Level 6 – New Zealand Curriculum

DIGITAL TECHNOLOGIES & HANGARAU MATIHIKO

Teaching and learning programme

Game development

MINISTRY OF EDUCATION
TE TĀHUHU O TE MĀTAURANGA

Developed by Kath Langman, Hillcrest High School, 2018

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Summary of the teaching and learning programme

Teenagers love games. Being able to build their own game from the ground up is hugely motivating. There are many skills to be learned in being able to design and build a game. Using game development, students will be guided to use iterative development (with the option of using Agile Scrum methodologies) to develop a successful outcome.

By the end of this teaching and learning programme, students will be able to:

- understand the game design elements and human computer interaction (HCI) to formulate an idea and interface
- use modelling and planning techniques
- use iterative processes to develop a fun and entertaining game in a programming language of the teacher's choice.

Duration

This programme is designed to be completed in one term (9–10 weeks). However, it may take longer depending on timetables and your student community.

Key teaching and learning concepts – the big ideas

- Game development principles
- Human–computer interaction (HCI)
- Technological modelling
- Iterative development (options of utilising Agile software development methodologies).

Alignment to NZC and/or Te Marautanga – (DTHM progress outcomes and progressions)

DTHM – Computational Thinking for Digital Technologies: Progress outcome 6

Areas of modular structured programming.

DTHM – Designing and Developing Digital Outcomes: Progress outcome 4

Iterative development of a digital outcome.

NZC – Technology: Technological Practice, level 6

Working through the technology process of planning, brief development and outcome development and evaluation.

Key competencies focus areas: Managing self and relating to others

- Managing their digital work and time management to meet project milestones
- Relating to how others think and feel when using digital solutions.

Links to other learning areas

- Technology
- Maths
- Design.

Teaching and learning pedagogy

- Group work (allow students to work in groups of 2–3 students on a larger game)
- Differentiation (allow students to work at a pace and level they are capable of)
- Consider the incorporation of key competencies
- Shared learning (encourage students to share their ideas, gain feedback and seek out appropriate solutions).

Prior knowledge and place in learning journey

This would ideally be suited to teach in terms 2 or 3 of a year 11/NCEA Level 1 course after introductory programming concepts have been taught.

Students are expected to have basic understanding of a programming language prior to this programme. This may be Visual Basic, Scratch, Python, Small Basic, Gamemaker, and so on.

Teachers will need to work with students to create an initial proposal. This could be created while learning the first part of this project.

Resources required

- Computers
- Programming development environment
- File-sharing method
- Pen, paper, scanner, and camera
- Coloured paper, scissors, and pens
- Sticky notes.

How you might adapt this in your classroom

You could set a theme for all students to work on, or they could choose their own. Possible themes might be: historical, futuristic, environmental issues or awareness, sport, water or ocean.

Students who work more quickly and are confident programmers can add additional levels and functionality to their game. Alternatively, less confident programmers can focus on different elements to make the game fun, such as simple scoring, increasing speeds and interesting comments.

Assessment

AS91884 (1.8): Use basic iterative processes to develop a digital outcome – 6 credits.

There is an assessment task at the back of this teaching and learning programme.

TERM OUTLINE

Teaching and learning programme

What is being covered	Approximate duration	Specific learning outcomes *Students will be able to:*	Learning activities	Checkpoints
Research game development	1 week (4 hours' class time)	• understand the process of developing a game.	• Review brief and feedback • Case study – Blackout sports (concept designs) • Tangential learning or edutainment • How to be creative • What makes a good game? • Game design elements.	Game Development teachers' notes PPT Game design template
HCI analysis	½ week (2 hours' class time)	• analyse game interfaces to understand what makes a good user interface.	• What are heuristics? • Analyse examples of game elements that relate to the heuristics.	HCI teachers' notes PPT
Planning and modelling	2 weeks (6–8 hours' class time)	• have a clear guide of what they are going to make and be open to changing their ideas based on feedback.	• Choose sketching or designing tools. • Get feedback and modify designs. • Implications: What do we need to consider? • Create a paper prototype and get feedback.	Modelling teachers' notes PPT
Agile	½ week (2 hours' class time)	• understand what Agile software development is and how it can improve teamwork.	• What is Agile software development (Scrum)? • How can we use it for our project? • What tools shall we use? For eg, Post-its, Trello. • Decompose game into 3 components: *graphics, interface, program*. • Set up a Scrum board.	Agile teachers' notes PPT Template – Breaking down your game.doc

