Geodata Hunt

A guide for introducing geospatial technologies to Geography and Science students

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This publication has been compiled by the Queensland Spatial Information Council, Land and Spatial Information of the Department of Natural Resources, Mines and Energy based on an original idea by Dr David Pullar and Ms Morgan Reilly from the University of Queensland.

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Overview

Introduction

Geospatial technologies are tools that allow us to view, manipulate, display and analyse information in relation to location. Geospatial technologies give students the opportunity to engage with data and information in different ways while enhancing problem solving, analysis and fieldwork skills. Introducing these technologies to students raises their awareness of the importance of geospatial technologies while they are exploring different issues in the classroom.

The geospatial industry is booming due to recent advances in Global Navigational Satellite Systems (GNSS) technology and the ability to quickly share large amounts of data digitally. Remote Sensing and Geographic Information Systems (GIS) are the other main geospatial technologies that have increased in accessibility and functionality in recent years, making their use more widespread.

Geodata Hunt is a short, simple interactive game, suitable for most students in secondary school (7-12), that is designed to:

- introduce the concept that geospatial data and GIS can be used for problem solving in our world
- demonstrate the range of social, environmental and economic issues that can be addressed with geospatial technologies
- show that solving geospatial problems requires the user to analyse data and evaluate options to make decisions and/or to reach a conclusion
- show that solving specific problems requires synthesis of data.

The activities that are part of this resource should be used to introduce geospatial technologies to your students before you embark on more specific uses of the technology in your classroom. For instance, if you have a Year 7 Geography or Science class learning about water, you could use Geodata Hunt to introduce the concepts behind geospatial technologies before moving into an activity where students collect water quality data from a local waterway and use geospatial technologies to visualise and analyse that data. Or with a Year 11 class learning about bushfire risk, you could use Geodata Hunt to introduce geospatial
technologies to your students before using interactive mapping tools to visualise bushfires around Australia and to create local bushfire risk maps with local data. For more examples of how you could use geospatial technologies in the classroom, visit the Queensland Spatial Educators’ Toolkit via https://www.qld.gov.au/education/schools/learningresources/spatial-education/pages/spatial-educators-toolkit.

**Terminology**
The terms ‘spatial’ and ‘geospatial’ are often used interchangeably when discussing spatial thinking, spatial issues and spatial tools. The Australian Curriculum and Queensland Curriculum both refer to ‘spatial technologies’. This publication will endeavour to use the industry accepted ‘geospatial technologies’ but both terms should be considered identical and interchangeable.

**Curriculum links**
Geospatial technologies are mandated for use in the:
- Australian Curriculum: Humanities and Social Sciences (HASS) from F-7
- Australian Curriculum: Geography from 7-10, and

They are also suitable for use in the:
- Australian Curriculum: Science from F-10.

Geospatial technologies lend themselves to be used during any of the inquiry processes outlined in the Australian Curriculum: Science or Geography. As Geodata Hunt is designed to be a lead in activity to further study using spatial technologies, the curriculum alignment will depend on how, and to what degree, spatial technologies are used. The following is an overview of opportunities for alignment to each subject area at different year levels.

**Geography**
Geodata Hunt links most closely with the Geographical Inquiry and Skills strand for Years 7-10 in the Geography Curriculum. Teachers could change the scenarios to
suit the topic they are currently studying with the class, and develop the skills by increasing the complexity of scenarios year by year.

The following table presents an overview of all content descriptors that relate to this resource. Those that are highlighted are content descriptors that directly relate to Geodata Hunt. Those that aren’t highlighted provide opportunities to use other spatial technologies in the classroom after using Geodata Hunt.
<table>
<thead>
<tr>
<th>Year 7</th>
<th>Evaluate sources for their reliability and usefulness and select, collect and record relevant geographical data and information, using ethical protocols, from appropriate primary and secondary sources  (ACHGS048)</th>
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<tr>
<td></td>
<td>Represent data in a range of appropriate forms, for example climate graphs, compound column graphs, population pyramids, tables, field sketches and annotated diagrams, with and without the use of digital and spatial technologies (ACHGS049)</td>
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<tr>
<td></td>
<td>Represent spatial distribution of different types of geographical phenomena by constructing appropriate maps at different scales that conform to cartographic conventions, using spatial technologies as appropriate (ACHGS050)</td>
</tr>
<tr>
<td></td>
<td>Interpret geographical data and other information using qualitative and quantitative methods, and digital and spatial technologies as appropriate, to identify and propose explanations for spatial distributions, patterns and trends, and infer relationships (ACHGS051)</td>
</tr>
</tbody>
</table>
Year 8

