PROGRESS OUTCOME 4

Keeping track of club members

Context

Mr Sims, a teacher and the secretary of the college's golf club, needs a way of organising membership details, subscriptions, and performance rankings for the club.

He has asked Nathan, one of the students, to help set up a system to manage this. Mr Sims has provided him with the necessary data and identified the information the club requires. This includes a term-by-term report showing all club members' first and last names, dates of birth, and total game scores for the term. An additional requirement is a separate report for each age group (juniors are under the age of 14, intermediates between 14 and 15, and seniors 16 and over).

Insight 1: Design decisions and stakeholder feedback

As I sketched out the design of the database, I had to consider the most efficient method of structuring the fields to make it easy to query data and extract information. I also had to think about the easiest way for a user to enter data into the database and the best software to use – I chose Filemaker Pro because Mr Sims has access to this.

Following discussion, we agreed that a form would be the best and easiest way of entering data. I added this to my plan, along with a method for creating the age group reports.

Insight 2: Developing and testing the outcome

As I set up the fields, I was careful to split the first and last name of each member and the different elements of the addresses. I also created a drop-down list to make it easier and faster for Mr Sims to enter the title of each club member. I added a validation rule to the phone number to ensure data consistency, and I included a warning message as a prompt for invalid numbers. I also added an ID field so that each member will have a unique number.

I then developed the form for entering data, which I tested with Mr Sims – I wanted to make sure it was easy for him to use and functioned as intended. On the basis of his feedback, I resized some of the fields.

Insight 3: Creating the age group reports

I entered data for several members from each age group and then performed separate queries to extract the age-group data and populate separate reports. I showed these to Mr Sims. He confirmed they were satisfactory, and I then saved the queries so that he could access and rerun them in the future.

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PROGRESS OUTCOME 4

Keeping a watch on your fitness

Context

The kura holds an annual wearable arts competition as part of its arts and cultural curriculum. Students must work in teams of two or more and complete their entries within one term. Their outcomes are judged by year groups before being displayed at the wearable arts evening. Local businesses and charitable groups sponsor prizes.

One category requires students from two or more different specialist subjects to collaborate on the design and development of an outcome. Jade and Aniwha have worked together on an entry in this category.

Insight 1: Design and construction decisions

My friend, Aniwha, is very skilled at fabric construction, and I'm good at building and programming circuits. We decided to together make a 'health watch' that would remind its wearer to complete activities for improving their health and well-being.

We came up with the idea of a wristband with LEDs. The LEDs would display a sequence that would prompt the user to exercise and that they could change to show that they had completed the exercise.

As the electronics expert, I had to understand the components and their functionality to ensure that they worked well in the finished outcome. I knew that the components had to be as compact as possible, so that our wristband would be lightweight and comfortable for the wearer.

We decided to sew an electronics board and battery holder into a wristband. We selected ultra-bright LEDs that could be chained together.

We sketched out our initial design ideas (including possible symbols for the user interface) and got feedback from potential end users, which helped us develop specific criteria.

Insight 2: Installing and testing components

I investigated how to sew the components on and connect them using conductive thread, while avoiding any short circuits. Building the circuit proved to be the biggest challenge – securing the components using the thread was a much more complex task than I had expected, but working with Aniwha meant we could problem-solve together and find ways to make everything work.

Once the components were sewn on and connected, we tested the LEDs to ensure they were visible on the fabric we'd chosen. The LEDs allowed for multiple colours, so we plugged the electronics board into my computer and used an open source microcontroller to modify the code to select the most appropriate colours.

Insight 3: Meeting end-user requirements

We then trialled the wristband with end users. This raised a concern with the functionality and design of the user interface, so we adjusted the symbols on the wristband to make sense to the wearer – so that, for example, they didn't put it on the wrong way round.

Finally, we tested the connectivity of the circuits under different physical situations. We used a range of students completing different fitness activities: skipping, a beep test, gymnastics, and cheerleading. The wristband fitted our chosen testers well and stood up to the activities.

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PROGRESS OUTCOME 4

A computer for the shearing shed

Context

The school farm has a shearing shed on the grounds. The farm is constrained by tight budgets but wants to have a working computer system in the shed with basic functionality for recording farming data.

In consultation with the farm manager and the school network manager, Zoe has been given access to some computer equipment no longer needed by the school to develop a system.

Insight 1: Design decisions

I sketched out a plan of the components, hardware, and software I would need to create a working computer system and discussed this with the network manager and farm manager. I then checked the available components to ensure interoperability and safe use and was able to confirm that I had all the necessary components.

Insight 2: Installation and testing

I configured the computer system hardware by installing and testing the internal components. The computer didn't respond, so I knew there was an error and had to troubleshoot to discover that the problem was the RAM seating and the internal cable connections. I attached the other computer peripherals (mouse, keyboard, and screen) and made sure all components initially functioned.