What is being covered	Approximate duration	Specific learning outcomes *Students will be able to:*	Learning activities	Checkpoints
Game development	5 weeks	• work in an iterative way to develop components of their game.	• Follow an iterative process of building, trialling, testing and refining of *graphics, interface, program*. • Investigate different graphics software options. • Build graphics. • Set up a structure chart of their game. • Consider and address relevant implications. • Build the interface. • Program elements of the game. • Participate in regular weekly 'stand-up' meetings to check progress.	Making Your Game teachers' notes PPT Trialling and testing log template.doc Refer to Trialling and Testing Log teachers' notes for simplified diagram of process and explanations of evidence required.
Final evaluation and GameCon	½ week (2 hours' class time)	• show off their games and reflect on the project • positively and constructively learn from the process.	• Hold a game convention (GameCon) to test their games. • Consider what lessons they have learned about: – Agile, working with teams – breaking down big problems into smaller components – game and software development. • Make notes for the next time they make something.	

ASSESSMENT TASK

Achievement standard:	91884
Standard title:	Use basic iterative processes to develop a digital outcome
Total credits:	6

This resource:

- Should be subjected to the school's usual assessment quality assurance process
- Should be modified to make the context relevant to students in their school environment and ensure that submitted evidence is authentic

OVERVIEW

This assessment activity requires you to work through the development process to make a game on an interest area that you choose.

HOW WILL YOU BE ASSESSED?

You will be assessed on planning and developing an outcome. While developing the outcome, you will be expected to split the task into smaller components and then trial, develop and test these.

Achieved:

- Identify the interest area you have decided to focus on.
- Plan your game development by decomposing the task into smaller components.
- Trial and test each of the components.
- Describe any implications at each stage.

Merit:

- Use information from testing and trialling to improve the game
- Trial multiple components and/or techniques and select the most suitable
- Address relevant implications

Excellence:

- Apply information from planning, testing and trialling of components to develop a high quality outcome (game).

ASSESSMENT TASK

Achievement standard:	91884
Standard title:	Use basic iterative processes to develop a digital outcome
Total credits:	6

TASK

Prior to starting this task, you need to have developed a proposal for a digital outcome to address an interest area (or problem, need, opportunity).

You will need to:

- sketch the interface(s) of your game proposal
- sketch the structure and content flow for your game proposal, ensuring it complies with game design principles (eg, rewards, punishments)
- plan your game by decomposing your proposal into smaller components
- trial the components of your game in an iterative manner
- consider and describe relevant implications (eg, usability, functionality, game design principles)
- investigate possible options for components and their implications (eg, social and ethical)
- select the most suitable components to use in your project
- record and track your selected components with version updates based on testing and trialling
- make your components (using information from trialling)
- put components together
- test that the digital outcome functions as intended.

HAND IN

- Your trialling and testing log (which should include scans of any brainstorms, sketches, notes you have created during the project)
- Your completed game.

TEACHER GUIDELINES

The following guidelines are supplied to support teachers/kaiako to carry out valid and consistent assessment using this internal assessment resource.

Teachers/kaiako need to be very familiar with the outcome being assessed by the achievement standard/s. The achievement criteria and the explanatory notes contain information, definitions and requirements that are crucial when interpreting the standard and assessing students/ākonga against it.

Please be aware that NZQA have read the assessment task but the task will still need to be checked by the teacher using the assessment to ensure it meets all requirements.

CONTEXT/TE HOROPAKI

The assessment activity requires students to plan and develop a refined game outcome based on an interest they want you to know more about.

Students will split the task into components which are required in their game and trial these in an iterative manner. They then select the most appropriate ones to use. Iterations should consider relevant implications and address these at each stage.

CONDITIONS/NGĀ TIKANGA

This task may be completed individually or in groups, but each student needs to provide evidence of their part of the project.

Schedule regular check-ins with groups or individuals by collecting or sharing documentation or having discussions. Collect or review documentation frequently to assess authenticity.

Conditions of Assessment related to this achievement standard can be found at http://ncea.tki.org.nz

RESOURCE REQUIREMENTS/NGĀ RAUEMI

Students will need access to the hardware and software required to plan and develop a programmed game, for example:

- a computer, drawing tablet, sketching equipment, scanner or camera
- Software development environment (for programming)
- a way to plan and share (if working in teams).

ADDITIONAL INFORMATION

Have student's record of evidence of planning and trialling of components in an iterative manner and testing in a document.

ASSESSMENT SCHEDULE

EVIDENCE/JUDGMENTS FOR ACHIEVEMENT/PAETAE	EVIDENCE/JUDGMENTS FOR ACHIEVEMENT WITH MERIT/KAIAKA	EVIDENCE/JUDGMENTS FOR ACHIEVEMENT WITH EXCELLENCE/KAIRANGI
Use basic iterative processes to develop a digital outcome.	Use basic iterative processes to develop an informed digital outcome.	Use basic iterative processes to develop a refined digital outcome.
The student has: • planned a digital outcome to address a problem, need, opportunity or interest *For example (partial evidence)* One or more of the following planning examples could be used: The student has created sketches of characters or interface layout to be used in the game which meets proposed problem, need, opportunity or interest. The student has written pseudocode or natural language description of the coding solution which meets proposed problem, need, opportunity or interest. **The student has:** • planned the development by decomposing the digital outcome into smaller components *For example (partial evidence)* The student has identified smaller components of their game that need to be developed, such as: different graphics required, coding of different parts (moving character, collecting tokens, shooting)	**The student has:** • used information from testing and trialling to improve the outcome *For example (partial evidence)* The student has recorded results of testing by taking screenshots of the component being tested. Their screenshots should be annotated detailing any changes as a result of testing to improve the outcome. **The student has:** • trialled multiple components and/or techniques and selecting the most suitable *For example (partial evidence)* The student has trialled two different graphics software programs and then tried these with potential users to help decide the most suitable. The student has tried two different ways of coding the character movement and has chosen the smoothest.	**The student has:** • applied information from the planning, testing and trialling of components to develop a high-quality outcome. *For example (partial evidence)* The student has provided evidence that their planning allowed them to meet all requirements of the project through planning, trialling and testing of components. Their game works without error and is easy for a new player to understand (good usability) and play. The student has handed in a game that functions every time without error.

ASSESSMENT SCHEDULE

The student has: • trialled components of the outcome in an iterative manner *For example (partial evidence)* The student has taken components identified in the development process and trialled each one in an iterative manner. For example: • creating graphics: sketching and creating • building interface: putting on elements • programming: coding actions and events for the elements. **The student has:** • tested that the digital outcome functions as intended *For example (partial evidence)* The student has tested each of the components and put evidence into their trialling and testing log, for example: • checking the size of the graphic or that animation works as expected • the interface runs without error and displays all required elements • the program is debugged frequently and each smaller component runs without errors. The combined outcome works as per the proposal in its intended environment (such as the school computer room). The student has also had other players test the outcome and could show photos and feedback of this happening.	**The student has:** • addressed relevant implications. *For example (partial evidence)* The student has addressed **legal** implications of copyright by developing their own graphics. The student has taken advice from end-users and stakeholders by selecting the most **aesthetically** pleasing design layout for their game.	

ASSESSMENT SCHEDULE

The student has: • described relevant implications. ***For example (partial evidence)*** The student has described relevant implications, such as: • when creating graphics, described that **legal** (copyright) requirements could become a problem • when creating screen layout, detailed the **aesthetics** required • when programming, what **functionality** is required for the player.		

Final grades will be determined on a holistic examination of the evidence provided against the criteria in the achievement standard.

All supporting materials are supplied with this programme and can be found on the TKI website.