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Game Design Learning Links

NSW K - 10 Syllabuses for the
Australian Curriculum



Rationale

Students are using more technology in more ways than ever before.

For our students, this technology is indistinguishable from other aspects of the social and communal lives. Technology isn't a tool to help in their lives, it is an integral part of it. Technology will only become more connected to our day to day lives as time goes on so it is our duty as educators to allow learning to be enhanced by it.

'These technologies also change our relationship with information and thus, suggest changes in educational goals. With instant access to facts, for instance, schools are able to reconceive the role of memorization, and focus more on higher order skills such as analysis, synthesis, and evaluation.' The Intellectual and Policy Foundations of the 21st Century Skills Framework 2007

Electronic devices, software and often games are now the first point of contact for students and the world they live in today. Simply chatting with friends after school will begin by selecting an application on a tablet, phone or gaming console. Teaching students the fundamentals for how applications work, deconstructing, constructing, modifying, improving and utilising these forms of contact with their world seems a logical path for real-world learning.

The information age is transforming how we receive and express communication at a rapid pace. The varying modes of text present today are becoming blended together to form new genres for interaction between people. Text now is seen to include video, audio, animation, interaction and virtual forms and experiences. And more often now, text includes combinations of all of them. Games have always been at the forefront of blurring the lines between text forms. As educators we are required to encourage students to *'respond to and compose a range of text about the world they live in and express viewpoints that are similar and different to their own'* outcome EN211D – NSW English K-10 Syllabus (2012). Designing games also requires students to think about the core elements of any mode of text – audience, purpose and tone but in a very unique way.

'We all know that learning doesn't stop when school does, but now more than ever, learning must be a lifelong pursuit. The rapidity of change, the relentless advance of technology, the diminishing half-life of knowledge, the far-reaching effects of globalization – all these factors contribute to a growing conviction that the best thing we can teach our children is how to teach themselves.' The Intellectual and Policy Foundations of the 21st Century Skills Framework 2007

There is a huge shift occurring in education around how students learn and what skills they need for the future. At the core of this shift is the philosophy that students learn how to teach themselves. Students need to better understand the learning cycle so they can create, analyse, reflect and improve their own learning. Teaching students to design games immerses them in this mindset. Designing games begins with students using their imagination to create an idea for a game. Students then plan and model what it may look, feel, sound and play like. Through building, students prototype their ideas thinking about things like; developing atmosphere through music, how the audience connects with their game, what makes the game fun, does the game serve a higher purpose, solutions to programming issues and developing work-arounds. Students also share their

games and learning experiences with their peers whilst reflecting and improving on their designs.

“To be playful and serious at the same time is possible, and it defines the ideal mental condition.” -- John Dewey, How We Think (1997)

Nothing is more magical in education than when a student can see that what they have learnt can make a positive impact on the world they live in. The world needs people who can independently and collaboratively develop innovative solutions to complex problems and contribute to sustainable patterns of living. Through designing games students can engage with serious world issues like sustainability, global warming or population in a virtual, fun and non-threatening way. This learning provides opportunities for students to contextualise these issues and create innovative meaningful solutions or engaging narrative that expresses a desired message. It also encourages students to be systems thinkers looking at each individual part of a system and how each of them interact and are often interdependent. Imagine students creating games that teach players about deforestation or immerses them in a story where they actively play the lead character.

“I see coding (computer programming) as an extension of writing. The ability to code allows you to write new types of things – interactive stories, games, animations, and simulations. And, as with traditional writing, there are powerful reasons for everyone to learn to code.

I see much deeper and broader reasons for learning to code. In the process of learning to code, people learn many other things. They are not just learning to code, they are coding to learn. In addition to learning mathematical and computational ideas (such as variables and conditionals), they are also learning strategies for solving problems, designing projects, and communicating ideas. These skills useful not just for computer scientists but for everyone, regardless of age, background, interests, or occupation.” Mitchel Resnick, LEGO Papert Professor of Learning Research and head of the Lifelong Kindergarten group at the MIT Media Lab - Cambridge, Massachusetts, USA

Teaching students to write computer code and designing games sounds more difficult than it actually is. There are online tools available now that allow primary school children to engage with code but in a pictorial/icon based form. Students simply click and drag the tiles with particular functions in order to create a coded sequence. This allows students to develop an understanding of the syntax of real code without the complicated machine language most of us don't understand. It takes the need for teachers to be experts in coding out of the equation and still provides student with the foundations for real code writing.

‘At the same time that computer games are evolving, they are also generating very big business. In fact some \$A40.9 billion dollars of interactive video games were sold in 2002 according to the Game Developers Association of Australia (GDAA)⁹. That's more than the worldwide box office takings for the film industry in the same year. In Australia the story is similar: Australians spent \$825 million in 2002 on games software and hardware, and this figure is ramping up yearly.’ Digital Games Industry in Australia - Australia.gov.au (2007)

Initiative and entrepreneurialism have been identified as 21st Century skills. A very large part of the game design industry focuses on marketing and product development. There are many vocational opportunities within the gaming

industry that could be explored when teaching students about designing games and not all of them require a degree in game design.

“There are more than a half a billion people worldwide who play online games at least an hour a day. Why? Because games do a better job of provoking our most powerful positive emotions, like curiosity, optimism, pride, and a desire to join forces with others. Games are fulfilling genuine human needs the real world is unable to satisfy.

Gaming is productive. It produces positive emotion, stronger social relationships, a sense of accomplishment, and for players who are a part of a game community, a chance to build a sense of purpose. I’m interested in bringing this mindset to our real lives in an effort to tackle the world’s most urgent problems, from curing cancer to slowing climate change.” Game designer Jane McGonigal, author of Reality Is Broken: Why Games Make Us Better and How They Can Change the World (2010)

Designing games has a major part to play in contemporary education. Learning experiences through game design are relevant, real-world, connected and complex. It provides the scaffold for students to purposefully engage with digital technology and design learning whilst embedding outcomes from across the key learning areas from the NSW Syllabuses for the Australian Curriculum.

References:

- Dewey, J. *How We Think*. Mineola, NY: Dover Publications (1997)
- The Intellectual and Policy Foundations of the 21st Century Skills Framework (2007)
- <http://australia.gov.au/about-australia/australian-story/digital-games-industry> (2007)
- Mitchel Resnick, director of the Lifelong Kindergarten group at the MIT Media Lab, May 8, 2013

Learning across the curriculum icons

Learning across the curriculum content, including the cross-curriculum priorities and general capabilities, assists students to achieve the broad learning outcomes defined in the Board of Studies *K–10 Curriculum Framework* and *Statement of Equity Principles*, and in the *Melbourne Declaration on Educational Goals for Young Australians (December 2008)*.

Cross-curriculum priorities enable students to develop understanding about and address the contemporary issues they face.

General capabilities encompass the knowledge, skills, attitudes and behaviours to assist students to live and work successfully in the 21st century.

The Board's syllabuses include other areas identified as important learning for all students.

The icons below are shown in each table of this document and used across the NSW syllabuses for the Australian curriculum.

Cross-curriculum priorities

 Aboriginal and Torres Strait Islander histories and cultures

 Asia and Australia's engagement with Asia

 Sustainability

General capabilities

 Critical and creative thinking

 Ethical understanding

 Information and communication technology capability

 Intercultural understanding

 Literacy

 Numeracy

 Personal and social capability

Other learning across the curriculum areas

 Civics and citizenship

 Difference and diversity

 Work and enterprise

Reference: The information above has been adapted from the NSW Board Of Studies website and the new Science K-10 (incorporating Science and Technology K-6) syllabus for the Australian curriculum.

