Digital technologies - detailed explanations

Below are some detailed explanations of the content descriptions featured in this learning sequence.

Strand: Knowledge and Understanding

Content description: Investigate how data is transmitted and secured in wired, wireless and mobile networks, and how the specifications affect performance (ACTDIK023)

Explanation: Modern computing systems rely extensively on networks for transmission and communication over a wide variety of physical media. Moving data through these networks, in a format that is easy to transfer, retains all of the message contents and guarantees some level of security is essential for modern society to function as it does. The choice of physical medium and the packaging up of data has implications for a number of factors including cost, speed and reliability, and all of these must be taken into consideration when examining the use case of a particular network.

By having students investigate the way data travels and the many competing issues that need to be addressed, and helping them develop an awareness of the many differences between the types of networks we use today, they begin to understand why it is that we often experience problems with our networks (for example, insufficient capacity on cell towers at special events, congestion on network services at peak times, and slow rates of transfer as we move further from our wireless sources). As more and more of our software is distributed through online mechanisms (such as updates to operating systems and games on consoles and computers), and we turn to the Internet for more of our entertainment and work needs, the pressure we exert on existing infrastructure becomes an issue that has far reaching implications for us socially and economically.

The scale of global networks such as the Internet is far beyond comprehension for most students of this age, so having them draw similarities to networks they are more familiar with (such as local transportation networks) can help make the issues more tangible and easier to understand. It also gives them an alternative context in which to apply their learning – congestion on public transport at peak times becomes understandable, as students see that there is a limit to the additional number of trains you could use on a single line without having significant negative impact on other lines. This is the real challenge for network designers – how can you minimise the number of bottlenecks that ultimately hinder the performance of the network as a whole? Students should be encouraged to continue investigating these issues beyond the simplified examples presented through this activity. While the examples are sound conceptually, there is much more going on that may be of interest to students, particularly those who are interested in the concepts or who are performing well academically. The material covered here is a solid foundation for the Knowledge and Understanding strand of the years 9 and 10 band, and for senior secondary and tertiary study.

Computer chatter

Strand: Processes and Production Skills

Content description: Acquire data from a range of sources and evaluate authenticity, accuracy and timeliness (ACTDIP025)

Explanation: As students become more capable users of the Internet and begin constructing their own knowledge from sources they select, being able to analyse the quality of the information they access becomes more important. Whereas young students rely on an informed peer or adult to provide them with the correct information, more independent, older students will tend to gravitate towards sources that affirm their beliefs, or that they find accessible and easy to understand. If these are not good sources, then what they 'learn' will contain factual inaccuracies or a lack of supporting evidence.

Through research tasks such as the one presented in this resource, students have the flexibility and scope to perform their own research within a structured environment, in this case supported by the teacher librarian. A valuable part of early research tasks, particularly when faced with topics where the language used is quite technical or unfamiliar, is learning how to validate the information presented through alternative sources.

The presentation of that research through an appropriate medium that allows the student to demonstrate their learning is in itself a learning process. As students identify the challenges associated with their choice of medium, they will develop solutions to overcome those challenges, and become more knowledgeable about how best to present what they know. Although explicitly listed as a content description in the Digital Technologies learning area, the acquisition and validation of data is an important skill in any learning area. When working directly with datasets that students may be required to manipulate and analyse, skills they have developed working with more familiar data sources help them be more critical users of data.