



Antarctica Exhibition

Phase II evaluation

Under the Sea Ice computer interactive

Families with children aged 7-11

&

Key Stage 2 pupils

Report by Alison James

March 2007

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1.0 Introduction

This document reports on the feedback on one of the two computer interactives tested at this stage as part of the formative evaluation undertaken for Antarctica, a temporary exhibition to be held at the Natural History Museum in 2007.

The intended visitor outcomes were as follows:

- Visitors will know there are; starfish, sea spiders, sea urchins, krill, algae, penguins, in Antarctica
- Visitors will enjoy pretending to explore marine life
- Visitors will know the main challenges and hazards of working under sea ice

The key messages were:

1. The seas of Antarctica are just as exotic as the surface, filled with interesting and varied marine life that can't be found anywhere else on Earth.
2. Being a diver (particularly in the Antarctic) is a challenging endeavour, and requires the careful balancing of resources (your oxygen supply and the tension of the line).
3. There are many dangers under the water – such as seals, rocks, and passages where your contact line could get caught, and care must be taken to avoid them.

At this stage the evaluator trialled the exhibit with families with children of the target age range (7-11 years) on Sunday 4th March and with Key Stage 2 pupils from four different schools on Wednesday 7th March.

2.0 Methodology

The approach taken was as follows:

- The exhibition team asked the child/children to play the game with minimal explanation (they were told there was to be an exhibition about Antarctica and that this game was about being a diver in the Antarctic; they were told how to operate the controls as these were different from how they would be in the final exhibit, ie. we were not testing their understanding of them). They were asked questions as they played and also at the end (see Appendix B for the final question guide)
- Two days of evaluation were undertaken in March 2007.
- One evaluator conducted both days of testing (Alison James).

- Children (and adults) were thanked and asked to choose a postcard to take home. They were also given information about the exhibition with details of the website

Sample

Families			Schools		
Ref.	Gender	Age	Ref.	Gender	Age
F1	M	7	S1	M x 2	8 x 2
F2	F (& mum)	11	S2	M	7
F3	F (& mum)	10	S3	M x 2	10, 11
F4	M x 2	13 x 2	S4	M	10
F5	F x 2	6, 10	S5	M & F	8 & 9
F6	F x 2	7, 8	S6	F	8
F7	F x 2	9, 11	S7	F x 2	7 x 2
F8	M x 2	10, 11	S8	F	8
F9	M	10	S9	F x 2	12 x 2
F10	M x 2	8, 11	S10	M	13
F11	F (& dad)	12			

The game was trialed a minimum of 11 times on Sunday and ten times on Wednesday (though in fact several children chose to play it a second time).

A total of 17 children trialed the exhibit on Sunday (families) and 15 pupils on Wednesday (schools). In addition some adults trialed it (comments from them are marked (A)).

Most were from within the target age range and were fairly equally distributed (see table below) with one child slightly younger (6 years) and three slightly older (12 and 13 years) on the Sunday, and three pupils from Key Stage 3 on the Wednesday (aged 12 and 13).

6 yrs	7 yrs	8 yrs	9 yrs	10 yrs	11 yrs	12 yrs	13 yrs
1	5	7	2	6	5	2	4

There was an equal gender split with 16 girls and 16 boys.

They were from a range of backgrounds and the school pupils in particular were ethnically diverse.

3.0 Summary of findings

For detailed comments see Appendix 1

Evaluation objective	Summary of results
Enjoyment	They all enjoyed it and most of them scored it 8 or 9 out of 10.
Understanding of lights	Most of them understood that the light was the diver's headtorch and a few understood that when you shone it on something that was when you 'spotted/collected' a creature.
Recognition of which diver they are	Most of the children realised which one they were very quickly.
Understanding who the other divers represent	Most of them understood that the other two divers represented other players.
Recognition of oxygen gauge and understanding its link to the length of the game	Half of them understood that it represented their oxygen (though some of them expressed it as the life they had left, their air or their breath) with several also understanding that it related to the time you had left. Half of them had no idea what it represented and some guessed that it might relate to the number of creatures they had collected/spotted.
Number of sea creatures found	All of them found a reasonable number (over 10) but often this was accidental rather than deliberate.
Length of game	Half of them thought the length of the game was OK as it was. Half of them would have liked it to be a little longer.
Areas of confusion	The main areas of confusion occurred at the start of the game with children (and adults) unclear about what they were supposed to be doing and why. Once they became aware of the task they were not sure how to actually 'get' the creatures and had some difficulty finding/seeing them. There was also some confusion about the controls, for example,

