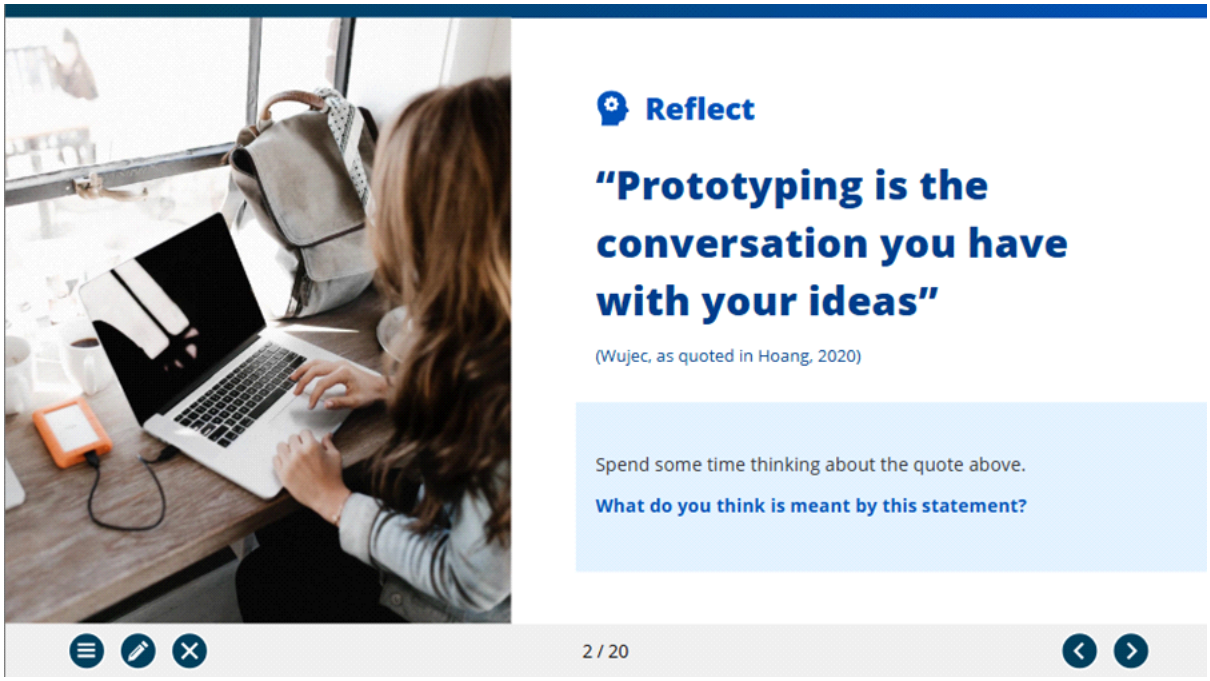
Example of a good presentation: 13 Years of Communication Skills Knowledge in 53 minutes



Unit 3 Topic 4 – Bringing your idea to life

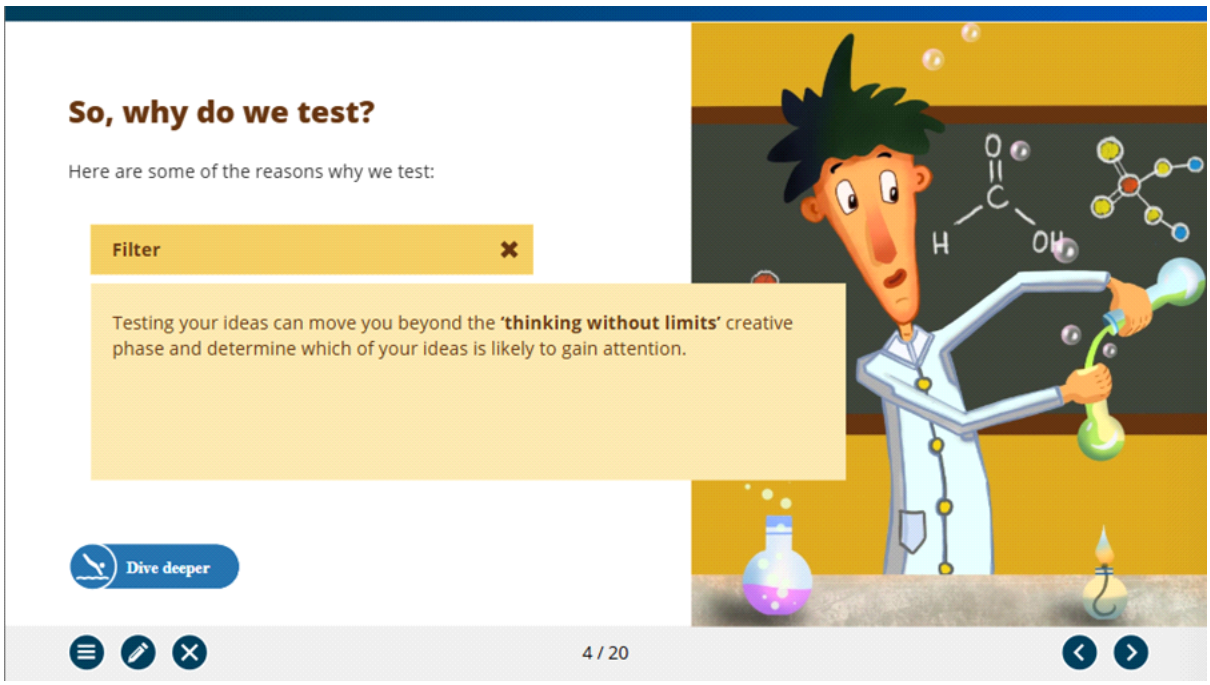
Section 1: Protype and test ideas

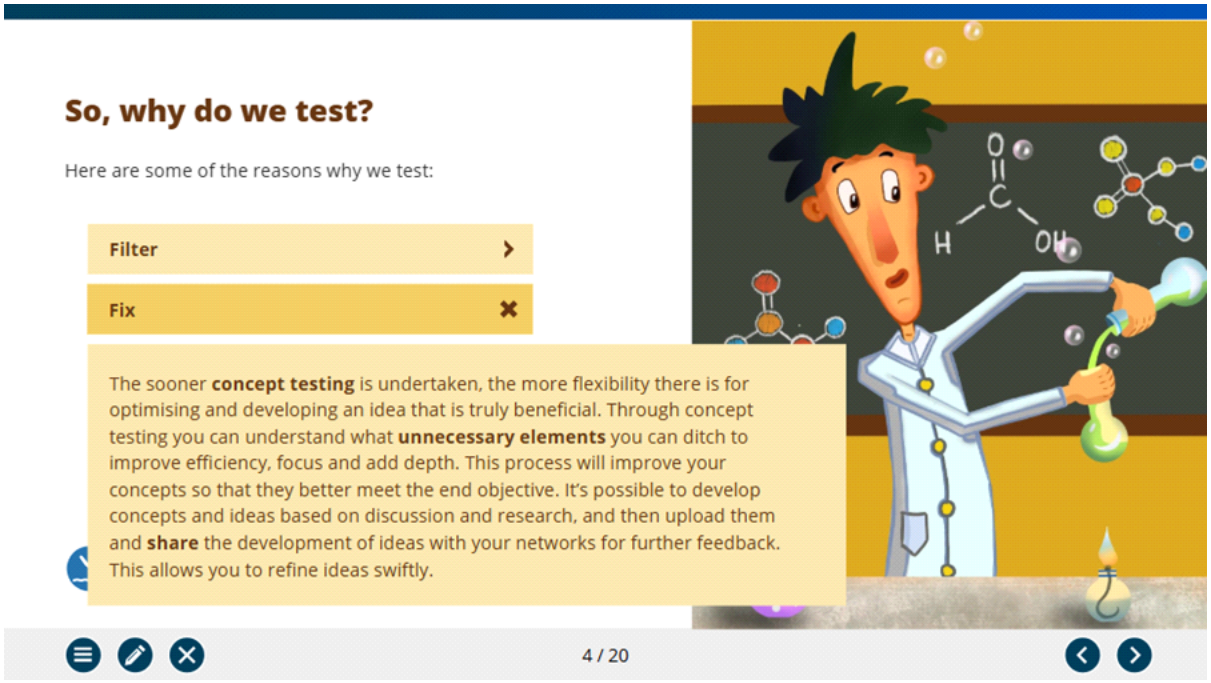
Introduction - Practice makes perfect

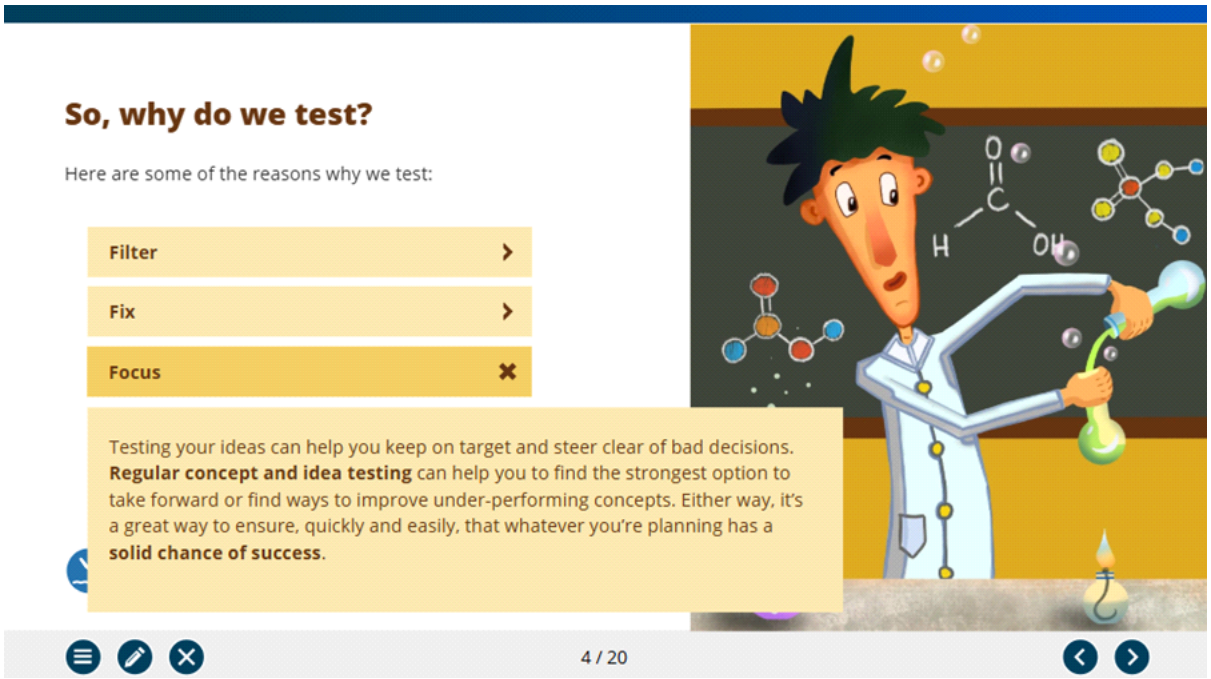


You test your ideas out by prototyping which stresses each aspect of your idea and allows key aspects of what works and what doesn't work to highlight themselves.

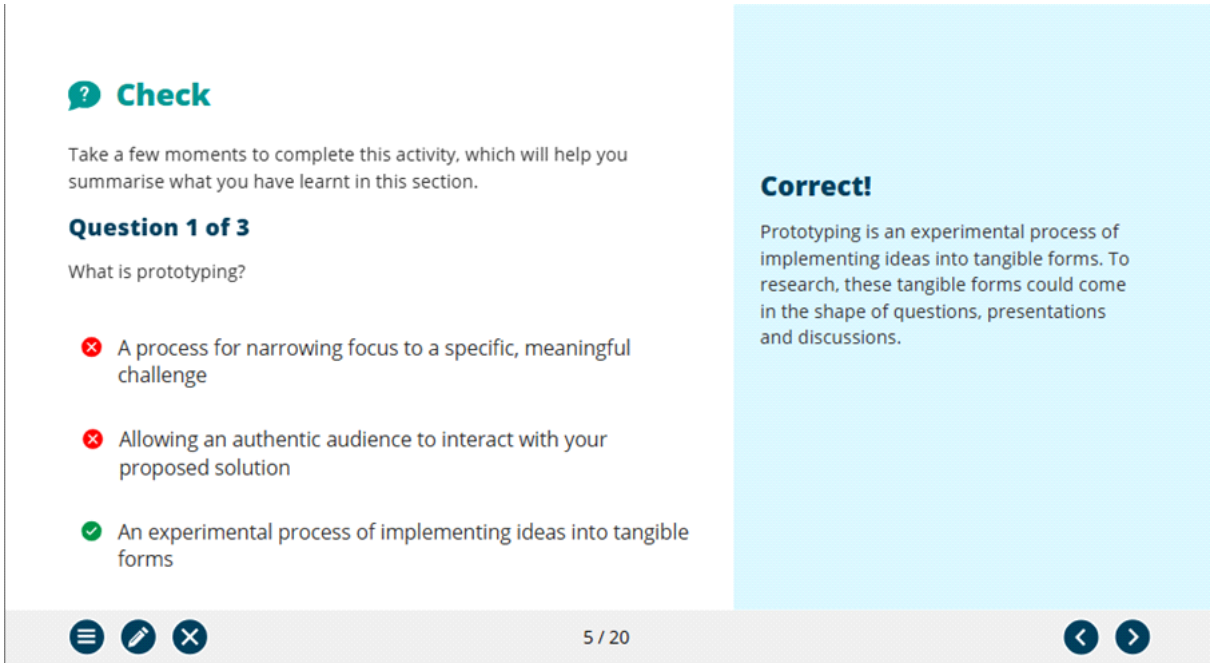
Why do we test?



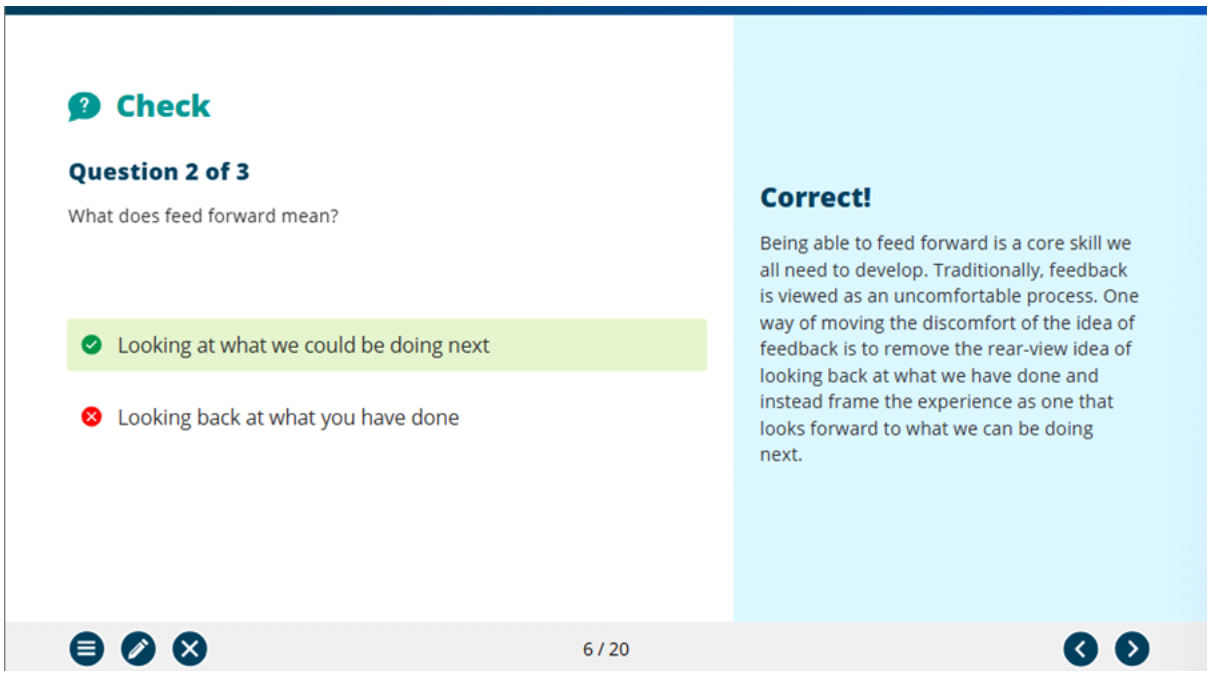

So, why do we test?
Here are some of the reasons why we test:
Filter
Fix
The sooner concept testing is undertaken, the more flexibility there is for optimising and developing an idea that is truly beneficial. Through concept testing you can understand what unnecessary elements you can ditch to improve efficiency, focus and add depth. This process will improve your concepts so that they better meet the end objective. It's possible to develop concepts and ideas based on discussion and research, and then upload them and share the development of ideas with your networks for further feedback. This allows you to refine ideas swiftly.
4 / 20


So, why do we test?
Here are some of the reasons why we test:
Filter
Fix
Focus
Testing your ideas can help you keep on target and steer clear of bad decisions. Regular concept and idea testing can help you to find the strongest option to take forward or find ways to improve under-performing concepts. Either way, it's a great way to ensure, quickly and easily, that whatever you're planning has a solid chance of success.
4 / 20

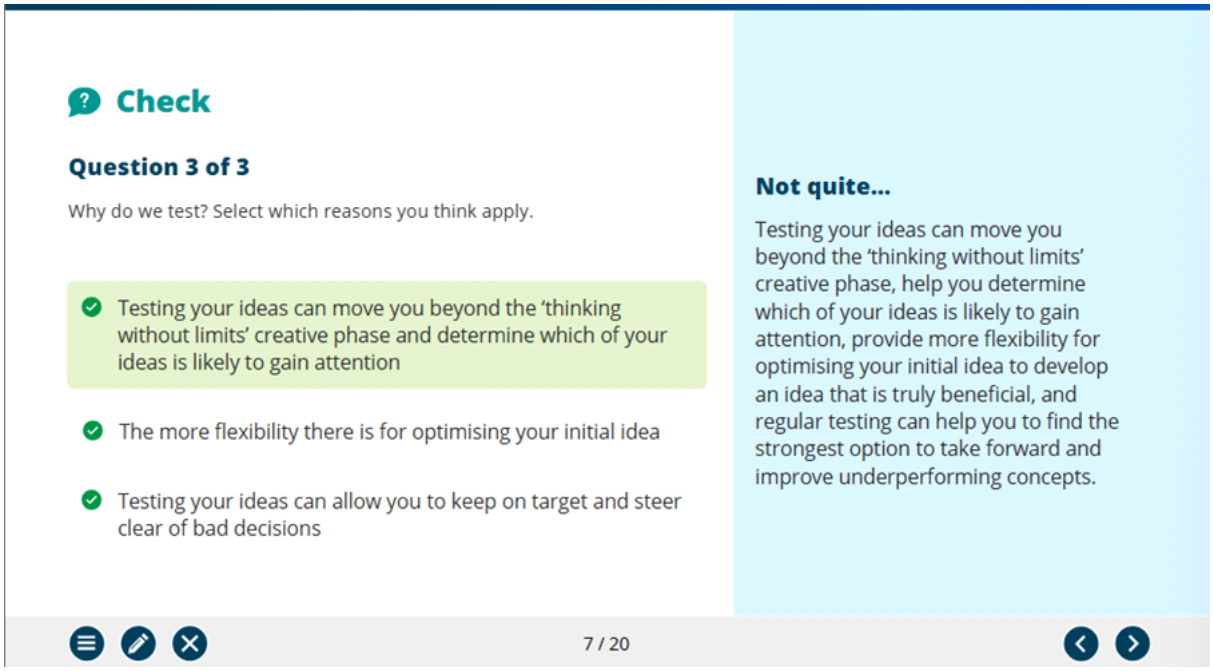
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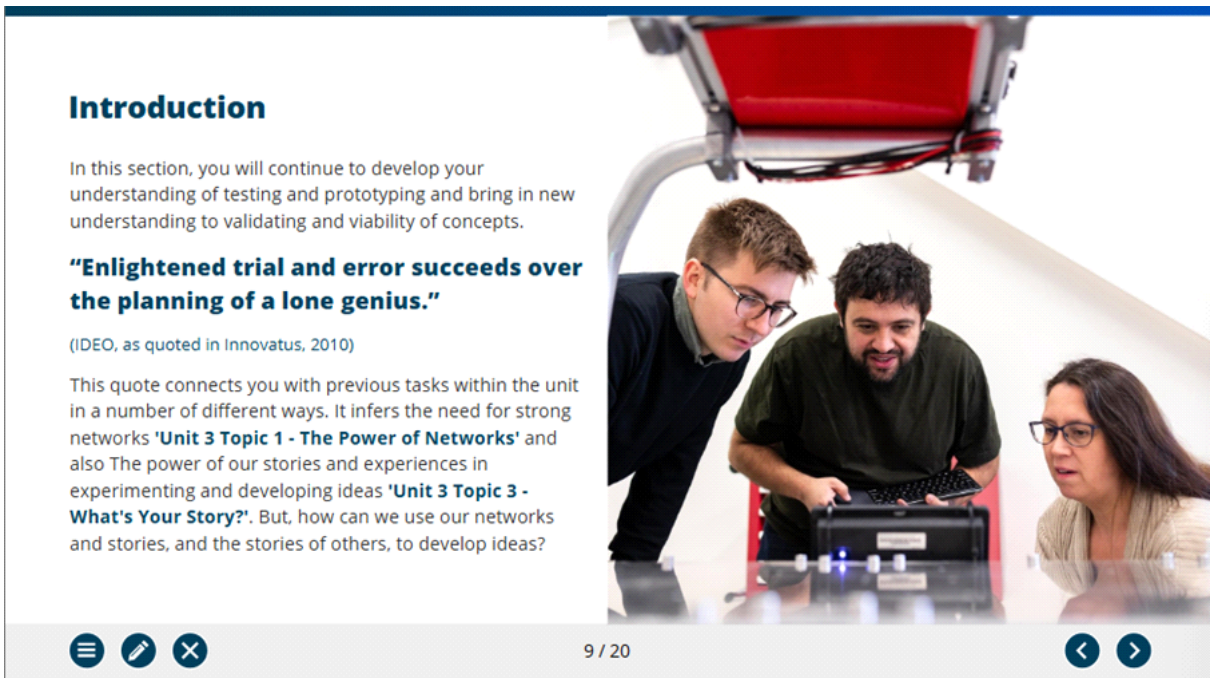
Check (2)



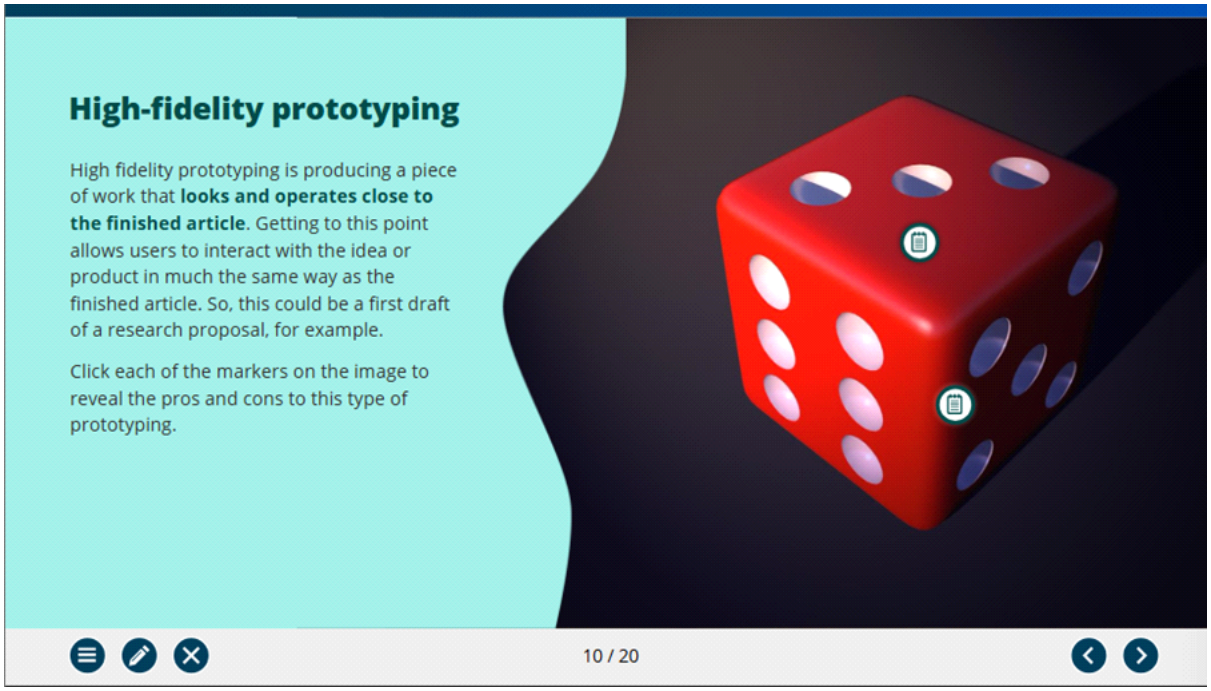
Check (3) redo



Section 2: Thinking agile



High fidelity prototyping



Low fidelity prototyping

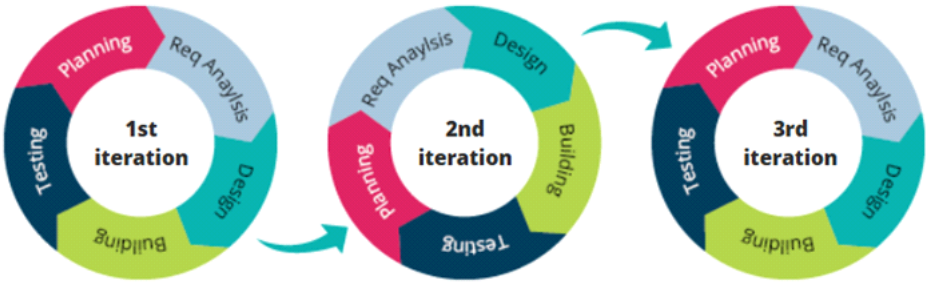


Agile Planning and MVP

Thinking agile about our ideas

Low-fidelity prototyping teaches us to think in new ways about our ideas and connects us with what is known about concepts in incremental steps, or **iterations**, to make **stepped changes with feedback loops**, where we can gain understanding from involved networks.