Following consultation with the farm manager and considering the budget, I selected Linux® as the operating system because it's open source with no cost for using it. I explained to the farm manager how Linux compares to proprietary software. I downloaded and installed the most recent version and ensured all components were recognised by the system.

💡 Insight 3: Meeting end-user requirements

After discussing storage requirements with the farm manager, I determined that he needed some spreadsheeting software. I installed Open Office, which again is non-proprietary and has no cost associated with its use.

The farm manager tested the system. It met his requirements, but he was concerned about security when students were in the shed. I installed a BIOS password and got the manager to set a password.

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PROGRESS OUTCOME 4

Programming pizzas

Context

Students in a year 11 class have been investigating systems in local businesses. Their aim has been to identify a need for increased efficiency that a design intervention could meet. They would then develop a basic digital program to respond to this need.

Kyle has worked with a partner to design a program for a new local pizza business.

Insight 1: Design decisions

To help us understand the task, we completed a case study of the business. We wanted to know what it needed to function more efficiently so that we could apply our knowledge about systems thinking to program a digital solution.

We decided that the most logical solution was to design a program to track the volume of pizza toppings used and automatically produce a regular list of what needs to be ordered when levels fall below a set amount.

Insight 2: Construction and testing

We created the variables from the data the manager provided for each of the toppings, including how long each ingredient remained fresh compared with the amount that was typically used on particular days of the week. This meant we could use test data for developing our code.

We included actions (purchase of the toppings), conditions (logging the use of toppings from sales data), and conditional control loops that adjusted the data accordingly.

At this stage, we looked at the problem again and came up with some simple test code to check our solution. This helped us identify some further issues that needed to be addressed. After addressing these in our program plan, we started writing the code.

Insight 3: Meeting end-user requirements

Each time we made changes, we discussed them with the manager. This proved vital to the process of developing a successful program. We found we needed help with debugging, as at times it was overwhelming.

During testing the manager decided that the program needed to include sauces. But adding the tracking of sauces was problematic, because they were in liquid form and the code was set up to track volumes and weights. If we'd had more time, we could have done this, but our deadline didn't allow it.

The final program was successful in that the store manager could see at a glance what was being used and needed reordering and what was close to its use-by date to create specials.

We also tested the final outcome using data from our school food technology rooms. We found that the program was transferable and could be used for their tracking systems too.

PROGRESS OUTCOME 4

Designing a portfolio website

Context

Amber has been designing and coding a website to showcase her visual arts portfolio. During the process, she had to make decisions regarding the website's design, layout, image file sizes, and file types, all of which have an impact on its usability and functionality.

Insight 1: Preparing images

Because I'm developing a website to showcase my visual arts portfolio, the quality of the imagery is an important consideration. I decided to use one of the school's high-quality digital cameras and shoot my artwork in the photography room to ensure consistent lighting.

However, I couldn't put the raw images straight onto my website, as the large file size would make the download time too slow (when researching human–computer interaction, we learned that most users won't wait longer than a few seconds for a page to load). So I used GIMP to scale the images to fit my design and exported them as optimised jpegs, which testing had proven would give me the best quality for a reduced file size.

Insight 2: Website design

When developing my design, I researched websites of photographers and artists to see what works best when displaying portfolios. I learned that most portfolio websites have smaller thumbnails of images for the user to browse and navigate for a larger view.

From my research I realised it's important to use a neutral colour scheme without background patterns so that the focus is on the artwork rather than the website graphics. I also wanted only a small amount of text so that the artwork could be as large as possible.

Before starting to code my design, I got feedback on it from my visual arts teacher and classmates, because they understand design aesthetics and often look through art-focused websites. I also asked my digital technology teacher about whether my design would be able to be coded effectively. I integrated their feedback into my final design.

Insight 3: Development and improvement

From our practice in web coding, I realised that it would be more efficient to first plan out my page structure on paper, thinking about HTML tags I would need. I coded the structure and then I applied some basic Cascading Style Sheets (CSS) to see how it would look. (It's easy to make changes to the CSS and look at them in the browser for quick testing.)

Once I had worked out the structure, I started adding some content and the colour schemes and fonts. I used comments in my HTML and CSS to help me with my testing because you can comment out parts and easily go back and forth between choices. My classmates and my teacher helped me to make decisions about size and font choice that matched my design aesthetic and made the information easy to read.

Insight 4: Browser testing

All along, I had been testing my website on my laptop in both Chrome and Safari as they are the most common browsers for macOS. My teacher had set up a server so that we could upload our websites and have others test them out. Having my classmates and parents test my site on different computers and browsers showed me things I could improve if I ever wanted to use it professionally. I decided to make sure it worked on modern browsers but didn't waste time checking whether it worked on older ones, because it was currently only for personal use.

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