

LESSON RESOURCE

The Data Lab, Lesson 3: What is Data Science?

Presentation Slide 5 Further Explanation

Data science begins with some data and a hypothesis – an idea that can be tested, using the data, to provide insight or value.

The process of data science requires an experimental approach, where the data scientist will begin by testing their idea and hopefully will emerge with the desired insight. However, in practice more than one attempt may be needed, as the data science project helps an organisation understand what data they need to record and the new data add new insight to the data science project.

Often, a data science project does not end up where it was originally intended as the data itself tells a new story. To do data science well, an organisation needs to learn to respond to this.

Case Studies Questions

- Describe the Case Study
- Main Benefits of Case Study
- Can you think of any other places this could be used?
- Do you think it's a good idea? Say why?

Case Study: Olly The Robot Possible Answers

DESCRIBE THE CASE STUDY	MAIN BENEFITS OF THE CASE STUDY:	CAN YOU THINK OF ANY OTHER PLACES THIS COULD BE USED?	DO YOU THINK IT'S A GOOD IDEA? SAY WHY?
	<p><u>Key points are underlined</u></p>	<p>[In considering other applications, pupils should show a connection to the features of the case study.]</p>	<p>[Pupils may consider this a good idea because of the benefits outlined, or may mention risks either from the case study or from their own knowledge.]</p>
<p>Personalised AI assistant that reads emotions, learns preferences and develops its own personality through interaction.</p>	<p>Responds to users more appropriately for their <u>emotions</u>. <u>Personalised</u> for its user and their needs. Supports users in understanding their emotions.</p>	<p>A study assistant that supports learning. Health assistance for the chronically ill. Response to people with mental illnesses, memory issues or recently bereaved. Supporting productivity and morale in the workplace.</p>	<p>[personal answer, but should be supported] Pupils should note that unlike existing home solutions Ollie tries to be personalised and to support users' emotions. [Some key points pupils may show awareness of in their answers] Pupils may make comparisons to Siri, Alexa and Google Home, but should mention the differences above. Risks of this system that may be mentioned by pupils could include the monitoring of personal data by corporations, that emotional manipulation may be dangerous in an environment with abuse or controlling personalities, or that damage to the individual Ollie owned by a family may result in a factory-restart to default Ollie with the loss of customisation.</p>

Case Study: Football Player Value Indicator Possible Answers

DESCRIBE THE CASE STUDY	MAIN BENEFITS OF THE CASE STUDY:	CAN YOU THINK OF ANY OTHER PLACES THIS COULD BE USED?	DO YOU THINK IT'S A GOOD IDEA? SAY WHY?
	<i>Key points are underlined</i>	<i>[In considering other applications, pupils should show a connection to the features of the case study.]</i>	<i>[Pupils may consider this a good idea because of the benefits outlined, or may mention risks either from the case study or from their own knowledge.]</i>
Using data to assess the value of a particular player based on certain criteria.	The business of football becomes more <u>measurable</u> and <u>transparent</u> . Allows best fit between club and footballer, which <u>saves/wins money</u> .	It could be used in many other well-compensated industries (tech, Hollywood) where personalities may earn substantial rewards. It could be applied to award selection procedures. It could be used as part of media or journalism on particular players.	[personal answer, but should be supported] Pupils should note that using data allows for the high value of some players to be defended, and for other players to begin to understand what drives high value for their colleagues. Pupils may note that it's hard to work out a fair system that rewards players for their effort regardless of their position in the team. Although pupils may not be expected to consider this, it is a risk that if many prominent clubs adopt the same system it could drive a very high market value for some players who fit the profile well while others, who may have other strengths, may not get the same recognition.

Case Study: Smart Housing – Albyn Housing Possible Answers

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	<i><u>Key points are underlined</u></i>	<i>[In considering other applications, pupils should show a connection to the features of the case study.]</i>	<i>[Pupils may consider this a good idea because of the benefits outlined, or may mention risks either from the case study or from their own knowledge.]</i>
<p>Housing equipped with sensors that can predict a person is at risk of falling and intercede to prevent injury.</p>	<p>Older people who are more vulnerable can <u>live independently for longer</u> and be <u>protected</u> from falls that could be particularly dangerous.</p>	<p><i>It could track other sorts of behaviour and support habit-forming activities such as quitting smoking or reducing screen time. It could help people analyse their time-use and optimise their spare time. It could reduce energy use by learning and predicting how rooms are used.</i></p>	<p>(Personal answer, but should be supported) Pupils should note that this system is for people who otherwise may need to move into care homes, and allows them to be independent for longer. Pupils may consider such monitoring to be creepy or undesirable, and this is not incorrect – they should be encouraged to consider why such monitoring might be acceptable in some circumstances and not in others. A key risk in such a system that pupils may recognise is that when we rely on these systems and they fail the consequences can be more severe than if the system is not in place – for instance a family member may hold off calling an ambulance when a monitored resident stops responding because the system hasn't raised the alarm, when in fact all automated systems can make mistakes.</p>