Thinking agile allows us to engage with all of those who have a connection and interest in our project throughout, adding meaning and **value** to the development and **validating** the proof of concept in a continuous cycle.



Minimum Viable Product

Select both of the markers to reveal what we mean by Minimum Viable Product.

MVP

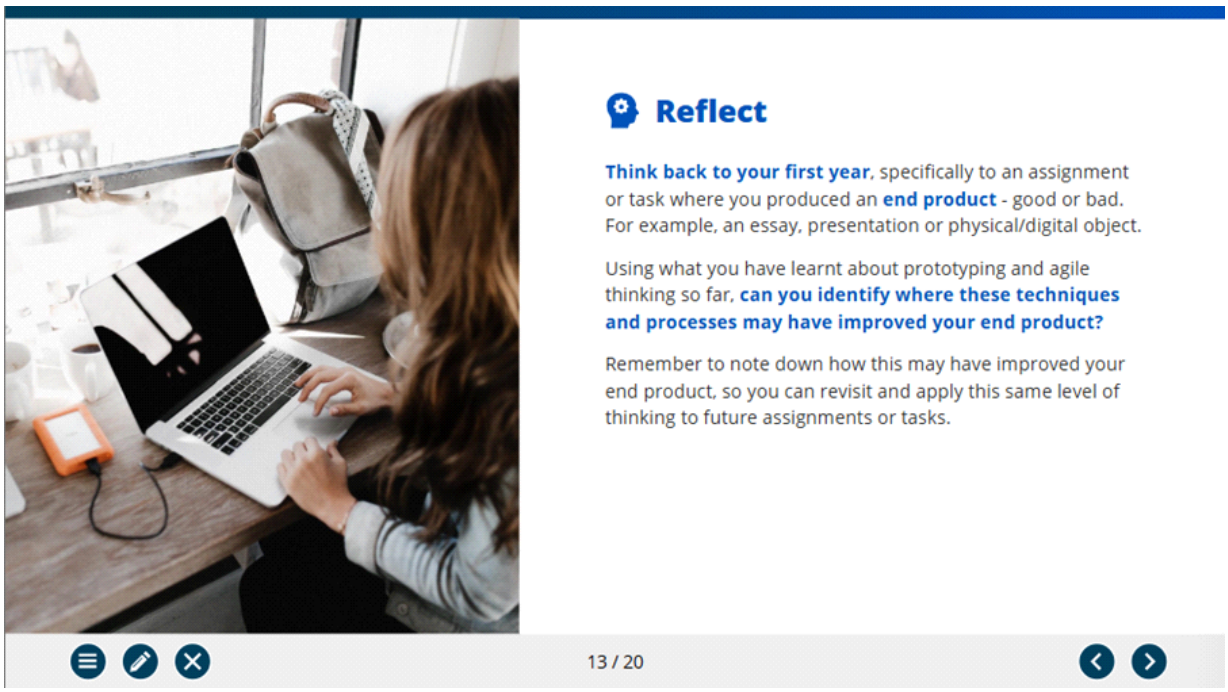
Minimum Viable Product (MVP) is defined as a version of a new product which allows a team to collect the maximum amount of validated learning about customers with the least effort, in order to make those incremental and viable amendments.



Dive deeper

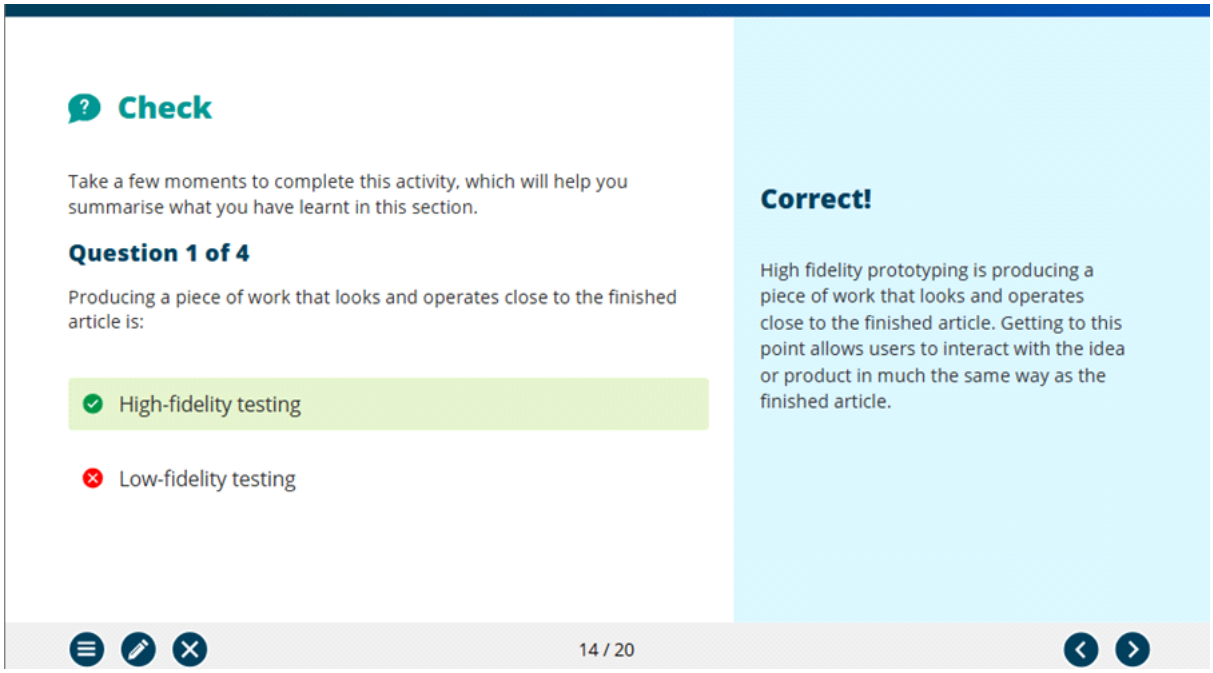


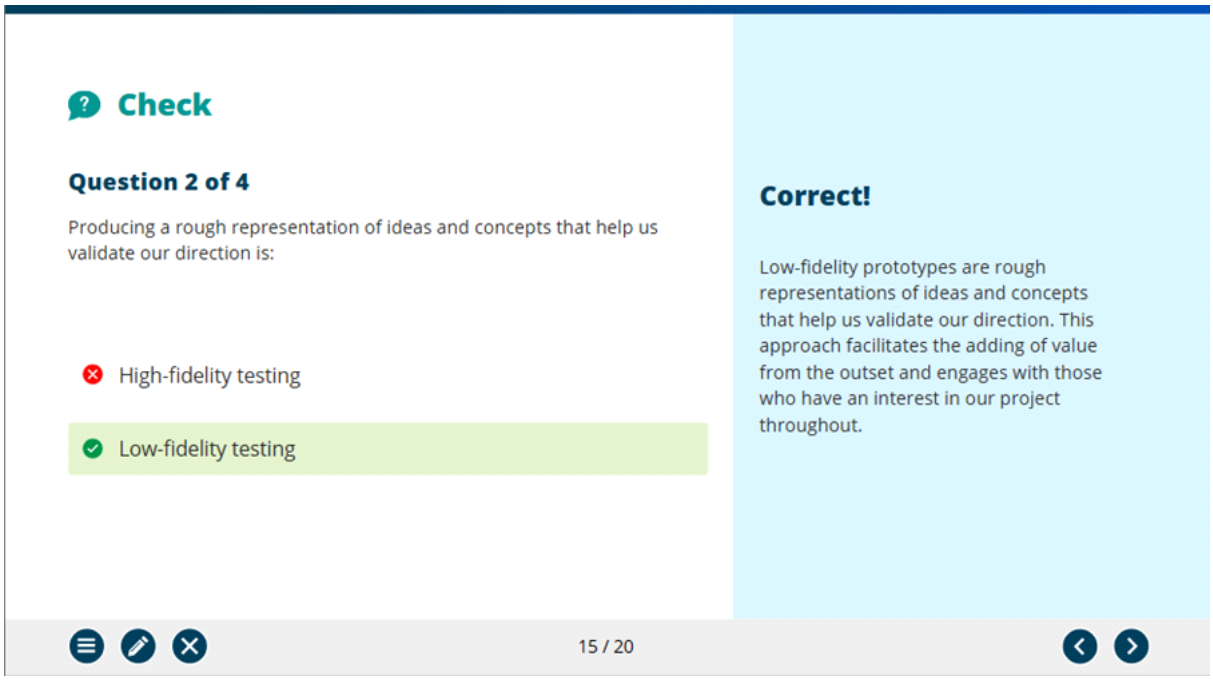
Reflect

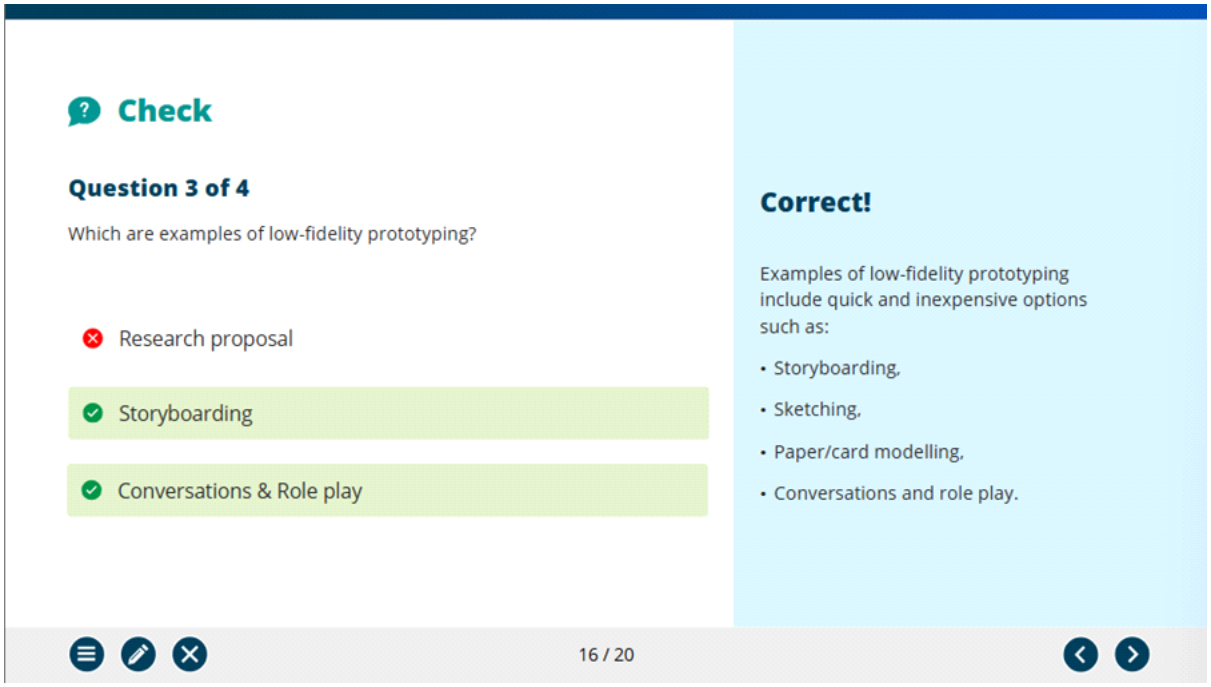


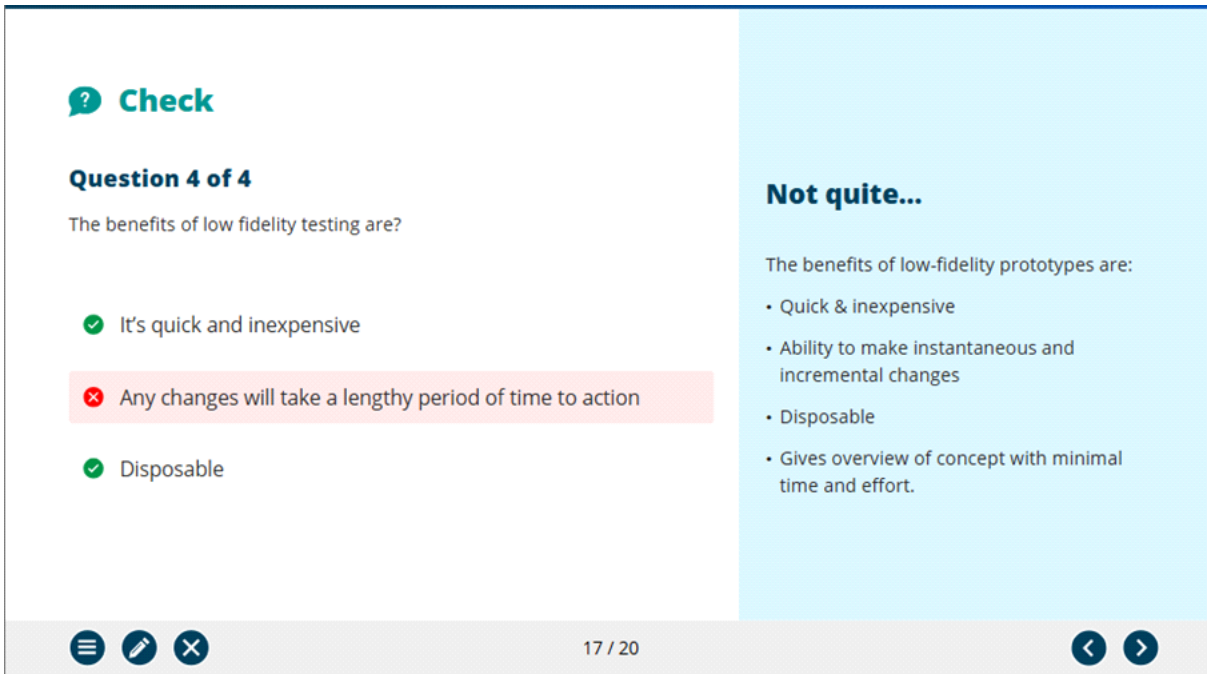
Assignment - creating a SQL shop for a fictional bike company. Agile and prototyping techniques could have improved this assignment by starting small with a working product (minimum viable product) and iterating with more features after this point. Feedback from peers would've been used to improve the project and to benefit the functionality of the outcome.

Check (1)

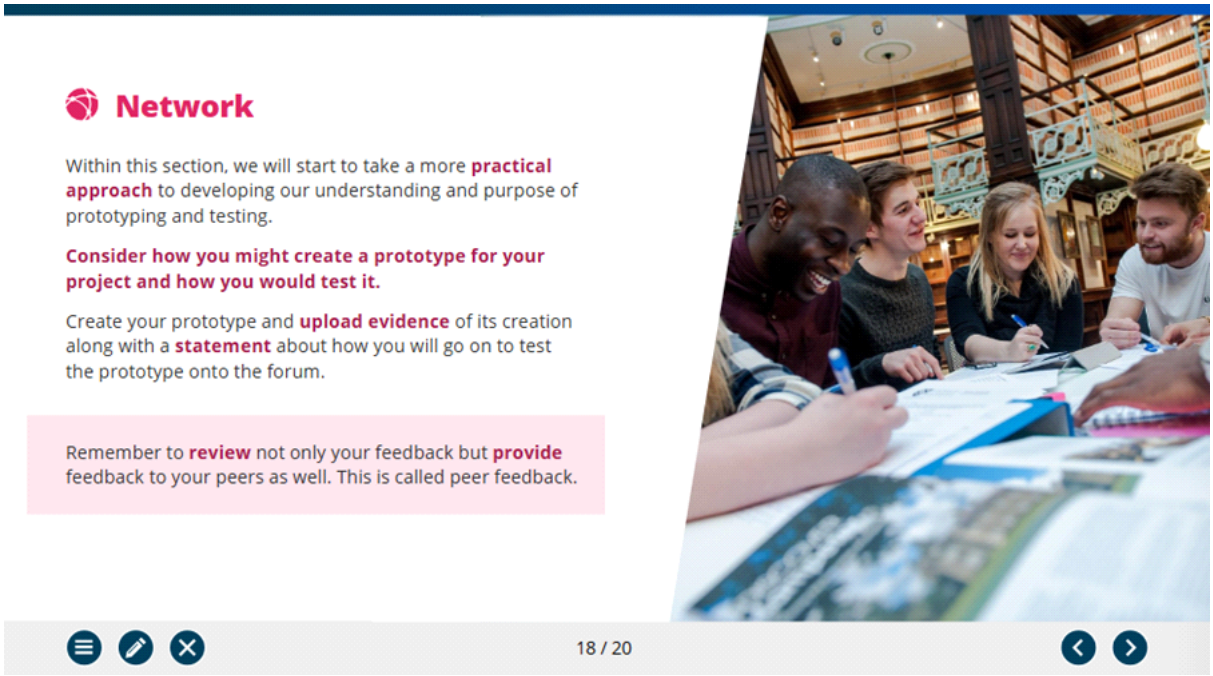

Check
Take a few moments to complete this activity, which will help you summarise what you have learnt in this section.
Question 1 of 4
Producing a piece of work that looks and operates close to the finished article is:
High-fidelity testing
Low-fidelity testing
Correct!
High fidelity prototyping is producing a piece of work that looks and operates close to the finished article. Getting to this point allows users to interact with the idea or product in much the same way as the finished article.
14 / 20


Check
Question 2 of 4
Producing a rough representation of ideas and concepts that help us validate our direction is:
High-fidelity testing
Low-fidelity testing
Correct!
Low-fidelity prototypes are rough representations of ideas and concepts that help us validate our direction. This approach facilitates the adding of value from the outset and engages with those who have an interest in our project throughout.
15 / 20


Check
Question 3 of 4
Which are examples of low-fidelity prototyping?
Research proposal
Storyboarding
Conversations & Role play
Correct!
Examples of low-fidelity prototyping include quick and inexpensive options such as:
• Storyboarding,
• Sketching,
• Paper/card modelling,
• Conversations and role play.
16 / 20


Check
Question 4 of 4
The benefits of low fidelity testing are?
It's quick and inexpensive
Any changes will take a lengthy period of time to action
Disposable
Not quite...
The benefits of low-fidelity prototypes are:
• Quick & inexpensive
• Ability to make instantaneous and incremental changes
• Disposable
• Gives overview of concept with minimal time and effort.
17 / 20

Network



I will not be creating a prototype of my application as it is an extensive software project. However, I will discuss the steps I would take in order to do so.

Initially I would use wireframe designs to structure the user interface and I would use entity relationship diagrams to highlight the design for the database structure. I would focus on a design that is reductive and includes only the main functions of the application to ensure an agile method can be used to iterate and improve at a later stage.

Next, I would action and create small coding files to mimic the above step using pseudocode and actual code.

I will test this prototype and its efficacy by releasing it to my peers for a chance to receive their feedback. Once their feedback has been received, I will improve the original design and later implement the features suggested.

Appendix 2 - Unit 4

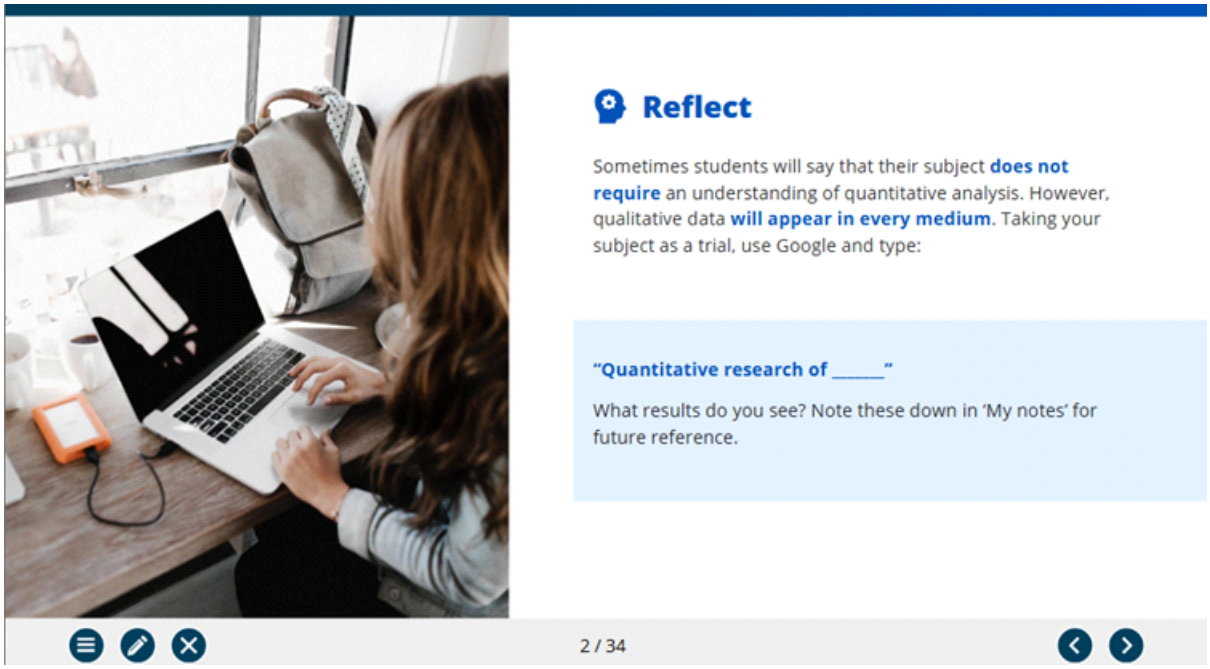
30 October 2025 13:08

All following appendix has content from Change Makers Unit 1 to Unit 4 [33]

Unit 4 Topic 1

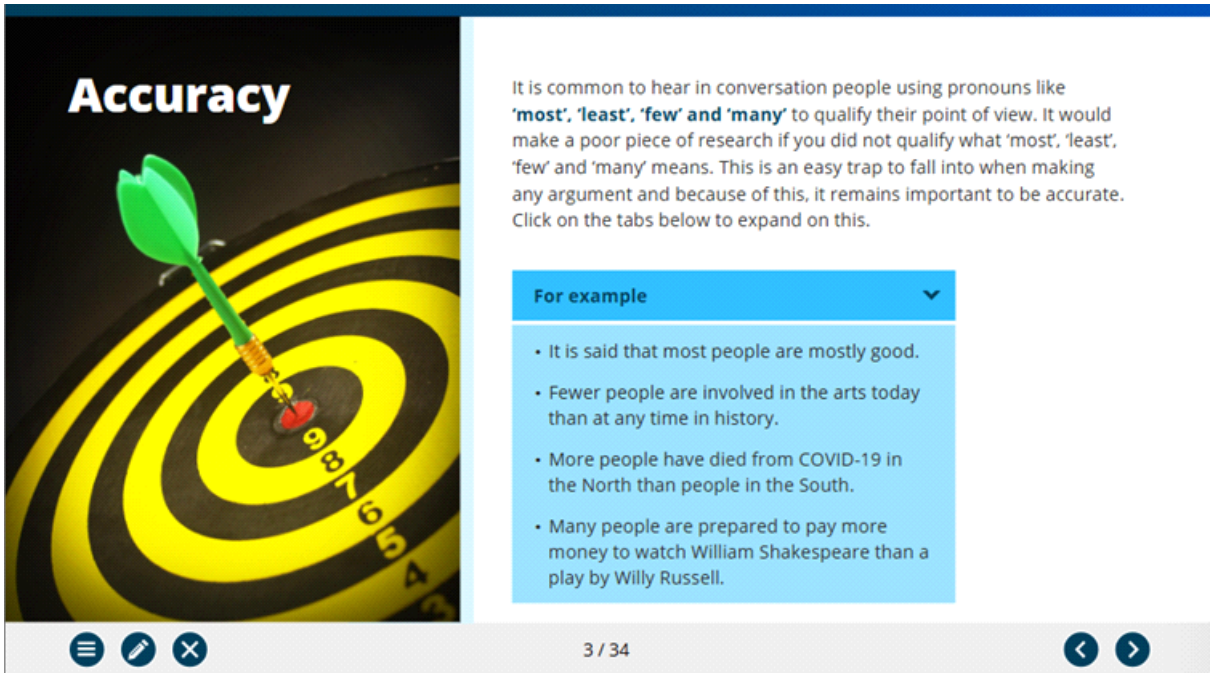
Section 1: The different sort of quantitative analysis

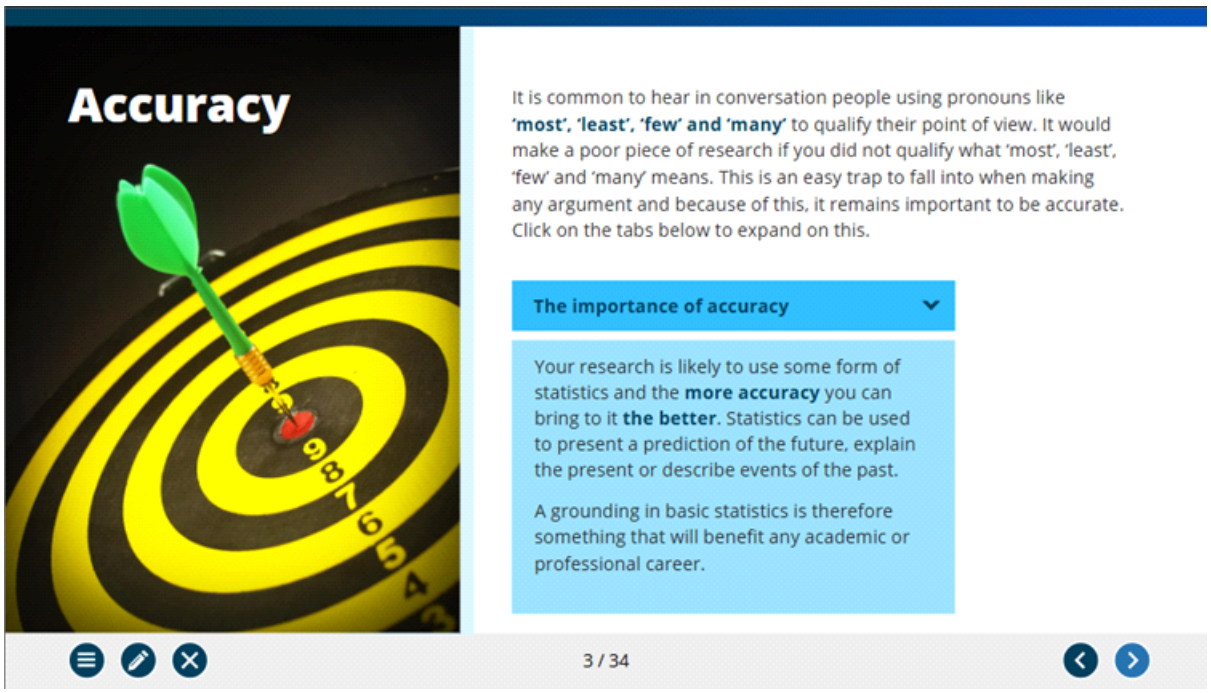
Quantitative Analysis





Software development inherits numeric values throughout it uses and technologies. It's inherit that the research of software development will provide quantitative research, as shown in the above screenshot.



