Final Presentation Script

eDINBURGH NAPIER UNIVERSITY

Data Visualisations eXAMPLE BANK

Team 13

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Introduction  
Good morning everyone. My name is Martin McVey and together with my team, we are pleased to be presenting to you our final project presentation for Data Visualisations Example Bank. A lot of work has gone into the product we are about to show you, and we hope you are as excited as we are with what we have created.

Before we get started, I would just like to quickly outline how we are going to present our product to you today.

Firstly- we would like to share with you the Summary of the project aims. We will then discuss an overview of the technical approach before demonstrating the final product. Finally, we will discuss the limitations and a roadmap for potential future development before taking any questions you may have.

I would now like to hand over to John who will discuss the summary of the project aims.

# Summary of the Project Aims

Thank you, Martin

The main aim of the project is to help students learning about data science while on their way to achieving a National Progression Award. This should be achieved through an educational website that presents a wide range of chart types with questions and answers for each chart. This will also assist teachers giving lessons on the subject, as they will have interactive materials ready with the content, questions, and answers for their students to explore.

Another aim was to ensure that the web application was user-friendly and intuitive, so that new users would be able to navigate the website freely from the get-go. This is important as the website will be introduced to many students at once, especially when they may be learning at home without supervision.

We wanted the website content to be easy to update, which we achieved through the creation of an easy-to-use content management system that the client’s admins can use. This means that the information on each chart page and the questions and answers can be changed and updated. This also means that the website can be used year after year with new questions and answers being added to keep the content fresh.

And one of the final aims was to make sure that the website can be used by as many students as possible. We knew students would be using a variety of devices, so we wanted to ensure that the website was functional on iPads, laptops, and computers. We aimed to ensure the website was dynamic to suit this requirement. And when selecting the colour palettes, we considered colour-blindness and partially sighted individuals to make the website as accessible as possible.

I will now pass you over to Daniel, who will now provide an overview of the technical approach that we took on this project.

# Overview of Technical Approach

Thanks John,

After our initial meeting as a team, we decided to adopt an agile approach to the project. This approach allowed us to focus on achieving as many Moscow requirements as possible. We prioritised the most important tasks and discussed the work we completed after each sprint weekly. Our stand-up meetings also allowed us to plan and discuss next week’s tasks, so the entire team was clear on our goals.

We felt an agile approach was the best option, as it has become the go to framework for building a quality site quickly and efficiently. Agile maximises value through the development process whilst also allowing us to react quickly to any feedback or changes the client wished to make.

Another decision made early in the project was to ensure the developers of our site all used Visual Studio code editor. This decision was made as vs code facilitates git with ease. Code can be pushed or pulled directly on the software ensuring collaboration and simultaneous work causes no errors. This was realised early into development as issues began to emerge working on different code editors. Merging the code onto git caused complications, however after switching and ensuring all coders worked with a correctly set up visual studio code the process became a lot smoother.

MySQL was picked as our database service. This was because most of the team felt comfortable using SQL compared to only one member knowing Mongo DB. SQL was chosen so numerous members of the team could work on the coding with confidence rather than limiting ourselves to one team member.

Initially we coded the site in html, but as we began to develop further, we realised there was going to be lots of pages and lots of overlap in code. We made the decision to change and code in php for more efficiency. This allowed us to include the header and footer on each page meaning we only needed change it once, and it would change throughout the site. This made us more efficient whilst coding as well as being able to pull data from the SQL database.

By making these decisions and allowing ourselves more options, it allowed us to create a content management system. This system makes it so the client could edit information on their own website easily as well as ensuring future maintenance is easier going forward.

The server used in the project was supplied by the university. It is an Engine- X server running on a ubuntu system. All packages were updated, and we installed a PHP and PHPMyAdmin package to give us easy file management.

During our first meeting with the client, we discussed how they wanted us to achieve certain goals. Initially we agreed on using a d3 library to create the graphs and visualisations for the project. We thought this would give us the best results and it was recommended by the client. After further research and deliberation, another library that was easier to implement, yet gave additional functionality meeting the Moscow priorities was found. Only after contacting the client, we switched to the AnyChart library. We contacted AnyChart and were able to get a licence for free as we are students. Chart.js was used in tandem with the other library as it offered a solution for most general charts. The libraries used have a huge user base and community that made our development easier. Creating interactive charts that bring new features to the pages was seamless as we had a wide range of options available.

As the client requested our site works across multiple devices with different screen sizes, we decided to use Bootstrap open-source framework throughout the site. This made it simple and easy for us to ensure the site not only worked on all devices but looked good to.

Creating a user-friendly interface that was quick and easy to use was a major priority in our project. We needed a way to display over 25 different pages to our users, whilst ensuring the site remained aesthetically pleasing and clear to read. We decided to include small thumbnail pictures within the links and buttons to each page. These images were created by us using the free browser-based graphics editor Figma. This was done as we had no budget for the project but also as it was the only way could ensure the images matched out colour scheme and layout we wanted. Doing this ensures we are safe from any copyright concerns or issues as well as bringing unique fresh content. Figma is easy to use, and some members of the team had used it before. This meant we did not need to learn anything new, and productivity remained high.

