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Teaching Guide.

Oddventurous Gaming: Play the game, be the game!

Introduction

We all play games; it's one of the most popular leisure activities in the UK. Whether it's playing video games or board games or even physical games; participating in them can help spark curiosity and develop important critical thinking & problem solving skills as well as address whatever issues the designer originally intended. This workshop aims to teach pupils key concepts of games design. Developed in collaboration with Disney and Playniac the Digital Schoolhouse brings knowledge from the games industry into the classroom.

Pupils begin the workshop by becoming the game themselves. Cat On Yer Head is a game designed to be played with large groups of people, and pupils use this to set the context for the day and explore the key principles of games design for themselves.

The pupils will then move into developing their own game idea, using an iterative design process. After jotting down their initial ideas pupils will play Disney's Oddventure Land before attempting to deconstruct the game and identify its key components.

While using Disney's Oddventure Land as a source for inspiration pupils will be encouraged to develop their skills with GameMaker through a series of challenges. Once their game has been made, peer evaluations and feedback is used to modify the game further before a final Show & Tell allows pupils to showc

Computing Programmes of Study Links

2. Key Stage 2:

- 2.1. design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- 2.2. use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- 2.3. use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs

3. Key Stage 3:

- 3.1. design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems
- 3.7. undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users
- 3.8. create, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability

Progression Pathway bands covered

ALG = Algorithms: Pink, Yellow, Orange, Blue

Reference

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| PA1 | Understands what an algorithm is and is able to express simple linear (non-branching) algorithms symbolically. |
| PA2 | Understands that computers need precise instructions. |
| PA3 | Demonstrates care and precision to avoid errors |
| YA1 | Understands that algorithms are implemented on digital devices as programs |
| YA2 | Designs simple algorithms using loops, and selection i.e. if statements. |
| YA3 | Uses logical reasoning to predict outcomes. |
| YA4 | Detects and corrects errors i.e. debugging, in algorithms. |

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| OA1 | Designs solutions (algorithms) that use repetition and two-way selection i.e. if, then and else. |
| OA2 | Uses diagrams to express solutions. |
| OA3 | Uses logical reasoning to predict outputs, showing an awareness of inputs. |
| BA1 | Shows an awareness of tasks best completed by humans or computers. |
| BA2 | Designs solutions by decomposing a problem and creates a sub-solution for each of these parts. |
| BA3 | Recognises that different solutions exist for the same problem. |

P&D = Programming & Development: Pink, Yellow, Orange, Blue

Reference

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| PP1 | Knows that users can develop their own programs and can demonstrate this by creating a simple program in an environment that does not rely on text |
| PP2 | Executes, checks and changes programs |
| PP3 | Understands that programs execute by following precise instructions |
| YP2 | Uses logical reasoning to predict the behaviour of programs |
| YP3 | Detects and corrects simple semantic errors i.e. debugging, in programs. |
| OP1 | Creates programs that implement algorithms to achieve given goals. |
| BP3 | Designs, writes and debugs modular programs using procedures. |

IT = Information Technology: Pink, Yellow, Orange, Blue

Reference

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| PI1 | Uses software under the control of the teacher to create, store and edit digital content using appropriate file and folder names. |
| PI5 | Talks about their work and makes changes to improve it. |
| YI5 | Talks about their work and makes improvements to solutions based on feedback received. |
| OI3 | Makes appropriate improvements to solutions based on feedback received, and can comment on the success of the solution. |
| BI1 | Makes judgements about digital content when evaluating and repurposing it for a given audience. |

Computational Thinking Strands

AL – Algorithmic Thinking

Ref. Activity

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| GE1 | Identifying patterns and commonalities in problems, processes, solutions, or data. |
| GE3 | Transferring ideas and solutions from one problem area to another |

Ref. Activity

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| AL1 | Writing instructions that if followed in a given order (sequences) achieve a desired effect |
| AL4 | Writing instructions that choose between different constituent instructions (selection) to achieve a desired effect; |
| AL6 | Grouping and naming a collection of instructions that do a well-defined task to make a new instruction (subroutines, procedures, functions, methods); |