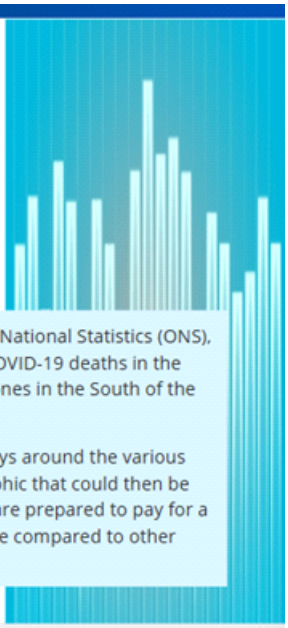


Descriptive statistical analysis

Descriptive statistical analysis

With a descriptive statistical analysis, we make steps to turn **data** into a **source of information** that can help describe the phenomena that you are investigating in your research. The information you use in your descriptions can be numbers, charts, tables and graphs. For example:

- If you surveyed 100 random people and found that only 5% had a criminal record, you could conclude that 'most' people are good.
- If you looked at a random collection of census reports from several different occasions, and counted how many were involved in the Arts,the resulting table could be compared job roles with the ones from the latest census.
- Collecting data from the Office of National Statistics (ONS), you could count the number of COVID-19 deaths in the North and compare them to the ones in the South of the country.
- A review of the price tickets of plays around the various theatres could be drawn as a graphic that could then be used to argue how much people are prepared to pay for a Shakespearean theatre experience compared to other forms of entertainment.



Conclusion

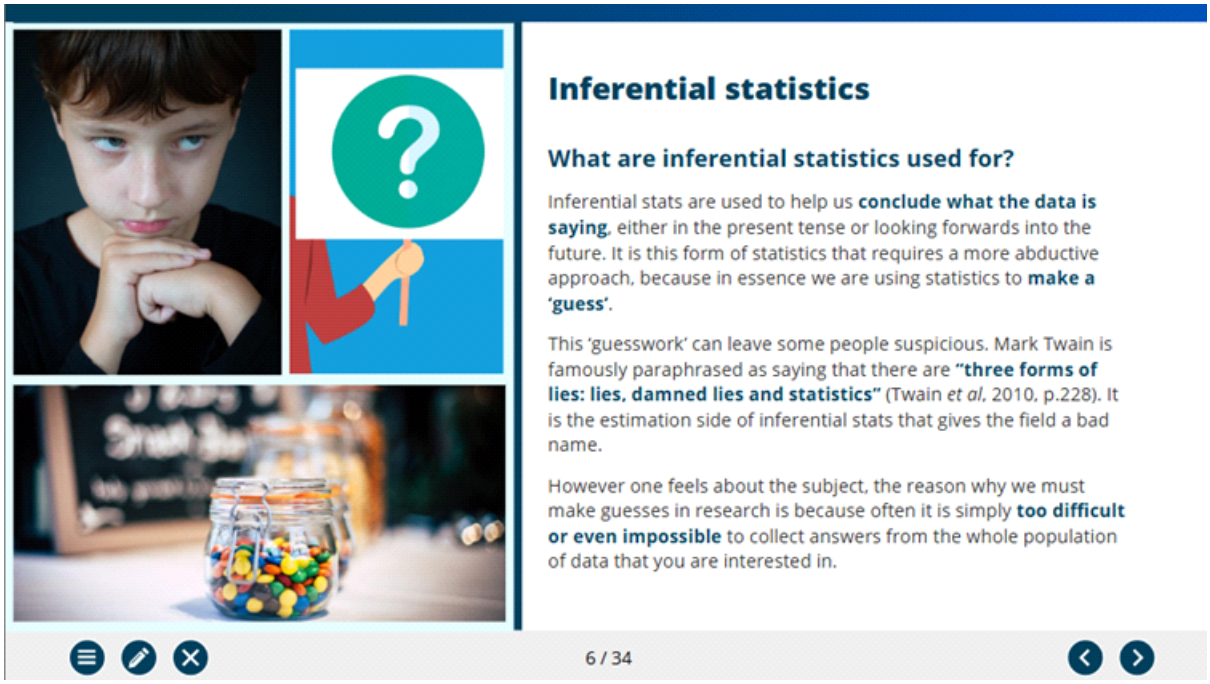
To conclude, descriptive stats are a great way to take a **snapshot of a data set** and **produce a summary** that can be consumed more easily than a heap of data. They give a piece of research a sense of gravitas that is not present when you simply state vague sentences.

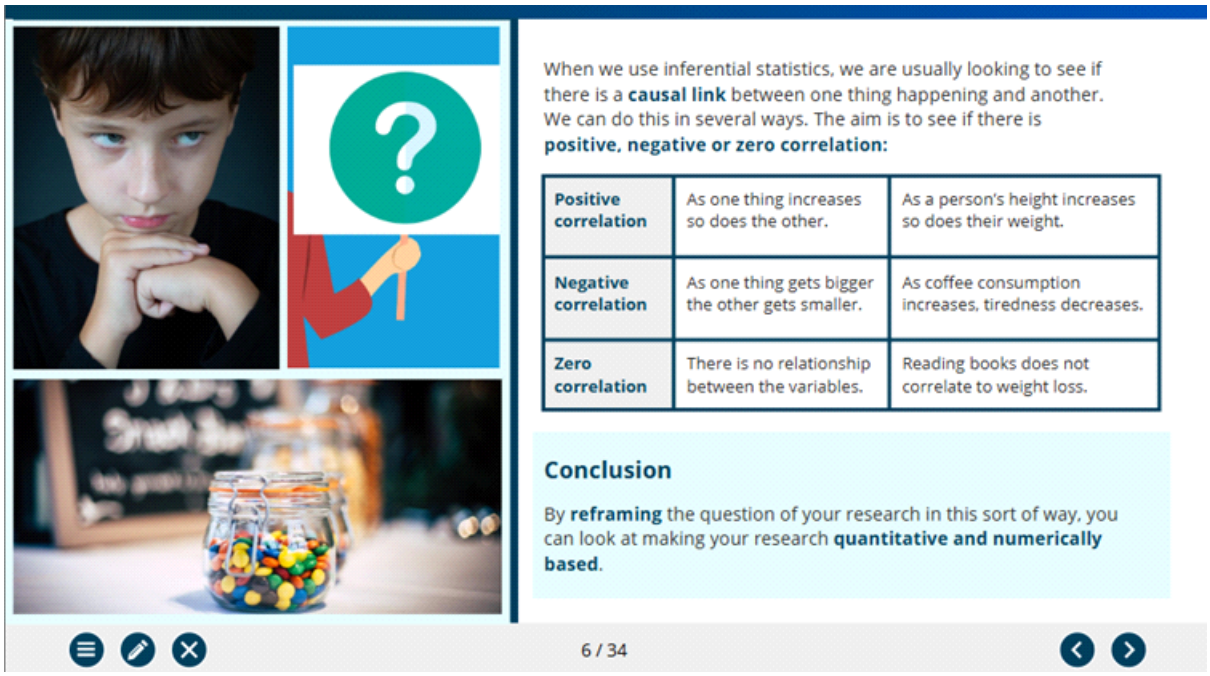
Basic mathematical analysis

A great way to describe data using mathematics that you collect is to create an **average**. An average is the middle point of a collection of numbers.

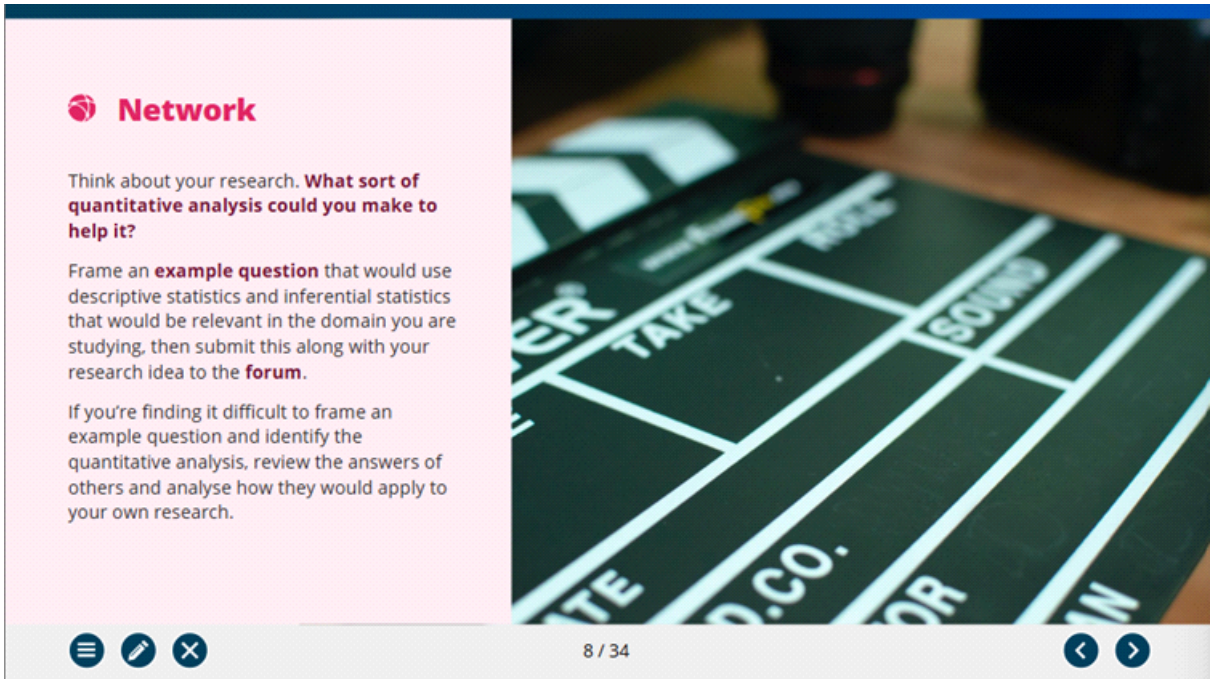
Another approach to descriptive stats is to count the number of times an event occurs or a particular answer is given. In maths, this is called the **frequency**.




Inferential statistics
What are inferential statistics used for?
Inferential stats are used to help us conclude what the data is saying, either in the present tense or looking forwards into the future. It is this form of statistics that requires a more abductive approach, because in essence we are using statistics to make a 'guess'.
This 'guesswork' can leave some people suspicious. Mark Twain is famously paraphrased as saying that there are "three forms of lies: lies, damned lies and statistics" (Twain et al, 2010, p.228). It is the estimation side of inferential stats that gives the field a bad name.
However one feels about the subject, the reason why we must make guesses in research is because often it is simply too difficult or even impossible to collect answers from the whole population of data that you are interested in.
6 / 34


When we use inferential statistics, we are usually looking to see if there is a causal link between one thing happening and another. We can do this in several ways. The aim is to see if there is positive, negative or zero correlation:
Positive correlation
As one thing increases so does the other.
As a person's height increases so does their weight.
Negative correlation
As one thing gets bigger the other gets smaller.
As coffee consumption increases, tiredness decreases.
Zero correlation
There is no relationship between the variables.
Reading books does not correlate to weight loss.
Conclusion
By reframing the question of your research in this sort of way, you can look at making your research quantitative and numerically based.
6 / 34

Network



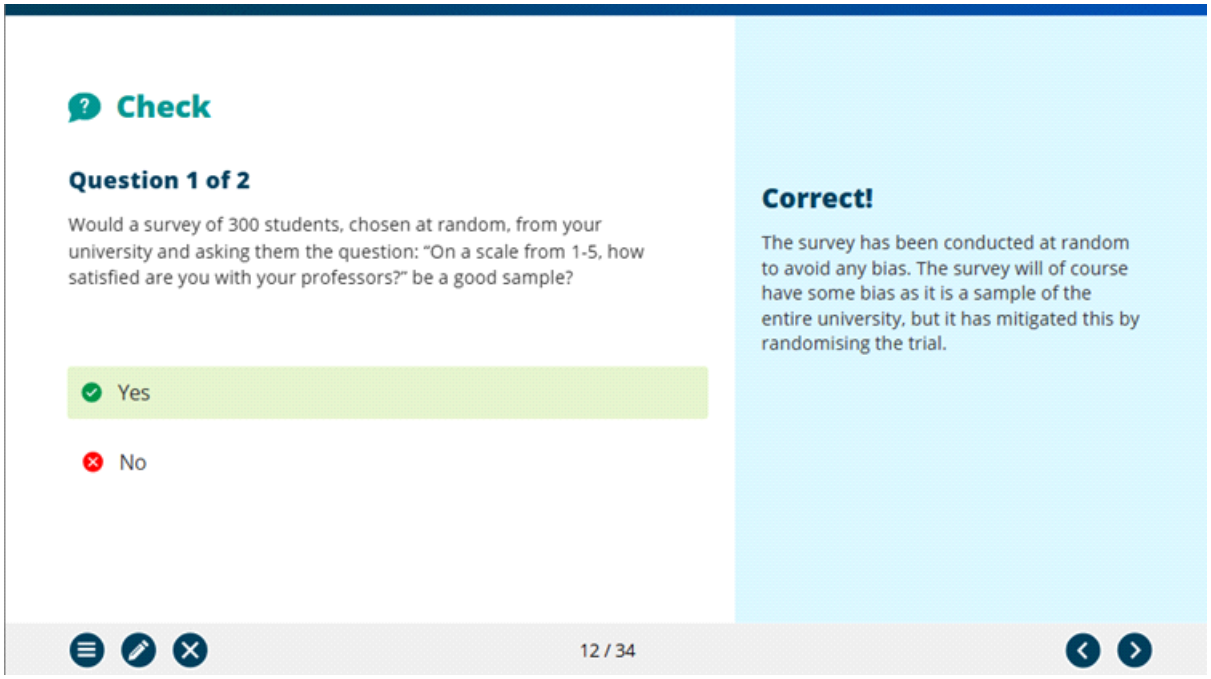
Comparing against non-users of the fitness application, does daily use of the fitness application significantly increase users' average weekly physical activity levels.

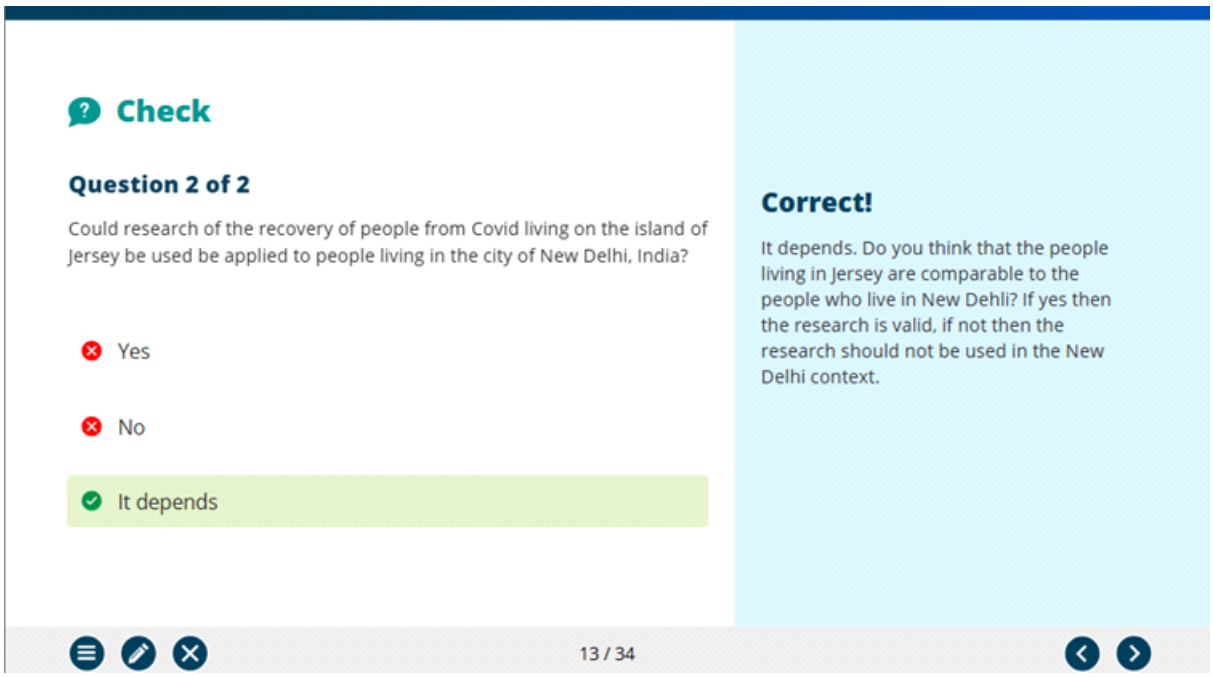
Descriptive statistics: mean, median and standard deviation of minutes of activity.

Inferential statistics: I will infer the general population statistics from the general user population



Check

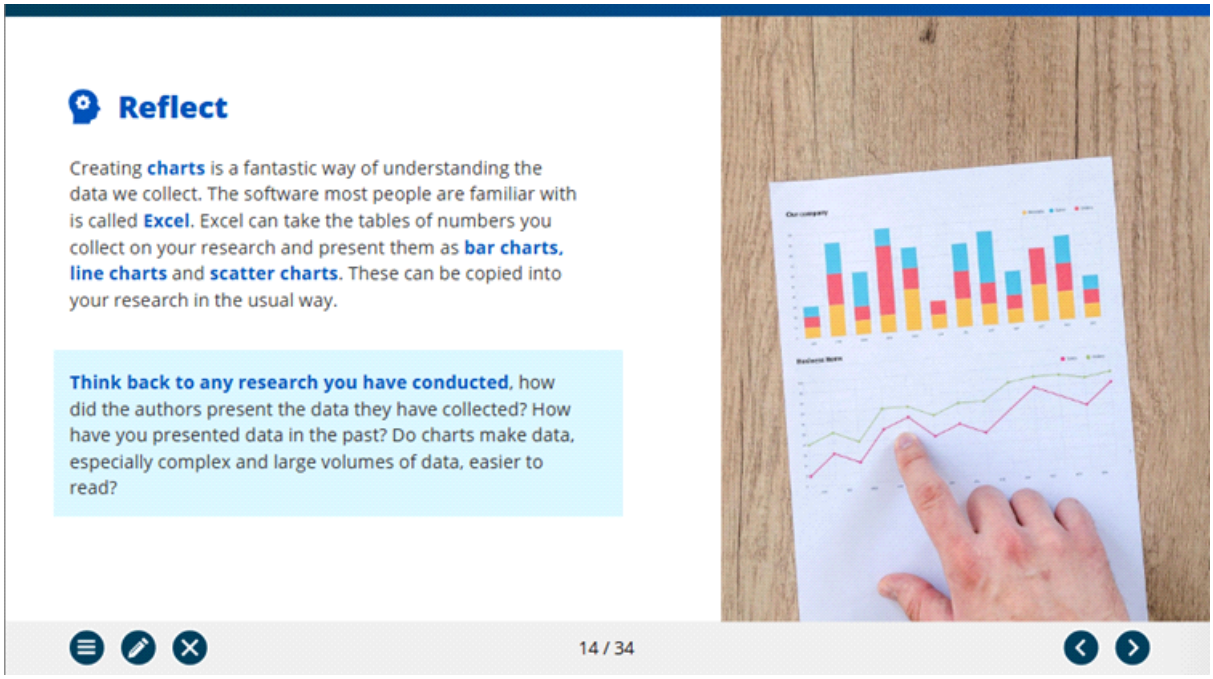




Section 2: Undertake a basic analysis

Graphs are a great way to detail data. Excel and its many functions are a great way to demonstrate this.

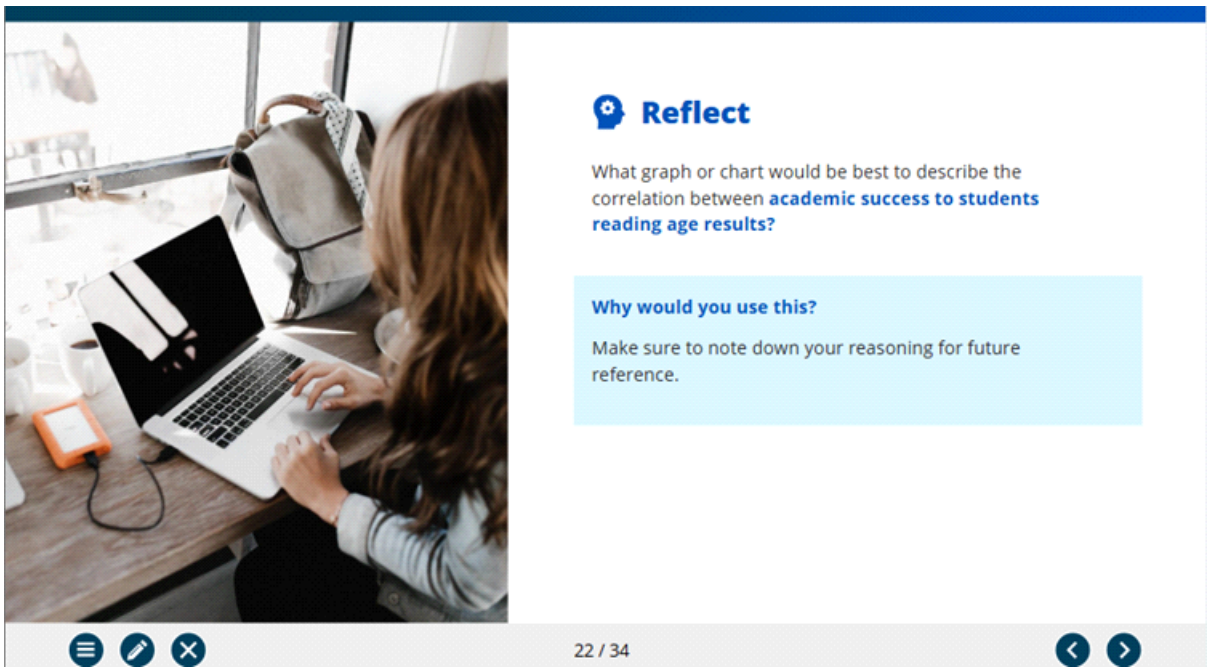
Reflect



The authors presented the data in tables, charts and metrics.

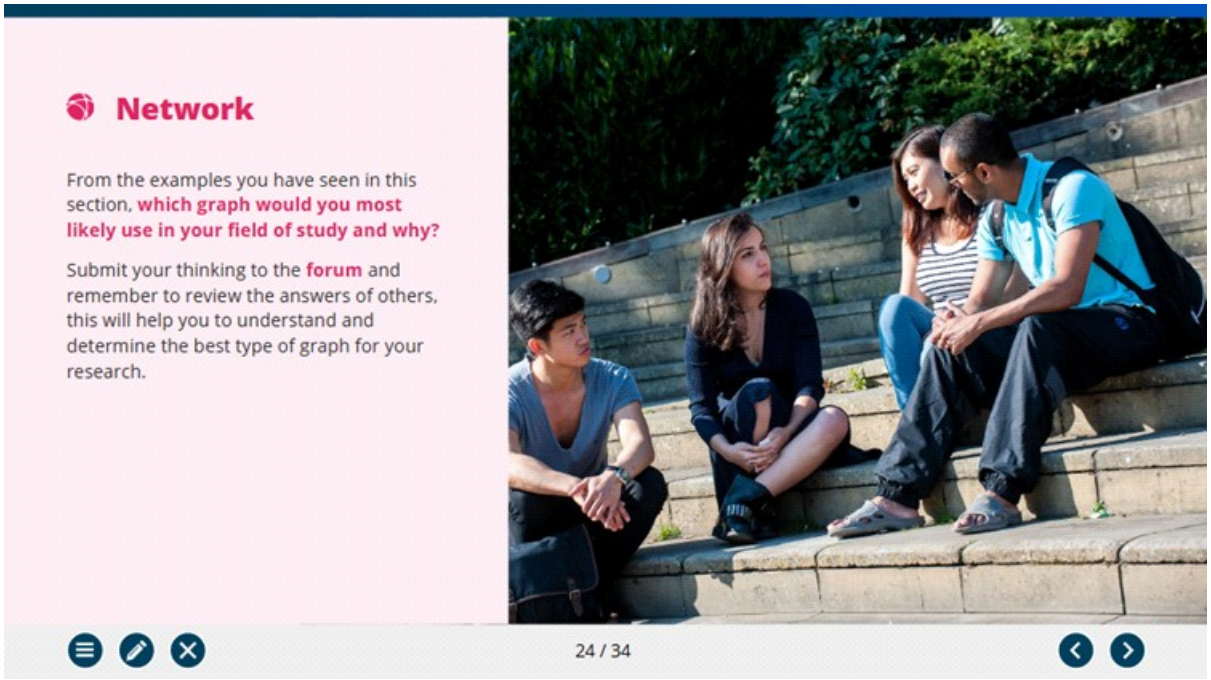
I have presented data in tables.

Charts make data more concise without losing value of the detail.



A scatter plot graph with a trend line - shows the relationship visually

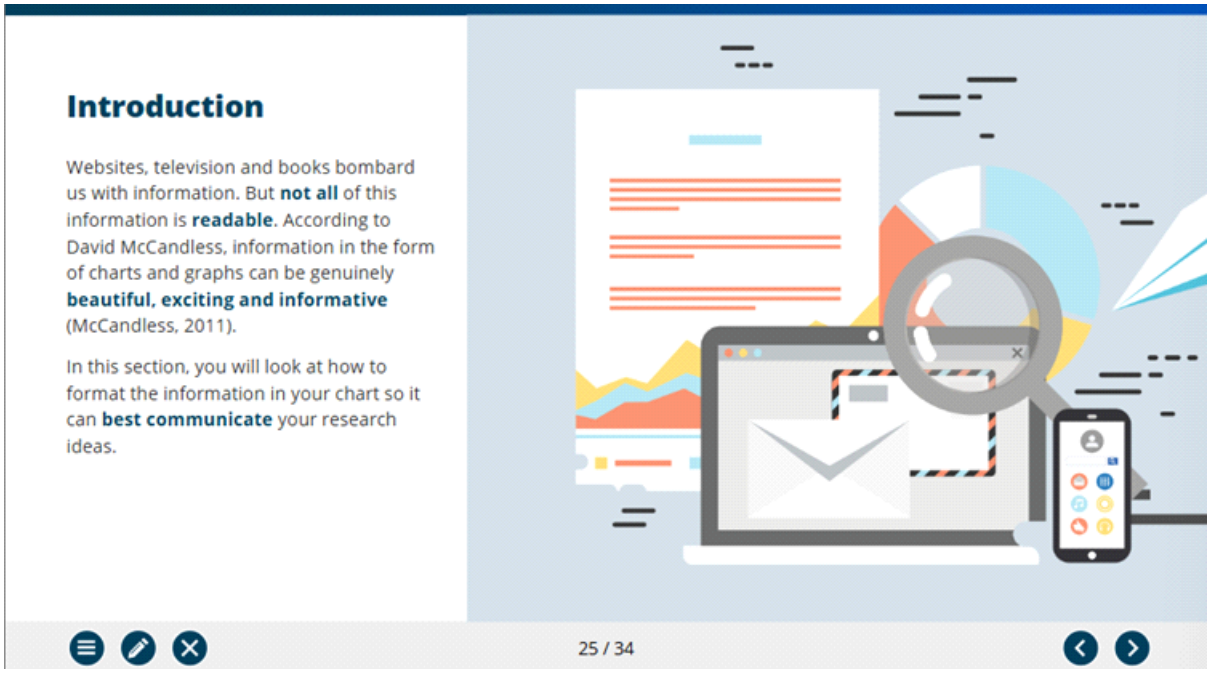
Network



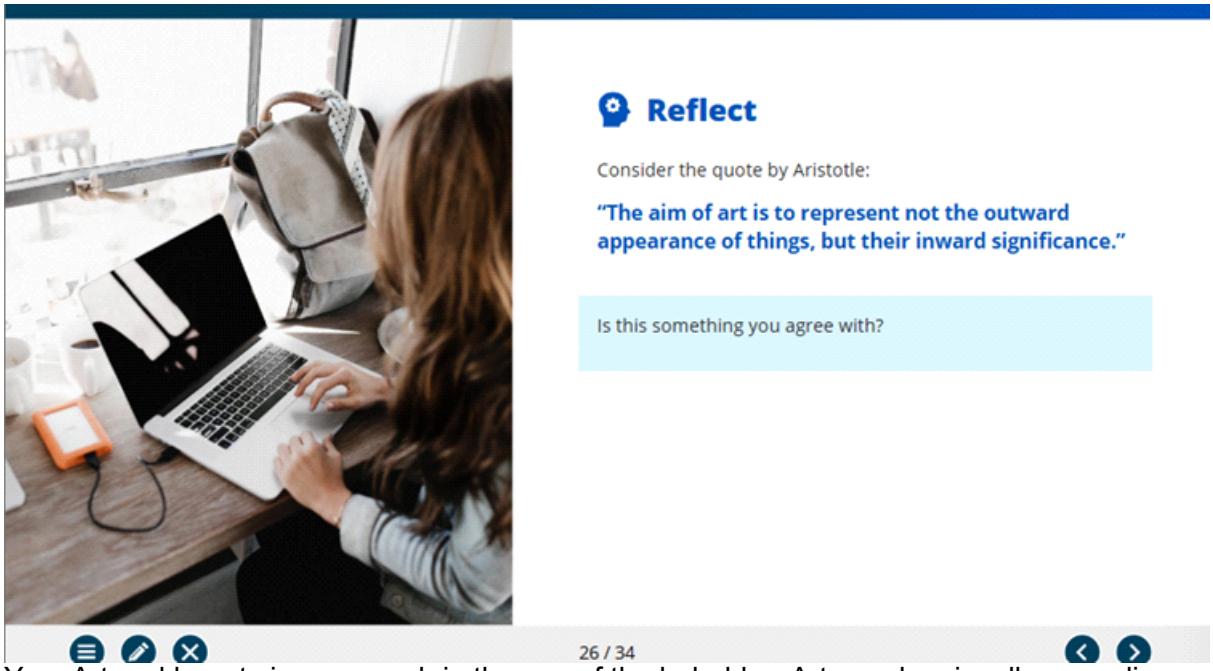
Scatter, line, bar and pie chart. These are easy to interpret, clear and can visualise trends simply.

Section 3: Using Excel to create a chart

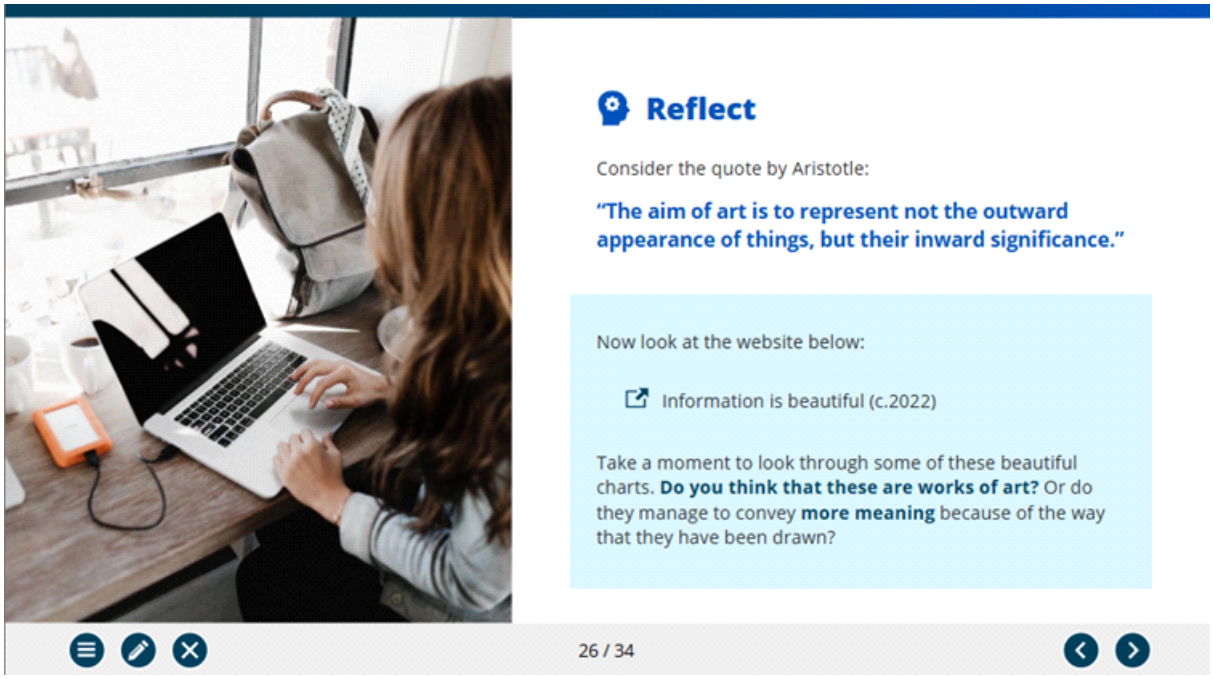
Introduction



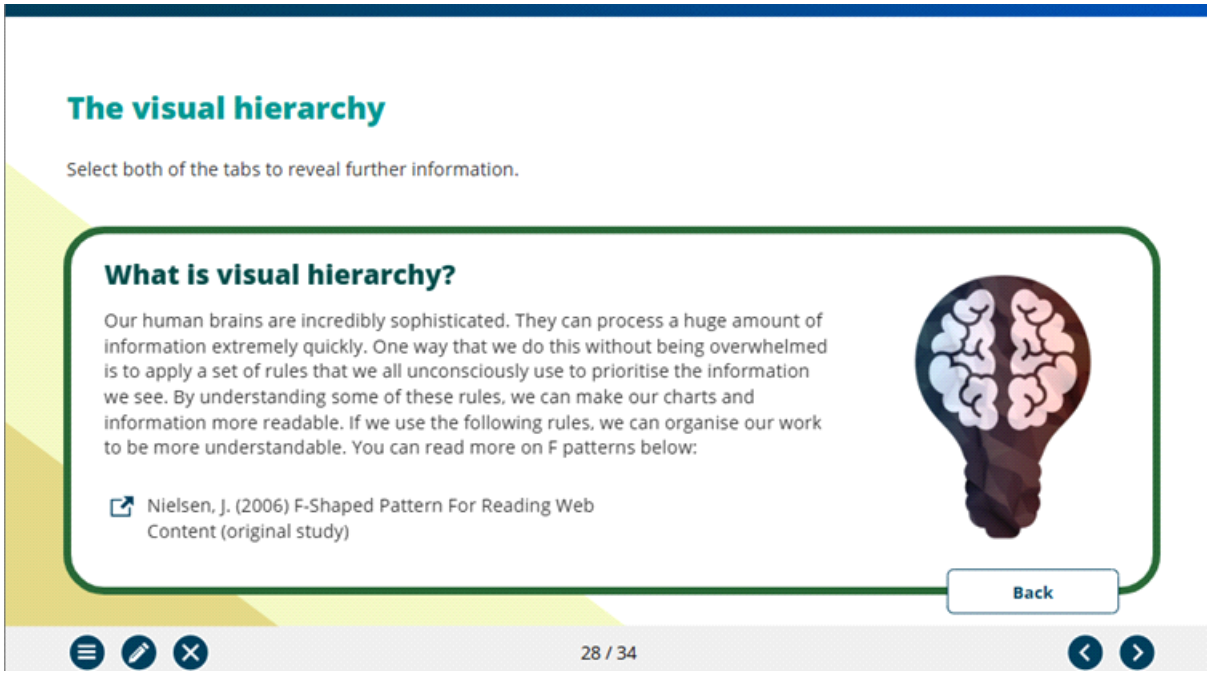
Reflect



Yes. Art and beauty is very much in the eye of the beholder. Art may be visually appealing but it is the feelings, emotions and thoughts we pair with the art that gives it significance.

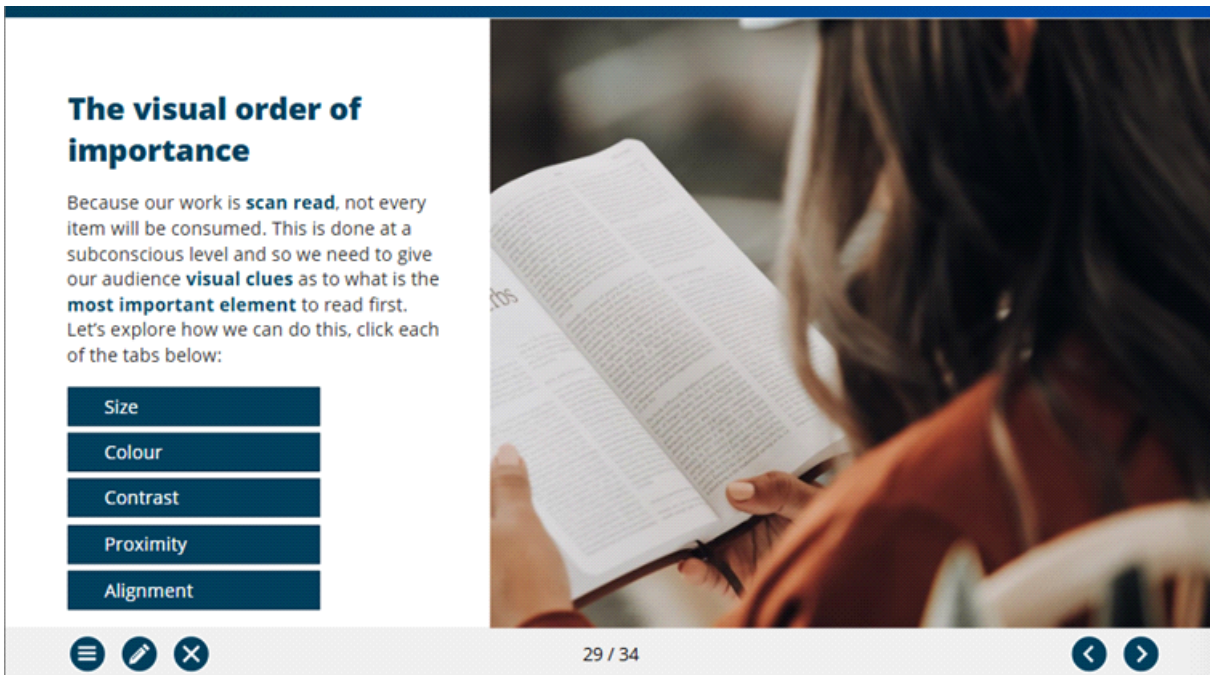


These charts are a work of art. It takes care, passion and insight to understand what your viewers will interpret and what you want them to interpret from your graphs. This is the same with art. They do convey more meaning, but this is also art.



[F-Shaped Pattern For Reading Web Content (original eyetracking research) - NN/G]

Notes: consider the reader

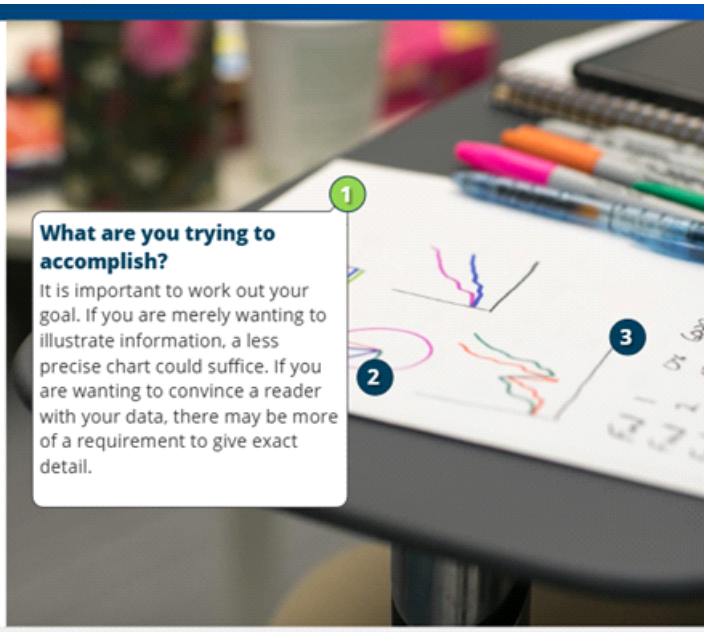


Applying consideration to our charts (and writing)

When you start to include charts in your research, consider the following questions.

1. **What are you trying to accomplish?**
2. **What story in your data do you want to share?**
3. **Are you trying to present too much?**

Click on the markers to expand on each question.



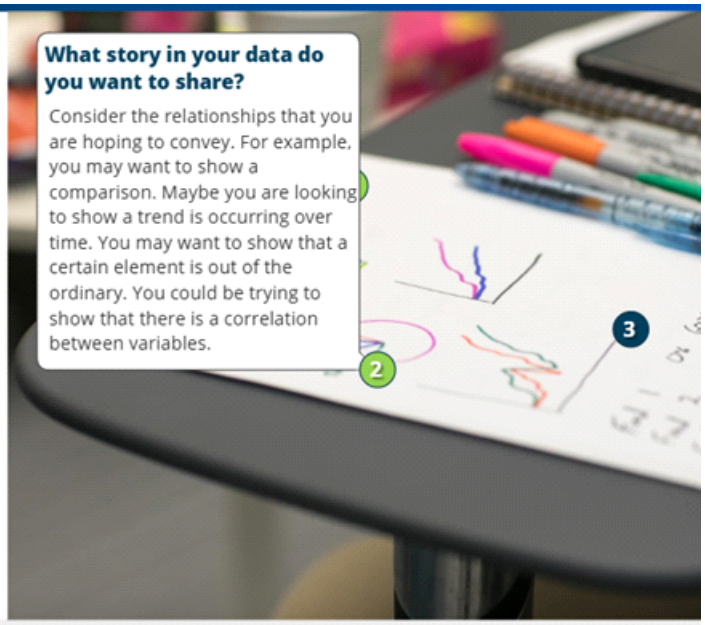
30 / 34

Applying consideration to our charts (and writing)

When you start to include charts in your research, consider the following questions.

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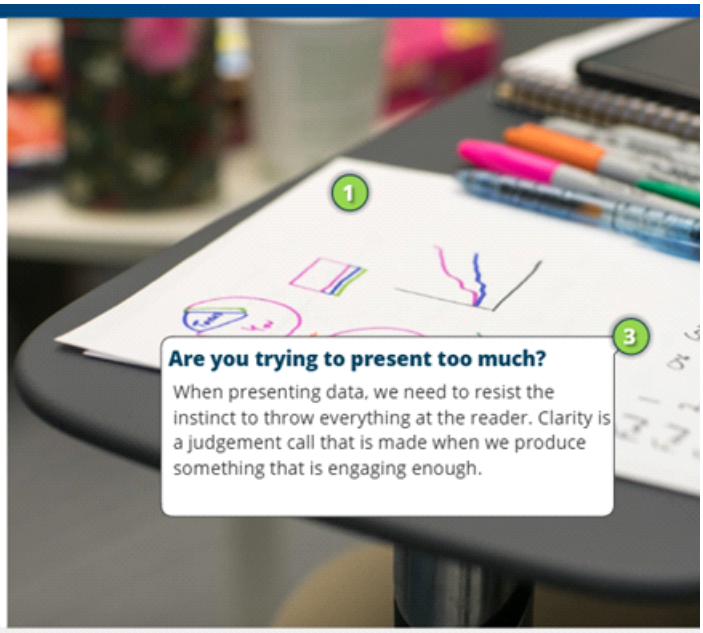
30 / 34

Applying consideration to our charts (and writing)

When you start to include charts in your research, consider the following questions.

1. **What are you trying to accomplish?**
2. **What story in your data do you want to share?**
3. **Are you trying to present too much?**

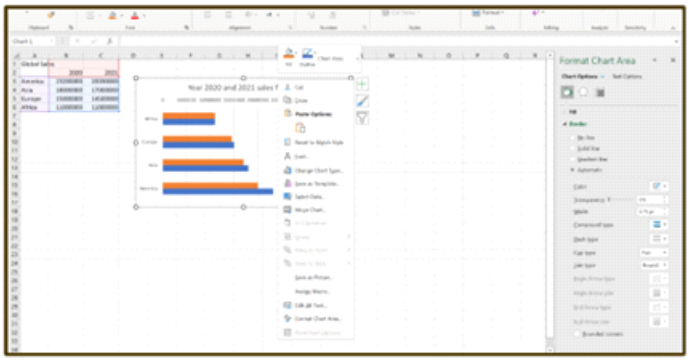
Click on the markers to expand on each question.



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Less is more

A more sophisticated approach would be to use the knowledge you have of the **visual hierarchy and the format options of Excel**. These options are found by right clicking in the image of the chart and then selecting the format.