Stage 2 Links

Science & Technology

Code	Description A student:	Game Design Activities	Learning across the curriculum
<i>Values & Attitudes</i> ST2-1VA	Shows interest in and enthusiasm for science and technology, responding to their curiosity, questions and perceived needs, wants and opportunities	<ul style="list-style-type: none"> Explores and experiments with video games and game-development software Constructs and experiments with basic programming commands to predict and control simple video games Individually and collaboratively designs, constructs, tests, edits and produces own video game 	
<i>Values & Attitudes</i> ST2-2VA	Demonstrates a willingness to engage responsibly with local, national and global issues relevant to their lives, and to shaping sustainable futures	<ul style="list-style-type: none"> Explores familiar local, national and global issues and stories in own game and in other commercial and non-commercial games 	
<i>Values & Attitudes</i> ST2-3VA	Develops informed attitudes about the current and future use and influences of science and technology based on reason	<ul style="list-style-type: none"> Explores and experiments with video games and game-development software Describes ways that video games are used for entertainment, education and research (medicine, robotics, engineering, simulation, etc.) Suggests creative ways that video games and simulations let humans explore and train for otherwise dangerous or impractical activities and environments 	
<i>Skills: Working Scientifically</i> ST2-4WS	Investigates their questions and predictions by analyzing collected data, suggesting explanations for their findings, and communicating and reflecting on the processes undertaken	<ul style="list-style-type: none"> Predicts, constructs and experiments with basic programming commands to control simple video games Shares own and others' programmed commands, work-arounds and advanced coding both directly and through the use of digital media Analyses and Describes bugs in programmed code as 'unintended actions' or 'incorrect responses to data' performed by the code. Suggests ways to test for, identify and correct erroneous programmed code 	

<p><i>Skills: Working Technologically</i> ST2-5WT</p>	<p>Applies a design process and uses a range of tools, equipment, materials and techniques to produce solutions that address specific design criteria</p>	<ul style="list-style-type: none"> • Develops and follows a design process. • Designs, builds, tests, edits and produces a video game using their design process and game-development software • Explores and deconstructs commercial and non-commercial games • Identifies game mechanics, goal, characters, obstacles and tools in a video game • Develops, understands and uses rubrics to evaluate their own and others games in accordance to specific criteria 	
<p><i>Knowledge & Understanding: Made World</i> ST2-13MW</p>	<p>Identifies the physical properties of natural and processed materials, and how these properties influence their use</p>	<ul style="list-style-type: none"> • Synthesises knowledge of natural and built environments to construct logical, coherent, appropriate and engaging digital environments • Describe how the environment and atmosphere of their game influences the player's emotional and narrative response to the game (a science-fiction world, a haunted forest, an ancient castle, etc.) • Explore, invent, describe and program logical, coherent, appropriate and engaging tools and materials in their game that maintain the game's narrative and suit its natural or built environment (wooden shovels, huts, natural caves, stone walls, futuristic cities, etc.) • Invent, describe and develop natural environment that demonstrate sustainable interaction with the natural environment 	
<p><i>Knowledge & Understanding: Built Environment</i> ST2-14BE</p>	<p>Describes how people interact within built environments and the factors considered in their design and construction</p>	<ul style="list-style-type: none"> • Synthesises knowledge of natural and built environments to construct logical, coherent, appropriate and engaging digital environments • Describe how the built environment and user controls have been designed to enhance an intuitive user experience • Describe how new skills for the user are introduced progressively through the game and their relationship to the difficulty curve • Explain how commercial games cater to different playing styles within a single game • Describe how the environment and atmosphere of their game influences the player's emotional and narrative response to the game (a science-fiction world, a haunted forest, an ancient castle, etc.) • Describe considerations they have incorporated to make their environments more sustainable and the intended impact these changes will have on the environment (Solar cells, hydro-electricity, etc.) 	



<p><i>Knowledge & Understanding:</i> Information ST2-15I</p>	<p>Describes ways that information solutions are designed and produced, and factors to consider when people use and interact with information sources and technologies</p>	<ul style="list-style-type: none"> • Describes the process of designing, building, testing, editing and producing their own and commercial video games • Identifies particular player audiences by age, gender, interest, etc. • Identifies different genres, atmospheres, narratives, controllers, control schemes (button maps/keyboard controls), actions (jump, sprint, move, look around), etc. and how they influence the player's gaming experience • Describes how in a 'good game' the interaction with information is seamless and enhances the user experience 	
<p><i>Knowledge & Understanding:</i> Products ST2-16P</p>	<p>Describes how products are designed and produced, and the ways people use them</p>	<ul style="list-style-type: none"> • Describes the process of designing, building, testing, editing and producing their own and commercial video games • Identifies and describes individual roles in commercial video games (level designer, modeller, artist, writer, musician, tester, lead designer, etc.) • Identifies particular player audiences by age, gender, interest, etc. • Describes ways that video games are used for entertainment, education and research (medicine, robotics, engineering, simulation, etc.) • Explore the evolution of the gaming controller and the ergonomic factors that influenced its design 	



Stage 2 Links

Mathematics

Code	Description A student:	Game Design Activities	Learning across the curriculum
<i>Working Mathematically</i> Communicating MA2-1WM	Uses appropriate terminology to describe, and symbols to represent, mathematical ideas	<ul style="list-style-type: none"> Identifies and describes how mathematical ideas have been programmed into own game (adding and subtracting scores, calculating a total score to win the game, creating a timer or countdown, etc) Uses simple number variables to track data in game, e.g. how many enemies, objects or seconds are left in their game at any time. 	
<i>Working Mathematically</i> Problem Solving MA2-2WM	Selects and uses appropriate mental or written strategies, or technology to solve problems	<ul style="list-style-type: none"> Follows a design brief to create a series of obstacles and problems that must be programmed for their game to be challenging and enjoyable. Uses a variety of strategies (including guess and check, diagramming, storyboarding and/or flowcharting) to synthesise these challenges into their programmed game. Uses game-design software to program, test and refine a variety of working challenges and obstacles their player must overcome. 	
<i>Working Mathematically</i> Reasoning MA2-3WM	Checks the accuracy of a statement and explains the reasoning used	<ul style="list-style-type: none"> Predicts, tests, corrects and explains own programming to confirm expected programmed behaviours in own game Creates simple environments to test elements of own game Understands that sometimes designers need to 'cheat' (giving themselves infinite health or ammo, invisibility, etc.) in order to test individual aspects of their game. 	
<i>Number & Algebra</i> Whole Numbers MA2-4NA	Applies place value to order, read and represent numbers of up to five digits	<ul style="list-style-type: none"> Orders, reads and represents numbers up to five digits as scores, timers, health bars, distances, damage, speed, etc. 	
<i>Number & Algebra</i> Addition and Subtraction MA2-5NA	Uses mental and written strategies for addition and subtraction involving two-, three-, four- and five-digit numbers	<ul style="list-style-type: none"> Uses mental or written strategies to guess, check and correct programmed behaviours involving addition and subtraction up to five-digit numbers 	

<i>Number & Algebra</i> Multiplication and Division MA2-6NA	Uses mental and informal written strategies for multiplication and division	<ul style="list-style-type: none"> • Uses mental or written strategies to guess, check and correct programmed behaviours involving multiplication and division 	  
<i>Number & Algebra</i> Fractions & Decimals MA2-7NA	Represents, models and compares commonly used fractions and decimals	<ul style="list-style-type: none"> • Digitally represents, models and compares common and equivalent fractions using grouped objects (e.g. differentiating grouped objects of a similar type by colour) or when creating terrain (half the mountain is green, etc.) • Reads, explains and explores simple decimals used to adjust speed, acceleration, height and size of objects (for example, speed multiplied by a factor of 1.1) 	  
<i>Number & Algebra</i> Patterns & Algebra MA2-8NA	Generalises properties of odd and even numbers, generates number patterns, and completes simple number sentences by calculating missing values	<ul style="list-style-type: none"> • Uses programmed behaviours to generate number patterns • Creates simple number sentences using programming tiles or code to calculate and operate with missing or dynamic variables 	  
<i>Measurement & Geometry</i> Length MA2-9MG	Measures, records, compares and estimates lengths, distances and perimeters in metres, centimetres and millimetres, and measures, compares and records temperatures	<ul style="list-style-type: none"> • Measures, records, compares and estimates lengths, distances and perimeters of objects and terrain using in-game measurements. 	  
<i>Measurement & Geometry</i> Area MA2-10MG	Measures, records, compares and estimates areas using square centimetres and square metres	<ul style="list-style-type: none"> • Measures, records, compares and estimates areas of terrain in-game. 	  
<i>Measurement & Geometry</i> Time MA2-13MG	Reads and records time in one-minute intervals and converts between hours, minutes and seconds	<ul style="list-style-type: none"> • Reads, uses and programs simple timers to count in seconds or minutes. 	  
<i>Measurement & Geometry</i> Three-Dimensional Objects MA2-14MG	Makes, compares, sketches and names three-dimensional objects, including prisms, pyramids, cylinders, cones and spheres, and describes their features	<ul style="list-style-type: none"> • Sketches and diagrams simple three-dimensional objects when creating and describing designs for their game world and the buildings and objects within it. 	   