AB – Abstraction

Ref. Activity

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| AB3 | Hiding the full complexity of an artefact, whether objects, problems, processes, solutions, systems (hiding functional complexity); |
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EV- Evaluation

Ref. Activity

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| EV1 | Assessing that an algorithm is fit for purpose; |
| EV2 | Assessing whether an algorithm does the right thing (functional correctness); |
| EV3 | Designing and running test plans and interpreting the results (testing); |
| EV7 | Assessment of whether a system is easy for people to use (usability); |
| EV8 | Assessment of whether a system gives an appropriately positive experience when used (user experience); |
| EV9 | Assessment of any of the above against set criteria; |
| EV10 | Stepping through algorithms/code step by step to work out what they do (dry run / tracing); |

DE – Decomposition

Ref. Activity

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| DE1 | Breaking down artefacts (whether objects, problems, processes, solutions, systems or abstractions) into constituent parts to make them easier to work with |
| DE2 | Breaking down a problem into simpler but otherwise identical versions of the same problem that can be solved in the same way (Recursive and Divide and conquer strategies) |

Learning Outcomes

1. Understand that some of the key principles of games design include:
 - a. Game characters including protagonists and antagonists
 - b. Game mechanics
 - c. Game end states
 - d. Iterative design process
2. To be able to apply key computational thinking skills such as problem solving, algorithmic thinking, logical reasoning, decomposition and abstraction.
3. To be encouraged to generate creative game ideas, and to refine these ideas through game play
4. To be able to decompose an existing game to be able to identify its key components and the game design principles highlighted above
5. To understand that games are developed in stages, starting with:
 - a. Ideas and design development
 - b. Graphic creation
 - c. Programming the game objects
 - d. Testing and debugging
 - e. Continued modifications
 - f. To be able to develop their own game idea using GameMaker, including the development of sprites and objects, the gameplay environment (rooms)
6. To be able to program their gameplay environment to include:
 - a. User controlled objects
 - b. Object interaction
7. To be able to play their game to test that it works the way they want it to using peer support
8. With peer support to be able to able to debug their game to identify logical errors.
9. To be able to make iterative improvements to their game based on peer feedback.
10. To be able to describe their game and how it works.

11. To be able to understand that computers follow instructions, and that these instructions need to be precise, clear and in a logical sequence
12. To be able to understand that programming enables us to give a computer instructions to tell it what to do.

Session Overview

SESSION 1

| Session Content / Activity | Resources Used | Prog. Pathway | Comp. Thinking | Computing POS Link |
|---|---|--|------------------------------------|----------------------------|
| Welcome pupils and give introductions for the day | DSH_WelcomeIntroduction.pptx | | | |
| Without too much prior explanation launch into playing the Cat On Yer Head game (the full game is available from www.catonyerhead.com). Slides 2 – 7 provide instructions on how to play. Additional information is given in the supplementary documentation. | Oddventurous Gaming.ppt COYH Supplementary Teachers Guidance.doc | <u>ALG</u> PA2, YA3, OA1, OA3, BA2, BA3 | AL1, AB3, EV7, EV8 | 2.1, 2.3, 3.1 |
| Play the first round with the original rules. Who won? Engage pupils in discussion around why what happened during the game, was it fair? How could the game be adapted? Encourage pupils to suggest their own modifications to the game. Choose to implement one or two of these and play another round. After each round have a quick discussion to encourage pupils to develop their game further. | | | | |
| Use slide 9 to have an extended discussion around games design principles. Encourage pupils to contribute and create their own list of 'what a good game must have' before showing them the key principles listed on slide 10. | Oddventurous Gaming.ppt | <u>ALG</u> PA2, YA3, OA1, OA3, BA2, BA3 | AL1, AB3, EV7, EV8 EV9 | 2.1, 2.3, 3.1 |
| Give pupils 3 minutes to jot down ideas for their own game. This could be in any form, written text, spider diagram, images, and flowcharts. Whatever they are comfortable with. The important thing is the generation of ideas. Emphasise to pupils that these are just initial ideas (so they can have more than one) and they are not set in stone. They will be | Oddventurous Gaming.ppt | <u>ALG</u> PA1, PA2, YA1, YA2, YA3, OA1, OA2, | AL1, AL4, AL6, AB3, DE1, DE2 | 2.1, 2.3, 3.1, 3.7, 3.8 |