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Network

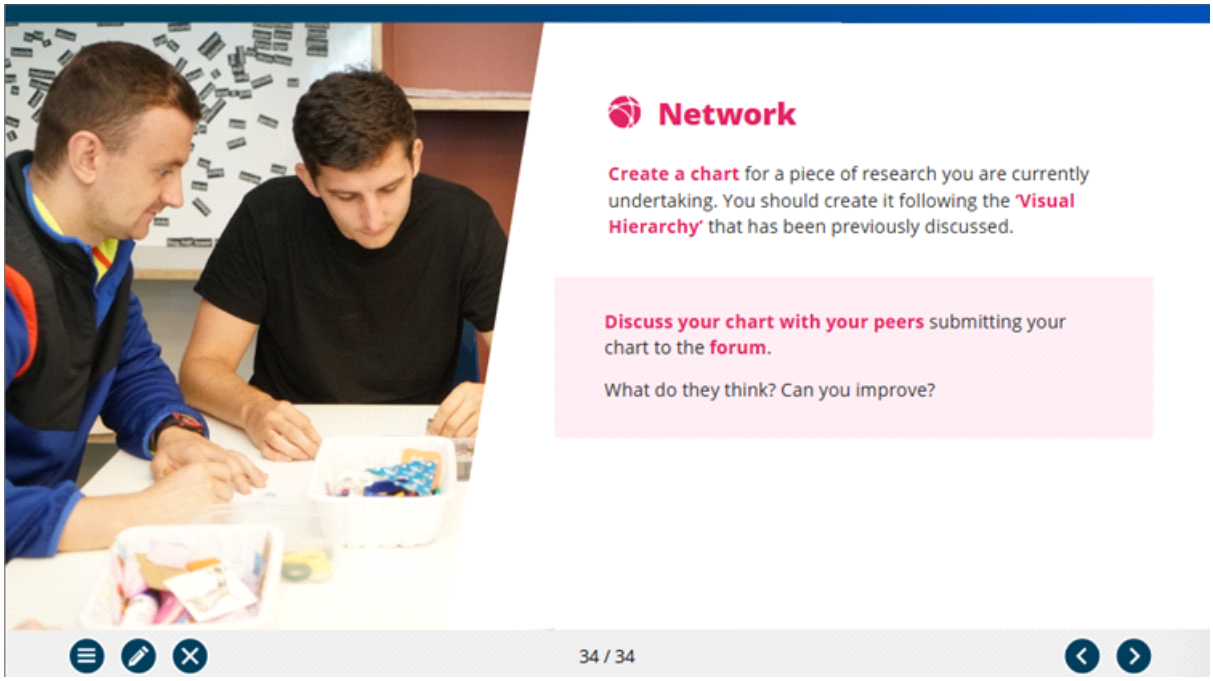
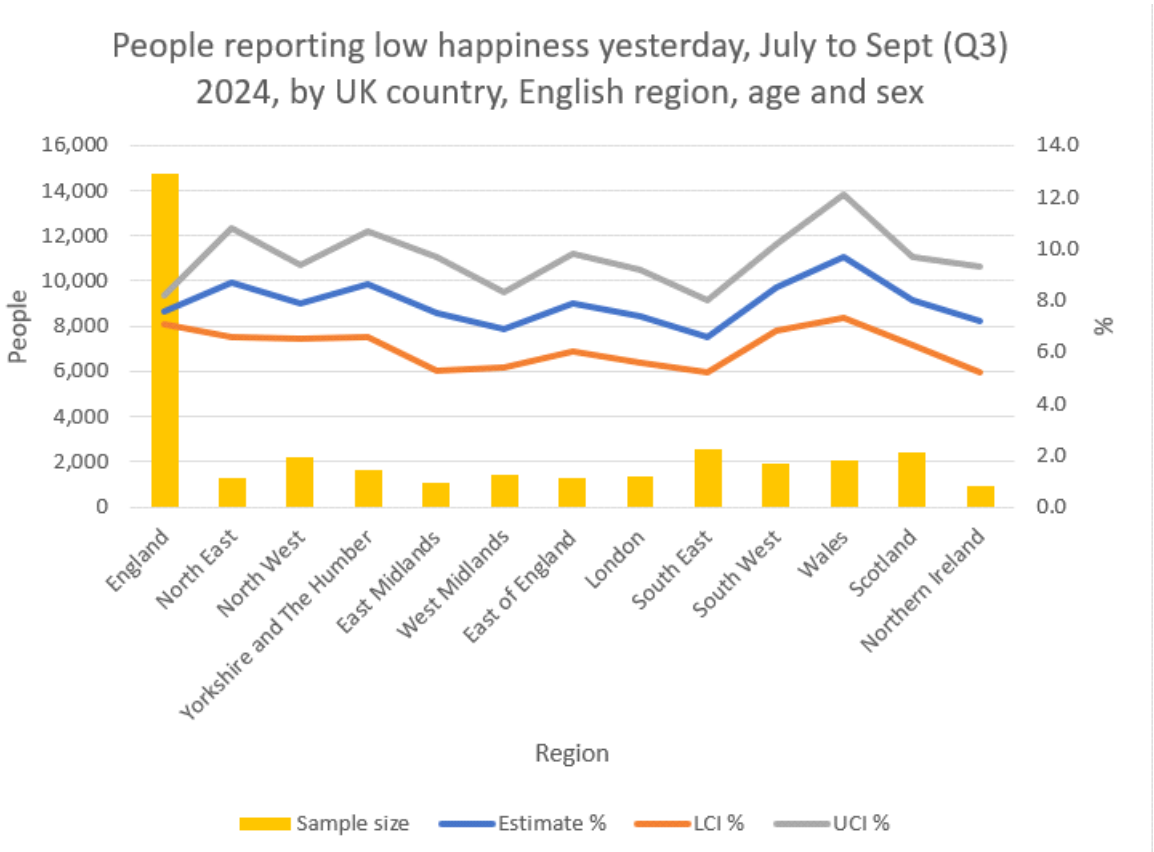


Table 1.3b

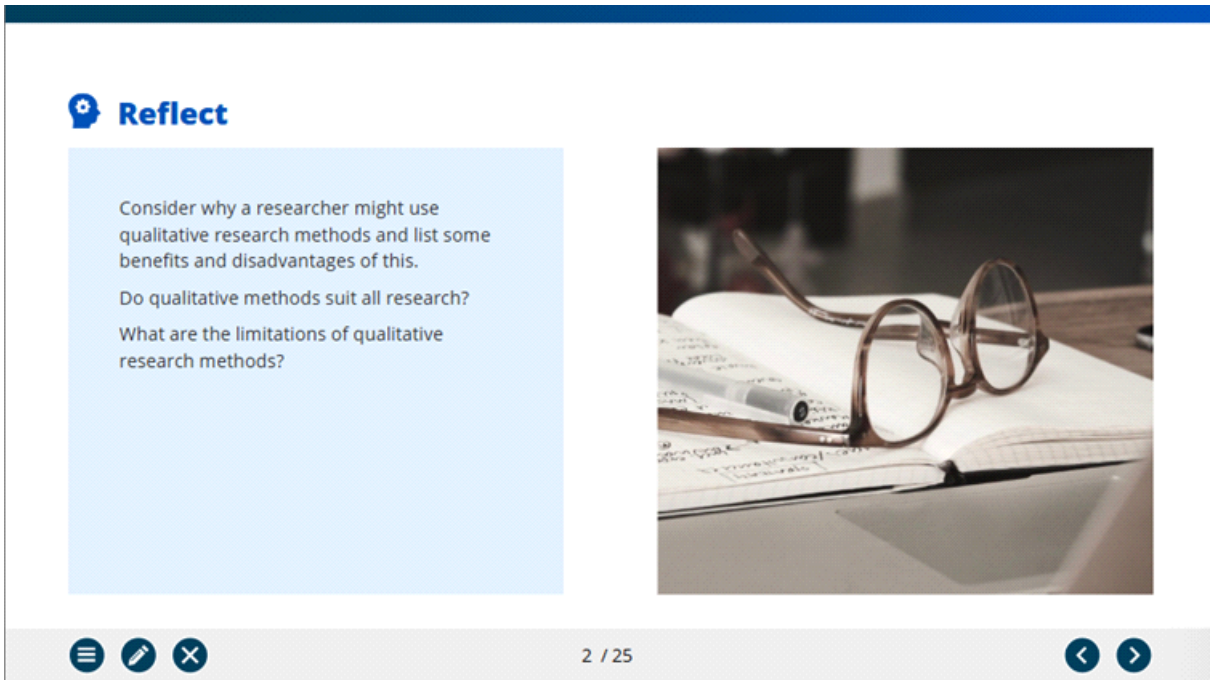
People reporting low happiness yesterday, July to Sept (Q3) 2024, by UK country, English region, age and sex	Estimate %	LCI %	UCI %	Sample size
England	7.6	7.1	8.2	14,780
North East	8.7	6.6	10.8	1,290
North West	7.9	6.5	9.4	2,190
Yorkshire and The Humber	8.6	6.6	10.7	1,630
East Midlands	7.5	5.3	9.7	1,060
West Midlands	6.9	5.4	8.3	1,430
East of England	7.9	6.0	9.8	1,310
London	7.4	5.6	9.2	1,390
South East	6.6	5.2	8.0	2,560
South West	8.5	6.8	10.2	1,930
Wales	9.7	7.3	12.1	2,040
Scotland	8.0	6.3	9.7	2,410
Northern Ireland	7.2	5.2	9.3	920



Unit 4 Topic 2

Section 1: Organising qualitive data

Reflect



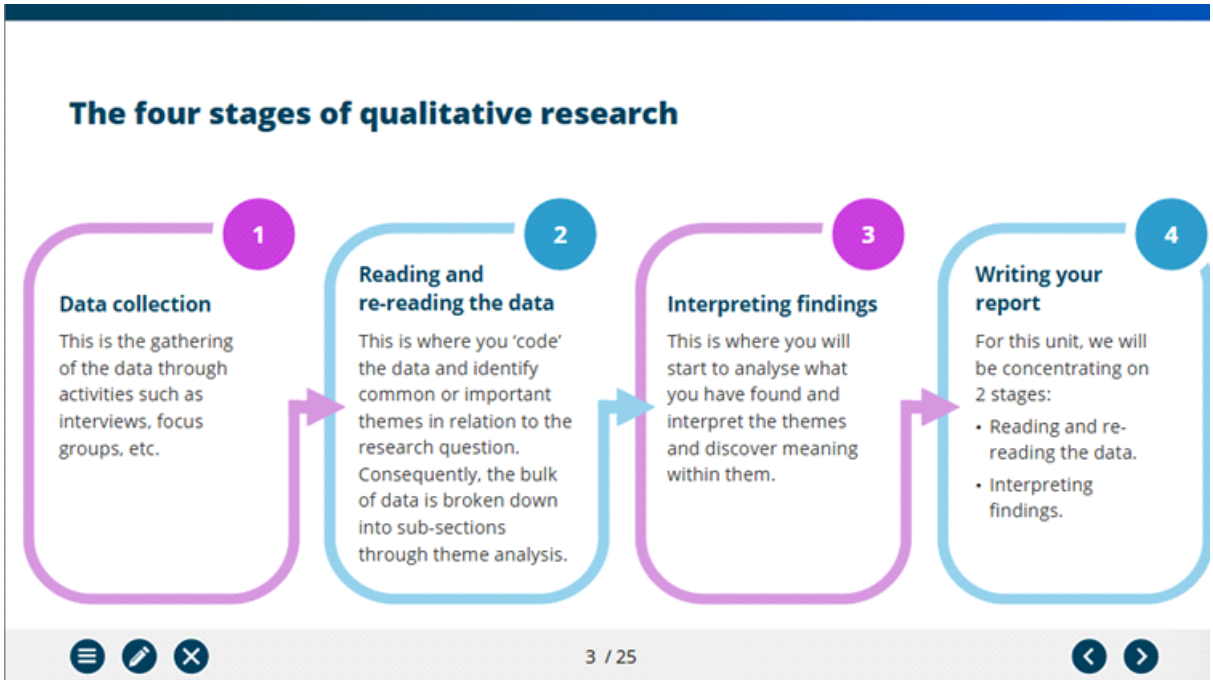
Researcher reasons: to discover information about human experiences, opinions emotions and motivations.

Benefits: this provides detailed data that numerical data may not be able to present and displays societal factors on individuals behaviour

Disadvantages: numerically sourced data takes less time to analyse and if smaller sample sizes are present then it may be difficult to state that the data speaks to the general population.

This method does not suit all research.

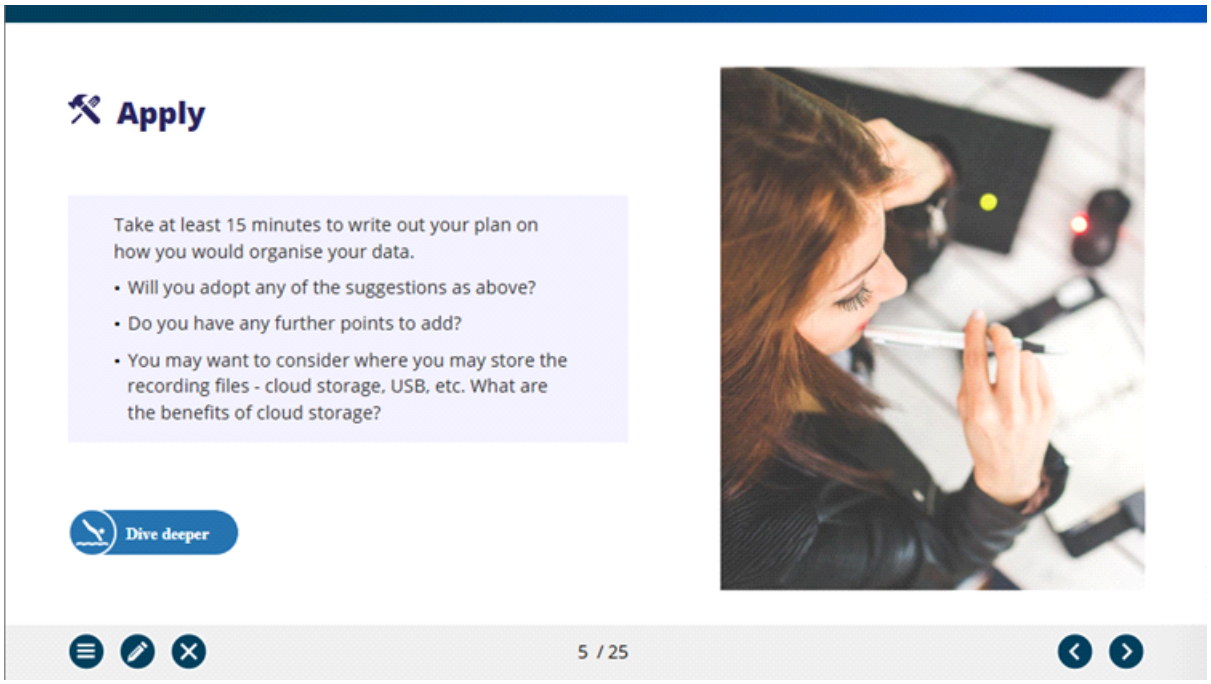
4 stages of qualitative research



Organising data involves:

Having the right equipment, organising dates and times, file storage and transcribing.

Apply

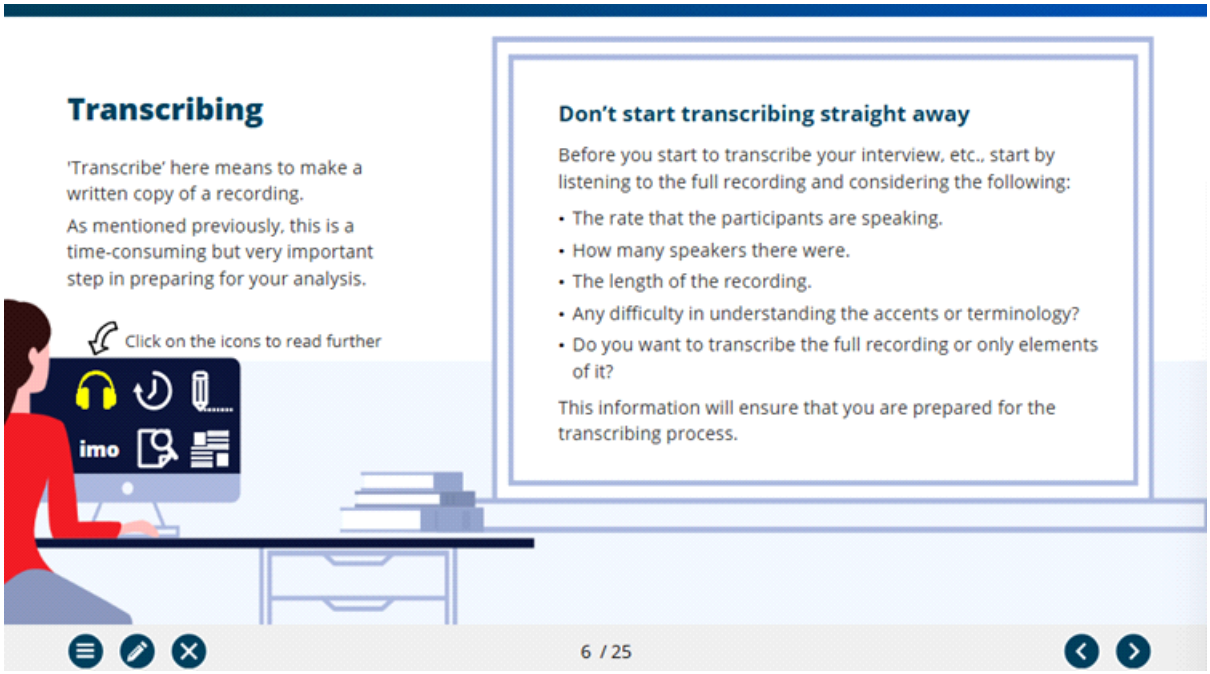


I will store the recordings on a USB device and secure it with a password to ensure the privacy of the recordings.

I will organise my data with clear dates and times and I'll create a log of participant responses on Excel.

I will use my laptop and my mobile to record the voice and to transcribe.

Transcribing tips



Reflect



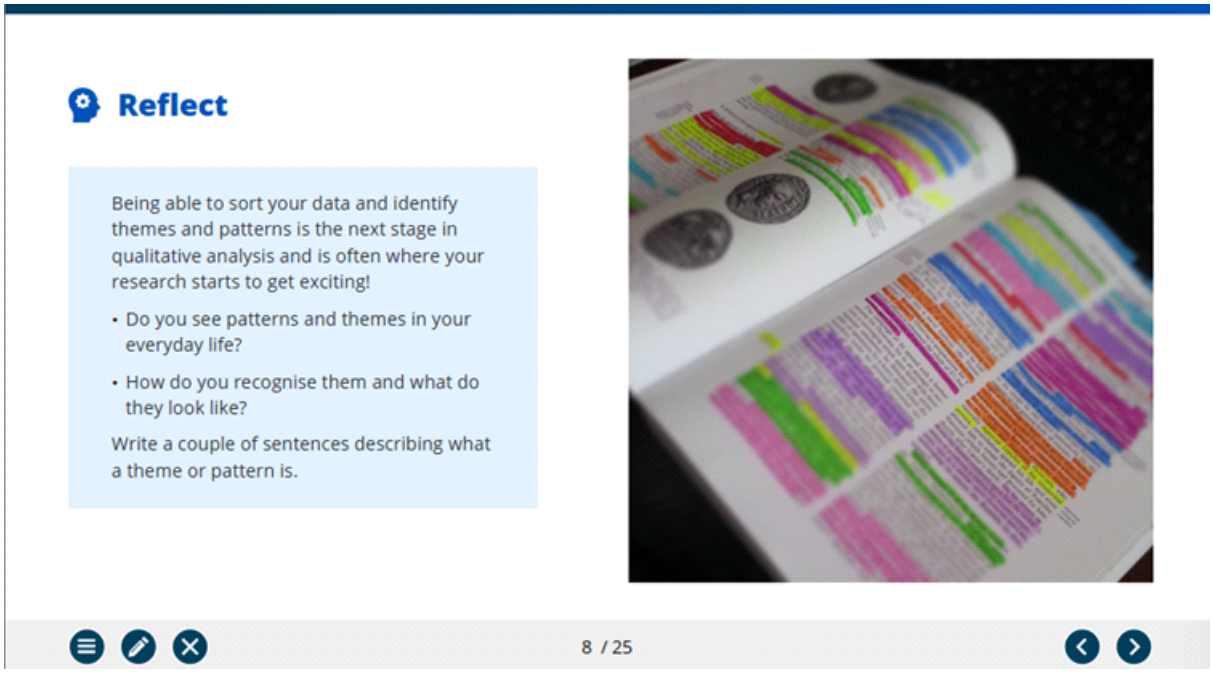
Post:

It is important to organise your qualitative data before collection to ensure a variety of things: reduces risk of losing data by disorganisation, creates a system of naming and transcription in advance and helps support ethical compliance of storage and consent considerations.

It will affect future qualitative research as this will form a data management process that will be carried out for each research which will improve accuracy and credibility of future research.

Section 2: Applying techniques to identify patterns and themes

Reflect



Yes - I see patterns in routines that I carry out such as exercise habits, study habits and how they merge into reflecting how motivated I feel.

I see themes such as communication arising in the house and at the workplace.

A pattern is repeated behaviour

Thematic analysis

Once qualitive data has been collected, thematic analysis is the next step.

This involves identifying themes by reading the data intently. This allows you to better understand your data.

This process can take several steps:

- Familiarising yourself with the data.
- Generating initial codes.
- Identifying themes.
- Reviewing the themes.
- Giving your themes a name.
- Writing about your themes.

Apply

Apply

Create your own Theme Table template that you could use for your data.
You can use Microsoft Word or Excel to create your table as follows.

Author	Note	Initial code
Name of person	A copy and paste of an interesting part of their transcript.	A code that you would assign to it.

11 / 25

Author	Note	Initial code	Identifying themes	Reviewing the theme	Theme Name	Writing about theme

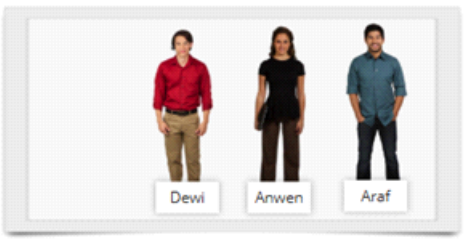
Apply



Hi, my name is Jordan and I now live and work in Swansea. I moved here from North Yorkshire to study business at the University of Wales Trinity St David.

In the 1990s, when I was first a student, I attended a lecture that inspired me to collect video games. At the time we all played video games in the student halls and later we competed against Manchester. My hobby has grown so much that I now have over 2000 games and the old consoles that go with them.

Recently my collection was featured in a museum exhibit in my hometown.



11 / 25

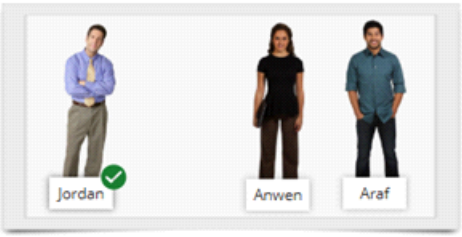
Apply



Hi, my name is Dewi. I studied for a nursing qualification at the university, having previous lived in Exeter.

A major incident during my time at UWTSD was that I caught chicken pox. It left me with this scar that I've got on my forehead. I was embarrassed about it at first, but I make a joke of it these days. I say it is a shark bite.

The big thing that I now do since uni is that I play football in an amateur league. I've been doing that since I was at university.



11 / 25

Apply



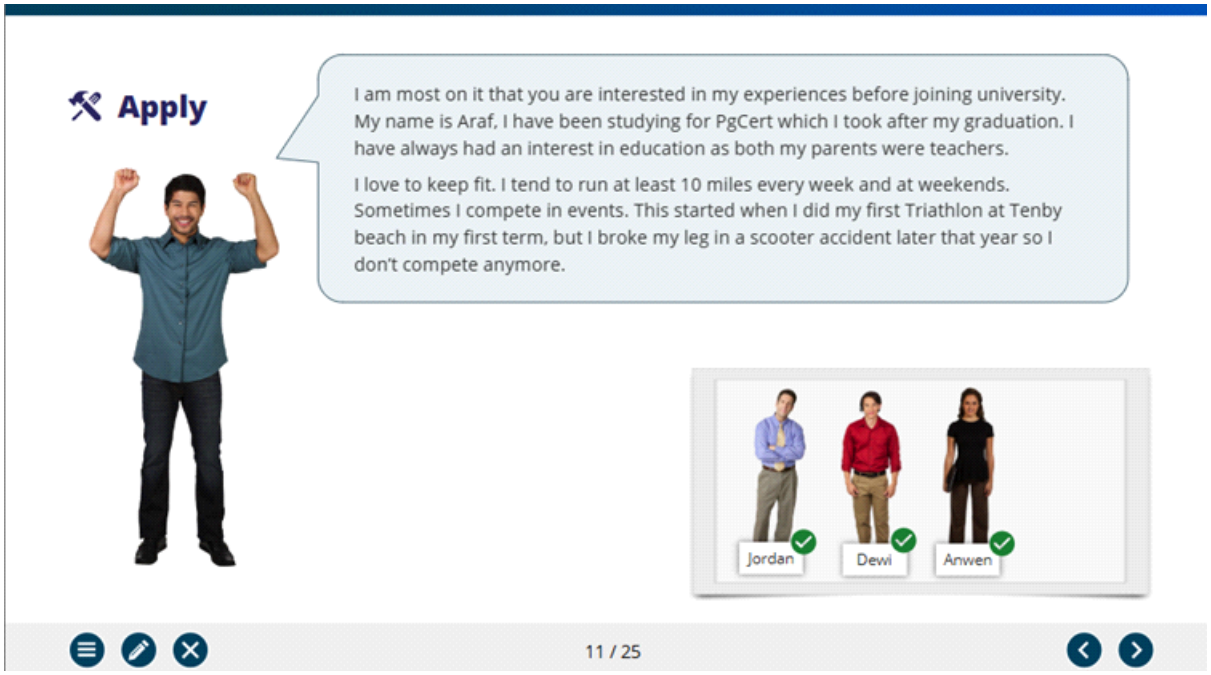
Thanks for giving me this opportunity to talk about my life.

A big thing that happened when I was in my 20s and studying was that I caught malaria. I've always lived in Swansea, so I have been interested in travel. This was inspired when a charity that made a presentation in class invited us to go to Africa. It's there where I caught it. While all my colleagues were working at an African village I had to go to hospital.

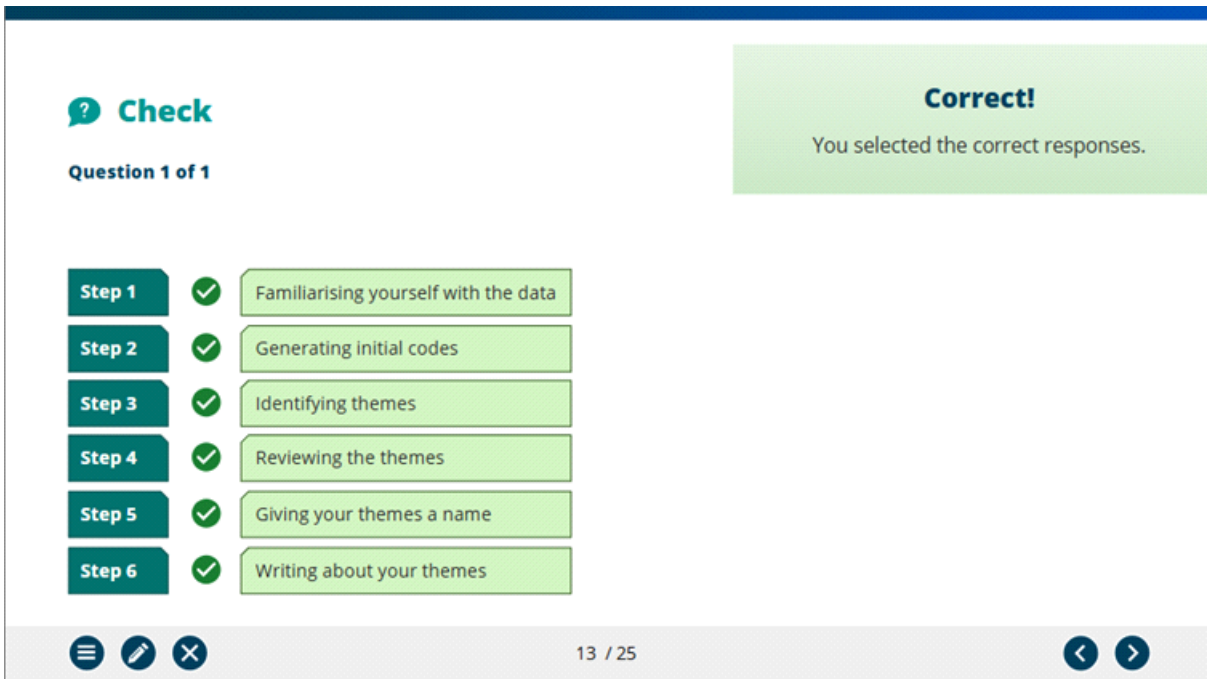
It hasn't affected me as I still travel to amazing places.