<i>Measurement & Geometry</i> Two-Dimensional Shapes MA2-15MG	Manipulates, identifies and sketches two-dimensional shapes, including special quadrilaterals, and describes their features	<ul style="list-style-type: none"> • Sketches and diagrams simple two-dimensional shapes when creating and describing designs for their game world and the buildings and objects within it. 	
<i>Measurement & Geometry</i> Position MA2-17MG	Uses simple maps and grids to represent position and follow routes, including using compass directions	<ul style="list-style-type: none"> • Sketches, maps and refers to a rough world-map and/or other drawings to design and create their game world • Follows compass points to orient their objects to the in-game compass • Programs objects to follow routes using paths and by limiting object movement to the points of the compass (North-South, East-West, etc.) 	
<i>Statistics & Probability</i> Data MA2-18SP	Selects appropriate methods to collect data, and constructs, compares, interprets and evaluates data displays including tables, picture graphs and column graphs	<ul style="list-style-type: none"> • Selects appropriate methods to collect data in-game through characters' programmed actions (e.g. how many apple has the character eaten?) • Constructs, interprets and evaluates a variety of graphs and visual displays to track in-game data and to evaluate the experience of testers and players (tracking high scores, recording health gained and lost to fine tune difficult boss battles, etc.) 	
<i>Statistics & Probability</i> Chance MA2-19SP	Describes and compares chance events in social and experimental contexts	<ul style="list-style-type: none"> • Uses random number variables to construct, explore and describe chance events in a digital, experimental context 	



Stage 2 Links

English

Code	Description A student:	Game Design Activities	Learning across the curriculum
Communicate EN2-1A	Communicates in a range of informal and formal contexts by adopting a range of roles in group, classroom, school and community contexts	<ul style="list-style-type: none"> • Designs and creates a game based off own narrative or developed from an in-class narrative • Creates games aimed at school, social and commercial contexts • Adopts a variety of roles in the process of designing, building, testing, refining and producing/marketing own game. These roles will echo professional roles from game design industry 	
Communicate EN2-2A	Plans, composes and reviews a range of texts that are more demanding in terms of topic, audience and language	<ul style="list-style-type: none"> • Deconstructs, reviews, designs, builds, tests, refines, produces and markets video games as multimodal texts • Identifies appropriate topic, audience and language while designing own game or responding to commercial games, describing intended audience by age, gender and interest and linking these features to elements of the game • Plans, composes and reviews a variety of additional texts when designing (concept art, world maps, design documents, etc.) and producing/marketing (player manuals, instruction guides, advertising materials, box art, promotional displays and presentations, etc). • Plans, composes and reviews sophisticated, professional and persuasive game-review and game journalism articles. 	
Communicate EN2-3A	Uses effective handwriting and publishes texts using digital technologies	<ul style="list-style-type: none"> • Designs, builds, tests and refines video games using digital game-design software • Uses a variety of other digital technologies to publish concept art, world maps, design documents, player manuals, advertising material, box art, promotional displays and presentations, etc. • Writes and draws early draft texts to help design their game 	
Communicate EN2-4A	Uses an increasing range of skills, strategies and knowledge to fluently	<ul style="list-style-type: none"> • Deconstructs, reviews, designs, builds, tests, refines, produces and markets video games as multimodal texts, using a variety of own games 	

	read, view and comprehend a range of texts on increasingly challenging topics in different media and technologies	<p>and commercial and peer games.</p> <ul style="list-style-type: none"> • Explores current local, national and global issues through games and describes ways that a game could be made to educate or warn players about these issues • Explores ways to synthesise class narratives into games, comparing and contrasting written texts with multimodal texts 	
Communicate EN2-5A	Uses a range of strategies, including knowledge of letter-sound correspondences, and common letter patterns, to spell familiar and some unfamiliar words	<ul style="list-style-type: none"> • Uses a range of strategies to check and correct spelling mistakes in own game. • Explores orthographic rules of spelling when spelling fictional names, places and things 	
Use Language EN2-7B	Identifies and uses language forms and features in their own writing appropriate to a range of purposes, audiences and contexts	<ul style="list-style-type: none"> • Describes how commercial games have been constructed (visual, characters, atmosphere, item and weapons, tone, language, challenges, goal) to best suit its intended purpose, audience and context • Explores a variety of appropriate purposes, audience and contexts for which games can be made, and argues the reasons for constructing games in each way. • Identifies purpose, audience and context in own and commercial/peer games • Designs and builds own game to meet its intended purpose, audience and context 	
Use Language EN2-8B	Identifies and compares different kinds of texts when reading and viewing and shows an understanding of purpose, audience and subject matter	<ul style="list-style-type: none"> • Deconstructs, reviews, designs, builds, tests, refines, produces and markets video games as multimodal texts, using a variety of own games and commercial and peer games. • Explores current local, national and global issues through games and describes ways that a game could be made to educate or warn players about these issues • Explores ways to synthesise class narratives into games, comparing and contrasting written texts with multimodal texts • Explains that games, like all texts, are constructed for an intended purpose, audience and context. • Describes how commercial games have been constructed (visual, characters, atmosphere, item and weapons, tone, language, challenges, goal) to best suit its intended purpose, audience and context 	

		<ul style="list-style-type: none"> • Explores a variety of appropriate purposes, audience and contexts for which games can be made, and argues the reasons for constructing games in each way. • Identifies purpose, audience and context in own and commercial/peer games • Designs and builds own game to meet its intended purpose, audience and context 	
Use Language EN2-9B	Uses effective and accurate sentences structure, grammatical features, punctuation conventions and vocabulary relevant to the type of text when responding to and composing texts	<ul style="list-style-type: none"> • Uses full spelling, punctuation and grammar when presenting text in own video game and in accompanying design documents, instructional guides and promotional material • Explores, identifies and explains how commercial games use a variety of printed, visual and audio cues to build atmosphere, tell a narrative and instruct and challenge the player (player feedback, colours, emotions, sounds, music, power-ups, lighting, etc.) • Compares and contrasts the grammatical features (such as visual and audio cues) in commercial video games with those in TV and movies. • Reviews and deconstructs commercial games to analyse how effectively and appropriately relevant vocabulary and visual grammatical features are used • Identifies and explains a variety of common verbs necessary to instruct the player in their required actions (push, jump, grab, etc.) • Explores and incorporates effective and sophisticated visual and audio grammatical features in own game 	
Think EN2-10C	Thinks imaginatively, creatively and interpretively about information, ideas and texts when responding to and composing texts	<ul style="list-style-type: none"> • Creates, designs and builds own video game based off own invented narrative or from in-class narrative. • Critically reviews, deconstructs, analyses and evaluates own, commercial and peer games 	
Express EN2-11D	Responds to and composes a range of texts that express viewpoints of the world similar to and different from their own	<ul style="list-style-type: none"> • Explores, reviews, analyses, designs, builds and evaluates a range of own, commercial and peer games that express viewpoints similar to and different from their own, especially Aboriginal and Torres Strait Islander histories and cultures as well as Asian and Australian-Asian cultures where appropriate. • Identifies intended purpose, audience and context in games that feature a range of familiar and unfamiliar social and cultural viewpoints 	



<p>Learn & Reflect EN2-12E</p>	<p>Recognises and uses an increasing range of strategies to reflect on their own and others' learning</p>	<ul style="list-style-type: none"> • Documents and records design process, and tracks the obstacles emerged and the solutions discovered as own game evolves and develops in response to intended purpose, audience and context • Explains and evaluates compromises between initial design document and finished game product that emerged in response to hardware, software, player and designer limitations • Reviews and refines own and peer games, suggesting constructive feedback to help improve and develop games. 	
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Stage 3 Links

Science & Technology

Code	Description A student:	Game Design Activities	Learning across the curriculum
<i>Values & Attitudes</i> ST3-1VA	Shows interest in and enthusiasm for science and technology, responding to their curiosity, questions and perceived needs, wants and opportunities	<ul style="list-style-type: none"> • Explores and experiments with video games and game-development software • Constructs and experiments with basic programming commands to predict and control simple video games • Individually and collaboratively designs, constructs, tests, edits and produces own video game 	
<i>Values & Attitudes</i> ST3-2VA	Demonstrates a willingness to engage responsibly with local, national and global issues relevant to their lives, and to shaping sustainable futures	<ul style="list-style-type: none"> • Describes how own game and other commercial and non-commercial games reflect on and are influenced by local, national and global issues • Designs and builds a game that identifies and seeks to inform its players about a local, national or global issue • Explores issues surrounding Aboriginal and Torres Strait Islander histories and cultures, Asia and Australia's engagement with Asia, Sustainability and Diversity 	
<i>Values & Attitudes</i> ST3-3VA	Develops informed attitudes about the current and future use and influences of science and technology based on reason	<ul style="list-style-type: none"> • Explores, experiments with video games and game-development software • Identifies, explores, designs and builds video games that aid in research, simulation, diversity, training or education around a particular issue • Explores the blending of digital and real environments through Augmented Reality video games, and suggests creative ways that augmented reality can improve and change our lives and our habits. 	
<i>Skills: Working Scientifically</i> ST3-4WS	Investigates by posing questions, including testable questions, making predictions and gathering data to draw evidence-based conclusions and develop explanations	<ul style="list-style-type: none"> • Predicts, constructs and experiments with programming commands such as collecting data and reacting to data with changes in programmed behaviours • Shares own and others' programmed commands, work-arounds and advanced coding both directly and through the use of digital media • Analyses and Describes bugs in programmed code as 'unintended 	

