

## **Virtual Reef Diver: Tabletop Edition & Links to the Australian Curriculum**

The Australian Curriculum has Three Primary Educational goals across every year level, from Foundation (prep) to Year 12. This document focuses on the Foundation and Primary School curriculum links that the game has, and the areas of student learning that it can help enhance. Educational lessons and activities related to VRD:TE can help increase student knowledge of each of these categories.

These three main categories for each year level are:

*Science Understanding* - awareness and knowledge of scientific concepts and methods

*Science as a Human Endeavour* - how humans do science, and how we use it in the world

*Science Inquiry Skills* - understanding and use of research skills, data gathering, report writing, and the scientific method

Virtual Reef Diver would aid as a learning resource to the following specific targets in each specific grade:

### **Value to Foundation Student Lessons and Curriculum Goals**

Foundation (Prep)

- The cards in this game provide students with stimulus that can help them learn to describe the properties and behaviour of familiar objects, such as corals, fish, boats, swimmers, water, and other marine features. They can learn more about how the environment affects them and other living things, particularly the ocean, marine life, and the Great Barrier Reef.
- Students can share and reflect on observations they make about the game, and ask and respond to questions about familiar objects and events, such as: "Which fish is this? A clownfish!", "What do divers do? Swim!", "Where do corals live? The reef!" (Technically they *are* the reef, but these are just ideas.)

### **Value to Primary and Secondary Student Lessons and Curriculum Goals**

*Science Understanding*

- Biological Sciences
  - Years 1 & 2 - The game shows that living things have a variety of external features, and that living things live in different places where their needs are met. The Organism cards show different types of creatures, in set categories of life (eg. Coral, Algae, Fish, Marine Mammal), and also talks about their *habitat*, which is what students will start to understand at these grades. All the creatures in the game have different ways of growing, changing, and

procreating, which is useful to discussions of life cycles and food chains/webs

- Years 3 & 4 - This game is primarily about categorising observable features of flora, fauna, and ocean features. Distinguishing between living and non-living things is a key component of the gameplay and discussions that occur both within playing teams and after the game during individual or group reflection time. The life cycles of creatures and their independence with each other and the environment are explored in the game, and through play students can learn more about these important biological functions and relationships.
- Years 5 to 8 - Adaptations to the marine environment can be seen in the game, and the structural features of many types of flora and fauna are highly visible due to the images featured on the cards, which have been provided by the *Great Barrier Reef Marine Park Authority*. Classification of these organisms help organise the diversity of marine life. All the creatures in the game have different ways of growing, changing, and procreating, which is useful to discussions of life cycles and food chains/webs
- Chemical Sciences
  - Years 1 & 2 - Everyday materials are physically changed in a variety of ways in the oceans and reefs, such as water, sand (silica), and coral, which forms food particles into a kind of rock that the coral polyps then inhabit. The game also shows symbioses between different creatures, and can prompt conversations regarding different materials that sea creatures use in building their homes.
  - Years 3 to 6 - Changes in the temperature of the reef occur in the game, and can assist with prompting discussion of how solids and liquids react to heat, particularly ice and cold water. This game and the technologies featured can help students explore the notion of natural vs. processed materials found in the ocean, and how their physical properties may influence their existence and use in the marine environment.
- Earth and Space Sciences
  - Years 1 & 2 - Observable changes in the ocean landscape have a dramatic effect on all aspects of nature, from rainfall, coastlines, clouds, rivers, deserts, and so forth. The impacts of some of these are reflected in the game. Earth's resources can be used in a variety of ways, including how beaches and reefs are used for tourism, fishing, industry, maritime transport, and so on and so forth. Protecting the reef and responsibly using this resource are key environmental highlights of the game's design.
  - Years 3 & 4 - Night and day cycles are an important part of animal and coral life, and directly influence the functioning of the food web, which is modelled in a

simple way in the game.

VRD:TE can help provide material to discuss tides and the forces that allow water to exert influence on other objects by direct contact or from a distance are another important factor.

- Years 5 & 6 - The physical features, materials, and forces present in the Great Barrier Reef and the game can be found on all worlds in our solar system. This game could also help prompt interesting discussions of the kinds of lifeforms that could exist on other worlds, as a full ecosystem is included and would likely share some similar features should life exist elsewhere in the universe.
- Physical Sciences
  - Years 1 & 2 - Light and sound are produced by a range of ocean features, like whale calls, tidal noises, bioluminescent fish, and so forth. Water is a fantastic medium for sound as well, and teachers can use the game to introduce students to the environments and creatures, and to then discuss the noises some of them make - especially whale and dolphin noises. A fun activity could be to show a card with a creature and have students mime the movements and make the sounds they know/imagine the creature can cause, like splashing, chittering, etc. Water can demonstrate how objects move or change shape, as the ocean is constantly pushing or pulling and morphing form.
  - Years 3 & 4 - The impact of the sun, climate, and human activities on the temperature of the ocean can help with discussions of heat and its impact on solids, liquids, and living organisms.
  - Years 5 & 6 - The interplay of light in the water can be seen while playing the game, as the *Great Barrier Reef Marine Park Authority* photography featured is from many different depths and conditions, and shows interesting waves, pillars, and fragments of light that can help visualise the effects of liquids on shadows, the way light can be absorbed by different materials, and how it is reflected and refracted in different mediums.