11 / 25



Check



Section 3: Using qualitative analysis software

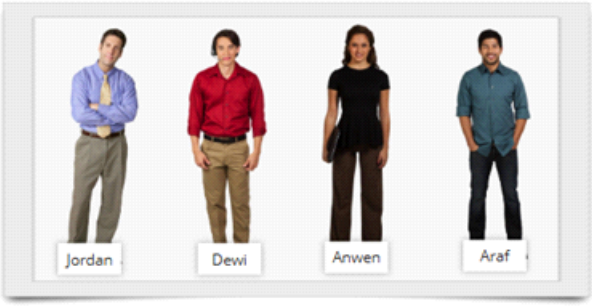
Reflect

Reflect

When you look at the example video transcriptions made from Dewi, Jordan, Anwen and Araf, can you identify what themes are the ones that appear to be significant?

Can you think how would you go about doing this as well as creating the evidence to be referenced in the future?

If you would like to view those transcriptions again, select the characters.



15 / 25

Reflect

When you look at the example video transcriptions made from Dewi, Jordan, Anwen and Araf, can you identify what themes are the ones that appear to be significant?

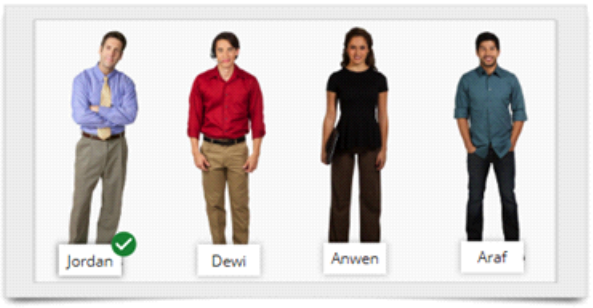
Can you think how would you go about doing this as well as creating the evidence to be referenced in the future?

If you would like to view those transcriptions again, select the characters.

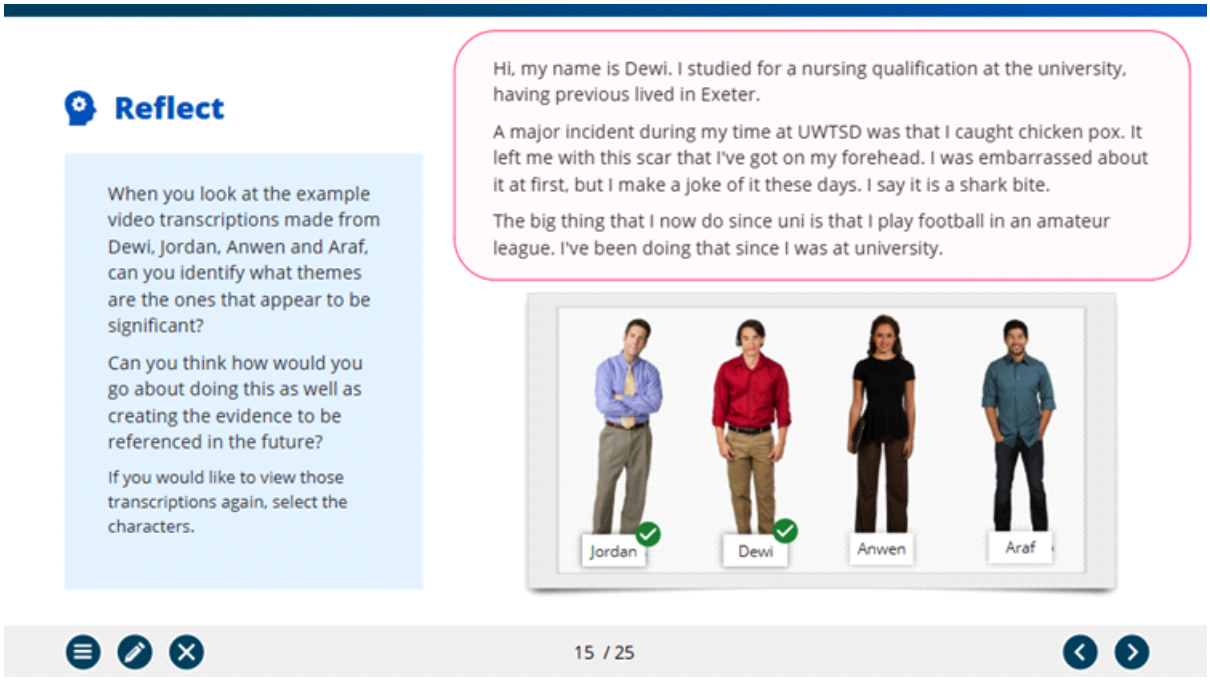
Hi, my name is Jordan and I now live and work in Swansea. I moved here from North Yorkshire to study business at the University of Wales Trinity St David.

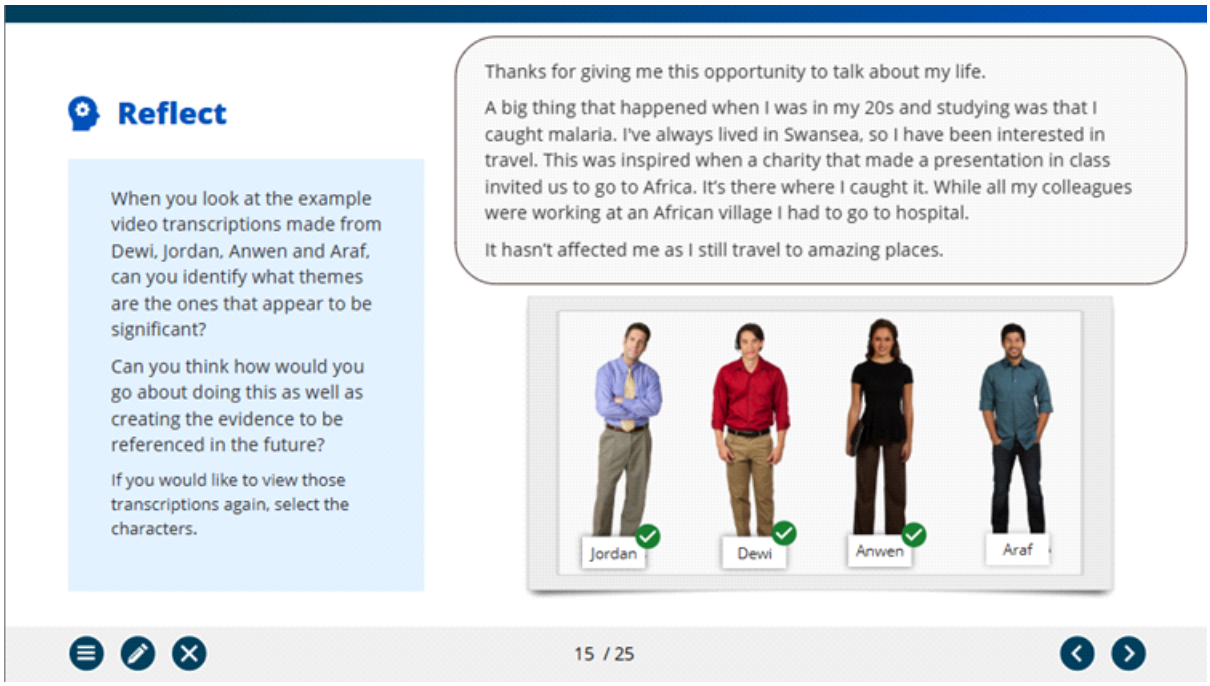
In the 1990s, when I was first a student, I attended a lecture that inspired me to collect video games. At the time we all played video games in the student halls and later we competed against Manchester. My hobby has grown so much that I now have over 2000 games and the old consoles that go with them.

Recently my collection was featured in a museum exhibit in my hometown.



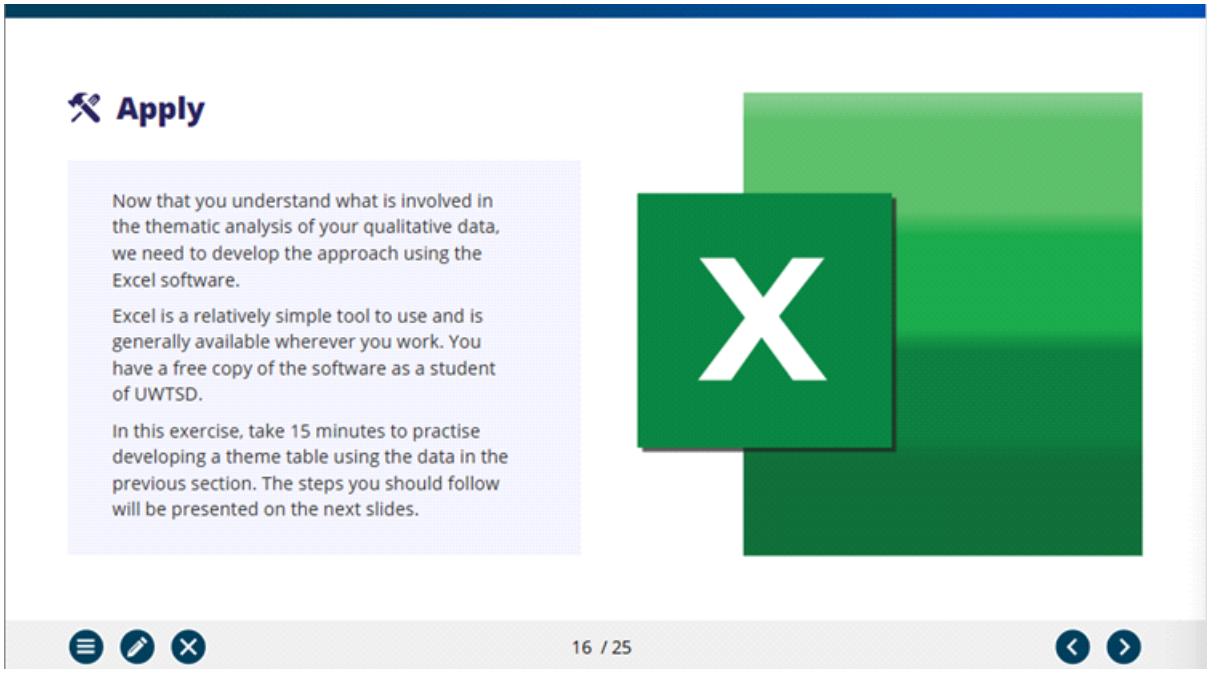
15 / 25





Themes: hobbies, interests, education, career, community

Apply



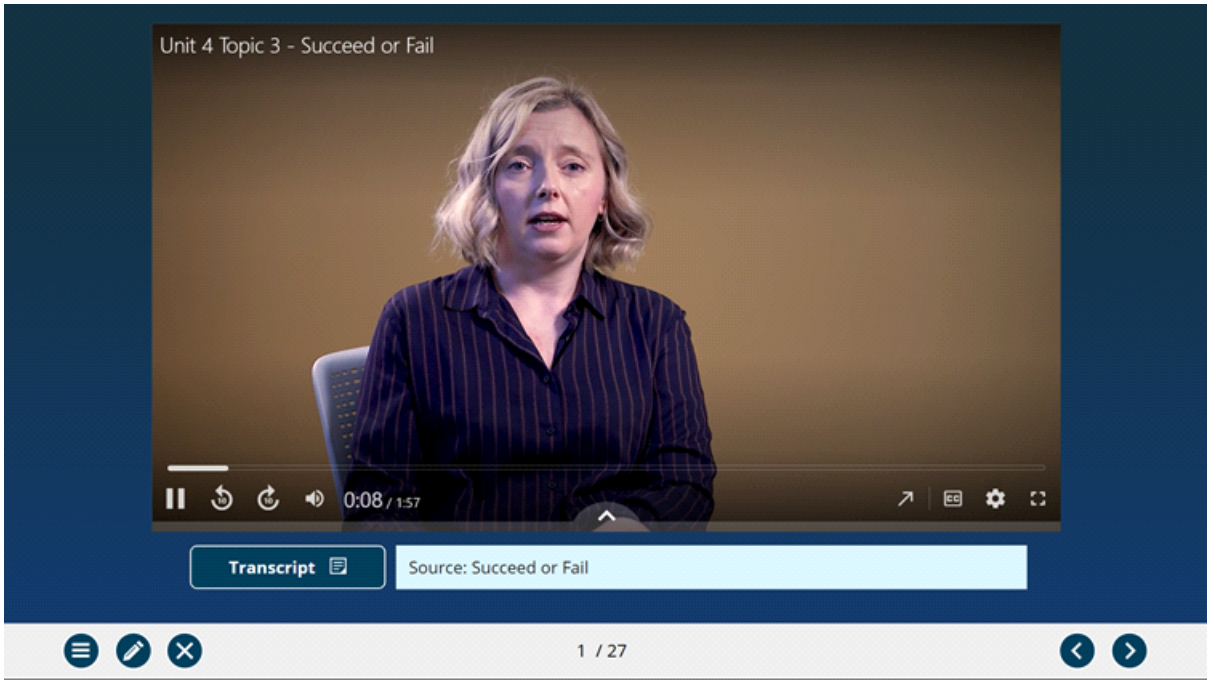
Source#	Note#	Author	Note	Theme	Initial Code
1	1	Jordan	I moved here from North Yorkshire to study business at UWTSD.	Home	#movedhome
1	2	Jordan	A lecture in the 1990s inspired me to collect video games.	Hobby/Collection	#collection
1	3	Jordan	We competed against Manchester in video games.	Competition	#competition
1	4	Jordan	I now have over 2000 games and old consoles, recently featured in a museum.	Hobby/Achievement	#collection
2	1	Dewi	I studied for a nursing qualification at the university, having previously lived in Exeter.	Home	#movedhome
2	2	Dewi	A major incident during my time at UWTSD was catching chicken pox, leaving me with a scar.	Medical	#illness
2	3	Dewi	The big thing I do since uni is play football in an amateur league.	Competition	#sport
3	1	Anwen	I caught malaria while on a trip to Africa inspired by a charity presentation.	Medical	#illness
3	2	Anwen	I've always lived in Swansea, interested in travel, visiting amazing places.	Home/Lifestyle	#home
4	1	Araf	I started my first triathlon at Tenby beach in my first term.	Competition	#sport
4	2	Araf	I broke my leg in a scooter accident that year, so I don't compete anymore.	Medical	#injury
4	3	Araf	I have always had an interest in education as my parents were teachers.	Academic/Family Influence	#education

Qualitative research software: discuss

Unit 4 Topic 3

Section 1: failure – Is this the end?

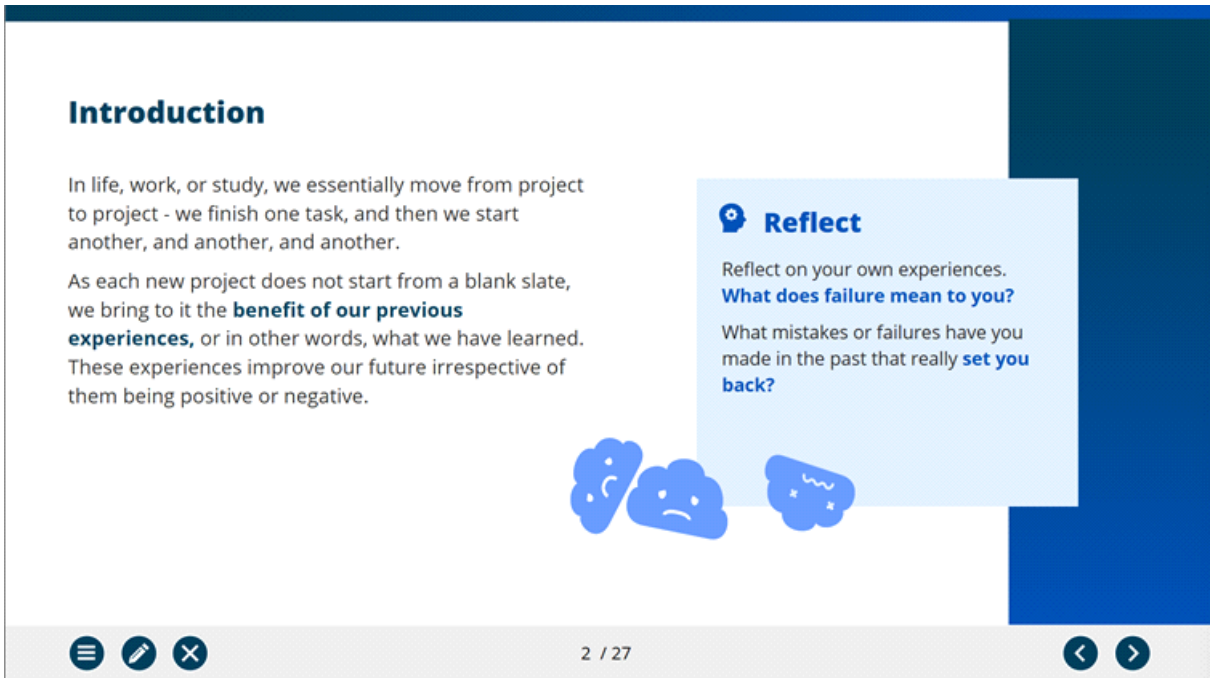
Succeed or fail



It's important to learn how to fail and perceive it as reason for growth. Shame and guilt are need needed here, acceptance is needed. Interpretation of failure being wrong is a way of punishing yourself.

Section 2: Success and wellbeing

Reflect



Failure to me means the inability to complete a task successfully. It is unique to the situation and, if this occurs, it should be learned from.

I failed a job. I lasted 6 months in one role as I let personal life and work life influence my stress levels without managing them effectively.

Section 3: Success from failure

Cited research

Cassess et all (2005) - Shows that assessing quantitative research appear to be more of an intuitive decision.

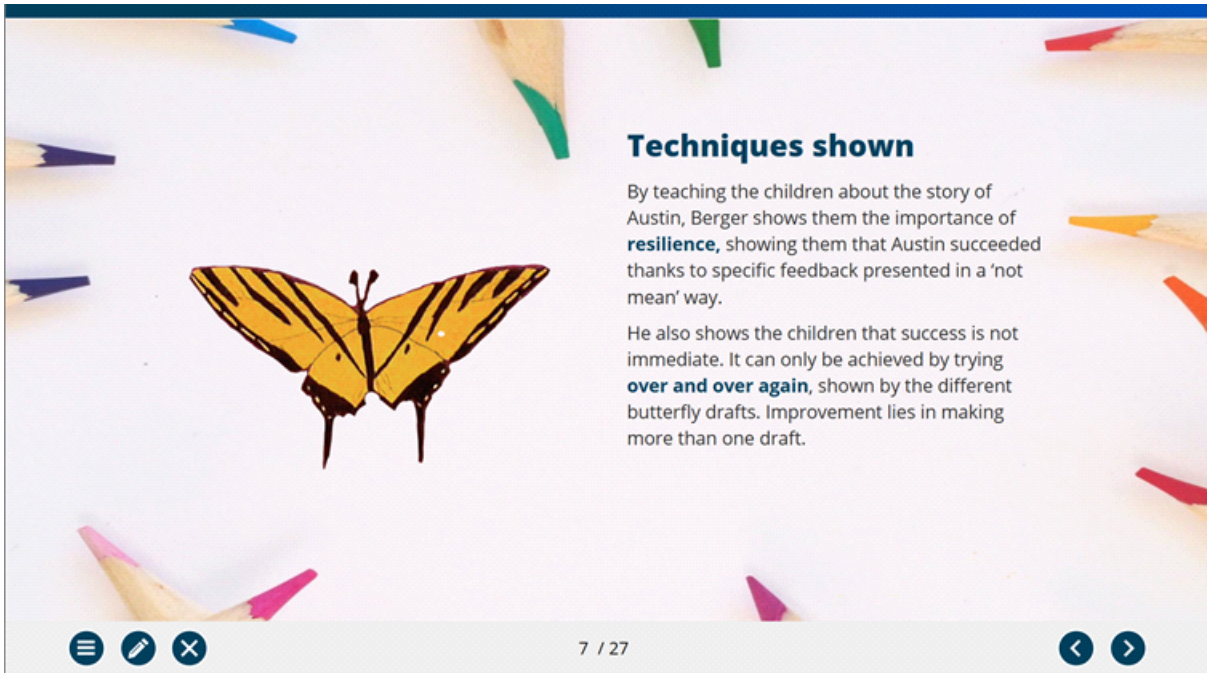
Lathrop (1890) - Thomas Edison took 10,000 failed attempts before inventing the light bulb.

Austin's butterfly findings

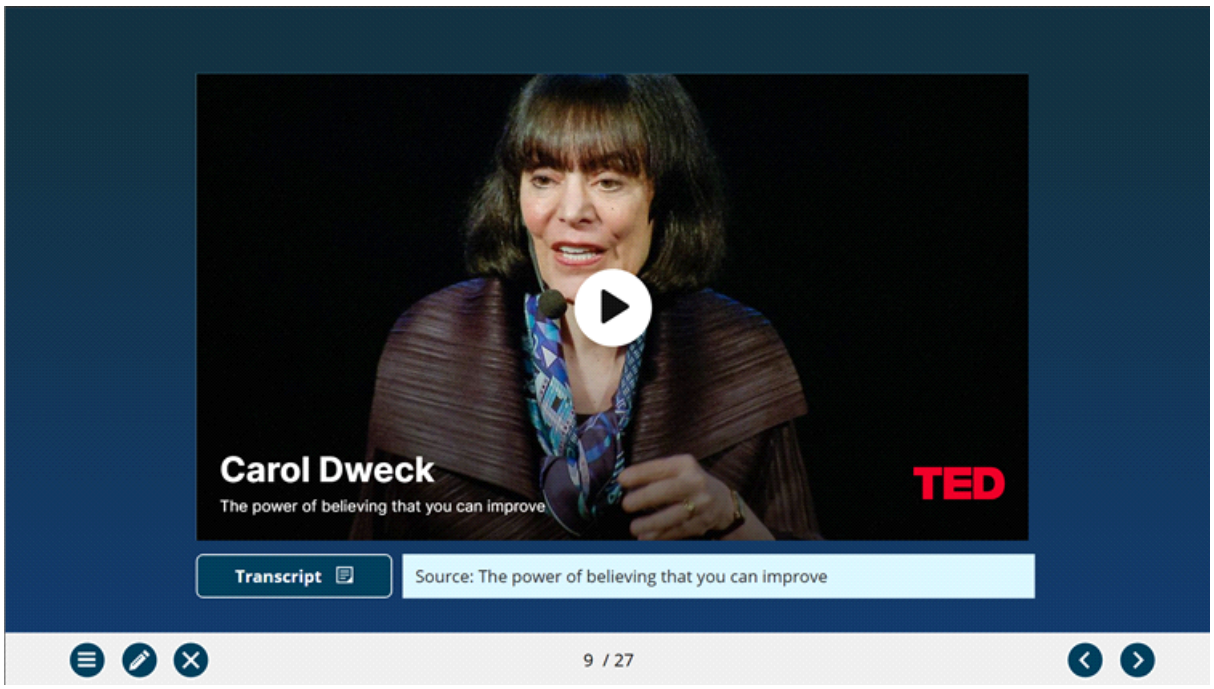
Specific advice on what is wrong with something can help new iterations to improve from the original. Failure plus feedback leads to growth.

Failure is a part of the process and creates learning opportunities.

Perseverance turns failure into mastery, which shows that failure is not permanent.



The Power of yet



Summary:

A view discussed was changing a failing grade to “Not Yet” to show that they’re on a learning curve.

Students with a growth mindset see challenges as opportunities to improve while those with a more fixed mindset avoided effort, feared failure and disengaged.