		<p>actions' or 'incorrect responses to data' performed by the code.</p> <ul style="list-style-type: none"> • Develops and tests sophisticated video games that feature more than one challenge, and other advanced programming • Uses a range of strategies to identify, explain, correct and avoid coding errors or bugs. 	
<i>Skills: Working Technologically</i> ST3-5WT	Plans and implements a design process, selecting a range of tools, equipment, materials and techniques to produce solutions that address the design criteria and identified constraints	<ul style="list-style-type: none"> • Develops, follows, adapts, reflects on and evaluates own design process, including appropriate identification of purpose, audience and context • Designs, builds, tests, edits and produces a video game using their design process and game-development software • Explores and critically deconstructs commercial and non-commercial games to explain game mechanics, goal, characters, obstacles and tools, etc. • Develops, understands and uses rubrics to evaluate their own and others games in accordance to specific criteria 	
<i>Knowledge & Understanding:</i> Living World ST3-10LW	Describes how structural features and other adaptations of living things help them to survive in their environment	<ul style="list-style-type: none"> • Synthesises knowledge of natural and built environments to construct logical, coherent, appropriate and engaging digital environments • Identifies and explains design choices in own, commercial and peer games that reflect sustainable practices in natural environments • Designs creative and factual abilities that animals and plants in their game can use to defend themselves and survive in their designed natural environments 	
<i>Knowledge & Understanding:</i> Living World ST3-11LW	Describes some physical conditions of the environment and how these affect the growth and survival of living things	<ul style="list-style-type: none"> • Synthesises knowledge of natural and built environments to construct logical, coherent, appropriate and engaging digital environments • Using visual representations of terrain and atmosphere, describe and depict a variety of realistic physical environmental conditions and logical consequences of these (healthy and fertile soil, arid deserts, rainforests, etc.) • Design and explain imagined and real-world animals and plants that could survive in these created environments, and how such animals and plants are adapted to survive and thrive in these areas 	
<i>Knowledge & Understanding:</i> Made World ST3-13MW	Describes how the properties of materials determine their use for specific purposes	<ul style="list-style-type: none"> • Synthesises knowledge of natural and built environments to construct logical, coherent, appropriate and engaging digital environments • Describe how the environment and atmosphere of their game influences the player's emotional and narrative response to the game (a science- 	



		<p>fiction world, a haunted forest, an ancient castle, etc.)</p> <ul style="list-style-type: none"> • Explore, invent, describe and program logical, coherent, appropriate and engaging tools and materials in their game that maintain the game's narrative and suit its natural or built environment (wooden shovels, huts, natural caves, stone walls, futuristic cities, etc.) • Invent, describe and develop natural environment that demonstrate sustainable interaction with the natural and built environments 	
<i>Knowledge & Understanding:</i> Built Environment ST3-14BE	Describes systems in built environments and how social and environmental factors influence their design	<ul style="list-style-type: none"> • Synthesises knowledge of natural and built environments to construct logical, coherent, appropriate and engaging digital environments • Describe how the environment and atmosphere of their game influences the player's emotional and narrative response to the game (a science-fiction world, a haunted forest, an ancient castle, etc.) • Describe how the built environment and user controls have been designed to enhance an intuitive user experience • Describe how new skills for the user are introduced progressively through the game and their relationship to the difficulty curve • Explain how commercial games cater to different playing styles within a single game • Explore, invent, describe and program logical, coherent, appropriate and engaging tools and materials in their game that maintain the game's narrative and suit its natural or built environment (wooden shovels, huts, natural caves, stone walls, futuristic cities, etc.) • Invent, describe and develop natural environment that demonstrate sustainable interaction with the natural and built environments • Compare and contrast real-world built environments with digital and visual representations in commercial games, TV and movies 	
<i>Knowledge & Understanding:</i> Information ST3-15I	Describes how social influences impact on the design and use of information and communication systems	<ul style="list-style-type: none"> • Describes, reflects on and evaluates the process of designing, building, testing, editing and producing their own and commercial video games • Explains and justifies design decisions (genre, atmosphere, narrative, challenges, etc.) made to appeal to particular purposes, audiences and contexts, in own, commercial and peer games. • Describes how in a 'good game' the interaction with information is seamless and enhances the user experience 	
<i>Knowledge &</i>	Describes systems used to produce	<ul style="list-style-type: none"> • Describes, reflects on and evaluates the process of designing, building, 	



<p><i>Understanding:</i> Products ST3-16P</p>	<p>or manufacture products, and the social and environmental influences on product design</p>	<p>testing, editing and producing their own and commercial video games</p> <ul style="list-style-type: none"> • Explains and justifies design decisions (genre, atmosphere, narrative, challenges, etc.) made to appeal to particular purposes, audiences and contexts, in own, commercial and peer games. • Explore the evolution of the gaming controller and the ergonomic factors that influenced its design 	
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Stage 3 Links

Mathematics

Code	Description A student:	Game Design Activities	Learning across the curriculum
<i>Working Mathematically</i> Communicating MA3-1WM	Describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions	<ul style="list-style-type: none"> Describes and programs a range of more complex variables to track scores, behaviours and timers in game Identifies game challenges as combinations of programmed triggers and actions 	
<i>Working Mathematically</i> Problem Solving MA3-2WM	Selects and applies appropriate problem-solving strategies, including the use of digital technologies, in undertaking investigations	<ul style="list-style-type: none"> Refers to, reflects on and reaches compromises with original designs to ensure functionality in game. Predicts, tests, analyses and corrects programming errors and bugs using a range of problem-solving strategies Uses a variety of strategies (including guess and check, diagramming, storyboarding and/or flowcharting) to synthesise designed challenges into programmed game. Uses game-design software to program, test and refine a variety of working challenges and obstacles their player must overcome. Explores, tests and refines challenges in game to ensure appropriate difficulty and enjoyment for player 	
<i>Working Mathematically</i> Reasoning MA3-3WM	Gives a valid reason for supporting one possible solution over another	<ul style="list-style-type: none"> Predicts, tests, corrects, explains and justifies design and programming decisions Programs, reflects on and evaluates two or more different solutions to a problem Develops test environments to explore and compare possible solutions as part of the design process 	
<i>Number & Algebra</i> Whole Numbers MA3-4NA	Order, reads and represents integers of any size and describes properties of whole numbers	<ul style="list-style-type: none"> Orders, reads and represents scores, timers, health bars, distances, damage, speed, etc. 	
<i>Number & Algebra</i> Addition and	Selects and applies appropriate strategies for addition and	<ul style="list-style-type: none"> Uses mental or written strategies to predict, confirm and correct programmed behaviours involving addition and subtraction 	

Subtraction MA3-5NA	subtraction with counting numbers of any size		
<i>Number & Algebra</i> Multiplication and Division MA3-6NA	Selects and applies appropriate strategies for multiplication and division, and applies the order of operations to calculations involving more than one operation	<ul style="list-style-type: none"> • Uses mental or written strategies to predict, confirm and correct complex programmed behaviours involving multiplication and division, following order of operations. 	  
<i>Number & Algebra</i> Fractions & Decimals MA3-7NA	Compares, orders and calculates with fractions, decimals and percentages	<ul style="list-style-type: none"> • Compares, orders and calculates fractions, decimals and percentages as life totals, score, completion rates, etc. 	  
<i>Number & Algebra</i> Patterns & Algebra MA3-8NA	Analyses and creates geometric and number patterns, constructs and completes number sentences, and locates points on the Cartesian plane	<ul style="list-style-type: none"> • Uses programmed behaviours to generate a variety of different number and geometric patterns • Creates and explains number sentences using programming tiles or code to calculate and operate with missing or dynamic variables 	  
<i>Measurement & Geometry</i> Length MA3-9MG	Selects and uses the appropriate unit and device to measure lengths and distances, calculates perimeters, and converts between units of length	<ul style="list-style-type: none"> • Measures, records, compares and estimates lengths, distances and perimeters of objects and terrain using in-game measurements. 	  
<i>Measurement & Geometry</i> Area MA3-10MG	Selects and uses the appropriate unit to calculate areas, including areas of squares, rectangle and triangles	<ul style="list-style-type: none"> • Measures, records, compares and estimates areas of terrain in-game. 	  
<i>Measurement & Geometry</i> Time MA3-13MG	Uses 24-hour time and AM and PM notations in real-life situations, and constructs timelines	<ul style="list-style-type: none"> • Designs and constructs timelines of actions and challenges to help when building own game 	  
<i>Measurement & Geometry</i> Three-Dimensional Objects MA3-14MG	Identifies three-dimensional objects, including prisms and pyramids, on the basis of their properties, and visualises, sketches and constructs them given drawings of different views	<ul style="list-style-type: none"> • Identifies, sketches, diagrams and represents three-dimensional objects when creating and describing designs for their game world and the buildings and objects within it. 	  



<i>Measurement & Geometry</i> Position MA3-17MG	Locates and describes position on maps using a grid-reference system	<ul style="list-style-type: none"> Using a grid-reference and symbols or key, sketches, maps and refers to a rough world-map and/or other drawings to design and create their game world 	
<i>Statistics & Probability</i> Data MA3-18SP	Uses appropriate methods to collect data and constructs, interprets and evaluates data displays, including dot points, line graphs and two-way tables	<ul style="list-style-type: none"> Selects appropriate methods to collect data in-game through characters' programmed actions (e.g. how many apple has the character eaten?) Records, interprets and evaluates multiple variables such as score over time, and creates a variety of graphs and visual displays to track in-game data 	
<i>Statistics & Probability</i> Chance MA3-19SP	Conducts chance experiments and assigns probabilities as values between 0 and 1 to describe their outcomes	<ul style="list-style-type: none"> Uses random number variables to construct, explore and describe chance events in a digital, experimental context, and assigning these events probabilities between 0 and 1 to describe their likelihood 	



Stage 3 Links

English

Code	Description A student:	Game Design Activities	Learning across the curriculum
Communicate EN3-1A	Communicates effectively for a variety of audiences and purposes using increasingly challenging topics, ideas, issues and language forms and features	<ul style="list-style-type: none"> • Designs and creates games based off own narrative or developed from an in-class narrative. Identifies and adapts games to fit particular purposes, audiences and contexts. • Creates games aimed at school, social and commercial contexts, with a focus on Aboriginal and Torres Strait Islander histories and cultures, Asia and Australia’s engagement with Asia, Sustainability and Diversity • Adopts a variety of roles in the process of designing, building, testing, refining and producing/marketing own game. These roles will echo professional roles from game design industry • Explores visual and multimodal literacies, comparing filmic grammar of TV and movies with multimodal grammar of games to deconstruct commercial games and refine own games 	
Communicate EN3-2A	Composes, edits and presents well-structured and coherent texts	<ul style="list-style-type: none"> • Deconstructs, reviews, designs, builds, tests, refines, produces and markets video games as multimodal texts • Identifies appropriate topic, audience and language while designing own game or responding to commercial games, describing intended audience by age, gender and interest and linking these features to elements of the game • Plans, composes and reviews a variety of additional texts when designing (concept art, world maps, design documents, etc.) and producing/marketing (player manuals, instruction guides, advertising materials, box art, promotional displays and presentations, etc). • Plans, composes and reviews sophisticated, professional and persuasive game-review and game journalism articles. 	
Communicate EN3-3A	Uses an integrated range of skills, strategies and knowledge to read, view and comprehend a wide range	<ul style="list-style-type: none"> • Designs, builds, tests and refines video games using digital game-design software 	

	of texts in different media and technologies	<ul style="list-style-type: none"> • Uses a variety of other digital technologies to publish concept art, world maps, design documents, player manuals, advertising material, box art, promotional displays and presentations, etc. • Writes and draws early draft texts to help design their game • Explores visual and multimodal literacies, comparing filmic grammar of TV and movies with multimodal grammar of games to deconstruct commercial games and refine own games 	
Communicate EN3-4A	Draws on appropriate strategies to accurately spell familiar and unfamiliar words when composing texts	<ul style="list-style-type: none"> • Uses a range of strategies to check and correct spelling mistakes in own game. • Explores orthographic rules of spelling when spelling fictional names, places and things 	
Use Language EN3-5B	Discusses how language is used to achieve a widening range of purposes for a widening range of audiences and contexts	<ul style="list-style-type: none"> • Identifies, explains and justifies the purpose, audience and context of own, commercial and peer games • Analyses how commercial games have been constructed (visual, characters, atmosphere, item and weapons, tone, language, challenges, goal) to best suit its intended purpose, audience and context • Explores a variety of appropriate purposes, audience and contexts for which games can be made, and argues the reasons for constructing games in each way. • Designs and builds own games with a strong focus on intended purpose, audience and context 	
Use Language EN3-6B	Uses knowledge of sentence structure, grammar, punctuation and vocabulary to respond to and compose clear and cohesive texts in different media and technologies	<ul style="list-style-type: none"> • Uses full spelling, punctuation and grammar when presenting text in own video game and in accompanying design documents, instructional guides and promotional material • Explores, identifies and explains how commercial games use a variety of printed, visual and audio cues to build atmosphere, tell a narrative and instruct and challenge the player (player feedback, colours, emotions, sounds, music, power-ups, lighting, etc.) • Compares and contrasts the grammatical features (such as visual and audio cues) in commercial video games with those in TV and movies. • Reviews and deconstructs commercial games to analyse how effectively and appropriately relevant vocabulary and visual grammatical features are used • Identifies and explains a variety of common verbs necessary to instruct 	



		<p>the player in their required actions (push, jump, grab, etc.)</p> <ul style="list-style-type: none"> • Explores and incorporates effective and sophisticated visual and audio grammatical features in own game 	
Think EN3-7C	Thinks imaginatively, creatively, interpretively and critically about information and ideas and identifies connections between texts when responding to and composing texts	<ul style="list-style-type: none"> • Creates, designs and builds own video game based off own invented narrative or from in-class narrative. • Critically reviews, deconstructs, analyses and evaluates own, commercial and peer games 	
Express EN3-8D	Identifies and considers how different viewpoints of their world, including aspects of culture, are represented in texts	<ul style="list-style-type: none"> • Explores, reviews, analyses, designs, builds and evaluates a range of own, commercial and peer games that express viewpoints similar to and different from their own, especially Aboriginal and Torres Strait Islander histories and cultures as well as Asian and Australian-Asian cultures where appropriate. • Identifies intended purpose, audience and context in games that feature a range of familiar and unfamiliar social and cultural viewpoints 	
Learn & Reflect EN3-9E	Recognises, reflects on and assesses their strengths as a learner	<ul style="list-style-type: none"> • Documents and records design process, and tracks the obstacles emerged and the solutions discovered as own game evolves and develops in response to intended purpose, audience and context • Explains and evaluates compromises between initial design document and finished game product that emerged in response to hardware, software, player and designer limitations • Reviews and refines own and peer games, suggesting constructive feedback to help improve and develop games. 	



Stage 4 Links

Science & Technology

Code	Description A student:	Game Design Activities	Learning across the curriculum
<i>Values & Attitudes</i> ST4-2VA	Shows a willingness to engage in finding solutions to science-related personal, social and global issues, including shaping sustainable futures	<ul style="list-style-type: none"> Engages with technology to design, build, test and publish a video game Explores, analyses and rigorously tests limitations with popular technology, and investigate suitable compromises and workarounds to overcome hardware / software limits Demonstrates an understanding of target audiences and how they can apply technology to best suit their chosen audience Explores issues of sustainability and diversity through a variety of own, peer and commercial video games 	
<i>Values & Attitudes</i> ST4-3VA	Demonstrates confidence in making reasoned, evidence-based decisions about the current and future use and influence of science and technology, including ethical considerations	<ul style="list-style-type: none"> Creates, follows, evaluates and adapts own design document as they design, build and publish their video game Tests own and peer video games to identify flaws, bugs and glitches. Suggests strategies to rectify them. Evaluates own and peer video games using 'Designer Scoreboard' to identify and analyse ways to improve own game. 	
<i>Skills: Working Scientifically</i> ST4-4WS	Identifies questions and problems that can be tested or researched and makes predictions based on scientific knowledge	<ul style="list-style-type: none"> Completes regular play-testing roles on own and peer games, posing and tracking features or glitches that can be explored or corrected. Predicts, tests and evaluates advanced logic in own and peer games, including multiple behaviours, power-ups, paradigm shifts, etc. 	
<i>Skills: Working Scientifically</i> ST4-5WS	Collaboratively and individually produces a plan to investigate questions and problems	<ul style="list-style-type: none"> Shares knowledge and collaborates to design, build, test and publish own and peer games. 	
<i>Skills: Working Scientifically</i> ST4-6WS	Follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually	<ul style="list-style-type: none"> Creates, follows, evaluates and adapts own design document as the design, build and publish their video game Works individually and collaboratively to design, build, test and publish video game 	