	<p>how to go up, how to go forward, how to turn. They also found it difficult to read the information at the same time – in fact several did not even notice the writing at the bottom. There were also questions regarding the graphics – especially the krill and the penguins/seals.</p>
<p>Understanding the purpose of the game</p>	<p>The concerns stated above were echoed here, but by the end of the game all understood that they were finding sea creatures, however, they were unclear whether they were just spotting them or actually collecting them (this uncertainty is reflected in the brief to the designers so the evaluator was also unclear).</p>
<p>Recollection of sea creatures found</p>	<p>Most of them were able to list at least three or four creatures they had seen. The most commonly mentioned ones were spiders and starfish, probably because they recognised the image without reading the names.</p>
<p>Recollection of other landscape features/creatures</p>	<p>Half of them mentioned seeing seals/penguins, a whale and fish. Two mentioned icebergs (another referred to '<i>big white things</i>'). In addition, the following were mentioned: sharks, dolphins, fossils and walruses.</p>
<p>Understanding what is special about the seas of Antarctica</p>	<p>Some children couldn't answer this question but about a quarter of them made reference to finding creatures which couldn't be found elsewhere; quarter talked about the wealth and variety of sealife; and quarter mentioned temperature. A couple mentioned the fact that the sea was frozen on top and one said the seas of Antarctica were beautiful and fascinating.</p>
<p>Understanding the main challenges of being a diver in the Antarctic</p>	<p>Half of them mentioned the risk of running out of oxygen and half of them mentioned the cold. Some thought it was dangerous or scary, eg. because of whales/sharks (see below). One mentioned the difficulty of getting to the top and another the importance of checking your equipment. A few children didn't know and one thought it would be an easy job!</p>
<p>Understanding of the dangers</p>	<p>Over half of the children mentioned big sea creatures 'getting' you, with several referring to whales, seals or sharks specifically. A few mentioned the freezing temperatures and running out of oxygen. One mentioned icebergs.</p>

<p>Suggestions re improvements</p>	<p>In summary the children wanted more control, more creatures, more danger, more of a competition and a better ending. The adults wanted more information.</p> <p>More control: of speed, of oxygen supplies (eg. able to go and get more/be awarded more).</p> <p>More creatures: including some dangerous ones – see below</p> <p>More danger: something to avoid or get away from, eg. shark, whale, iceberg with warnings that flash onto the screen (the first time only, as one child suggested, after that you are on your own!)</p> <p>Competition: running score of points for creatures (different points for different creatures, one child suggested) and a total score at the end with a summary of creatures caught (consolidating their learning as one parent said).</p> <p>Ending: They wanted to know their points/number of creatures spotted/collected, but they also suggested the divers returned to the boat at the end, with some pointing out that if they didn't they would die. One suggested having the image of a diver trying to breathe as the ending! They wanted clearer information about the game being over.</p> <p>Adults in particular wanted more instructions at the start to explain the purpose of the game, how to operate the controls, about the oxygen gauge and clearer information about the creatures. They suggested the name flashed up beside the creature when you 'spotted' it, instead of down at the bottom of the screen. Someone pointed out that it would be even harder to see the words when it was a tabletop screen.</p> <p><i>See recommendations</i></p>
<p>Other comments</p>	<p>Two adults asked whether there would be displays showing the sea creatures near the game in the exhibition.</p> <p>Two children asked if they could buy the game!</p>

Not all the originally planned questions were asked as there were no obvious obstacles/dangers; the ending was not very clear; the creature descriptions were not complete.

4.0 Conclusions and Recommendations

Firstly I will address the intended visitor outcomes:

- *Visitors will know there are; starfish, sea spiders, sea urchins, krill, algae, penguins, in Antarctica*

The children were able to name the majority of these species after playing the game once.

- *Visitors will enjoy pretending to explore marine life*

All the children enjoyed playing the game and rated it highly.

- *Visitors will know the main challenges and hazards of working under sea ice*

Most of the children were able to name some of the challenges and hazards but these have not yet been fully developed in the game.

In terms of the key messages:

- *The seas of Antarctica are just as exotic as the surface, filled with interesting and varied marine life that can't be found anywhere else on Earth.*

Several of the children were able to describe the uniqueness and variety of marine life. However, some could not. This message is not directly communicated as part of the game.

- *Being a diver (particularly in the Antarctic) is a challenging endeavour, and requires the careful balancing of resources (your oxygen supply and the tension of the line).*

At least half the children understood the importance of having sufficient oxygen but no-one mentioned the tension on the line. The latter point is not made clear as part of the game currently.

- *There are many dangers under the water – such as seals, rocks, and passages where your contact line could get caught, and care must be taken to avoid them.*

Most of the children were able to guess at the danger presented by some of the sea creatures, however, no-one mentioned the risk of getting your line caught. There is no opportunity in the current version of the game to avoid danger of any kind. Many children said they would like there to be.

Recommendations

- Instructions need to be provided at the start of the game (or on a panel nearby) which introduce the task, its purpose and the challenges as well as how to operate the divers.
- The oxygen gauge could be presented visually as an oxygen tank which most children would recognise (test this?).
- The image and name of the creature collected should flash up more obviously (eg. closer to the creature itself, or more centrally).
- Each player should have a running total of the creatures they have spotted/collected showing throughout the game.
- Dangers/hazards (icebergs, rocks, sharks, etc.) should be made obvious and the risks to the diver apparent in the form of a warning (the first time) and then by the game ending for any diver who comes off worse in an encounter.
- At the end it should be made clearer that the game is over (eg. by the diver(s) swimming up to the surface/to a boat) and details of the total number of creatures spotted/collected should be provided.
- The interactive should be positioned in the vicinity of any displays which include specimens/images of or information about the sea creatures in the game.

Several children said they would like to be able to make the game longer by collecting/winning more oxygen but this could result in people playing the game for too long affecting visitor flow so has not been included as a recommendation.

Appendix A

* note: the first child (F1) tested the earlier version of the interactive where the four divers were not colour-coded and no information was provided that the game was over. In the later version, when the game ended, the words OXYGEN IS UP showed at the bottom, although many failed to notice this.

Evaluation objective	Summary of results
Enjoyment (link Q1)	F1 'Good' F2 8 out of 10 (would like to be able to go faster) F3 'It's quite fun, isn't it?' 9 out of 10 F4 8 out of 10 F5 9 out of 10 F6 10 out of 10 F7 9 out of 10 and 10 out of 10 F8 7 out of 10 and 9 out of 10 F9 8 or 9 out of 10 F10 8 out of 10 F11 8 out of 10 S1 9 out of 10 (x 2) S2 10 out of 10 S3 8 out of 10 S4 9 out of 10 S5 8 out of 10, 9 out of 10 S6 10 out of 10 S7 7 out of 10 and 8 out of 10 S8 6 or 7 out of 10 S9 6 out of 10 (x 2) S10 7 out of 10
Understanding of lights (link Q3)	F1 'Torch' F2 'The beam of the torch'

	<p>F3 <i>'So the lights come on when you see something?'</i> F4 <i>'You've got to get them in your sights to get something'</i> F5 One understood this, the other didn't F6 <i>'Shows where you are looking'</i> F7 <i>'Torch to see'</i> F8 <i>'Torches'</i> F9 <i>'Flashlight to try and identify things'</i> F10 <i>'Cameras?'; 'Not sure – what you could see?'</i> F11 <i>'Torch?'</i> S1 <i>'Yes – torch'</i> S2 Yes S3 Yes S4 <i>'Searchlight'</i> S5 No S6 Yes S7 <i>'You shine your light on stuff'</i> S8 Yes S9 Yes S10 <i>'Headlamp'; 'I thought they showed frequency of sightings'</i></p>
<p>Recognition of which diver they are (link Q4)</p>	<p>F1 <i>'Not at the beginning, but when it moved I knew'</i> F2 <i>'Yes, cos it went green'</i> F3 <i>'Which one am I?'</i> but quickly realised F4 <i>'Which colour am I?'</i> but quickly realised F5 Yes F6 Yes F7 <i>'I'm red!' 'I'm green!'</i> F8 Yes F9 Unclear at start – process of elimination F10 Yes F11 Yes S1 <i>'Yes - not sure at first, but because I was on this side...'</i> S2 <i>'I'm red!'</i> S3 Yes S4 Yes</p>

