Lumination

Lesson Plan

Immersive Data Visualisations in AR & VR

Learning Area	Mathematics	Kit	VR/AR Education Kit and Creation Kit
Year Level	Years 7-10	Duration	1x 60 minute Lesson

Introduction/Description

When collecting data there are different representations we can have for them (e.g. using tables, graphs, etc.). This lesson will allow students to create data visualisations for location-based data.

Learning Intentions

Students will understand the importance of how we present data and learn different data visualisation methods.

Task Summary

After researching different statistical results, students will create an immersive experience using augmented reality (AR) or virtual reality (VR) technologies based on the data they have collected.

Preparation

Students are expected to
- Have a basic understanding of measures of central tendency (e.g. mean, median, mode) and measures of spread (range, interquartile range, standard deviation).
- Have a TinkerCAD account setup
- Have at least a basic CoSpaces account setup.
  To use Merge Cubes in CoSpaces, your class needs to have a Pro account and the Merge Cube add-on.
- Need to have an understanding of basic world-building using CoSpaces. If not, it is recommended to spend at least a 1x60 minute lesson to learn the basics. There are tutorials linked in the resources section.

Teachers should make sure that:
- Devices are charged (if using)
- Students are able to access YouTube videos.
- Presentation slide deck has been checked.
- A copy of the Student Digital Notebook has been distributed to students and they have downloaded/ made a copy for themselves.

Resources

Hardware
- HHVR Headsets
- Mobile Devices
- Student Laptops
- Headphones
- Internet Access
- Smartboard/TV

Tasks/Presentations
- 🟨 Data Visualisation - Teaching Deck
- 🟨 Data Visualisation - Student Digital Notebook
- VR Safety Poster

Videos
- ▶️ Hans Rosling's 200 Countries, 200 Years, 4 Minutes - The Joy …
  4 minutes
  Hans Rosling's famous lectures combine enormous quantities of public data with a sport's commentator's style to reveal the story of the world's past, present and future development.

- ▶️ Importing a 3D object into your CoSpaces gallery
  2 minutes
  How to import a 3D object into your CoSpaces gallery.

VR Experiences
- 21 Years of the NASDAQ in VR
  Self-paced
  A virtual reality guided tour of 21 years of the Nasdaq

Websites
- Australian States #Map
  TinkerCAD file for the Australian States
- Australian Bureau of Statistics
  A source for statistics related to economy, people and health

Other Learning Areas
- Geography

Learning Sequence

1   Introduction
(5 mins)

Select and show students different data visualisation methods below
- ▶ Hans Rosling's 200 Countries, 200 Years, 4 Minutes - The Joy of …
- [21 Years of the NASDAQ in VR](#)

2   Discussion
(10 mins)

Discuss with students the advantages or disadvantages of these methods of displaying data (compared to traditional methods such as tables, graphs, etc.).

Students write down their responses on page 4 of the
▢ Student Digital Notebook Data Visualisation

3   Research
(5-10 mins)

Students research topics to create a 3D population map, suggestions include:

- Population in each state
- Australian Bureau of Statistics Census data
- Average Income
- Education attainment
- Ethnic Origins
- Political Affiliation

Students answer the questions on pages 5-6 of the
▢ Student Digital Notebook Data Visualisation

4   Development
(30 mins)

Create 3D population map in TinkerCAD by applying the following steps:

1. Copy and TInker the ["Australian States #Map"](#).
2. Edit the height of each state according to the collected data
(Note: for scaling, it may be helpful to treat a height of "100.00" as 100% and scale the statistics in relation to this - e.g. 20% is 20.00, 50% is 50.00, etc.).
3. Export file as an ".OBJ" file

5   Cospaces
(5 mins)

Students import OBJ file into Cospaces in order to view this data on a Merge Cube in Augmented Reality by following the steps below

1. Select "Upload"
2. Select "3D models"
3. Navigate to the folder where your TinkerCAD ".OBJ" file was saved
4. Drag the file into your Cospace once it has finished uploading

6   Conclusion
(5 mins)

Ask students to reflect and share their data visualisations using [CoSpaces EDU](#) by sharing the link/ QR code. Students will be able to view each other's creations in VR or AR by scanning each other's QR codes.

Students complete the reflection sheet on page 8 of the
▢ Student Digital Notebook Data Visualisation .

See a completed version on TinkerCAD [here](#) or on CoSpaces [here](#).

Modifications

Adaptations

Students may view the experiences in 'gyro' mode on the mobile devices if they are unable to view in VR

This lesson can be adapted to different units by changing the statistical measures being examined. For example if students have only learned basic data analysis they can collect data from the class and represent them using Cospaces. Or if a Geography unit is focused on a particular country they can create a visualisation for this location.

If students have iPads they can also view creations in the TinkerCAD AR app.

Extension Ideas

Students can examine the data of different statistical measures and countries to create a different data visualisation model.

Consider other sources of data where students might be able to create visualisations (see some examples from David Milne)

Curriculum Connections

Australian Curriculum	NSW Curriculum	VIC Curriculum
Year 7 & 8 - Mathematics Evaluate statistical reports in the media and other places by linking claims to displays, statistics and representative data **ACMSP253**	**Stage 4 - Mathematics** collects, represents and interprets single sets of data, using appropriate statistical displays **MA4-19SP**	**Level 7 - Mathematics** Construct and compare a range of data displays including stem-and-leaf plots and dot plots **VCMSP269**
Year 9 & 10 - Mathematics Use comprehension strategies to interpret and analyse information and ideas, comparing content from a variety of textual sources including media and digital texts **ACELY1713**	**Stage 5 - Mathematics** uses statistical displays to compare sets of data, and evaluates statistical claims made in the media **MA5.1-12SP**	**Level 10 - Mathematics** Evaluate statistical reports in the media and other places by linking claims to displays, statistics and representative data **VCMSP354**

Year 9 & 10 - Geography	Stage 5 - Geography	Level 9 - Geography
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**	collects and uses geographical information for inquiry **GEELS-8**	Collect and record relevant geographical data and information, using ethical protocols, from reliable and useful primary and secondary sources **VCGGC130**

Select, organise and represent data and information in different forms, including by constructing special purpose maps that conform to cartographic conventions, using digital and spatial technologies as appropriate **VCGGC131** |

Cross-Curriculum Priorities

✅ Aboriginal and Torres Strait Islander Histories and Cultures
✅ Asia and Australia's Engagement with Asia
☐ Sustainability

Capabilities

☐ Literacy
✅ Numeracy
☐ ICT Capability
✅ Critical and Creative Thinking
☐ Personal & Social Capability
✅ Ethical Understanding
✅ Intercultural Understanding