<p><i>Skills: Working Scientifically</i> ST4-7WS</p>	<p>Processes and analyses data from a first-hand investigation and secondary sources to identify trends, patterns and relationships, and draw conclusions</p>	<ul style="list-style-type: none"> • Explores logical programming, and rigorously tests alternative lines of code to determine which variables impact on which elements of gameplay. • Performs rigorous and ethical testing of own video game, both individually and collaboratively and using own collected data, to identify and remove unintended glitches and improve their game. • Explores, analyses and rigorously tests limitations with popular technology, and investigate suitable compromises and workarounds to overcome hardware / software limits 	
<p><i>Skills: Working Scientifically</i> ST4-8WS</p>	<p>Selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems</p>	<ul style="list-style-type: none"> • Demonstrates an understanding of a broad range of programming logic (loops, triggers, variables), and selects appropriate logical tool to efficiently program complex video games. • Explores and rigorously tests variations of programmed logic to achieve complex outcomes and game mechanics 	
<p><i>Knowledge & Understanding: Earth and Space</i> ST4-13ES</p>	<p>Explains how advances in scientific understanding of process that occur within and on the Earth influence the choices people make about resource use and management</p>	<ul style="list-style-type: none"> • Documents a brief history of video games, especially the technological advancements and cultural impact from 1970s to today, as a case study of an evolving technology • Develops and demonstrates awareness of issues surrounding sustainable resource management through their video game. • Challenges their players to think sustainably. 	
<p><i>Knowledge & Understanding: Living World</i> ST4-14LW</p>	<p>Relates the structure and function of living things to their classification, survival and reproduction</p>	<ul style="list-style-type: none"> • Researches, designs and builds a variety of complex digital animals that inhabit and coexist in a virtual world; each displaying a defined life-cycle, a predator-prey relationship or an identified evolutionary trait that makes them particularly suited to this virtual environment. 	

Stage 4 Links

Mathematics

Code	Description A student:	Game Design Activities	Learning across the curriculum
<i>Working Mathematically</i> Communicating MA4-1WM	Communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols	<ul style="list-style-type: none"> Creates elaborate design documents that include flowcharts to present their game's complex internal logic 	
<i>Working Mathematically</i> Problem Solving MA4-2WM	Applies appropriate mathematical techniques to solve problems	<ul style="list-style-type: none"> Tests and records changes in variables, and documents their effects on the logic of own game in order to identify and remove glitches in programmed logic or unintended actions in game. 	
<i>Working Mathematically</i> Reasoning MA4-3WM	Recognises and explains mathematical relationships using reasoning	<ul style="list-style-type: none"> Uses, and manipulates through programming, integer variables to track scores, time-limits, and perform other etc. 	
<i>Number & Algebra</i> Computation with Integers MA4-4NA	Compares, orders and calculates with integers, applying a range of strategies to aid computation	<ul style="list-style-type: none"> Uses, and manipulates through programming, integer variables to track scores, time-limits, etc. Tests relationships between and expected computations performed on integer variables both mentally and at the computer to ensure their game is functioning correctly 	
<i>Number & Algebra</i> Fractions, Decimals & Percentages MA4-5NA	Operates with fractions, decimals and percentages	<ul style="list-style-type: none"> Uses (and manipulates through programming) fractions, decimals and/or percentages to control acceleration, distances, angles, etc. 	
<i>Number & Algebra</i> Financial Mathematics MA4-6NA	Solves financial problems involving purchasing goods	<ul style="list-style-type: none"> Constructs a simple economy into own video game as player feedback. Players earn money throughout the game and can then spend this money to unlock rewards and power-ups. 	
<i>Number & Algebra</i> Ratios & Rates	Operates with ratios and rates, and explores their graphical	<ul style="list-style-type: none"> Manipulates integer variables to record or display ratios of enemies remaining, or treasures left to be found, etc. 	

MA4-7NA	representations	<ul style="list-style-type: none"> Presents graphical representations of player life totals (for example) over several play tests, using own captured data. 	
<i>Number & Algebra</i> Algebraic Techniques 1 MA4-8NA	Generalises number properties to operate with algebraic expressions	<ul style="list-style-type: none"> Explores simple algebraic expressions using unknown variables in programmed code. Uses, programs, captures data for and presents dynamic (unknown) variables to track player score, time-limits, etc. 	
<i>Measurement & Geometry</i> Length MA4-12MG	Calculates the perimeters of plane shapes and the circumferences of circles	<ul style="list-style-type: none"> Calculates the perimeters and/or circumferences of plane shapes and circles in their digital world, including the perimeter of land players can move on, or the size of boxes (etc.) players would need to hide behind for example. Uses metric measurement (typically metres), to represent the perimeters of their world. 	
<i>Measurement & Geometry</i> Area MA4-13MG	Uses formulas to calculate the areas of quadrilaterals and circles, and converts between units of area	<ul style="list-style-type: none"> Calculates the areas of quadrilaterals and circles in their digital world. Uses metric measurement (typically metres squared) to represent the area of their world. Converts between different units of area, and compares similar areas in their digital world. 	
<i>Measurement & Geometry</i> Volume MA4-14MG	Uses formulas to calculate the volumes of prisms and cylinders, and converts between units of volume	<ul style="list-style-type: none"> Calculates the volumes of prisms and cylinders in their digital world. Uses metric measurement (typically metres cubed) to represent the volumes in their world. Converts between different units of volume, and compares similar volumes in their digital world. 	
<i>Statistics & Probability</i> Data Collection & Representation MA4-19SP	Collects, represents and interprets single sets of data, using appropriate statistical displays	<ul style="list-style-type: none"> Uses, and manipulates through programming, integer variables to track scores, time-limits, etc. Tests relationships between and expected computations performed on integer variables both mentally and at the computer to ensure their game is functioning correctly Manipulates integer variables to record or display ratios of enemies remaining, or treasures left to be found, etc. Presents graphical representations of player life totals (for example) over several play tests, using own captured data. 	
<i>Statistics & Probability</i> Single Variable Data Analysis	Analyses single sets of data using measures of location and range	<ul style="list-style-type: none"> Uses, and manipulates through programming, integer variables to track distance and location on a Cartesian plane or in reference to other programmed objects in own game. 	



MA4-20SP			
<i>Statistics & Probability</i> Probability MA4-21SP	Represents probabilities of simple and compound events	<ul style="list-style-type: none"> • Uses, describes and manipulates through programming simple and compound events in their game using random number generators. 	



Stage 4 Links

English

Code	Description A student:	Game Design Activities	Learning across the curriculum
Communicate EN4-1A	Responds to and composes texts for understanding, interpretation, critical analysis, imaginative expression and pleasure	<ul style="list-style-type: none"> Responds to and deconstructs a range of own, peer and commercial multimodal texts (video games) using the elements of narrative, filmic grammar and multimodal grammar. Designs, builds, tests and produces own multimodal text (video game), using own narrative or one developed from an issue or context explored in class. Synthesises and critically evaluates a range of narratives in own, peer and commercial games to analyse how each text presents narrative in a multimodal medium Emphasises links in game to issues of sustainability and diversity to create engaging narratives 	
Communicate EN4-2A	Effectively uses a widening range of processes, skills, strategies and knowledge for responding to and composing texts in different media and technologies	<ul style="list-style-type: none"> Deconstructs, reviews, designs, builds, tests, refines, produces and markets video games as multimodal texts Designs, composes and responds to a range of supplemental texts (manuals, advertisements, box art, online forums, etc.) to support publishing and marketing own game 	
Use Language EN4-3B	Uses and describes language forms, features and structures of texts appropriate to a range of purposes, audiences and contexts	<ul style="list-style-type: none"> Demonstrates an understanding of the language choices in and grammar of multimodal texts including player feedback, atmosphere, narrative, challenges and power-ups. Analyses and justifies language choices made when designing own game for particular purposes, audiences and contexts Reviews, analyses and justifies language choices made in peer and commercial games to suit particular purposes, audiences and contexts Deconstructs, reviews, designs, builds, tests, refines, produces and markets video games as multimodal texts Refers to elements of filmic and/or multimodal grammar when 	

		<p>deconstructing, reviewing, designing, building and testing own, peer and commercial games.</p> <ul style="list-style-type: none"> • Describes and justifies language choices made to establish player feedback, atmosphere, narrative or challenges in own, peer and commercial games • Uses game mechanics, symbolism and atmosphere to develop and tell the narrative 	
Use Language EN4-4B	Makes effective language choices to creatively shape meaning with accuracy, clarity and coherence	<ul style="list-style-type: none"> • Demonstrates an understanding of the language choices in and grammar of multimodal texts including player feedback, atmosphere, narrative, challenges and power-ups. • Analyses and justifies language choices made when designing own game for particular purposes, audiences and contexts • Reviews, analyses and justifies language choices made in peer and commercial games to suit particular purposes, audiences and contexts • Deconstructs, reviews, designs, builds, tests, refines, produces and markets video games as multimodal texts • Refers to elements of filmic and/or multimodal grammar when deconstructing, reviewing, designing, building and testing own, peer and commercial games. • Describes and justifies language choices made to establish player feedback, atmosphere, narrative or challenges in own, peer and commercial games. • Uses game mechanics, symbolism and atmosphere to develop and tell the narrative 	
Think EN4-5C	Thinks imaginatively, creatively, interpretively and critically about information, ideas and arguments to respond to and compose texts	<ul style="list-style-type: none"> • Responds to and deconstructs a range of own, peer and commercial multimodal texts (video games) using the elements of narrative, filmic grammar and multimodal grammar. • Analyses and justifies language choices made when designing own game for particular purposes, audiences and contexts • Reviews, analyses and justifies language choices made in peer and commercial games to suit particular purposes, audiences and contexts • Describes and justifies language choices made to establish player feedback, atmosphere, narrative or challenges in own, peer and commercial games. 	