Evaluate sources for their reliability and usefulness and select, collect and record relevant geographical data and information, using ethical protocols, from appropriate primary and secondary sources (ACHGS056)

Represent data in a range of appropriate forms, for example, climate graphs, compound column graphs, population pyramids, tables, field sketches and annotated diagrams, with and without the use of digital and spatial technologies (ACHGS057)

Represent spatial distribution of different types of geographical phenomena by constructing appropriate maps at different scales that conform to cartographic conventions, using spatial technologies as appropriate (ACHGS058)

Interpret geographical data and other information using qualitative and quantitative methods, and digital and spatial technologies as appropriate, to identify and propose explanations for spatial distributions, patterns and trends, and infer relationships (ACHGS059)
Evaluate sources for their reliability, bias and usefulness and select, collect, record and organise relevant geographical data and information, using ethical protocols, from a range of appropriate primary and secondary sources (ACHGS064)

Represent multi-variable data in a range of appropriate forms, for example scatter plots, tables, field sketches and annotated diagrams, with and without the use of digital and spatial technologies (ACHGS065)

Represent spatial distribution of geographical phenomena by constructing special purpose maps that conform to cartographic conventions, using spatial technologies as appropriate (ACHGS066)

Interpret and analyse multi-variable data and other geographical information using qualitative and quantitative methods, and digital and spatial technologies as appropriate, to make generalisations and inferences, propose explanations for patterns, trends, relationships and anomalies, and predict outcomes (ACHGS067)

Identify how geographical information systems (GIS) might be used to analyse geographical data and make predictions (ACHGS069)
Year 10

Evaluate sources for their reliability, bias and usefulness and select, collect, record and organise relevant geographical data and information, using ethical protocols, from a range of appropriate primary and secondary sources (ACHGS073)

Represent multi-variable data in a range of appropriate forms, for example scatter plots, tables, field sketches and annotated diagrams, with and without the use of digital and spatial technologies (ACHGS074)

Represent spatial distribution of geographical phenomena by constructing special purpose maps that conform to cartographic conventions, using spatial technologies as appropriate (ACHGS075)

Interpret and analyse multi-variable data and other geographical information using qualitative and quantitative methods, and digital and spatial technologies as appropriate, to make generalisations and inferences, propose explanations for patterns, trends, relationships and anomalies, and predict outcomes (ACHGS076)

Identify how geographical information systems (GIS) might be used to analyse geographical data and make predictions (ACHGS078)
In Years 9 and 10, students are required to ‘identify how geographical information systems (GIS) might be used to analyse data and make predictions’ (ACHGS069 and ACHGS078). Geodata Hunt is directly linked to this content descriptor, and could be developed in any unit of work in these year levels. Specifically Year 9 Biomes and Food Security, or Year 10 Geographies of Human Wellbeing would be topics that would allow the development of skills.

In Senior Geography (Years 11-12), Geodata Hunt can be directly linked to syllabus objectives 2 and 3; to ‘comprehend geographic patterns’ and to ‘analyse geographical data and information’. Through contextual use within Units 1-4, Geodata Hunt provides the skills for students to select, synthesise and interpret data to solve a geographical challenge.

More broadly, Geodata Hunt could be used as an introductory activity related to primary data that needs to be collected during fieldwork, or as part of a geographic inquiry associated with a case study.

**Science**

In the Science curriculum, Geodata Hunt fits most appropriately as part of an inquiry. Specifically in the following inquiry stages in the 7-10 Australian Curriculum: Science:

- Planning and conducting
- Processing and analysing data and information
- Evaluating.

Geodata Hunt should be used to introduce data and spatial thinking before the use of spatial tools as part of an investigation. An example might occur in year 7 where water quality data is collected and mapped and students use spatial tools to analyse patterns in water quality distribution.
Teaching and learning sequence

This resource is comprised of two activities that work together to introduce geospatial technologies and their application to our world. The first activity uses a presentation titled ‘What is Spatial?’, covering the basics of geospatial technologies, to introduce geospatial technologies to the students. The second activity uses role play for students to solve a problem using geospatial technologies through a card game.