	<p>S5 Yes S6 Yes S7 Yes S8 <i>'I think I'm the red one'</i> S9 Yes S10 Yes</p>
<p>Understanding who the other divers might be (link Q5)</p>	<p>F1 <i>'No idea'</i> F2 <i>'Yes'</i> F3 Yes F4 <i>'Instructors?'</i> F5 <i>'Other people doing it'</i> F6 <i>'Someone else'</i> F7 <i>'Other visitors'</i> F8 <i>'Other players'</i> F9 <i>'Computerised?'</i> F10 <i>'Four players'</i> F11 <i>'Other divers'</i> S1 <i>'Other people'</i> S2 Yes S3 <i>'Friends'</i> S4 <i>'Other people playing'</i> S5 <i>'Assistants?'</i> S6 <i>'Don't know'</i> S7 <i>'4 players'</i> S8 <i>'So can you have up to 4 players?'</i> S9 <i>'Other players'</i> S10 <i>'Different people'</i></p>
<p>Recognition of oxygen gauge and understanding link to rest of the game (link Q7)</p>	<p>F1 No F2 No F3 Aware <i>'but should be written at the beginning'</i> F4 <i>'Is that your air?'</i> F5 <i>'The light shows the time you have left'</i> F6 Thought lights along bottom showed how many creatures you had got</p>

	<p>F7 <i>'I thought the coloured lights were how much time'</i> F8 <i>'Your life – your limit'</i> F9 <i>'I think we're running out of oxygen'</i> F10 <i>'Is that air?'</i> F11 <i>'Oxygen shows at the bottom'</i> S1 <i>'Time'</i> (didn't understand it showed oxygen) S2 No S3 <i>'How much breath, oxygen, you have'</i> S4 No S5 No S6 No S7 No S8 <i>'Are the lights telling you what to collect?'</i> S9 <i>'Are they like the life you've got?'</i> S10 No</p>
Number of sea creatures found	<p>All of them found a reasonable number (over 10) but often this was accidental. F7 - Collecting was random – they admitted they hadn't seen them S10 <i>'I didn't really see what I was collecting'</i></p>
Length of game (link Q2)	<p>F1 N/A F2 <i>'Fine'</i> F3 OK F4 OK F5 wanted more time F6 Too short F7 OK/too short F8 Too short F9 Too short F10 <i>'Could be a bit longer'</i> F11 OK S1 OK/ too short S2 Too short S3 OK S4 Too short</p>

	<p>S5 OK/too short S6 OK S7 OK S8 OK but maybe a bit longer S9 OK S10 OK</p>
<p>Areas of confusion (link Q6)</p>	<p>F1 <i>'Not really'</i> F2 <i>'How do I go forward?'; 'What are these things?' (krill); 'What are those? (seals/penguins); 'I didn't realise I had to shine the torch to get them' (A); 'I was just doing random moves'; 'Difficult to read what you're collecting while concentrating on moving' (A)</i> F3 <i>'Not really' 'Would like to know context – why collecting and where are they going?' (A)</i> F4 No F5 No F6 <i>'Trying to get things'; 'Where they were'</i> F7 <i>'Not sure how to actually get things – often clicked the other button'</i> F8 <i>'Not really'</i> F9 <i>'Do you just collect them by shining your torch on them?' Confused by controls at start</i> F10 <i>'It's odd that you don't know what you're supposed to be doing – the other one had text'</i> F11 <i>'It feels like it's happening by chance'; 'It was a tiny bit unclear when you got something and what you did to pick it up'</i> S1 <i>'Can't tell it's Antarctica'; 'Can't see the objects you are collecting at first'</i> S2 No S3 No (they play computer games a lot) S4 No S5 <i>'What were we supposed to be doing?'</i> S6 <i>'Trouble operating the controls'</i> S7 <i>'When I started I didn't know about the things and what it meant'</i> S8 <i>'What are we doing?' (at start) 'How do you collect them?'; 'At first I was confused about how to turn'</i> S9 <i>'Can you make it go up again?'</i> S10 <i>'I didn't really see what I was collecting'</i></p>

