Stage 2 Digital Technologies

Assessment Type 1: Project Skills set of tasks

Description of Assessment

Complete four project skills tasks in which you identify, deconstruct, and solve problems of interest by applying:

* computational thinking skills, including use of abstract reasoning
* data analysis skills
* design and programming skills
* iterative project development techniques.

Each of the four tasks is based on the following scenario.

Scenario

One of the earliest computer games developed was *Pong*. The game is a two-player game, in which each player moves a ‘bat’ vertically to hit a ball back and forth until one player misses the ball.

The task is to create your own version of *Pong*.

Your version should include the following features:

* allow 2 players to control a bat at either end of the screen that can move up and down
* the controls for the left bat should be A for up and Z for down and the controls for the right bat should be L for up and K for down
* increase speed after a certain number of hits (you determine)
* once a player misses 3 times, game is over
* keep score (number of wins) for each player
* use a creative interface

Complete the following four project skills tasks to create your version of *Pong*.

Task 1: Computational thinking

Task 2: Data analysis and ethical implications

Task 3: Programming

Task 4: Project development

Together, the four project tasks comprise the equivalent in multimodal form of a maximum of 20 minutes.

Task 1: Computational Thinking

Description of Assessment

Work collaboratively to analyse the features of the *Pong* computer game problem. As a group, choose two of the features of the game to analyse. Use computational thinking to break down the features of the problem and identify any repeating patterns.

Working in groups of three or four:

* select the two features to be analysed
* determine the roles and tasks for individual group members
* decide on how to keep records of the collaboration of group members using appropriate web based software
* use computational thinking to analyse the two selected features of *Pong*, break down the features logically using structure charts, flow charts and/or mind maps, and look for repeating patterns in the features or similar problems that arise. Consider the following steps in the analysis:
* identify the multimedia elements in the game
* identify the variables controlling these elements
* identify the collisions
* recognise patterns in the game, for example are there similar outcomes when the ball hits the bat or the wall
* recognise patterns that can be represented as functions or procedures
* identify the application of sequence, selection and iteration in the programming of the game
* meet with the teacher at least twice to monitor how well your collaboration is working
* download and play an ‘aliens’ game or an ‘arcade duck’ game, compare the features of this game with those of *Pong*

Assessment Conditions

Each group presents their findings in a multimodal presentation, to a maximum of 5 minutes or equivalent. Each group member includes evidence of their individual contribution to the task in the form of web postings, vlogs or social media updates. An example of a vlog can be found [here](https://www.youtube.com/watch?v=gnHCw87Enq4).

The presentation should include graphical evidence of:

* the computational thinking concepts and techniques that the group used to identify and deconstruct the *Pong* problem
* the group’s use of abstraction to identify core concepts and ideas
* each group member’s role in and contribution to the task.

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| *Learning Requirements* | *Assessment Design Criteria* |
| 1. apply computational thinking skills, including abstraction, to approach, identify, deconstruct, and solve problems of interest 2. analyse data sets related to problems of interest, to identify patterns and/or trends, draw conclusions, and make predictions 3. apply iterative project - development techniques to manage and evaluate proposed digital solutions to problems of interest 4. apply design and programming skills to create and document digital solutions 5. research and discuss ethical considerations in digital technologies 6. work individually and collaboratively to create and explain digital solutions. | Computational Thinking  The specific features are as follows:  CT1 Application of computational thinking concepts and techniques, to identify and deconstruct problems of interest  CT2 Use of abstraction to identify core concepts and ideas  CT3 Analysis of relationships in datasets to draw conclusions and make predictions  CT4 Application of skills and processes to develop solutions to problems of interest  Development and Evaluation  The specific features are as follows:  DE1 Design and creation of digital solutions or a prototype  DE2 Application of iterative development, testing, modification, and documentation of a digital solution or prototype  DE3 Evaluation of the effectiveness of a digital solution or prototype  DE4 Explanation, with supporting evidence, of own role in and contribution to projects  Research and Ethics  The specific features are as follows:  RE1 Research into and discussion of the ethical considerations in digital technologies. |

Task 2 Data Analysis and Ethical Implications

Description of Assessment

Apply your computational thinking skills to extract, interpret and analyse data sets. Analyse the data sets to identify simple and complex relationships in the data. Consider the social and ethical implications of collecting and using data, and any issues this may raise in the design of your version of *Pong*.

Working individually:

* read the following blogs:
  + [2015-global-video-game-stats-whos-playing-what-and-why](http://www.bigfishgames.com/blog/2015-global-video-game-stats-whos-playing-what-and-why/)
  + [android-gaming-statistics-2014-a-worldwide-glimpse](http://www.bigfishgames.com/blog/android-gaming-statistics-2014-a-worldwide-glimpse/)
  + [2016-video-game-statistics-and-trends](http://www.bigfishgames.com/blog/2016-video-game-statistics-and-trends/)
  + [Pokémon-go-addiction-game-design](http://www.bigfishgames.com/blog/pokemon-go-addiction-game-design/)
* locate and examine the data sets used by the 4 web references to establish their arguments
* identify any other issues from the data sets
* identify the simple and complex relationships in the data
* identify and discuss at least two ethical issues raised in these blogs.
* read the following article:

Posso, A. (2016) Internet Usage and Educational Outcomes Among 15-Year-Old Australian Students. International Journal of Communication 10 (2016), 3851-3876

* answer the following questions:
* Are Posso’s findings surprising to you? Explain why, or why not.
* What are the implications of the issues raised in the blog entries, data sets, and Posso’s research for the design of the *Pong* game you are developing?
* What are the ethical implications for any solution that you create?

Assessment Conditions

Prepare your individual report. Your report should be a maximum of 5 minutes in multimodal form. Your report should provide evidence of your:

* analysis of relationships in datasets
* research into the ethical implications of data collection and use
* consideration of the ethical implications for the design of your *Pong* game and other digital solutions you create.

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Task 3: Programming

Description of Assessment

Apply your design and programming skills and use the information you generated in the computational thinking task to create modules that can be blended into a basic program for *Pong*. Your teacher will provide you with this basic program.

Your modules must transform data into information using the basic *Pong* program. If you present a model, there should be enough programming present to clearly explain how the solution will produce an output.

You should develop those features selected for the computational thinking task.

For the two features you have selected:

* use computational thinking skills to design a solution prior to coding and develop your code
* use variables, expressions, assignment, input/output commands, and the constructs of sequence, selection, and iteration to achieve an output(s)
* use basic data structures (strings, numbers, Booleans, and arrays)
* test the code
* fix syntactic/runtime errors and develop and execute test cases to identify logic errors before you submit your program
* use commenting to explain how your program will produce an output
* ensure your game is working, complete and well designed
* evaluate the effectiveness of your solution:
* comment on the programming skills you have demonstrated in the features you developed
* comment on more efficient ways to program, for example:
* have you used any arrays, if so where and why?

Assessment Conditions

Prepare a digital solution or prototype with accompanying screen capture validation. Your digital solution should be no more than 1 GB, and your evaluation to a maximum of 3 minutes in multimodal form. If you present a prototype, there should be enough programming present to clearly explain how the solution will produce an output. Your screen capture validation should provide evidence of:

* your application of skills and processes to develop a solution or prototype
* your initiative in the design and creation of a digital solution or prototype
* an evaluation of the effectiveness of your digital solution or prototype.

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Task 4: Project Development

Description of Assessment

Reflect on your work in the computational thinking task and the programming task, and the two features you selected to develop.

As a starting point, work in the same group as for the computational thinking and the programming tasks, and produce a project timescale for each task, showing each group member’s contribution to the solution:

* use specific examples to show your contribution, refer to the records (web postings, social media updates, vlogs) you kept in the computational thinking task,

Consider the following questions:

* How did you decide which two features to develop?
* Why were they important?

Explain the method you used to develop these features:

* How did you sequence the stages of development of each of the features?

Evaluate your development of the features

* Applying the learnings from this process, what would you do differently next time?

Assessment Conditions

Present your report in multimodal form, to a maximum of 5 minutes. Your report should provide evidence of:

* the application of iterative development
* evidence of your role in and contribution to the computational thinking and the programming tasks.

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