### *Science as a Human Endeavour*

- Nature and Development of Science
  - Years 1 & 2 - Observing the creatures on the cards, asking questions and receiving immediate answers in a collaborative way, and describing changes in the ocean due to Reef Disturbances and human activity are all key elements of Virtual Reef Diver: Tabletop Edition.  
Students can observe changes in the game's reef environment through the play of certain cards, and explore and discuss the benefits and negatives of different

## human interventions

- Years 3 & 4 - This game includes mention of Symbiotic relationships between creatures, and gives a broad presentation of the flora and fauna that exist in the marine ecosystem. This can be useful to prompt discussions and a deeper understanding of how these patterns and relationships function in nature.
- Years 5 & 6 - Discussions of different events, phenomena, historical events and cultural significance can be gained through play of the game, as many natural and manmade versions of these concepts are featured on the cards and in the mechanics of play.
- Use and Influence of Science
  - Years 1 & 2 - VRD:TE can be use to prompt conversations about how science is used in our daily lives, as it contains a knowledge about things that impact the reef and many ways that families, students, and schools can help the Great Barrier Reef.  
This game teaches students about the reef, how we know so much about the underwater world, how much there is left to learn, and how precious this amazing place is to both Australia and the world
  - Years 3 & 4 - The impact of human activity and the effect of human actions is a key part of this game. Students witness and attempt to mitigate these affects directly in the game, and also learn about the different dangers and methods of intervention that exist on the Great Barrier Reef.
  - Years 5 & 6 - Personal and community decisions are highlighted in VRD:TE, as students gain and deploy scientific and community interventions in the service of saving the reef and preventing/reacting to disasters and adverse events in the marine environment. Students will sometimes need to discuss and vote on certain actions to take, and can reflect afterwards on whether their decisions were the best ones overall for the circumstances.

## *Science Inquiry Skills*

- *Questioning and Predicting*
  - Years 1 & 2 - Key features of the game, as students will ask eachother questions about the marine animals and plants and their categories, as well as their habitats. All cards include fun facts and gameplay revolves around learning and using acquired knowledge immediately and after time, over subsequent playthroughs.

- Years 3 & 4 - Students can gain greater familiarity with the reef and marine life through engaging play, and then use that familiarity to make better predictions due to their enhanced prior knowledge, and can also use it to help structure further scientific investigations.  
Observations of the different population levels in a particular reef (which changes each round) can allow for some informal and simple data to be gathered, useful to the creation of graphs, drawing, tables, and so forth.
- Years 5 & 6 - Students make predictions about the nature, habitat, and other details on a variety of marine organisms, and can pose clarifying questions to each other about the scientific investigations features in the game.
- *Planning and Conducting*
  - Years 1 & 2 - This game is an excellent way to instil interest in the reef (due to gameplay, fun facts, and colourful imagery), allowing students to conduct their own investigations to explore and answer questions, both during and after playing.  
Students have the opportunity to use informal measurements to collect and record observations, such as asking “how many fish are in this reef this game? How many corals? How many marine mammals? How many algae?” The Virtual Reef Diver online citizen science program is an ideal way to extend to use of digital technologies, as it also allows actual data to be gathered by participating students and staff.  
Students also gain a number of cards that allow them to make strategic game decisions that mirror scientific methods used in the field and in the lab, like predicting weather impacts and fish populations.
  - Years 3 & 4 - This game shows a variety of techniques and equipment that are used to gather data on and explore the reef.  
Observations of the different population levels in a particular reef (which changes each round) can allow for some informal and simple data to be gathered, useful to the creation of graphs, drawing, tables, and so forth.  
Virtualreef.org.au allows students to help generate actual data that is used by scientists, and enhances their understand of when, where, how, and why this data is gathered, and by who.
  - Years 5 & 6 - Students can gain a greater awareness of identifying, planning and applying the elements of scientific investigations to answer questions and solve problems using equipment and materials safely and identifying potential risks, as many examples of scientific equipment can be used in the game to help mitigate disasters.
- *Processing and Analysing Data and Information*

- Years 1 to 6 - Virtual Reef Diver: Tabletop Edition can provide simple, informal data that allows players to use a range of methods to sort information, including drawings and tables, and can inspire discussion that compares observations with predictions made before, during, and after playing the game. Students can use the game to gain knowledge to predict what creatures, events, or other factors may be found or occur on the reef.
- *Evaluating*
  - Years 1 & 2 - Students directly compare their observations with those of their team and those of other players during gameplay, and can also discuss their knowledge of habitats, creatures, species, food chains, and so forth during and after play.
  - Years 3 to 6 - With previously made predictions based on gameplay and the uncertainty of the semi-randomised content, students can reflect on investigations and learn more about scientific experiments and the fairness of tests and testing methods.
- *Communicating*
  - Years 1 to 6 - Students can represent and communicate their observations and idea in a variety of ways both during and after the game, by writing, drawing, talking about, calculating, discussing, and so forth. The game is fun and provides lots of information that students can reflect on later as groups.