Case Study: Customised Shopping – Online Returns Possible Answers

DESCRIBE THE CASE STUDY	MAIN BENEFITS OF THE CASE STUDY:	CAN YOU THINK OF ANY OTHER PLACES THIS COULD BE USED?	DO YOU THINK IT'S A GOOD IDEA? SAY WHY?
	<p><i>Key points are underlined</i></p>	<p><i>[In considering other applications, pupils should show a connection to the features of the case study.]</i></p>	<p><i>[Pupils may consider this a good idea because of the benefits outlined, or may mention risks either from the case study or from their own knowledge.]</i></p>
<p>Companies who focus on online sales are missing the opportunity to save money on returns.</p>	<p>By changing their interface for customers with different behaviours, companies can encourage customers to <u>maximise sales</u> and <u>reduce returns</u>.</p>	<p>This applies to all businesses selling products online and shipping to the customer. The same approach of customer profiling is valid in advertising and marketing more generally.</p>	<p>(Personal answer, but should be supported) Pupils should note that businesses often consider only sales instead of returns, but that returns cost money. Pupils may draw parallels with the taxi v bus case study. Pupils should take note of the strategies suggested for managing the two example customers through promotions and through controlling what they see on site. Risks of this system that may be mentioned could include that some people may not see a product they are particularly looking for due to this approach. Pupils may also note that there are other options to reduce returns such as displaying clothing on models with various body sizes, having a clear and consistent sizing approach, or partnering with a bricks-and-mortar store to reduce the cost and hassle of returns.</p>

Case Study: Traffic Accidents Possible Answers

DESCRIBE THE CASE STUDY	MAIN BENEFITS OF THE CASE STUDY:	CAN YOU THINK OF ANY OTHER PLACES THIS COULD BE USED?	DO YOU THINK IT'S A GOOD IDEA? SAY WHY?
	<i><u>Key points are underlined</u></i>	<i>[In considering other applications, pupils should show a connection to the features of the case study.]</i>	<i>[Pupils may consider this a good idea because of the benefits outlined, or may mention risks either from the case study or from their own knowledge.]</i>
<p>A dashboard which displays open data about road accidents in Scotland.</p>	<p>The dashboard allows differences in the causes and frequency of road accidents to be <u>compared</u> between cities or time periods. This has implications for <u>health and safety policy</u>.</p>	<p>Visualising data is a good way to draw comparisons and can be used in a wide range of applications – comparing costs, looking into human behaviour, comparing across countries. There are many, many potential examples that pupils may consider.</p>	<p>(Personal answer, but should be supported) Interactive dashboards are an engaging and interesting way to give people control over how they interact with information, and pupils may comment to this effect. Pupils may focus on the traffic data itself, and may need prompting to consider why this has been included as a case study. Risks of this system may not be considered by pupils, but the key risk here is that the data may not be accurate, and that the visualisations discourage the user from considering gaps in the information. Some types of graph can also <i>exaggerate</i> effects, especially if there's actually not much raw data in a particular category, which can lead policy makers to an incorrect conclusion.</p>

Case Study: Taxi v Bus Possible Answers

DESCRIBE THE CASE STUDY	MAIN BENEFITS OF THE CASE STUDY:	CAN YOU THINK OF ANY OTHER PLACES THIS COULD BE USED?	DO YOU THINK IT'S A GOOD IDEA? SAY WHY?
	<i><u>Key points are underlined</u></i>	<i>[In considering other applications, pupils should show a connection to the features of the case study.]</i>	<i>[Pupils may consider this a good idea because of the benefits outlined, or may mention risks either from the case study or from their own knowledge.]</i>
<p>A council had to decide how to best spend their transport budget between bus and taxi services.</p>	<p>An app lets a council see <u>where and when particular routes</u> are used, and therefore decide whether a <u>bus or taxi</u> is more appropriate.</p>	<p>This is a visualisation of data (like the traffic accidents) and also a comparison (like the customer returns) so those aspects could be considered. It is also a geographic display of traffic data that may be used by bus or train companies considering new routes, and may be appropriate for airlines or ferries too.</p>	<p>(Personal answer, but should be supported) Pupils should note that the app uses taxi data to support decisions about bus routes. Pupils may mention the environmental impact of taxis vs buses – although frequent empty bus journeys are more wasteful than a single taxi in some circumstances. The key risk of this system, which pupils may not consider, is that if there are additional taxi companies whose data are not included, the decision may be based on faulty data - some routes may be more popular with the missing taxi company, and the app may display them as uncommon.</p>