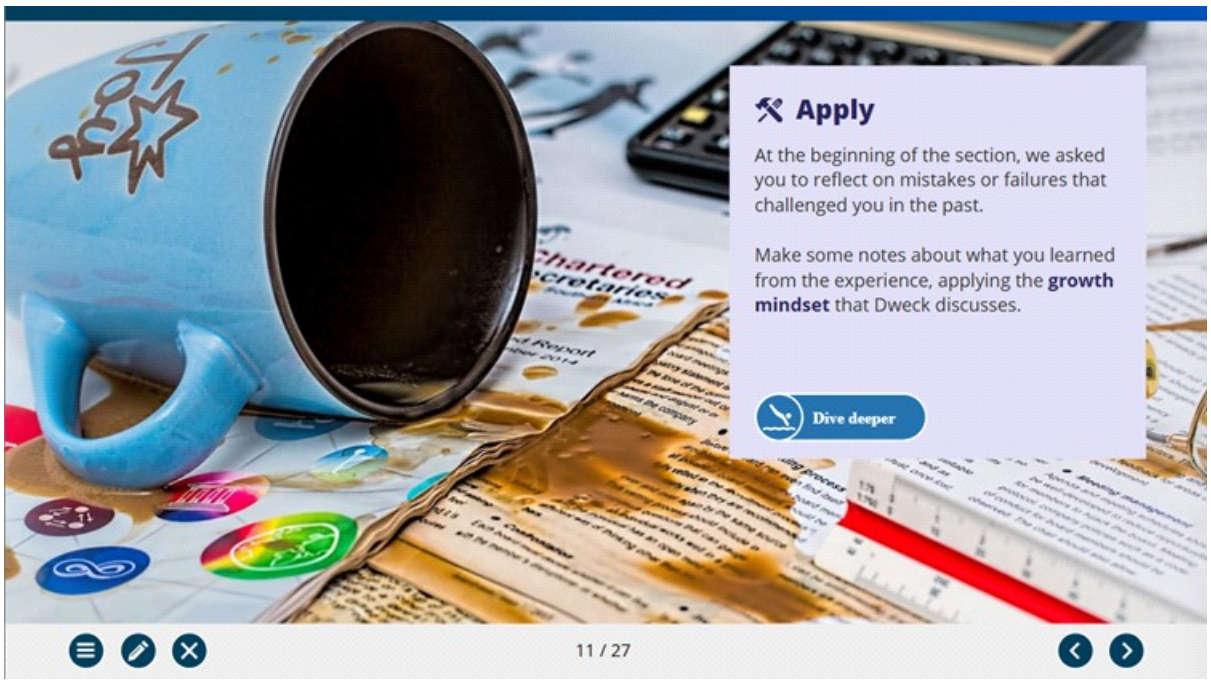
Informing students that their brains can grow through effort leads to better grades and personal advantages attached to achievement.

“The tyranny of now” is the mindset attached to those that have fixed mindset. They’re disengaged, happy to run away from the testing or even cheat.

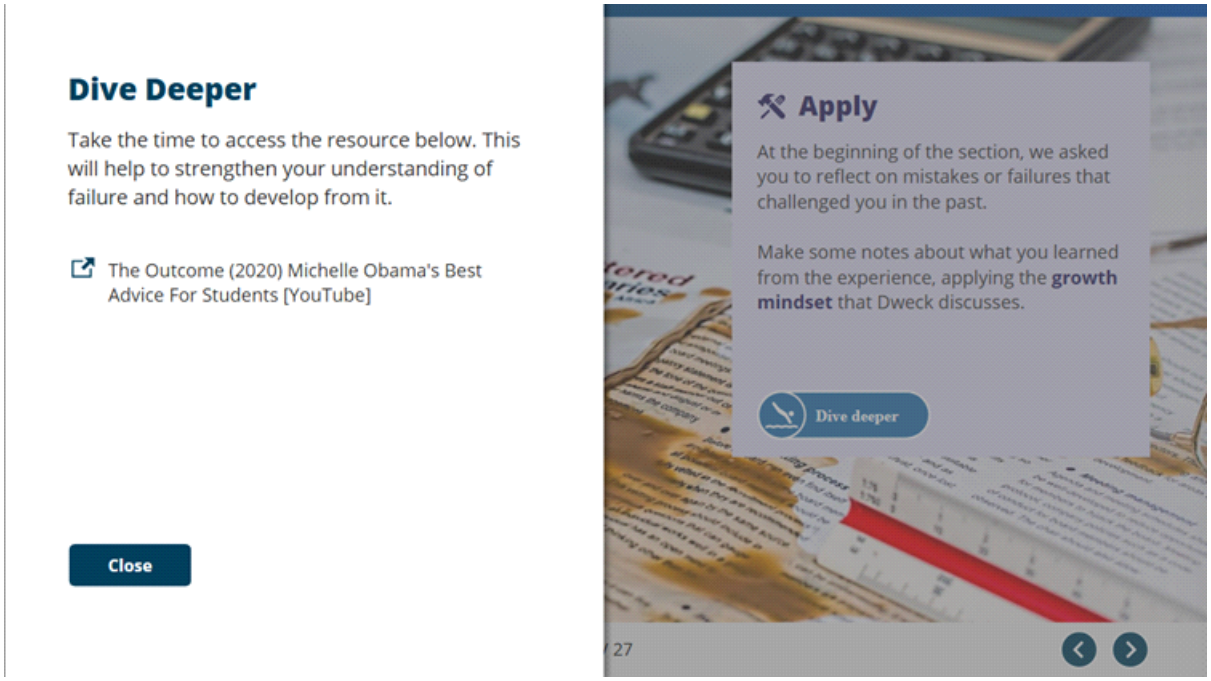
To get to the power of yet, praising the effort during the process, rewarding “yet” mindsets promotes growth mindsets

To teach resilient students with the power of yet they can advance and exceed beyond the previous levels.

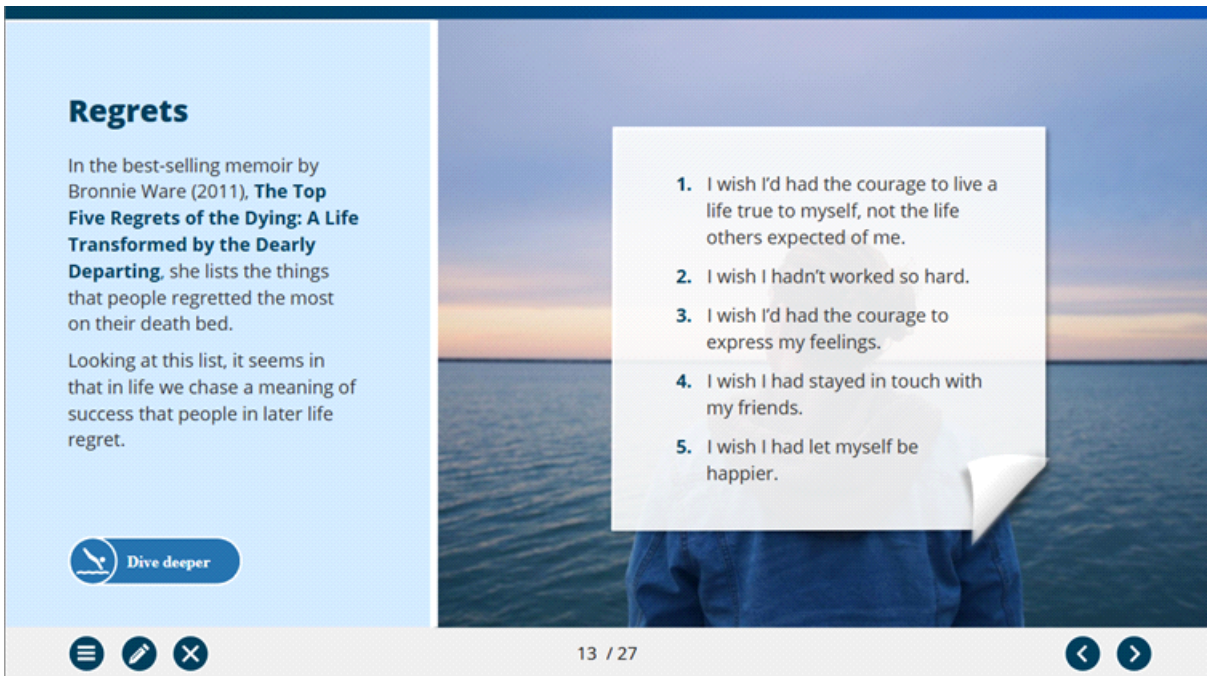
Apply



Applying the growth mindset, failing in my workplace role due to mismanagement of stress provided me with an opportunity rather than a challenge or setback. Without it, I would not have learned the importance of self-awareness, time management and, most importantly, seeking support when the pressure builds. This was an opportunity to develop emotional resilience, and doing so I improved on my ability to prioritise tasks, communicate with managers and improve life both in and out of work.



Section 2: Success and wellbeing



Common regrets:

I wish I found my passion sooner.

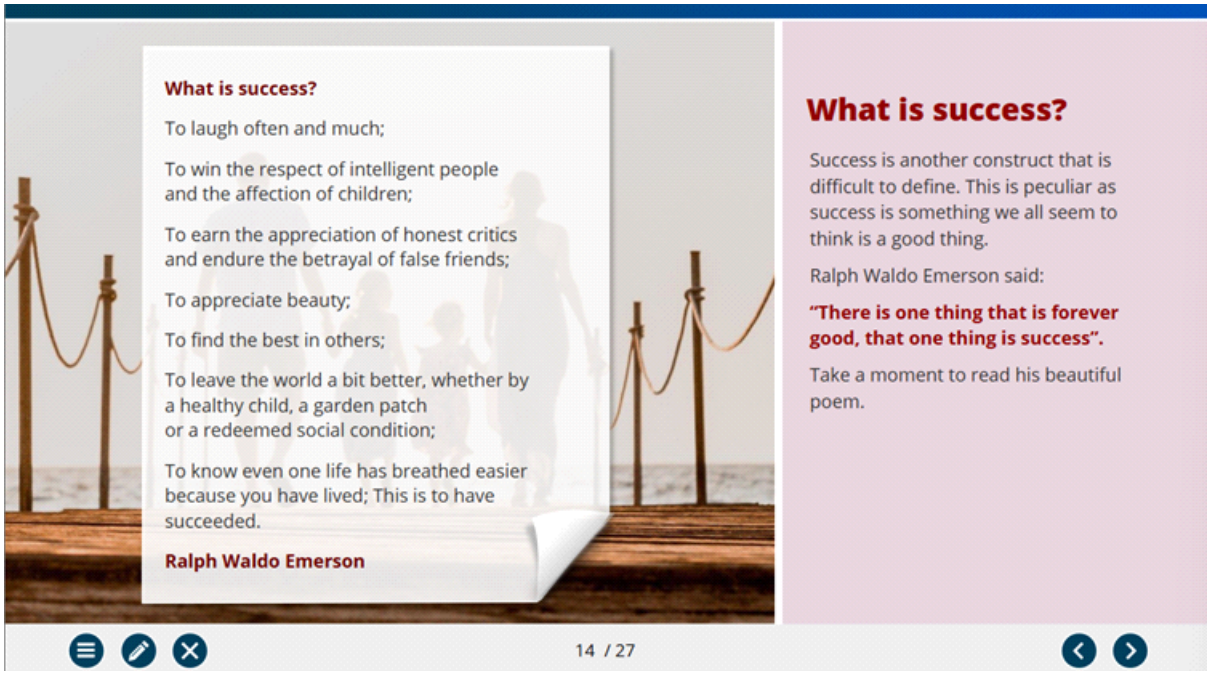
I wish I made spirituality more of a priority.

... I hadn't worked so much/hard.

I wish I took more risks.

I wish I quit my job and found my passion.

I wish I pursued my dreams.

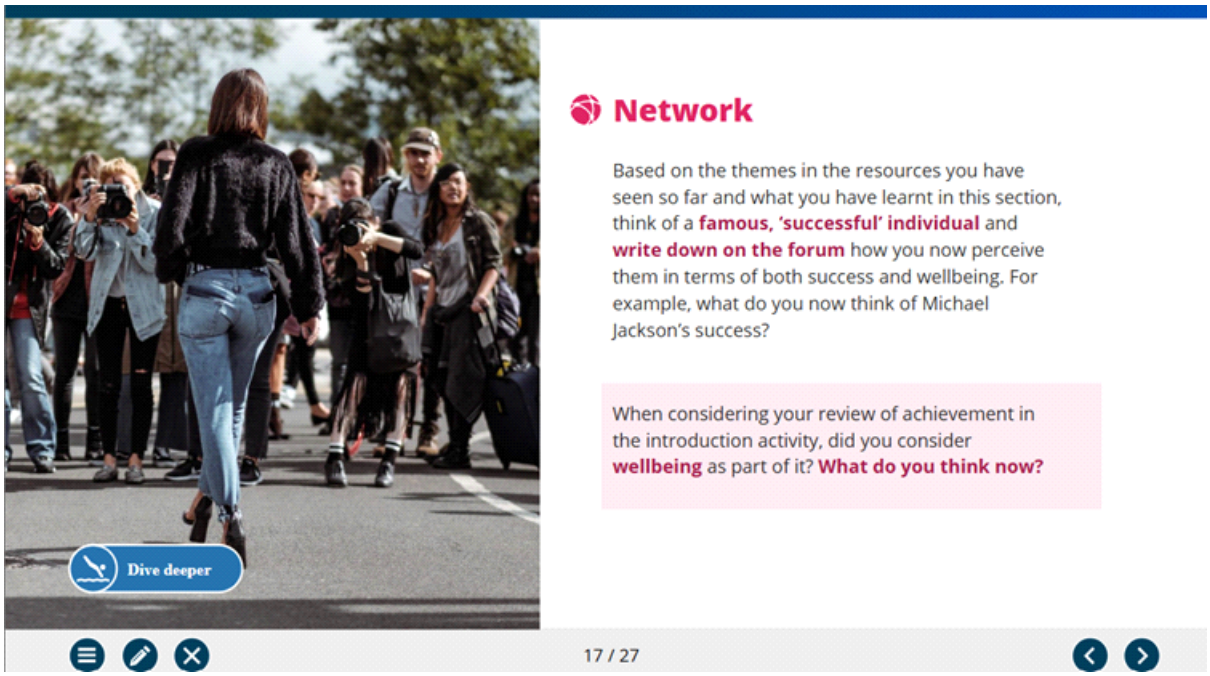


To succeed it to think about death, the possible regrets, reframe your perspective and understand you have nothing to lose by trying.

Network

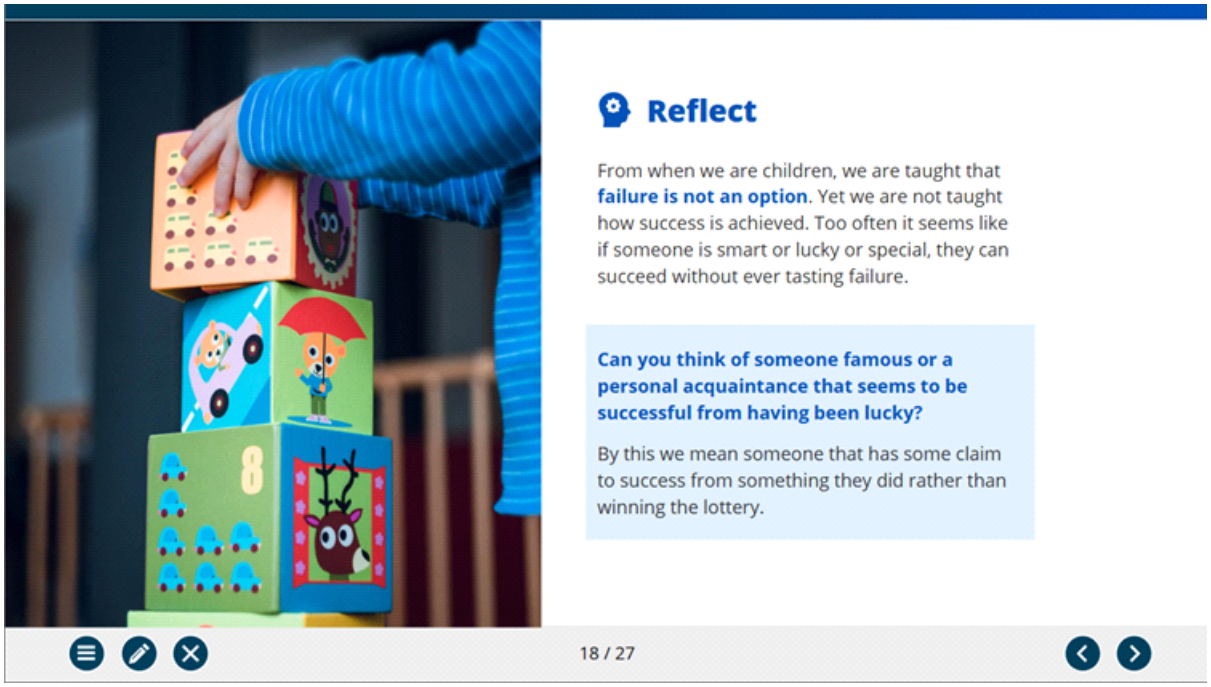
I think wellbeing is an important part of achievement. Achieve amazing achievements will impact your wellbeing but it is important to manage this.

Bill Gates: successful in terms of career and in quantity and quality of achievements. It is important to understand that there is a trade-off to achieving a life like Bill Gates. His wellbeing likely suffered in striving for those goals. This is one of the costs of being Bill Gates, or someone who strives to accomplish the extraordinary. It is equally important to find a balance between wellbeing and success.

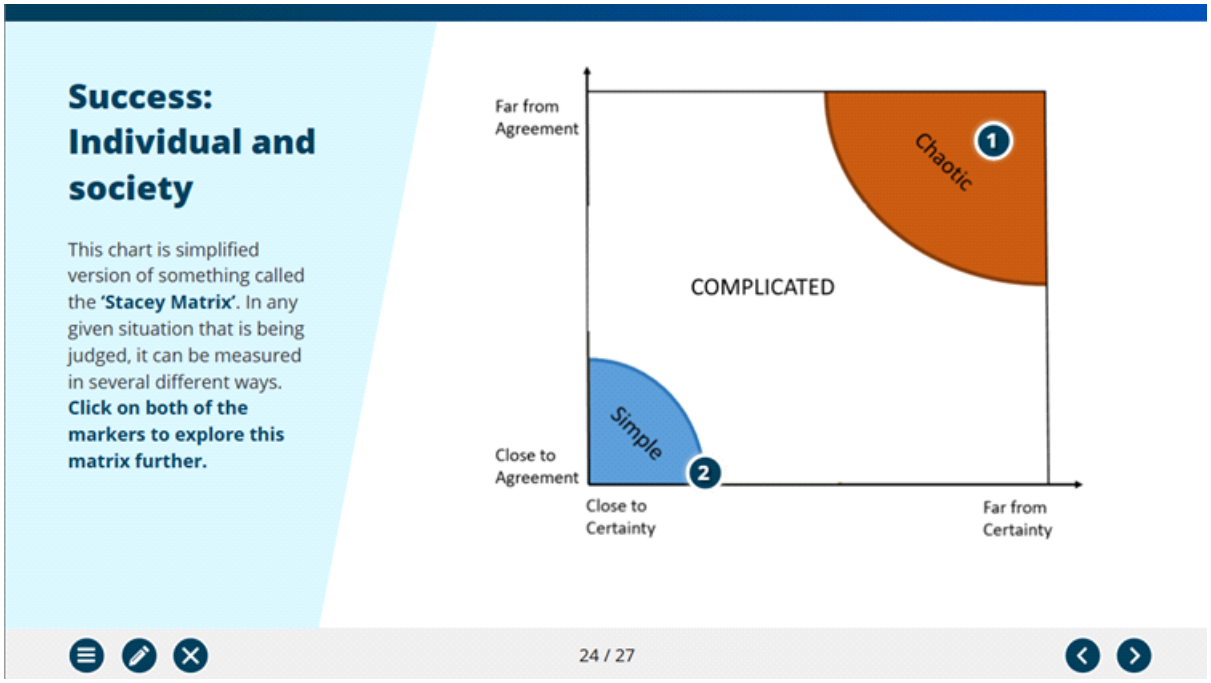


Section 3: Success from failure

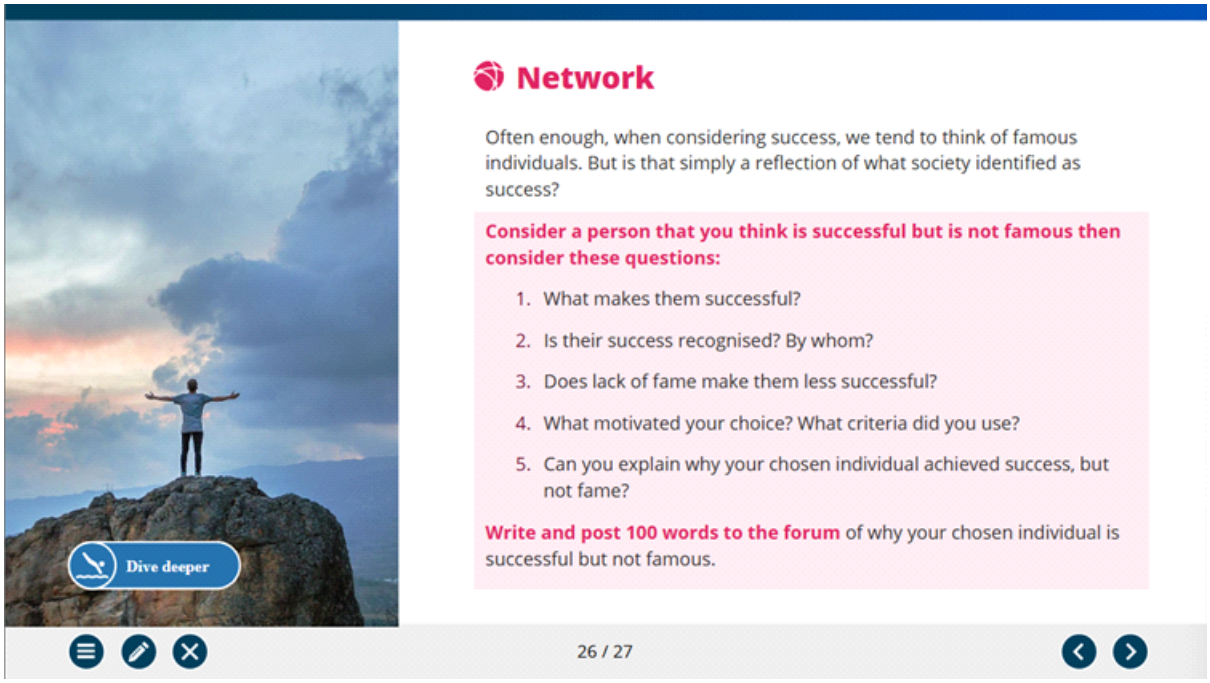
Reflect



Every successful person I know personally has not been lucky rather they have had to work toward their success.



Network



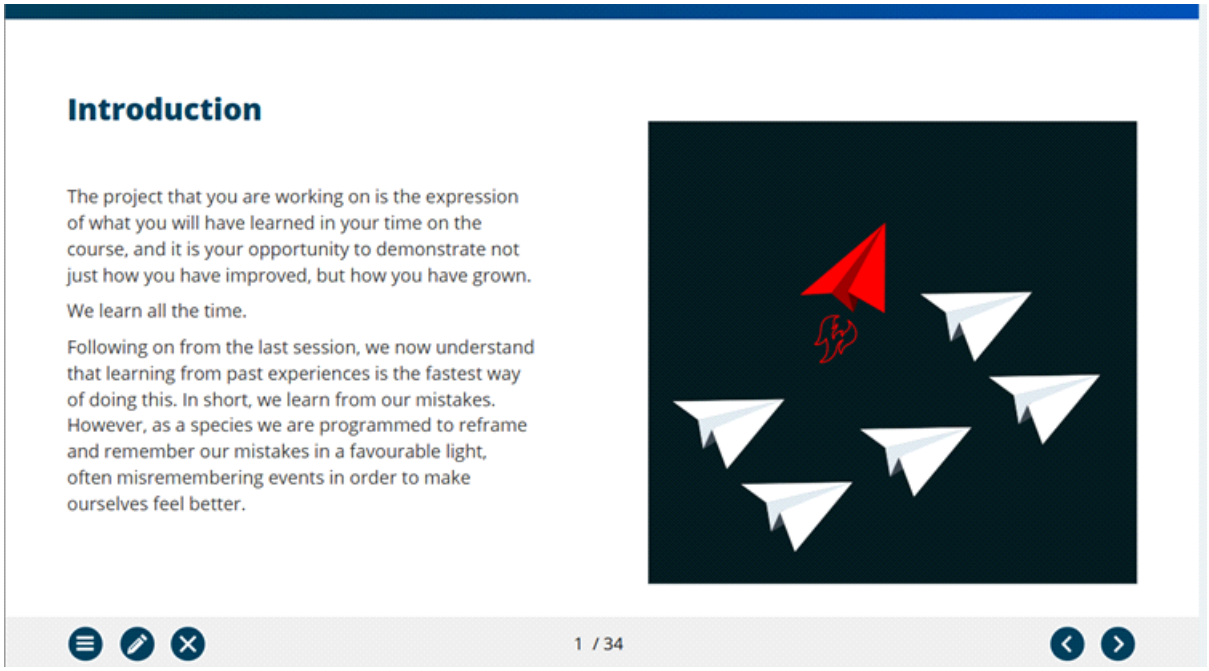
My brother: a quantity surveyor.