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| encouraged to adapt and change these throughout the day. | | OA3, BA2, BA3 | | |
| Now that they have some initial ideas for their own game help pupils navigate their way to Disney's Oddventure-Land game. Allow pupils to play the game uninterrupted for at least 5 minutes before proceeding to the next activity. | Oddventurous Gaming.ppt | <u>ALG</u> PA2, YA3, OA1, OA3, BA2, BA3 | GE1, GE3, DE1, DE2 | 2.1, 2.3, 3.1, 3.7, 3.8 |
| Show slide 13 and give pupils the 'Decomposing Oddventure' worksheet. Remind them off the key principles established earlier. Encourage them to now play the game again, but with the worksheet in mind. The aim is for pupils to complete the worksheet through game play. | Oddventurous Gaming.ppt Decomposing Oddventure.doc | <u>ALG</u> PA2, YA3, OA1, OA3, BA2, BA3 <u>IT</u> BI1 | EV1, EV2, EV3, EV7, EV8, EV9, GE1, GE3, DE1, DE2 | 2.1, 2.3, 3.1, 3.7, 3.8 |
| Slide 14 shows the BBC's proposal of Game Development Stages. Give pupils the 'Games Design worksheet' and using Slide 15 encourage them to add detail to their overall idea for a game. They should now build upon their learning from playing and deconstructing Oddventure as well as the key principles gained from playing Cat on Yer Head. | Oddventurous Gaming.pptx Game Design Pack.doc | <u>ALG</u> PA1, PA2, YA1, YA2, YA3, OA1, OA2, OA3, BA2, BA3 | EV1, EV2, EV3, EV7, EV8, EV9, GE1, GE3, DE1, DE2 AL1, AL4, AL6, AB3 | 2.1, 2.3, 3.1, 3.7, 3.8 |
| Direct pupils to GameMaker, allow them to familiarise themselves with the interface. It will be useful for them to see an existing game project, to play it and to explore its components. End this session with a discussion based on the key parts of the environment, what they are and what they do. Try to ensure this activity is pupil-led. Allow them to play and explore independently and feed into a discussion and class feedback later on. | Oddventurous Gaming.pptx | <u>ALG</u> PA1, PA2, YA1, YA2, YA3, OA1, OA2, OA3, BA2, BA3 <u>IT</u> PI1 | DE1, DE2, GE1, GE2, AB3 | 2.1, 2.3, 3.1, 3.7, 3.8 |

SESSION 2

| Session Content / Activity | Resources Used | Prog. Pathway | Comp. Thinking | Computing POS Link |
|--|--------------------------|--|----------------|------------------------------|
| Recap session 1. Introduce the concept of sprites. Show pupils the existing sprites and enable them to choose the ones they wish to use for their game; edit them if needed and name them appropriately. | Oddventurous Gaming.pptx | ALG PA1, PA2, YA1, YA2, YA3, OA1, OA2, OA3, BA2, BA3 IT PI1 | As above | 2.1, 2.3, 3.1, 3.7, 3.8 |
| Challenge 2. Explain the concept of an object in GameMaker. Explain that a sprite is simply an image and nothing more. In order to make it do something we need to assign it to an object. A single object in GameMaker can have only one sprite (i.e. one image), but a sprite can be assigned to multiple objects. Encourage pupils to 'discover' independently how to make their objects for their game. Provide guidance for lower ability pupils, or encourage pupils to 'teach each other'. | Oddventurous Gaming.pptx | ALG PA1, PA2, YA1, YA2, YA3, OA1, OA2, OA3, BA2, BA3 IT PI1 | AL1, AL6, AB3 | 2.1, 2.2, 2.3, 3.1, 3.7, 3.8 |
| Challenge 3. Explain that the 'game screen' is referred to as a 'room' in GameMaker. These rooms need to be designed i.e. the computer needs to be told what the game screen should look like. Can pupils create their own room? | Oddventurous Gaming.pptx | ALG PA1, PA2, YA1, YA2, YA3, OA1, OA2, OA3, BA2, BA3 | AL1, AL6, AB3 | 2.1, 2.2, 2.3, 3.1, 3.7, 3.8 |

| | | IT | | |
|---|--------------------------|--|--|---------------------------------|
| | | PI1 | | |
| Slide 24 – encourage pupils to test their game. When they press the ‘play’ button nothing happens, why? Because the objects have not been told what to do. No instructions have been assigned. Use this as an introduction to programming. | Oddventurous Gaming.pptx | ALG PA1, PA2, YA1, YA2, YA3, OA1, OA2, OA3, BA2, BA3 | EV1, EV2, EV3, EV7, EV8, EV9, EV10 | 2.1, 2.2, 2.3, 3.1, 3.7, 3.8 |
| | | IT | | |
| | | PI1 | | |
| Carry out a quick unplugged programming activity. The following activity has been described on the PowerPoint. Playdough Programming: Give the pupils a lump of playdough and put them into pairs. One pupil is responsible for moulding the playdough based entirely on the instructions given by their partner. The pupil giving the instructions must use only verbal commands and no hand gestures at all. | Oddventurous Gaming.pptx | ALG PA1, PA2, YA1, YA2, YA3, OA1, OA2, OA3, BA2, BA3 | AL1, AL4, AL6, DE1, DE2, GE1, GE2 | 2.1, 2.2, 2.3, 3.1 |
| | | IT | | |
| | | PI1 | | |
| If playdough is unavailable, then the following activity can be carried out as an alternative: Human Robot: a pupil pretends to be the robot. The class give the robot instructions to move to a given destination. | | | | |
| Each of the activities above should be followed with a discussion of the need for precise and clear instructions given in a logical order. | | | | |
| Use slides 27 – 31 to discuss what programming is and encourage them to link this back to their own games. For Slide 30 give pupils access to the ‘Planning Algorithms’ | Oddventurous Gaming.pptx | ALG PA1, PA2, YA1, YA2, YA3, OA1, | AL1, AL4, AL6 | 2.1, 2.2, 2.3, 3.1, 3.7, 3.8 |

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| Worksheet so that pupils can brainstorm the instructions they need for their games. | Planning Algorithms Worksheet.doc | OA2, OA3, BA2, BA3 IT PI1 | | |
| Depending on the ability level of the pupils some may benefit from a quick demonstration of how instructions could be added, however slide 31 could be used as a prompt to allow pupils to explore this for themselves. Enable them to share their learning amongst each other and at a timely interval some may wish to deliver a quick demo to the group. | Oddventurous Gaming.pptx | ALG PA1, PA2, YA1, YA2, YA3, OA1, OA2, OA3, BA2, BA3 IT PI1 P&D PP1, PP2, PP3, YP2, YP3, OP1, BP3 | AL1, AL4, AL6 | 2.1, 2.2, 2.3, 3.1, 3.7, 3.8 |

SESSION 3

| Session Content / Activity | Resources Used | Prog. Pathway | Comp. Thinking | Computing POS Link |
|---|--------------------------|--|----------------|---------------------------------|
| Recap key learning from Session 1 and 2 | | As above | As above | As above |
| Introduce challenge 4, which focuses on making their characters move. Enable the pupils to develop this themselves. | Oddventurous Gaming.pptx | ALG PA1, PA2, YA1, YA2, YA3, OA1, OA2, OA3, BA2, BA3 IT | AL1, AL4, AL6 | 2.1, 2.2, 2.3, 3.1, 3.7, 3.8 |

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| | | PI1 P&D PP1, PP2, PP3, YP2, YP3, OP1, BP3 | | |
| Challenge 5 deals with collisions. The example used is a character bouncing off a wall. However, more able pupils will pick up on the concept and identify that the same could be applied to any two objects. So rather than a character bouncing off a wall, it could be a character collecting rewards or bumping into the enemy. | Oddventurous Gaming.pptx | ALG PA1, PA2, YA1, YA2, YA3, OA1, OA2, OA3, BA2, BA3 | AL1, AL4, AL6 | 2.1, 2.2, 2.3, 3.1, 3.7, 3.8 |
| | | IT PI1 P&D PP1, PP2, PP3, YP2, YP3, OP1, BP3 | | |
| Testing is important. Remind pupils to regularly test their game to see if it works. This is a good interim point to encourage them to stop and test their game with their peers and reconsider their original ideas to see what further modifications need to be made. | Oddventurous Gaming.pptx | P&D PP1, PP2, PP3, YP2, YP3, OP1, BP3 | EV1, EV2, EV3, EV7, EV8, EV9, EV10 | 2.1, 2.2, 2.3, 3.1, 3.7, 3.8 |
| Slides 38 – 42: Challenge 6 suggests collecting rewards as one potential modification. However, pupils should be allowed to expand upon and develop their own ideas as they see fit. | Oddventurous Gaming.pptx | P&D PP1, PP2, PP3, YP2, YP3, OP1, BP3 | EV1, EV2, EV3, EV7, EV8, EV9, EV10 | 2.1, 2.2, 2.3, 3.1, 3.7, 3.8 |
| How good is your game? Encourage pupils to peer test each others games and identify three strengths and three areas for improvement. | Oddventurous Gaming.pptx | P&D | EV1, EV2, EV3, EV7, EV8, EV9, EV10 | 2.1, 2.2, 2.3, 3.1, 3.7, 3.8 |

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|--|--------------------------|--|--|---------------------------------|
| | | PP1, PP2, PP3, YP2, YP3, OP1, BP3 | | |
| | | IT | | |
| | | PI1, PI5, YI5, OI3, BI1 | | |
| If time allows enable pupils to build upon their ideas and feedback. | Oddventurous Gaming.pptx | IT PI1, PI5, YI5, OI3, BI1 | EV1, EV2, EV3, EV7, EV8, EV9, EV10 | 2.1, 2.2, 2.3, 3.1, 3.7, 3.8 |
| Encourage pupils to go back to Oddventure Land and play again. It is worth encouraging pupils to break into discussion around their perception of the game now compared to when they played it during session 1. | Oddventurous Gaming.pptx | P&D PP1, PP2, PP3, YP2, YP3, OP1, BP3 | EV1, EV2, EV3, EV7, EV8, EV9, EV10 | 2.1, 2.2, 2.3, 3.1, 3.7, 3.8 |
| | | IT | | |
| | | PI1, PI5, YI5, OI3, BI1 | | |
| End the day with a 'show and tell' activity where pupils can describe their game, the key elements they included, what they are most proud of and what they would like to develop further. | Oddventurous Gaming.pptx | IT PI1, PI5, YI5, OI3, BI1 | EV1, EV2, EV3, EV7, EV8, EV9, EV10 | 2.1, 2.2, 2.3, 3.1, 3.7, 3.8 |

Files/Resources

| Filename | Resource Type | Purpose/Description |
|-------------------------------|-----------------|---|
| Oddventurous Gaming.pptx | PowerPoint | Main teaching PowerPoint resource |
| Decomposing Oddventure | Worksheet | Worksheet for pupils to use |
| Design Game Pack | Worksheet | Worksheet for pupils to use |
| Planning Algorithms Worksheet | Worksheet | Worksheet for pupils to use |
| Spiffys Adventure.gmx | Resource Folder | GameMaker assets and source files for sample game |
| Spiffys Adventure 2.gmx | Resource Folder | GameMaker assets and source files for sample game |
| Spiffys Adventure 3.gmx | Resource Folder | GameMaker assets and source files for sample game |

PLEASE NOTE: The activities outlined in this workshop pack are a suggested outline of how the workshop can be delivered. It is envisaged that teachers will adapt the resources and the organisation of them according to the needs of their class.