Thank you very much, I will now pass over to Flynn who will take you through our site and give you a short demonstration.

# Demonstration

To get started we will briefly introduce the main pages of the website to give an overview of how the site is structured. Here is the homepage. It is the initial entry point for the user, containing the welcome information and what the site offers. At the top we have the navbar that links to the other main pages of the website. And at the bottom we have the footer which contains more information on the Data Education in Schools project and a quick link section which has useful links including the link to the admin login page, which is where all the admin related features can be found such as the content management system that is used for editing text on the website. PHP enabled us to easily reuse the footer and navbar on multiple pages and allows easy further development of these components, as changing the component once in PHP changes it everywhere it is used on the website. Moving on to the chart selection page, this is where the specific charts can be found and accessed. It displays all the available charts that can be taught and a link to each one’s page. The additional resources page contains extra information that is relevant to the topic of data visualisation that users can access.

Going back to the chart selection page we will now demonstrate what the chart pages look like. Each page contains information about the chart and questions and answers relating to that information. The charts were primarily created using Chart.js and its data labels plugin, and AnyChart.js was also used. These are both JavaScript libraries available to use in a non-profit project provided you have got a key from them, which we did. Chart.js is used most of the time but for the charts that are not implemented well by the Chart.js library, AnyChart.js is used instead. These libraries enabled us to add many features to the charts contained on the website that would otherwise not have been able to be there if just a picture or drawing of a chart had been used instead. One of these features was the ability to add interactivity options for the user to experiment with, which would change the chart in real-time. Depending on the chart, the user can have options to add datasets, remove datasets, move sliders, toggle the appearances of a chart, and more. We will show these features in action now. As you can see all these changes are done in real time so the user can see the effect the change they made has on the chart. This helps the user visually learn about charts. The user can also hover over the charts to get more details on the chart itself, like the height of a bar in a bar chart or quartiles in a box plot.

There is also a playground card located at the end of the chart selection list, that is the user clicks on will take them to a page which has a dropdown menu containing many different charts the user can select and view as they wish. The user can also scroll to the bottom of the page, where they will find an area that displays a few graphs which they can change in real time using the sliders given.

The website has been integrated with a database using SQL and PHP. This has allowed us to create a content management system for the admin user(s). Since the website pulls most of its textual content from the database it enables the admin user to edit said database which will in turn change the content of the website. An example of this is the text relating to the questions and answers on the chart pages, all of which are fully customisable by the admin. The admin is not required to have any technical knowledge of databases as we have provided an easy-to-use interface for the user to make these changes. This interface can be found after logging in through the admin login page. We will now demonstrate changing content on the website with the interface provided. [ad lib]

Bootstrap has allowed us to easily make the whole website responsive, allowing it to work on many devices such as tablets and laptops. One example of this responsiveness is the navbar changing its appearance based on the size of the screen [demo the navbar changing to the mobile view explaining] making the website easy for small screens to navigate the website. This was easily implemented using bootstrap as the framework supplies tools to implement this feature. Using Bootstrap, we were able to make the website responsive for most devices as the framework comes with tried and tested media queries for each device dimensions.

# Limitations

Thank you, Flynn.

While the final version meets most of the Moscow principles set out in the beginning of the project and all deliverables have been supplied, there are some limitations of the final version and some suggestions we make for potential future development.

As we have seen, the main goal of the website is to showcase different chart types and assist students and teachers with learning about data science. A current limitation of the final version is that the charts cannot yet be updated from within the content management system. This means that to create new charts, it would require some coding within the JavaScript files. There are possibilities of further developing the content management system so that an admin would be able to edit and update the charts without having to change any code. We strongly suggest this is an area of potential development.

Another limitation of the website is regarding the interactive sections within the chart pages. Currently we have 4 chart types that have interactive sections. This allows users to use sliders and buttons to change the data, number of datasets, and other variables within the chart to show how the charts change as the data changes. This interactive feature is great to help students learn about the chart type and how it represents the data. The ability to implement this across all charts within the time of the project was unrealistic and instead we created a playground page for some added interactivity for students. This page helps to show how the same data can be represented over different charts. A suggestion for potential future development would be to add this interactive section to each of the chart pages to give students an experiment area for each chart type.

Another consideration for future development would be to develop a page within the website, possibly limited to teachers, where they could upload a CSV file to generate a chart with data of their choosing. This would allow the website to showcase fresh data everyday without an admin having to do any work. We were not able to create this functionality within the scope of this project, but we did add a link to the external resources page that has this functionality.

Another limitation for the website is its compatibility across browsers and devices. We have ensured that the website works for most devices bar mobile phones as it was agreed with the client that the students should be using iPads or laptops for their learning experience. The website also has style issues on Internet Explorer; however, this browser is becoming outdated, and less development is focused on it.

Finally, as we did not have a budget to register a domain, we were unable to accrue an SSL certificate. We have set out a list of recommendations within our security test report that the client should consider to increase the levels of security for the website.

Thank you very much for listening to our presentation. At this point, we would like to open the floor to any questions anyone may have regarding the project and the product we have created. And in the meantime, we will showcase some of the charts we have created for the website.