1) Their ability to be in the right network at the right time.
2) Yes, by his place of work.
3) No, arguably fame would hinder his ability to get a job.
4) I choose someone close to me in my network who was successful.
5) He is working the status quo of someone who works in industry. He works as expected like the average quantity surveyor which does not lead to fame.

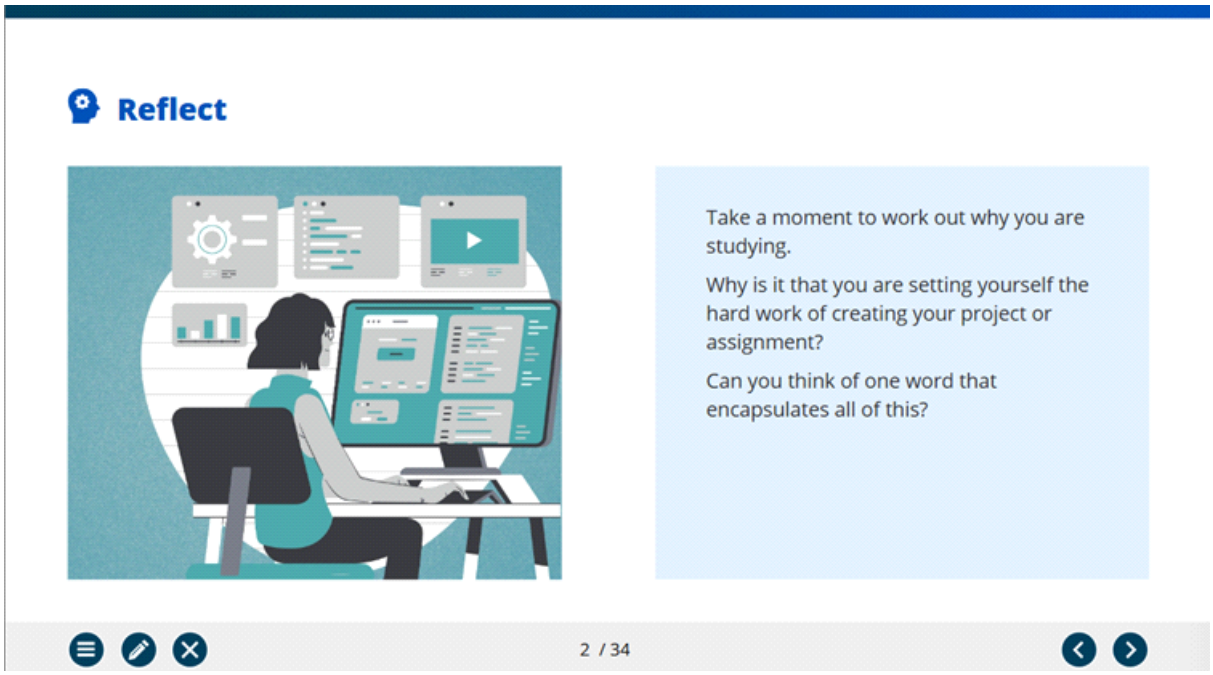
Unit 4 Topic 4

Section 1: Applying learning from your project

Introduction



Reflect



Ambition.

Hindsight bias is the tendency to view past events as more predictable than they actually were which can lead the person to overestimate their prior foresight. This makes the person think they understand concepts more deeply than they do.

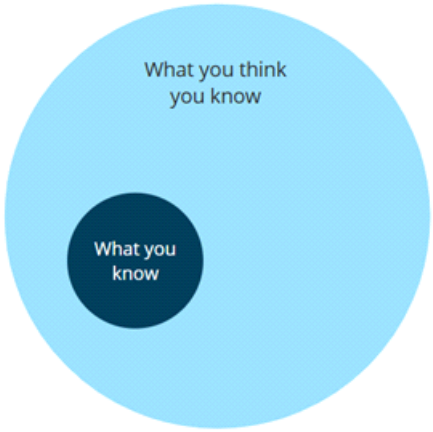
The circle of competence

We often sing songs in our head. When we 'hear' this singing we can be convinced that it is a stellar performance, we seem to know all the words and our singing is pitch perfect.

Now click on the small circle to read further.

However, when the moment comes at a karaoke party or when we sing in the shower, our nearest and dearest may think otherwise!

It is important to appreciate this idea when we are making a project. This is because if we are not careful, our appreciation of where we are in the circle of competence only emerges when we get feedback from a lecturer.



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Feynman technique

Of course, this approach will only work once the project has been completed, and at this point it could be considered too late. Another way of finding out the limits to what you know is called the 'Feynman technique'.

Richard Feynman was another Nobel Prize winner. He often talked of ways of exposing a lack of knowledge by simply trying to teach another person in as simple a form as possible. By applying what we have learnt into a small consumable lesson, we engage all parts of our knowledge and, in doing so, we find the areas that we may potentially be weak on.



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Apply the Feynman technique to future business ideas.

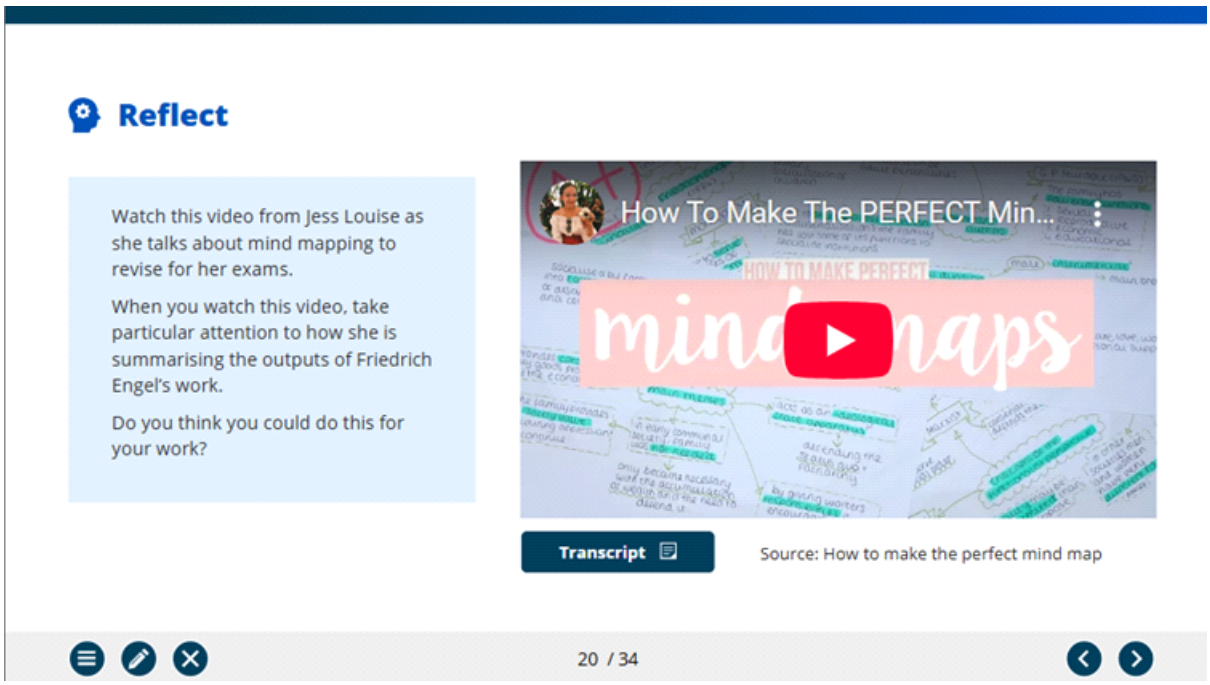


Yes, I do.

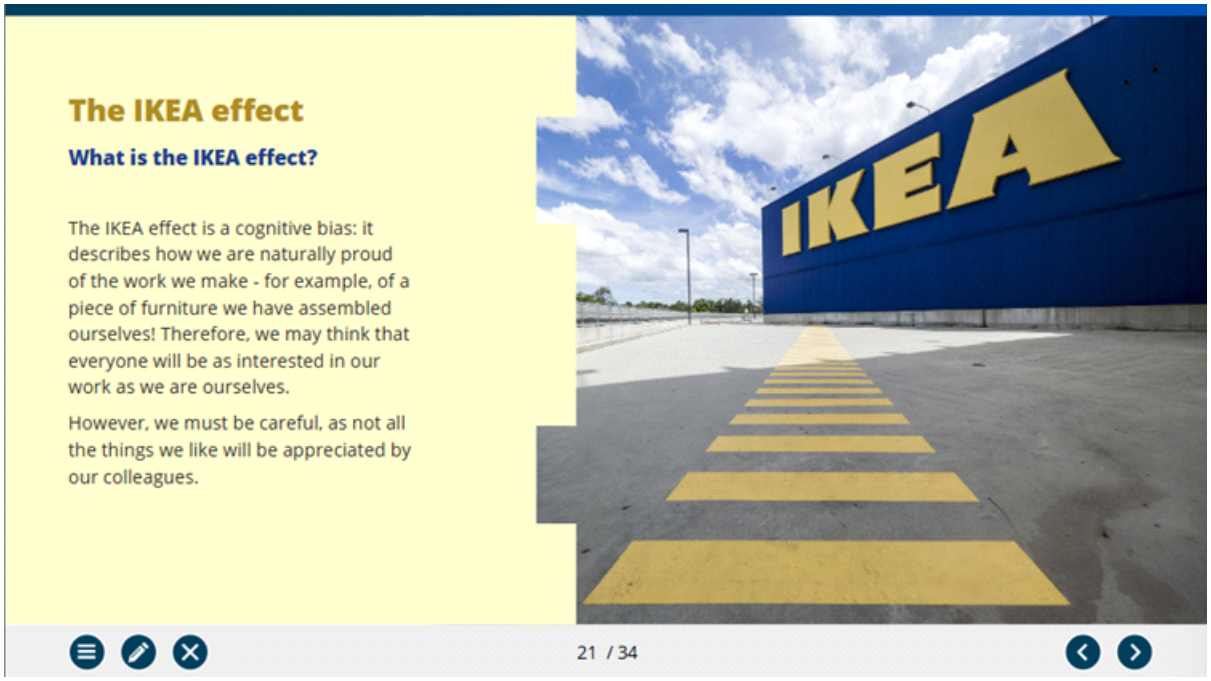
[Accept Payments]

Section 2: Develop an approach to showcase the outputs of your project

Reflect

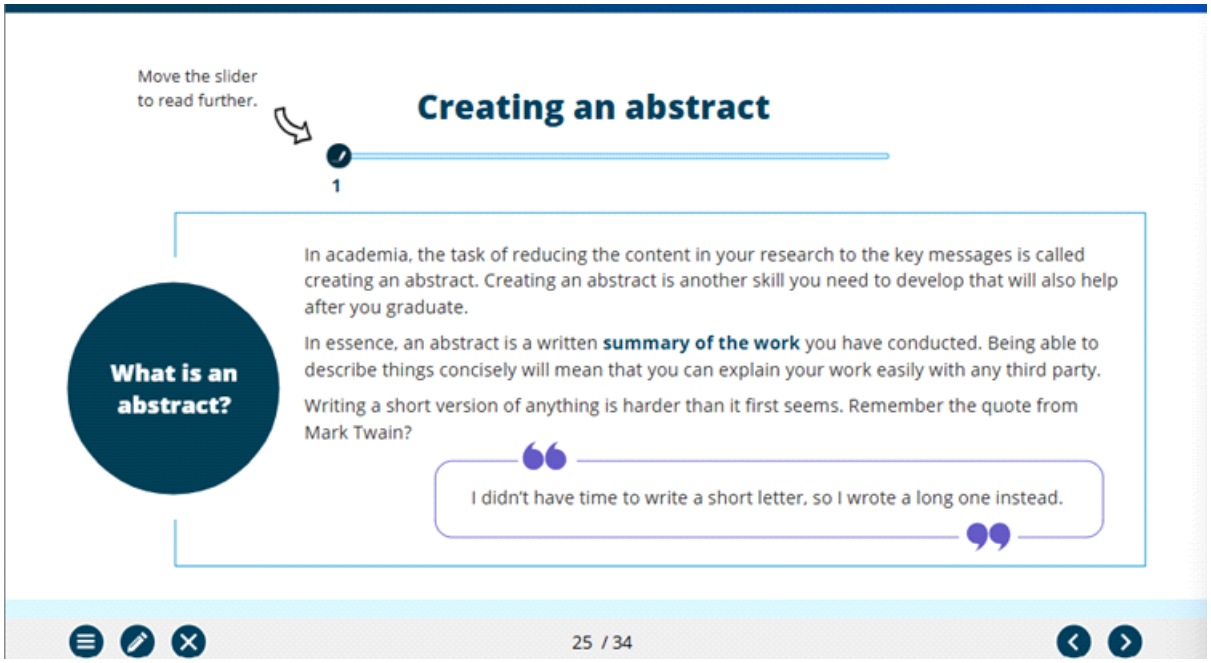


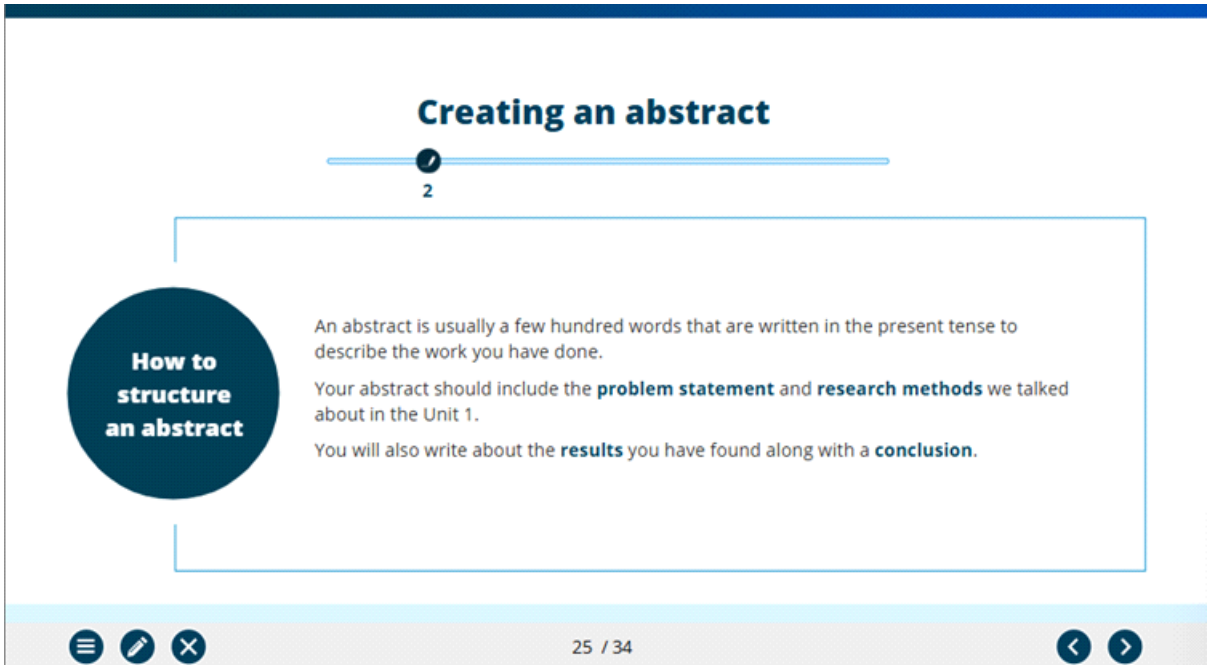
This would be possible to reflect in my work. Using little amounts of detail to make data more concise improves the readability of the mind map.



Shortening work is essential when showcasing work. Only present parts that standout.

Creating an abstract




Creating an abstract
2
How to structure an abstract
An abstract is usually a few hundred words that are written in the present tense to describe the work you have done.
Your abstract should include the problem statement and research methods we talked about in the Unit 1.
You will also write about the results you have found along with a conclusion.
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Creating an abstract
3
Introducing your abstract
You should start by very concisely explaining the context of the research and why it is important, you could also identify the gap you are hoping to address with your research.
For example:
'Studies examining students' self-perceptions of employability skills within UK business schools are limited, with very little being done to evaluate the impact of employability practices utilised to improve student employment prospects. With increasing focus being placed on HEI's to improve the prospects of their graduates, assessing the impact of these practices becomes critical.'
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Creating an abstract

4

Summarising your abstract

You then summarise **who** was involved in the research and the **methodology** used to conduct it.

For example:

'The author surveyed 35 students' self-perceptions of their employability skills to ascertain the most significant influencers from a number of variables previously identified in the literature.'

Creating an abstract

5

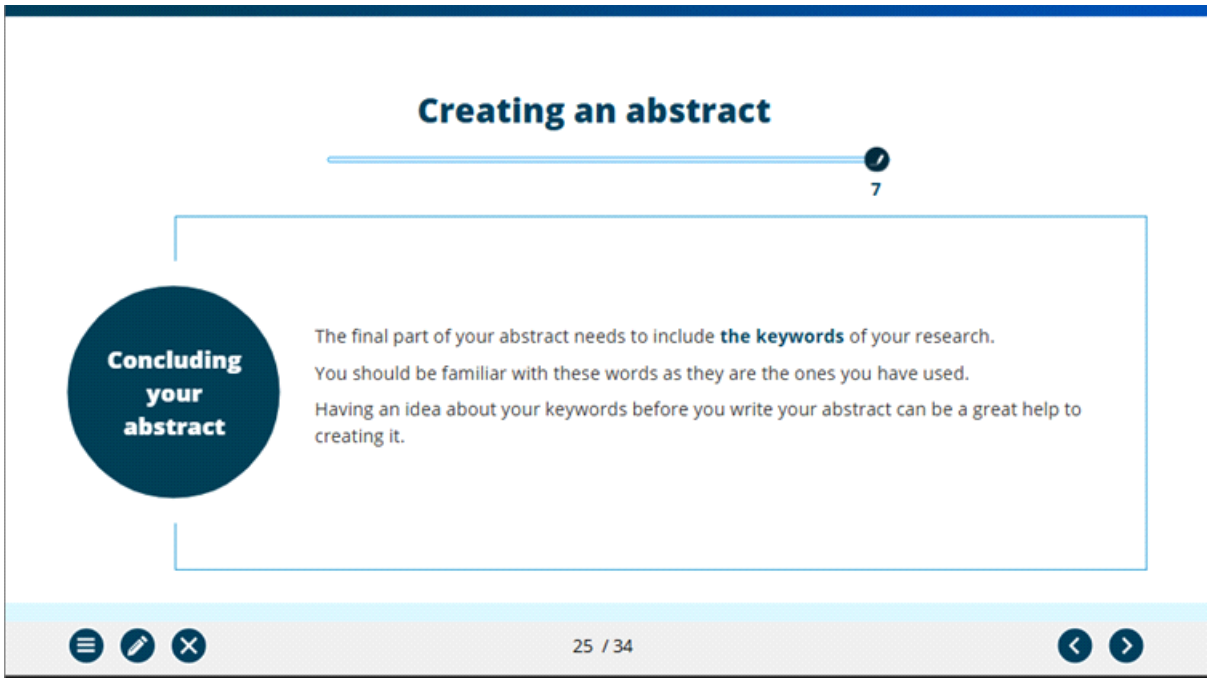
Writing a synopsis

Next will be a synopsis of your **findings**.

For example:

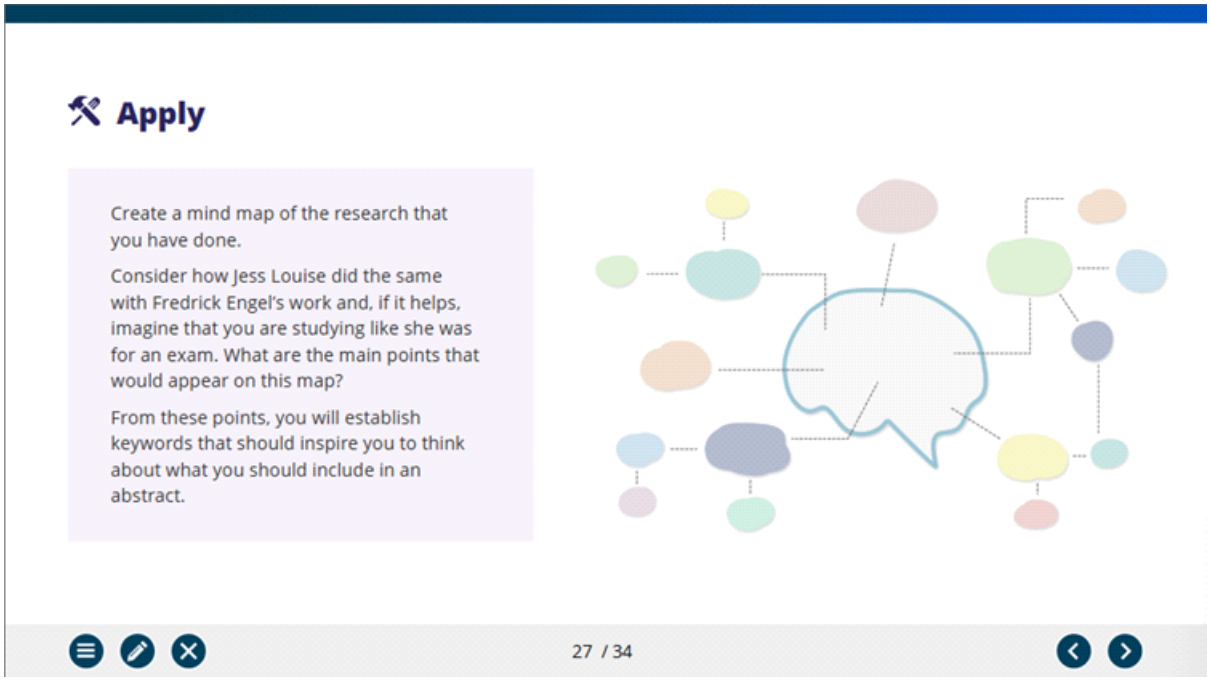
'Findings indicate undergraduates whose programme content is focused on employability and where links are made between content and skills development, are more positive about the skills they have. Further, an association exists between feelings of conscientiousness and level of skill attainment.'





Building a mind map at this stage can help make an abstract of work.

Apply



See appendix one for mind map.

Section 3: Implement an approach to showcase your project

This can be done using posters.

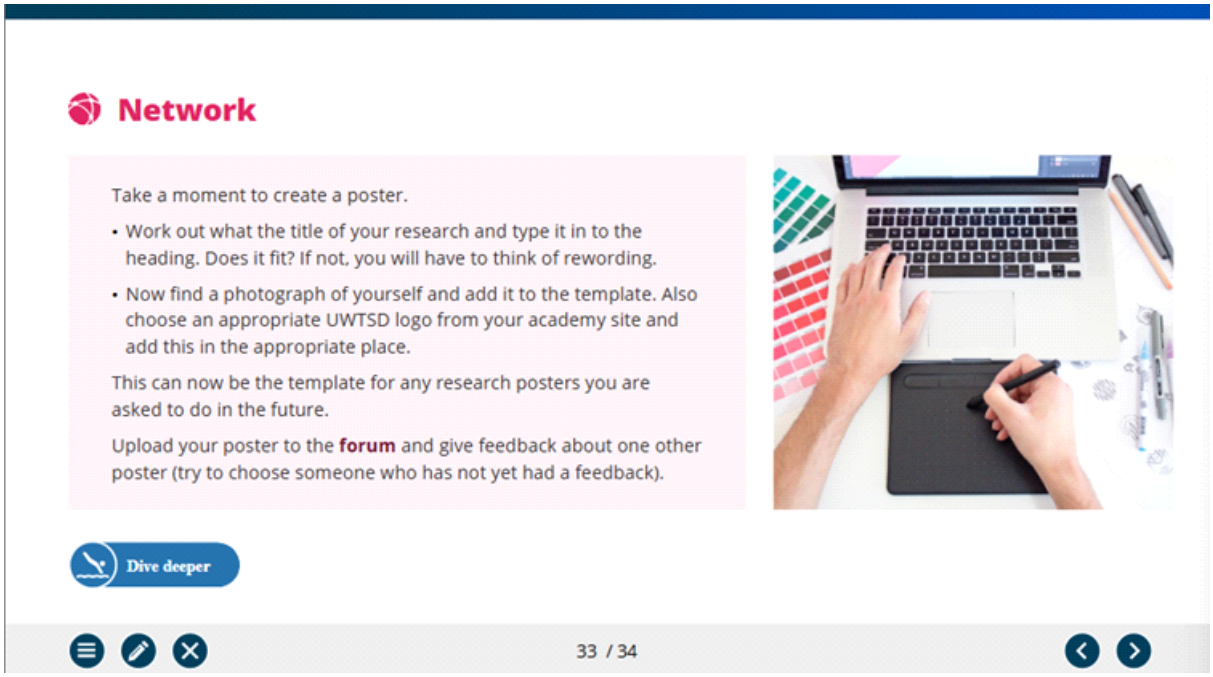
Posters

Notes:

Less is more.

Use PowerPoint.

Network



Poster:



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

Designing Fitness Activity with Social Accountability, Wearable Devices & Big Data Analytics

2317135@student.uwtsd.ac.uk