<p>Understanding the purpose of the game (link Q8)</p>	<p>F1 <i>'Find sea creatures'</i> F2 <i>'Quite an interesting seascape' (A)</i> F3 <i>'We're picking up things'; 'What happens to all the things we're collecting?' 'Saw shells and a whale'</i> F4 <i>'Where am I going?'; 'Collecting creatures from the bottom of the sea'</i> F5 <i>'I want to get that starfish!'</i> F6 <i>'Shine light and get creatures'</i> F7 <i>'Saw penguins, whales, seals, fish'</i> F8 <i>'You've got to try and spot different creatures' 'Control directions'</i> F9 <i>'The point is to search to find things'; 'I lost sight of the diver a few times'</i> F10 <i>'Exploring and finding out what creatures lived in the Antarctic'</i> F11 <i>'Is the idea to collect stuff?'; 'Looking for things on the ocean floor – see what's down there'</i> S1 <i>'Go down holes and collect stuff'</i> S2 <i>'Collected a lot of crabs and seaweed'</i> S3 <i>'Searching for sea monsters'</i> S4 <i>'Found lots of creatures – ran out of oxygen'</i> S5 <i>'Finding stuff'</i> S6 <i>'A big wave' (?)</i> S7 <i>'I think you have to try and collect things'; 'Found lots of things'</i> S8 <i>'I think you're meant to collect the things on the bottom'; 'Caught a lot of interesting things'</i> S9 <i>'Are you looking for things?'; 'Didn't really know what you were doing at first'; 'Saw different creatures under the sea'</i> S10 <i>'Is it like different shells, objects, plants, animals?'</i></p>
<p>Recollection of sea creatures found (link Q9)</p>	<p>F1 clam, spider, cucumber, starfish, coral F2 This child was reading the names of the creatures as she found them. She remembered: sea cucumber, coral, spider F3 <i>'I've got some coral;'</i> coral, starfish, lantern shell (but don't know what it is), spider F4 Spider, cucumber, coral, starfish, shell F5 Didn't look on the bottom, didn't see the words - could only remember the starfish F6 starfish, clam, sea spider, shell F7 spiders, cucumber, clam, coral, starfish (<i>'I didn't see the words, just the pictures – no time to read'</i>)</p>

	<p>F8 Sea spider, sea cucumber, coral, starfish F9 Saying the name of the creature as it came up – remembered clam, starfish, coral, sponge F10 Searching and naming creatures – remembered sea cucumber, lantern shell, coral, shellfish. Sea spider. F11 <i>'Saw the symbols – not the writing!'</i> S1 Coral, starfish, spider, shells S2 <i>'A piece of bread' (?)</i> S3 Reading aloud – remembered lantern shells, sea spiders, clams, rocks S4 Spiders, star(fish) – recognising by images rather than words S5 Shells, fish, spider, rock S6 <i>'Not really – spider, starfish, crab'</i> S7 Spiders, coral S8 <i>'Spiders - I hadn't heard of those before and they sound interesting'</i> S9 Starfish, seaweed, coral, lantern shell S10 Spider</p>
<p>Recollection of other landscape features/creatures (link Q10)</p>	<p>F1 seals F2 N/A F3 <i>'What are these things?' (seals) 'Maybe fossils?'</i> F4 N/A F5 seals and penguins F6 <i>'Is that a whale?'</i>; fish, seals, whale F7 <i>'Saw penguins, whales, seals, fish'</i> F8 Other animals, fish, blue whale F9 Whales, reef and lead diver F10 <i>'There's a penguin!'</i> Whale F11 Whale, seal S1 Icebergs S2 Whales and dolphins, penguin S3 Fish, whale S4 shark, dolphin, fish S5 <i>'Big white things – rocks? Seals'</i> S6 Fishes S7 Whales, seals</p>

	<p>S8 Walrus and fish S9 Whale, seals (but initially thought they were otters), fish S10 Fish, icebergs</p>
<p>Understanding what is special about the seas of Antarctica (link Q11)</p>	<p>F1 <i>'Creatures you can't find anywhere else'</i> F2 <i>'It's so large – a different world' (A); 'Everything is spaced out. You can see the ice on the top'</i> F3 N/A F4 <i>'How many different creatures can live in water that cold'</i> F5 <i>'Cold, can't come up for air, dark'; 'You get different creatures'</i> F6 <i>'You find different fish'</i> F7 <i>'Beautiful, cold, fascinating'</i> F8 <i>'Penguins'</i> F9 <i>'Things no-one knows about'</i> F10 <i>'Whales, cold, the top is frozen'</i> F11 <i>'Lots of life on the bottom'</i> S1 <i>'Cold, freezing'</i> S2 <i>'Lots of stuff at the bottom'</i> S3 <i>'Wildlife you don't see anywhere else'</i> S4 <i>'Lots of objects to find'</i> S5 <i>'There's stuff underneath'</i> S6 <i>'I liked floating'</i> S7 <i>'All the different creatures'</i> S8 Don't know S9 <i>'What lives there'</i> S10 Don't know</p>
<p>Understanding the main challenges of being a diver in the Antarctic (link Q12)</p>	<p>F1 <i>'You have to find a hole (in the ice) to get up again'</i> F2 <i>'You can run out of oxygen'</i> F3 <i>'You're not really concentrating on not crashing into things, or are you?'; oxygen</i> F4 <i>'Hard, 'cos cold, long way down, dark'</i> F5 <i>'Can run out of oxygen'</i> F6 <i>'Might get cold or drown'</i> F7 <i>'Watch out! Don't touch! Something might harm you. Keep on checking your oxygen'</i> F8 <i>'Don't know – cold?'</i></p>

	<p>F9 <i>'Need to check the equipment is working. It's cold!'</i> F10 Temperature and oxygen limit F11 <i>'Oxygen levels, whales, cold'</i> S1 N/A S2 <i>'You might freeze and it's scary'</i> S3 N/A S4 <i>'Quite easy'</i> S5 <i>'Cold'</i> S6 Don't know S7 <i>'Could run out of oxygen – wouldn't be able to breathe'</i> S8 Don't know S9 <i>'Oxygen – knowing when to go up'</i> S10 <i>'Freezing, running out of oxygen, being eaten by whales/sharks'</i></p>
<p>Understanding of the dangers (link Q13)</p>	<p>F1 <i>'I saw seals – they might eat you'</i> F2 <i>'Other creatures getting you'</i> (but said they were not worried about this) F3 <i>'Cold, watch out for animals'</i> F4 <i>'Oxygen running out'; 'Shark'</i> F5 <i>'Avoid poisonous fish – you might catch the wrong thing and lose points'</i> F6 <i>'Shark'</i> F7 <i>'Whales, icebergs'</i> F8 <i>'Creatures'</i> F9 <i>'Whales! Blocked by ice. Seals'</i> F10 Whales. Seals. F11 <i>'Freezing, running out of oxygen, running into creatures, eg. whales'</i> S1 N/A S2 Whales S3 <i>'You might get eaten by a shark'</i> S4 <i>'Sea creatures – big ones'</i> S5 <i>'Oxygen – you could die'; 'Sharks'</i> S6 Don't know S7 Dangerous S8 <i>'Walruses might be quite dangerous'</i> S9 <i>'Cold'</i> S10 See above</p>

<p>Suggestions re improvements (link Q14)</p>	<p>F1 <i>'At the end it should give you a score and tell you what you got'</i></p> <p>F2 <i>'When the light hits something it would be better if the name came up beside the creature'; 'Make the creatures easier to see' (reference to when the screen was very dark). Would like control over speed, eg. to get away from the whale. 'It would be good if there was something leaping out at you' 'At the end you just floated up – you should get points for creatures/escapes'</i></p> <p>F3 <i>'Put in more creatures – something nasty' 'A shark – or a shipwreck to negotiate?' (A)</i></p> <p>F4 <i>Would have liked to dodge sharks; 'A reward/bonus for collecting creatures, eg. extra oxygen'; 'More creatures'</i></p> <p>F5 <i>'It could tell you which one you were'; Would like to get points; 'More danger to avoid, eg. sharks. It could warn you of danger' 'At the end it would be good to be able to look and see what you've got – consolidate the learning' (A) 'Flash up a bigger picture/photo to make it more obvious when you find something' (A)</i></p> <p>F6 <i>'Make it scary – control speed so you can get away quickly'; 'Collect more variety of things'; 'It would be good to have audio for younger children' (but explained this would be confusing with 4 players)</i></p> <p>F7 <i>'Would be better if a bit more of a challenge. Comments could flash up in the middle of the screen, eg. Don't touch the jellyfish!'; 'The information about the creatures should be beside the creatures'; 'The intro should tell you eg. about the dangers – there should be a stop button'</i></p> <p>F8 <i>'Make the penguins better!'; 'More options on the controls, eg. u-turns. More places to go – not just forward'; 'More creatures to spot'; 'More hazards, eg. icebergs, sharks, etc.' 'There are no winners/losers – need a competitive edge' (A); 'It should flash up on the screen when you find something – the writing needs to be bigger. To be educational it needs to be more obvious' (A)</i></p> <p>F9 <i>'Better if the name pops up beside the creature'; 'Make it a competition – have an ongoing score' (A); 'At the end swim back to the boat. Get a certificate from the website'</i></p> <p>F10 <i>'Improve the seals/penguins – better graphics'; 'Have something chasing you'; 'More control over the game time – control speed and you could surface to get more air'; 'At the end go up to the boat. It ends suddenly'</i></p> <p>F11 <i>'The end is a bit sudden – it should tell you how many you collected and you should be able to see how you're doing'; 'Have the images and the words at the bottom (or somewhere) all the time' (A); 'Will there be displays of the creatures, eg. lantern shells nearby in the exhibition?'(A)</i></p> <p>S1 <i>'You could have stuff that could eat you, eg. sharks, killer whales, to make it harder;</i></p>
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	<p><i>and a broken ship. It would be good if you could collect more oxygen' (more control)</i></p> <p><i>S2 'More animals to collect'</i></p> <p><i>S3 'At the end a picture of a diver trying to breathe!'</i></p> <p><i>S4 'Show the oxygen tank'; 'Show your score at the end'; 'If you run out of oxygen, go up and get more'</i></p> <p><i>S5 'It was OK – could be longer'</i></p> <p><i>S6 'No – longer?'</i></p> <p><i>S7 'Would like to go faster' (x2); 'Should go up to the top at the end when you are out of oxygen'</i></p> <p><i>S8 'Maybe some penguins could jump off the rock'; 'Sound effects – bubbles and whale noises' (A) ; 'Scoreboard at the end'; 'Get more oxygen'; 'Will it be near the relevant exhibits?' (A)</i></p> <p><i>S9 'Collect better things'; 'Go up for oxygen'; 'Didn't know when it had finished – better if it says more clearly'</i></p> <p><i>S10 'Make it so the diver goes further'; 'More control – eg. up and down'; 'Would like obstacles/dangers – a warning could flash on the screen (but only the first time!), eg. Iceberg! Whale!'</i></p>
Other comments	<p>F1</p> <p>F2</p> <p>F3</p> <p>F4</p> <p>F5</p> <p>F6</p> <p>F7</p> <p>F8 <i>'The scenery itself is very good' (A)</i></p> <p>F9</p> <p>F10 <i>'My one dream has come true – to be a computer tester'; 'When you shone on the seal/penguin there was no information'</i></p> <p>F11</p> <p>S1 <i>'Who won?'</i> (first question at end of game)</p> <p>S2 <i>'If you hit a whale do you die?'; 'Haven't you died if you've run out of oxygen?'; 'If it was a playstation game, I would want it'</i></p> <p>S3</p> <p>S4 <i>'What's the best object you can catch?'</i></p>

S5

S6

S7 *'There's a whale! I don't know if they're bad or good?'*

S8 *'It's like a Super Mario game and you go up to collect more oxygen'; 'Can you buy the game in the shop?'; 'It's very informative' (A)*

S9

S10 From teacher: *'I didn't realise there was information at the bottom'; 'I want to know how many I've spotted' 'I didn't see the words at the bottom - it would be good having a speech bubble coming from the diver saying 'Oh, it's a sea cucumber!''; 'Can anything awful happen?' (A)*

Appendix B: Question guide

Invite children/KS2 pupils to try out the game without guidance (record age/gender)

Observe for

- Do they enjoy it?
- Do they understand what the lights represent?
- Do they realise which diver they are?
- Do they realise other visitors will represent other divers?
- Do they recognise the oxygen gauge?
- Do they understand that the length of the game relates to the level of oxygen?
- How many sea creatures do they collect?

Follow-up interview (if necessary with guided experience of game):

1. Did you enjoy it? Score out of 10?
2. Do you think it was too long/too short/OK?
3. Did you understand what the lights represented?
4. Did you realise which diver you were?
5. Who do you think the other divers could be?
6. Did anything confuse you?

7. Did you recognise the oxygen gauge? (link to length of game?)
8. What happened to you during the dive – what did you encounter?
9. Can you remember which sea creatures you saw/collected? (eg. starfish, sea spiders, sea urchins, krill) Any info about them?
10. What else was there?
11. What do you think is special about the seas of Antarctica (if anything?)
12. What do you think are the main challenges of being a diver in the Antarctic?
13. What are the dangers? (eg. seals, rocks, etc.)
14. How do you think we could make this game better? What about the ending?
15. Any other comments?

Thank and present postcard