		<ul style="list-style-type: none"> • Designs, builds, tests and produces own multimodal text (video game), using own narrative or one developed from an issue or context explored in class. • Synthesises and critically evaluates a range of multimodal texts to analyse how each text presents information, ideas and arguments in a multimodal medium 	
Think EN4-6C	Identifies and explains connections between and among texts	<ul style="list-style-type: none"> • Synthesises and critically evaluates a range of multimodal texts to analyse how each text presents narrative, information, ideas and arguments in a multimodal medium • Explores, synthesises and critically analyses the different genres of video games • Explores inter-textual references between games, movies, books, etc. (E.g. 'Donkey Kong' and 'King Kong', 'Atlas Shrugged' and 'BioShock') • Explores, synthesises and critically analyses differences in language choices and language techniques when telling a story in print text, visual text and/or multimodal text. 	
Express EN4-7D	Demonstrates understanding of how texts can express aspects of their broadening world and their relationships within it	<ul style="list-style-type: none"> • Describes ways that own, peer and commercial games explore or present contemporary issues, stereotypes and/or concepts (e.g. war, gender, morality, etc.) • Composes and critically responds to a range of complex narratives in own, peer and commercial games. • Explores filmic and multimodal grammar used to position or influence the player towards particular worldviews or perspectives. • Composes and critically responds to filmic and multimodal grammar in own, peer and commercial games 	
Express EN4-8D	Identifies, considers and appreciates cultural expression in texts	<ul style="list-style-type: none"> • Describes ways that own, peer and commercial games explore or present contemporary issues, stereotypes and/or concepts (e.g. war, gender, morality, etc.) • Describes ways that players are positioned towards and against cultures, people and behaviours in own, peer and commercial games (through narrative, through challenges and enemies, through atmosphere, etc.) • Deconstructs, analyses and evaluates traditional and non-traditional representations of culture in games 	



Learn & Reflect EN4-9E	Uses, reflects on and assesses their individual and collaborative skills for learning	<ul style="list-style-type: none"> • Composes, follows, adapts and evaluates a design document when building and testing own game. • Works collaboratively and independently to deconstruct, design, build, test and publish own, peer and commercial games. 	
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Stage 5 Links

Science & Technology

Code	Description A student:	Game Design Activities	Learning across the curriculum
<i>Values & Attitudes</i> ST5-2VA	Shows a willingness to engage in findings solutions to science-related personal, social and global issues, including shaping sustainable futures	<ul style="list-style-type: none"> • Critically engages with technology to design, build, test and publish a number of complex video games • Analyses and rigorously tests limitations with popular technology, suggesting and investigating suitable alternatives, compromises and workarounds to overcome hardware / software limits • Conducts case studies on a variety of target audiences to determine cultural, technological, social and financial factors that appeal to each target audience. • Analyse, design, build, test and publish a number of own, peer and commercial games that explore issues of globalisation, sustainability, diversity, poverty and/or war. 	
<i>Values & Attitudes</i> ST5-3VA	Demonstrates confidence in making reasoned, evidence-based decisions about the current and future use and influence of science and technology, including ethical considerations	<ul style="list-style-type: none"> • Creates, follows, evaluates and adapts own design document as they design, build and publish their video game • Tests own and peer video games to identify flaws, bugs and glitches. Suggests, rigorously tests and critically evaluates strategies to rectify them. • Evaluates own and peer video games using 'Designer Scoreboard' to analyse and evaluate and improve game. 	
<i>Skills: Working Scientifically</i> ST5-4WS	Develops questions or hypotheses to be investigated scientifically	<ul style="list-style-type: none"> • Creates, follows, evaluates and adapts own design document as the design, build and publish their video game • Tests own and peer video games to identify flaws, bugs and glitches. Suggests strategies to rectify them. • Evaluates own and peer video games using 'Designer Scoreboard' to identify and analyse ways to improve own game. • Critically analyses commercial games and recreates gameplay elements to investigate and demystify the logic behind them. 	

<i>Skills: Working Scientifically</i> ST5-5WS	Produces a plan to investigate identified questions, hypotheses or problems, individually and collaboratively	<ul style="list-style-type: none"> • Shares knowledge and collaborates to design, build, test and publish own and peer games. 	
<i>Skills: Working Scientifically</i> ST5-6WS	Undertakes first-hand investigations to collect valid and reliable data and information, individually and collaboratively	<ul style="list-style-type: none"> • Explores logical programming, and rigorously tests alternative lines of code to determine which variables impact on which elements of gameplay. • Performs rigorous and ethical testing of own video game, both individually and collaboratively and using own collected data, to identify and remove unintended glitches and improve their game. • Explores, analyses and rigorously tests limitations with popular technology, and investigate suitable compromises and workarounds to overcome hardware / software limits 	
<i>Skills: Working Scientifically</i> ST5-7WS	Processes, analyses and evaluates data from first-hand investigations and secondary sources to develop evidence-based arguments and conclusions	<ul style="list-style-type: none"> • Evaluates and justifies programming and logic choices made to ensure own, peer and commercial games are efficient, logical, structured and engaging for the player • Uses, evaluates and justifies data collection methods and the data collected through peer and own playtests to fine-tune difficulty curve, improve game efficiency and better engage the player. 	
<i>Skills: Working Scientifically</i> ST5-8WS	Applies scientific understanding and critical thinking skills to suggest possible solutions to identified problems	<ul style="list-style-type: none"> • Demonstrates an understanding of a broad range of advanced programming logic (loops, triggers, variables, conditions), and selects, tests and justifies appropriate logical tools to efficiently program complex video games. • Analyses, evaluates and rigorously tests variations of programmed logic to achieve complex outcomes and game mechanics 	



Stage 5.1 Links

Mathematics

Code	Description A student:	Game Design Activities	Learning across the curriculum
<i>Working Mathematically</i> Problem Solving MA5.1-2WM	Selects and uses appropriate strategies to solve problems	<ul style="list-style-type: none"> Describes and deconstructs a range of own, peer and commercial games as a sequence of mathematical and logical problems Deconstructs, describes, builds and rigorously tests in-game challenges and game-mechanics as a sequence of interlinked mathematical and logical triggers and actions. Applies a range of known mathematical concepts and logical strategies to design, build and test engaging challenges, game-mechanics and complete video games. Explores, rigorously tests, documents and describes unfamiliar mathematical concepts and logical strategies in own video games 	
<i>Working Mathematically</i> Reasoning MA5.1-3WM	Provides reasoning to support conclusions that are appropriate to the context	<ul style="list-style-type: none"> Poses, rigorously tests, confirms and justifies a range of possible coding solutions to ensure efficient, engaging and complex video games. 	
<i>Measurement & Geometry</i> Area MA5.1-8MG	Calculates the areas of composite shapes, and the surface areas of rectangular and triangular prisms	<ul style="list-style-type: none"> Uses a range of mathematical formulae and strategies to calculate a variety of areas in own video game. 	
<i>Measurement & Geometry</i> Properties of Geometric Figures MA5.1-11MG	Describes and applies the properties of similar figures and scale drawings	<ul style="list-style-type: none"> Creates, follows, adapts and evaluates design documents including representative and scale drawings of game environments. 	
<i>Statistics & Probability</i> Probability MA5.1-13SP	Calculates relative frequencies to estimate probabilities of simple and compound events	<ul style="list-style-type: none"> Describes, programs and calculates the probabilities of a range of randomised events, using random number generators. 	

