Stage 5 Information and Software Technology

Year: Year 9 **Teacher:**

Topic: Option 1: Artificial intelligence, simulation and modeling **Time:**

This option involves students making decisions in order to solve real-world applications. Students experience the use of an expert system as well as neural network application and are able to compare the two methods for solving problems. Students have the opportunity to manipulate variables in a simulation program in order to observe trends and subsequent results. Models can be related to generate solutions to real-world problems.

Outcomes

A student:
5.2.1 describes and applies problem-solving processes when creating solutions
5.2.2 designs, produces and evaluates appropriate solutions to a range of challenging problems
5.2.3 critically analyses decision-making processes in a range of information and software solutions.

Students learn about:	Students learn to:	Teaching and learning strategies	Resources	Registration
Artificial intelligence • definition of intelligence and artificial intelligence	• define and describe artificial intelligence	• Research project: Students are to complete research and an oral presentation using Microsoft *PowerPoint* on the history and current uses of AI provided in a handout that includes web resources.	• Oral presentation project.	
• historical perspective of artificial intelligence	• investigate the work of pioneers of artificial intelligence, for example Alan Turing			
• research (core)	• use electronic communication to research data and information relevant to solutions			
• producing the solution (core)	• develop and implement the stages involved in the completion of a solution • apply set criteria to choose the most appropriate solution			
• intelligent systems • knowledge bases • demons • agents • expert systems • neural networks	• identify a range of intelligent systems including games • examine a range of expert systems • explore and contrast the uses for demons, agents, expert systems, neural networks and knowledge bases • investigate the creation of an expert system shell for a particular purpose			

Students learn about:	Students learn to:	Teaching and learning strategies	Resources	Registration
Requirements of artificial intelligence • software	• research the requirements of artificial intelligence for a range of situation			
• copyright and/or licensing (Core)	• examine legal issues as they apply to the development of information and software technology solutions			
• demands on memory (Core)	• discuss how software packages affect hardware requirements • calculate memory requirements for specific purposes			
• hardware	• research the requirements of artificial intelligence for a range of situations	• End of AI Project	• End of oral presentation project	
Modeling and simulations • definition of a model and a simulation	• define and describe models and simulations	• Comprehension and class discussion	• Wilson, C. (2001) Exploring Computing Studies, 2nd edition, Cambridge University Press, pp. 71–72, Unit 13.1.	
• purposes of models and simulations	• investigate the purposes for models and simulations in a range of situations			
Evaluation criteria (core) • ethics (core) • environment (core)	• establish criteria for the evaluation of solutions • evaluate solutions using established criteria	• Hypothetical discussion: “Is it appropriate to simulate violent acts in computer games?” • Brainstorm: Criteria that could be used to evaluate a simulation program. Ask students to change situations/circumstances to test their criteria.		

Students learn about:	Students learn to:	Teaching and learning strategies	Resources	Registration
Requirements of models and simulations such as • hardware needs such as speed, storage	• examine the hardware needs for operating simulation programs	• Comprehension and class discussion.	• Wilson, C. (2001) *Exploring Computing Studies*, 2nd edition, Cambridge University Press, pp. 244. Unit 13.2.	
• secondary storage such as random and sequential access (core)	• describe the functions of primary and secondary memory	• Web inquiry: "Research secondary storage devices that would be used by simulator systems. Discuss how these systems work."	• Internet	
• secondary storage media such as tape, disk and optical media (core)	• select and use the appropriate data storage media for a given situation in an ethical manner • state the reasons for the range of data storage and media formats	• Comprehension exercise.	• Wilson, C. (2001) *Exploring Computing Studies*, 2nd edition, Cambridge University Press, pp. 84–87. Exercise 5.4.	
• bits and bytes such as kilobytes, megabytes, gigabytes and terabytes (core)	• discuss the units used when measuring data storage	• Comprehension and class discussion.	• Wilson, C. (2001) *Exploring Computing Studies*, 2nd edition, Cambridge University Press, pp. 78–79. Unit 5.2.	
• simulators such as flight, driving	• explore a range of simulations	• Comprehension and class discussion.	• Wilson, C. (2001) *Exploring Computing Studies*, 2nd edition, Cambridge University Press, pp. 251. Unit 13.5	
• software requirements including languages	• identify software requirements for models and simulations	• Comprehension and class discussion.	• Wilson, C. (2001) *Exploring Computing Studies*, 2nd edition, Cambridge University Press, pp. 78–79. Unit 13.3.	

Students learn about:	Students learn to:	Teaching and learning strategies	Resources	Registration
Project development • processes and techniques	• design, produce and evaluate a simple project for a real-world application either separately for this option, or integrated with other options	• Lemonade project.	• Lemonade project handout. • http://www.lemonadegame.com/	
• quality of information such as (core)				
• accuracy (core)				
• relevance (core)				
• roles and responsibilities of group members (core)	• establish and use strategies for effective collaboration			
Advantages and limitations of models and simulation programs for: • predictions such as global warming, ozone layer changes	• investigate the use of educational simulations and games • propose advantages and limitations of simulation and modelling programs	• Discovery learning: Using the Internet students are to find different 3 simulators on weather forecasting, global warming, ozone change and AI simulators. List and discuss +, – of each using established criteria.	• Internet especially Australian weather forecasting sites.	
• trial situations such as weather forecasting	• investigate and evaluate predictions and trial situations that used model and simulation programs			

Students learn about:	Students learn to:	Teaching and learning strategies	Resources	Registration
Using model and simulation programs • variables to ensure accuracy	• examine a range of simulation programs and describe how variables are adjusted to ensure accuracy	• Lemonade Project	• Lemonade project handout • http://www.lemonadegame.com/	
• code of practice and conduct (core)	• research and report on ethical issues relating to the development of information and software technology solutions			
• spreadsheets • what-if predictions for spreadsheets such as goal seek and look ups	• use spreadsheets to make predictions • critically analyse the effectiveness of spreadsheets when solving a problem for a particular situation			
• input/processes/output table (Core)	• model possible solutions using a range of methods			
Careers in information and software technology (Core) • career paths	• explore career opportunities and pathways for people within the field of information and software technology • discuss the use of information technology skills across industry and for self employment	• Student investigation of careers in AI modelling and simulation.	• Internet	

Additional content

Students learn about:	Students learn to:	Teaching and learning strategies	Resources	Registration
• spreadsheet design	• design, produce and evaluate a predictive spreadsheet including macros for a specified situation	• Lemonade project	• Lemonade project handout • http://www.lemonadegame.com/	
• simulation software	• examine and explain the operation of selected simulation software			