The purpose of the game is to demonstrate to students that geospatial technologies are not computer programs that let you push a button to solve your problem. Just like in the real world, students playing the game will need to think about their scenario (problem) and consider what data would be best suited to help them address their scenario.
Activity 1: ‘What is spatial?’ presentation

Activity overview
Introduce geospatial information and geospatial technologies to your students with this short presentation.

Time allocation
20 minutes.

Activity objectives
- Introduce geospatial technologies to students
- Define the three most prominent geospatial technologies (GNSS, Remote Sensing and Geographic Information Systems (GIS))
- Promote career opportunities in the geospatial and surveying fields.

Equipment
- Data projector
- Internet-enabled computer
- ‘What is Spatial?’ presentation

Preparation
- Connect the projector to an internet-enabled computer and ensure all are working.
- Resource 1: ‘What is spatial?’ presentation notes
- Pre-load the YouTube video(s) contained in the ‘What is Spatial?’ StoryMap.

Activity steps
1. Open the presentation using the link below and present each slide to your students while using the notes in Resource 1 as a guide.
2. Once you have completed the presentation, move students into groups of two to three.
3. Ask each group to take a few minutes to consider how the geospatial technologies in the presentation influence their daily lives. Students will need to be creative and think beyond the obvious. Ask them to consider industries that might use a lot of geo-located data such as ride-share or taxis, pizza or food delivery, logistics and transport or emergency services. Ask them to think about data that is used to make decisions around them. Tell students to discuss these ideas in their group with a view to sharing with the class.

4. Ask students to share some of their responses with the class to demonstrate the breadth of application of geospatial information and geospatial technologies across our community.
Activity 2: Geodata Hunt

Activity overview
Explain the link between geospatial data and solving problems with Geodata Hunt.

Time allocation
20-30 minutes

Activity objectives
- Introduce geospatial data
- Examine how geospatial problems are solved with data
- Promote the value of data synthesis

Equipment
- Resource 2: Geodata Hunt cards
- Resource 3: Geodata Hunt scenarios (Geography and Science)
- Resource 4: Geodata Hunt response sheet

Preparation
For all students:
- Print and cut up the Geodata Hunt cards in Resource 2. These can be laminated if you are going to use them again. One set of cards should be used with no more than eight groups (of 3-4 students) concurrently.
- Spread the Geodata Hunt cards out, face up, randomly so that no cards are hidden and all groups can easily access them. A table in the centre of the room would be most suitable.

For each group:
- Print a copy of Resource 3: Geodata Hunt scenarios (Geography and Science)
- Print a copy of Resource 4: Geodata Hunt response sheet

Activity steps
1. Create groups of three to four students. Assign each group a scenario from Resource 3.
2. Ask students to review their scenario and to discuss, within their group, what data might be useful to solve their particular problem. There is no need to refer to or pick up the data cards yet.

3. Ask students to move to the data cards and review them to select four that would be most useful to address their scenario. Ask students not to select a wildcard at this stage. They should place their selected cards on Resource 4.

4. Once all groups have chosen their data cards, quickly review each group’s selections with the class. Ask them why they chose each piece of data. Look out for unusual data selections and press the group for their reasoning.

5. Ask each group to think about what symbols could be used to represent each layer of data if they were to view the data in a computer package (Geographic Information System or GIS) or on a map.

6. Ask students how each piece of data might be collected. Consider the methods used to get the data. Is it collected first hand or is it automated? What hardware would be used? How would the data be stored?

7. Now challenge groups to include a wildcard in their data—if they had to, what data would they choose and what piece of data would they remove in order to include it?

8. Ask each group to discuss how their data could be used to address their scenario. What solutions could their analysis lead to? How does bringing different pieces of data together impact their analysis? Share useful observations with the class. Get groups to record their response on Resource 4.
9. Ask each group to consider what additional data they would use to extend their inquiry or better understand the current option(s)? How could this data be collected? Monitor each groups’ response and share interesting responses with the class. Students should record their response on Resource 4.

Optional activities

- Use the Queensland Spatial Educators' Toolkit (QSET) to extend understanding of geospatial technologies in your classroom with fun, interesting and interactive geospatial resources. Find it at:

- Use the Queensland Globe to explore issues in Queensland using over 800 layers of Queensland data. Find it at:

- View topographic maps across Queensland using the QTopo tool. Find it at:

- Examine Queensland aerial imagery going back to the 1930’s with QImagery. Find it at: