AUSTRALIAN STEM
VIDEO GAME
CHALLENGE

CURRICULUM LINKS

TEACHING RESOURCES

Are you unsure of where to start? Never fear, our Teacher Learning Pack is free from the Teaching Resources page on the STEM games website. It provides a foundational overview of game development, including a brief history of video games and gaming technology, positioning within key subject areas and suggestions for lessons to mirror the game development cycle.

Positioning

POSSIBLE APPROACHES TO INTEGRATING THE STEM VIDEO GAME CHALLENGE INTO A SCHOOL

There are a variety of opportunities for students and teachers to integrate the STEM Video Game challenge into their work and life at school. These ideas show some possibilities, but others – including innovative combinations of these – might also be considered:

1. With the support of a teacher (or teachers), student teams could incorporate the STEM Video Game challenge into a single subject as an assessment task or alternate task

2. Students could partner across several classes/subjects, using skills and knowledge developed to help support their STEM Video Game challenge entry

3. Students could partner out of classes in extra-curricular programs or on their own

No matter the approach that student teams take we encourage teachers to support students in attempting their game development projects. The experience of students and supervising teachers in previous years shows that involvement in the STEM Video Game challenge is an important and key moment in the school lives of students and teachers.
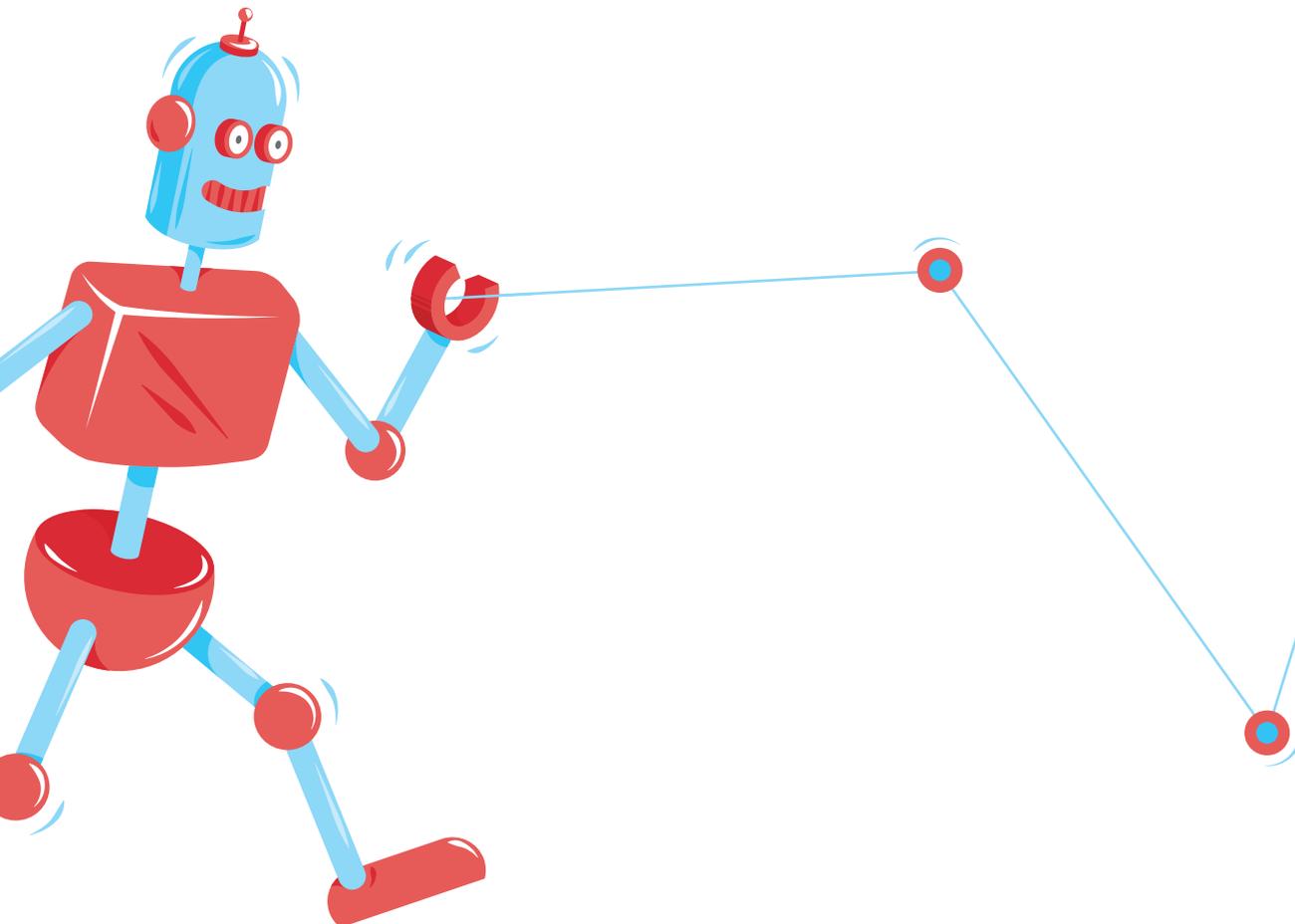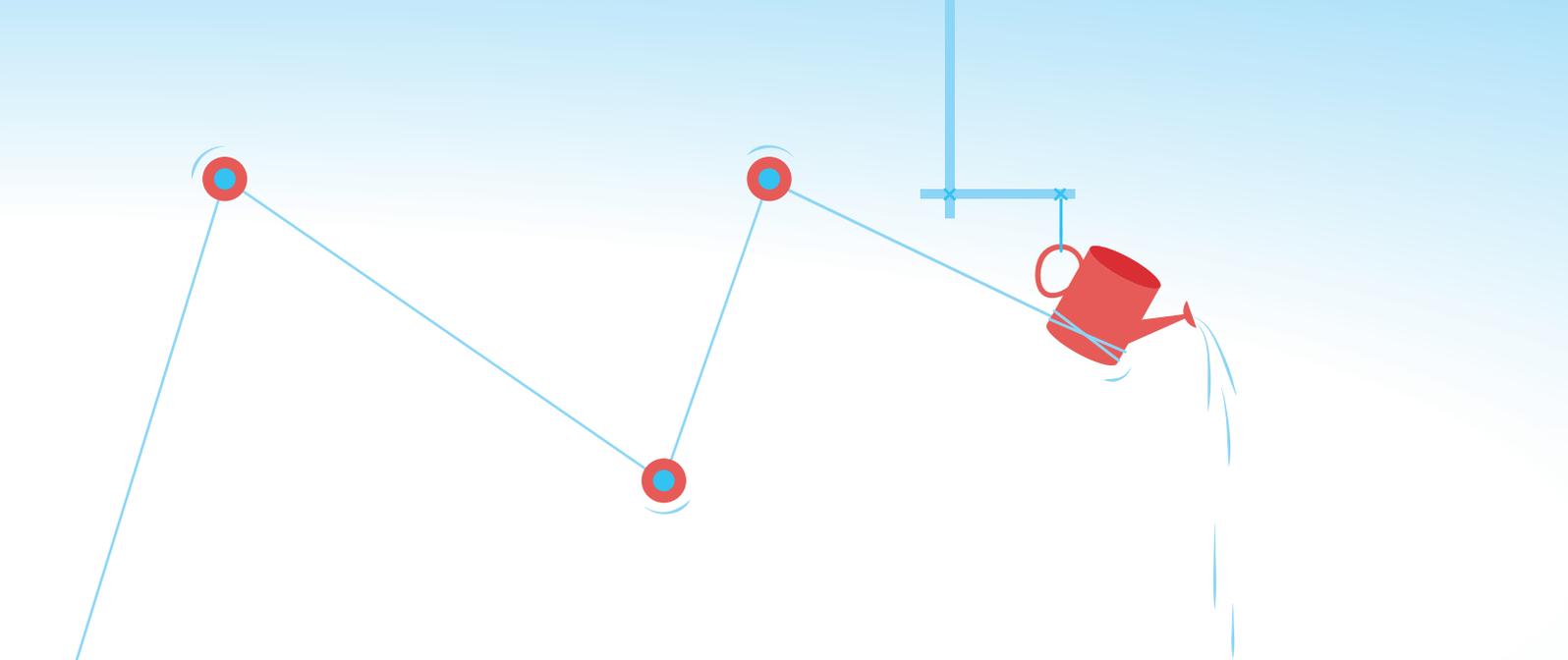
OVERVIEW OF SKILLS AND CONTENT AREAS

Language/Literacy

Games generally require a significant investment in printed text. Whether a first person shooter or a role playing game, participants will require text-based instructions and developers must write them.

The STEM Video Game challenge includes a requirement that all teams describe their game and the development process in a Game Design Document (GDD). The GDD is a great opportunity for students to write about the development process and to improve and enhance their language and literacy skills.

Mathematics

Coding a game heavily relies on arithmetic language. The core of game design is a core which revolves around numeracy – the language through which software, hardware, and the product which ultimately arrives onscreen is a mathematical one. Thus, game design is a powerful method of numeracy education.

Scientific literacy

Game design engages powerfully with scientific literacy education – from understanding the principles of physics and motion, the psychology of perception and interaction, and the principles underpinning the ways that humans hear, see, and experience the world. These are all elements which must be understood and manipulated in order to produce good, engaging game design.

The game development process involves students experimenting with their characters, narrative, game objects and backgrounds. Students need to develop the ability to predict and explain outcomes to other members of the game design team – communicating their work and progress – and incorporating the results into further game design. They need to be able to constructively critique the work of their partners and respond positively to criticism and suggestion.

I.T. literacy

The technologies involved in video game creation are disparate, complex, and often challenging for both neophyte and experienced development staff. Developers must often straddle multiple design roles, requiring the ongoing skill development of multiple I.T-based literacies and competencies in specific platforms. Graphic design suites, compilers, audio recording software, and animation packages may all need to be mastered during a role in a small design team, resulting in rich opportunities for I.T teaching and learning.

Coding is now recognised as an important skill for students of all ages and year levels to develop. The STEM Video Game challenge encourages students to develop their coding skills in the supportive environment of peer teams. The coding languages and platforms used by students for the challenge are available for students across a wide range of coding backgrounds – from absolute beginners to coding geniuses.

Multimedia design

Sound design, video design, and the capturing and editing of content for integration into development builds of video games requires an extensive understanding of multimedia practices. From music to sound effects to video-based cutscenes, the multimedia aspect of video game design offers many different paths for skill development.

Curriculum links

Linking the STEM Video Game Challenge to the Australian Curriculum (Years 5 to 10)

Elements of Australian STEM Video Game Challenge		Australian Curriculum Content	
Collaborating as a team	Although the challenge can be completed by individual students, many students complete their project as a part of a team. Working collaboratively requires communication of ideas, consultation between group members, and the development of agreed protocols. Examples of these processes in action could include: • developing a set of 'rules' about appropriate conduct within a team and using these rules as a basis for resolving dilemmas • using a range of communication tools (including collaborative online environments) to share ideas and information • using cloud computing to store common files and establishing virtual meetings organising timelines, devising file naming conventions and planning backup measures • using software to record and monitor project tasks, responsibilities and timeframes and to organise continuous opportunities to review progress with collaborative partners and to conduct regular unit testing	**Years 5/6**	Plan, create and communicate ideas and information, including collaboratively online, applying agreed ethical, social and technical protocols (ACTDIP022)
		Years 7/8	Plan and manage projects that create and communicate ideas and information collaboratively online, taking safety and social contexts into account (ACTDIP032)
		Years 9/10	Plan and manage projects using an iterative and collaborative approach, identifying risks and considering safety and sustainability (ACTDIP044)
Planning the game project	The initial planning and development of ideas for the game, could include asking such questions as: • Who is the game for? • What aspect(s) of the theme might the game address? • What pre-existing games might the developed game be like? • How could interactivity be used in the game? • What might be the mechanics of the game play? • Will there be a story? Students might consider such things as: • explaining ways in which the visual, auditory and user controls and interface interact • consistent placement of symbols to help with performing actions that require speed • modelling the attributes of real-world objects for the game • identifying the elements of the game design such as characters, movements, collisions and scoring • explaining the role of interactivity systems, such as mouse, touch pad, screen, or accelerometer • investigating reliability, user-friendliness, portability and robustness	**Years 5/6**	Plan, create and communicate ideas and information, including collaboratively online, applying agreed ethical, social and technical protocols (ACTDIP022)
		Years 7/8	Plan and manage projects that create and communicate ideas and information collaboratively online, taking safety and social contexts into account (ACTDIP032)
		Years 9/10	Plan and manage projects using an iterative and collaborative approach, identifying risks and considering safety and sustainability (ACTDIP044)

Elements of Australian STEM Video Game Challenge		Australian Curriculum Content	
Designing for the game		Years 5/6	Design a user interface for a digital system (ACTDIP018)
		Years 7/8	Investigate how digital systems represent text, image and audio data in binary (ACTDIK024)
			Analyse and visualise data using a range of software to create information, and use structured data to model objects or events (ACTDIP026)
			Design the user experience of a digital system, generating, evaluating and communicating alternative designs (ACTDIP028)
		Years 9/10	Design the user experience of a digital system by evaluating alternative designs against criteria including functionality, accessibility, usability, and aesthetics (ACTDIP039)
Coding for the game		Years 5/6	Examine how whole numbers are used to represent all data in digital systems (ACTDIK015)
			Design, modify and follow simple algorithms involving sequences of steps, branching, and iteration (repetition) (ACTDIP019)
			Implement digital solutions as simple visual programs involving branching, iteration (repetition), and user input (ACTDIP020)
		Years 7/8	Design algorithms represented diagrammatically and in English, and trace algorithms to predict output for a given input and to identify errors (ACTDIP029)
			Implement and modify programs with user interfaces involving branching, iteration and functions in a general-purpose programming language (ACTDIP030)
		Years 9/10	Design algorithms represented diagrammatically and in structured English and validate algorithms and programs through tracing and test cases (ACTDIP040)
			Implement modular programs, applying selected algorithms and data structures including using an object-oriented programming language (ACTDIP041)
Testing of the game		Years 5/6	n/a
		Years 7/8	Evaluate how student solutions and existing information systems meet needs, are innovative, and take account of future risks and sustainability (ACTDIP031)
		Years 9/10	Plan and manage projects using an iterative and collaborative approach, identifying risks and considering safety and sustainability (ACTDIP044)
Finalising the game product		Years 5/6	Plan, create and communicate ideas and information, including collaboratively online, applying agreed ethical, social and technical protocols (ACTDIP022)
		Years 7/8	Plan and manage projects that create and communicate ideas and information collaboratively online, taking safety and social contexts into account (ACTDIP032)
		Years 9/10	Plan and manage projects using an iterative and collaborative approach, identifying risks and considering safety and sustainability (ACTDIP044)

Linking the STEM Video Game Challenge to the senior Australian curricula (Years 11 and 12)

A sampling of courses available in the senior secondary years (Year 11 and Year 12) throughout Australia is included below.

Some of these course make explicit reference to video games as a suitable form for study and development by students. Others include content and skills that are appropriate (and in some cases, necessary) for the development of video games. Across many of these courses it would be possible and appropriate for teachers to encourage students to use video games developed for the purposes of course work and assessment tasks also as entries to the STEM Video Game challenge.

These are not intended to be completely comprehensive. With the help and support of teachers, senior students studying courses in English, Science, Humanities, and many other areas could feasibly incorporate the development of a game into work requirements and assessment tasks.

ACT

Information Technology	Visual Arts
• Units include Computer Games Programming and Design, Computer Games Design	• Units include: Contemporary Game Design

NEW SOUTH WALES

HSC Visual Design	HSC Software Design Development
• This course includes an Interactive and Multimedia module that references video games as a possible context for study	• This course includes modules on introduction to software development, the software development cycle, and developing software solutions. These incorporate aspects that could be tailored to video games as a context or assessment approach: Defining and understanding the problem, Planning and designing software solutions, Implementing software solutions, Testing and evaluating software solutions, and Maintaining software solutions

QUEENSLAND

QCE Film, Television and New Media	QCE Information Technology Systems
• This course incorporates aspects of design that match the process in the STEM Video Game competition	• Contexts described in this course include Game Design
QCE Information and Communication Technology	**QCE Media Arts in Practice**
• This course includes electives, Animation, Application Development, Audio and Video Production, and Digital Imaging and Modelling	• This course includes the elective, Interactive Media
QCE Information Processing and Technology	**QCE Visual Arts in Practice**
• This course includes topics, Algorithms and Software Programming, both of which can be applied to the development of video games	• This course includes the elective, Digital and 4D

SOUTH AUSTRALIA

Digital Technologies (Stage 1)	Digital Technologies (Stage 1)
• Focus areas include: Programming, Advanced programming and Exploring innovations; • Assessment includes Project skills tasks, and development of Digital solutions	• Focus areas include: Computational thinking, Design and programming, and Iterative project development; • School assessment includes Project skills tasks, and a Collaborative project

TASMANIA

Computer Graphics and Design	Computer Science
• Unit 2 Design Studios includes as an elective module: Asset development, game design and production • Unit 3 Extended Project	• Area 4 Computing Option includes Game development in a suitable environment as a suggested topic

VICTORIA

VCE Computing	VCE Media
• Unit 1, Area of study 1 – Data and graphic solutions • Unit 2, Area of study 1 – Programming; Area of study 2 – Data analysis and visualisation	• In this course video games are explicitly identified as an appropriate media form for students to study. • Unit 1, Area of study 2 – Media forms in production • Unit 2, Area of study 2 – Narratives in production • Unit 3, Area of study 2 – Media production development; Area of study 3 – Media production design • Unit 4, Area of study 1 – Media production
VCE Software Development	
• Unit 3, Area of study 1 – Programming practice; Area of study 2 – Analysis and design • Unit 4, Area of study 1 – Software solutions	
VCE Visual Communication and Design	**VCE VET Information, Digital Media and Technology**
• Unit 1, Area of study 2 – Design elements and design principles • Unit 2, Area of study 3 – Applying the design process	• This course includes options for the completion of the Certificate III level. Option B is Games Creation Focus.

WESTERN AUSTRALIA

Applied Information Technology (ATAR)	Computer Science (General)
• Unit 2 Design Studios includes as an elective module: Asset development, game design and production • Unit 3 Extended Project	• Relevant content includes programming; • Suggested programming languages for the Computer Science General course include Scratch, Gamefroot, GameMaker, and Gamesalad; • 60% (at Year 11) and 50% (at Year 12) of the assessment for this subject is based on a project which involves students developing a software system
Applied Information Technology (General)	
• Relevant content includes design concepts, application skills, and project management; • 70% (at Year 11) and 60% (at Year 12) of the assessment for this subject is based on a project which involves students researching and creating digital solutions	
Applied Information Technology (Foundation)	**Media Production and Analysis (ATAR)**
• Relevant content includes core modules – project management, and social collaboration – and elective modules – digital photography and graphics manipulation, sound editing, video editing, animation, and gaming; • 70% (at Year 11) and 50% (at Year 12) of the assessment for this subject is based on a project which involves students researching and creating digital solutions	• Unit 1 Popular Culture suggested contexts include computer games; • Unit 3 Media Art suggested contexts include interactive entertainment; • 50% of the assessment for this subject at both Year's 11 and 12 is based on extended production projects
Computer Science (ATAR)	**Media Production and Analysis (General)**
• Relevant content includes programming; • 40% of the assessment for this subject is based on a project which involves students developing a software system	• Unit 1 Mass Media suggested contexts include video games; • 70% of the assessment for this subject is based on an extended production project

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