Stage 5.2 Links

Mathematics

Code	Description A student:	Game Design Activities	Learning across the curriculum
<i>Working Mathematically</i> Problem Solving MA5.2-2WM	Interprets mathematical or real-life situations, systematically applying appropriate strategies to solve problems	<ul style="list-style-type: none"> Describes and deconstructs a range of own, peer and commercial games as a sequence of mathematical and logical problems Deconstructs, describes, builds and rigorously tests in-game challenges and game-mechanics as a sequence of interlinked mathematical and logical triggers and actions. Applies a range of known mathematical concepts and logical strategies to design, build and test engaging challenges, game-mechanics and complete video games. Explores, rigorously tests, documents and describes unfamiliar mathematical concepts and logical strategies in own video games 	
<i>Working Mathematically</i> Reasoning MA5.2-3WM	Constructs arguments to prove and justify results	<ul style="list-style-type: none"> Deconstructs, describes, builds, rigorously tests and evaluates challenges and game-mechanics to prove and justify expected programmed results in own, peer and commercial games. 	
<i>Measurement & Geometry</i> Area MA5.2-11MG	Calculates the surface areas of right prisms, cylinders and related composite solids	<ul style="list-style-type: none"> Uses a range of mathematical formulae and strategies to calculate a variety of areas in own video game. 	
<i>Measurement & Geometry</i> Volume MA5.2-12MG	Applies formulas to calculate the volumes of composite solids composed of right prisms and cylinders	<ul style="list-style-type: none"> Uses a range of mathematical formulae and strategies to calculate a variety of volumes in own video game. 	
<i>Statistics & Probability</i> Probability MA5.2-21SP	Describes and calculates probabilities in multi-step chance experiments	<ul style="list-style-type: none"> Describes, programs and calculates the probabilities of a range of randomised events, using random number generators. 	

Stage 5.3 Links

Mathematics

Code	Description A student:	Game Design Activities	Learning across the curriculum
<i>Working Mathematically</i> Problem Solving MA5.3-2WM	Generalises mathematical ideas and techniques to analyse and solve problems efficiently	<ul style="list-style-type: none"> Describes and deconstructs a range of own, peer and commercial games as a sequence of mathematical and logical problems Deconstructs, describes, builds and rigorously tests in-game challenges and game-mechanics as a sequence of interlinked mathematical and logical triggers and actions. Applies a range of known mathematical concepts and logical strategies to design, build and test engaging challenges, game-mechanics and complete video games. Explores, rigorously tests, documents and describes unfamiliar mathematical concepts and logical strategies in own video games 	
<i>Working Mathematically</i> Reasoning MA5.3-3WM	Uses deductive reasoning in presenting arguments and formal proofs	<ul style="list-style-type: none"> Applies a range of known mathematical concepts and logical strategies to design, build and test engaging challenges, game-mechanics and complete video games. Explores, rigorously tests, documents and describes unfamiliar mathematical concepts and logical strategies in own video games to develop formal proofs. 	
<i>Measurement & Geometry</i> Area MA5.3-13MG	Applies formulas to find the surface areas of right pyramids, right cones, spheres and related composite solids	<ul style="list-style-type: none"> Uses a range of mathematical formulae and strategies to calculate a variety of areas in own video game. 	
<i>Measurement & Geometry</i> Volume MA5.3-14MG	Applies formulas to find the volumes of right pyramids, right cones, spheres and related composite solids	<ul style="list-style-type: none"> Uses a range of mathematical formulae and strategies to calculate a variety of volumes in own video game. 	

Stage 5 Links

English

Code	Description A student:	Game Design Activities	Learning across the curriculum
Communicate EN5-1A	Responds to and composes increasingly sophisticated and sustained texts for understanding, interpretation, critical analysis, imaginative expression and pleasure	<ul style="list-style-type: none"> Responds to and deconstructs a range of own, peer and commercial multimodal texts (video games) using the elements of narrative, filmic grammar and multimodal grammar. Designs, builds, tests and produces own multimodal text (video game), using own narrative or one developed from an issue or context explored in class. Synthesises and critically evaluates a range of narratives in own, peer and commercial games to analyse how each text presents narrative in a multimodal medium Emphasises links in game to issues of sustainability and diversity to create engaging narratives 	
Communicate EN5-2A	Effectively uses and critically assesses a wide range of processes, skills, strategies and knowledge for responding to and composing a wide range of texts in different media and technologies	<ul style="list-style-type: none"> Analyses, evaluates, reviews, designs, builds, tests, refines, produces and markets video games as multimodal texts Designs, composes and responds to a range of supplemental texts (manuals, advertisements, box art, online forums, etc.) to support publishing and marketing own game 	
Use Language EN5-3B	Selects and uses language forms, features and structures of texts appropriate to a range of purposes, audiences and contexts, describing and explaining their effects on meaning	<ul style="list-style-type: none"> Demonstrates an understanding of the language choices in and grammar of multimodal texts including player feedback, atmosphere, narrative, challenges and power-ups. Analyses and justifies language choices made when designing own game for particular purposes, audiences and contexts Reviews, analyses and justifies language choices made in peer and commercial games to suit particular purposes, audiences and contexts Deconstructs, reviews, designs, builds, tests, refines, produces and markets video games as multimodal texts 	

		<ul style="list-style-type: none"> • Refers to elements of filmic and/or multimodal grammar when deconstructing, reviewing, designing, building and testing own, peer and commercial games. • Describes and justifies language choices made to establish player feedback, atmosphere, narrative or challenges in own, peer and commercial games • Uses game mechanics, symbolism and atmosphere to develop and tell the narrative 	
Use Language EN5-4B	Effectively transfers knowledge, skills and understanding of language concepts into new and different contexts	<ul style="list-style-type: none"> • Demonstrates an understanding of the language choices in and grammar of multimodal texts including player feedback, atmosphere, narrative, challenges and power-ups. • Analyses and justifies language choices made when designing own game for particular purposes, audiences and contexts • Reviews, analyses and justifies language choices made in peer and commercial games to suit particular purposes, audiences and contexts • Deconstructs, reviews, designs, builds, tests, refines, produces and markets video games as multimodal texts • Refers to elements of filmic and/or multimodal grammar when deconstructing, reviewing, designing, building and testing own, peer and commercial games. • Describes and justifies language choices made to establish player feedback, atmosphere, narrative or challenges in own, peer and commercial games. • Uses game mechanics, symbolism and atmosphere to develop and tell the narrative 	
Think EN5-5C	Thinks imaginatively, creatively, interpretively and critically about information and increasingly complex ideas and arguments to respond to and compose texts in a range of contexts	<ul style="list-style-type: none"> • Responds to and deconstructs a range of own, peer and commercial multimodal texts (video games) using the elements of narrative, filmic grammar and multimodal grammar. • Analyses and justifies language choices made when designing own game for particular purposes, audiences and contexts • Reviews, analyses and justifies language choices made in peer and commercial games to suit particular purposes, audiences and contexts • Describes and justifies language choices made to establish player feedback, atmosphere, narrative or challenges in own, peer and 	



		<p>commercial games.</p> <ul style="list-style-type: none"> • Designs, builds, tests and produces own multimodal text (video game), using own narrative or one developed from an issue or context explored in class. • Synthesises and critically evaluates a range of multimodal texts to analyse how each text presents information, ideas and arguments in a multimodal medium 	
Think EN5-6C	Investigates the relationships between and among texts	<ul style="list-style-type: none"> • Synthesises and critically evaluates a range of multimodal texts to analyse how each text presents narrative, information, ideas and arguments in a multimodal medium • Explores, synthesises and critically analyses the different genres of video games • Explores inter-textual references between games, movies, books, etc. (E.g. 'Donkey Kong' and 'King Kong', 'Atlas Shrugged' and 'BioShock') • Explores, synthesises and critically analyses differences in language choices and language techniques when telling a story in print text, visual text and/or multimodal text. 	
Express EN5-7D	Understands and evaluates the diverse ways texts can represent personal and public worlds	<ul style="list-style-type: none"> • Analyses and evaluates techniques used in own, peer and commercial games to explore or skew perspectives of contemporary issues, stereotypes and/or concepts (e.g. war, gender, morality, etc.) • Composes and critically responds to a range of complex narratives in own, peer and commercial games. • Analyses and evaluates filmic and multimodal grammar used to position or influence the player towards particular worldviews or perspectives. • Composes and critically responds to filmic and multimodal grammar in own, peer and commercial games 	
Express EN5-8D	Questions, challenges and evaluates cultural assumptions in texts and their effects on meaning	<ul style="list-style-type: none"> • Analyses and evaluates techniques used in own, peer and commercial games to explore or skew perspectives of contemporary issues, stereotypes and/or concepts (e.g. war, gender, morality, etc.) • Analyses and evaluates cultural perspectives of the protagonist, antagonist and bystander in a range of own, peer and commercial games. • Analyses and evaluates techniques used to present or b • Analyses and evaluates video games in context to deconstruct perspective and bias towards and against cultures, people and 	

		behaviours (through narrative, through challenges and enemies, through atmosphere, etc.)	
Learn & Reflect EN5-9E	Purposefully reflects on, assesses and adapts their individual and collaborative skills with increasing independence and effectiveness	<ul style="list-style-type: none"> • Composes, follows, adapts and evaluates a design document when building and testing own game. • Works collaboratively and independently to deconstruct, design, build, test and publish own, peer and commercial games. 	

