Please refer to the online lesson plan on the DT Hub to access all website links and additional resources.

## Learning hook

1. 1. Display the Google Earth application via data projector or interactive whiteboard and ask students to describe its tools and features.

Have students examine Google Earth’s own navigation tools and tips: *Navigate around the world on your computer*

Encourage students to explore Google Earth using their own computers.

1. 2. Set some competitive challenges for students. See who can be the first to:
   * find a particular landmark
   * locate a given city/country/geographic feature.
   * Conduct a debrief session with students regarding what tools and techniques they used (search box, integrated software joystick, mouse, keyboard) and how effective each of these were.
2. 3. Ask students to use Google Earth to explore one continent for 4–5 minutes in order to describe its broad features and where various landmarks or geographical features are located (eg deserts, mountains, significant rivers, cities, lakes).
   * Ask students to suggest other possible input devices or software tools that would be useful for interaction with the data provided by Google Earth.
3. 4. Demonstrate the Leap Motion controller as a potential input device (this can be enabled for use as an input device with Google Earth using ‘Google Earth Preferences > Enable controller’)
   * Challenge students to use the device to fly over and explore as the class observes via data projector.
   * Have students participate in challenges.
4. 5. Introduce and have students experience Leap Motion controller as an input device.
   * Ask students to explore other apps specially designed for use with the Leap Motion controller.
5. 6. Conduct a discussion with students on the advantages and disadvantages of using the Leap Motion controller as an input device.
   * Show students other Leap Motion controller apps. Discuss the benefits and limitations of this input device.

## Learning map and outcomes

Computers users need to have the ability to enter data into computers. Various peripheral devices have been created to fulfil this need and this process of invention continues.

They explore some of the inventions developed over time to meet the need for users and computers to both input and output data.

## Learning input

1. 1. Discuss the evolution of peripheral devices and in particular the invention and evolution of the mouse.
2. 2. Have students research its first inclusion in a commercial computer. Discuss why this invention was so influential.
3. 3. Discuss what other devices have been invented in order to input data to a computer (hard-wired patch cables; paper tape; punched cards – mention Jacquard loom; keyboard; joysticks; game controllers; accelerometers – Nintendo Wii; speech recognition).

Explain to students that they will be conducting research into the history of various devices.

1. 1. Show a short section of video of the first programmable computer ‘Colossus’ (which used paper tape) in operation (see Resources).
   * Present images and videos of other devices in operation and ask students to commence research in groups.
2. 2. Project a YouTube 360 degree video (there are many) such as *Google Data Center 360°* from a compatible browser connected to a data projector.
   * Demonstrate how navigation can be achieved by moving the mouse around. Ask how this is done.
3. 3. Hold up an assembled Cardboard VR.
   * Ask if it is an input or an output device? (Answer: It is both)
4. 4. Project the VRSE app’s VR movie Invasion (YouTube Baobab Studios) using a smartphone connected to a data projector, showing how viewpoint can be controlled by the orientation of the phone. Ask students how this is done.
5. 5. As a class, view selected images and videos of devices in operation. Explain to students they will be constructing their own VR device, which will act as both an input and output device.

## Learning construction

**Stage 1: investigating an input device**

1. 1. Tell students that they will first be investigating a range of input devices.
2. 2. Organise students into groups and have a lucky dip to select their device (they will treating hardware together with any enabling software).
   * Some suggestions:

paper tape, punchcards, keyboard, joystick, game controller, accelerometer, microphone and speech recognition, intelligent assistants, graphics tablet, scanner, stylus, touchscreen, webcam

1. 3. Ask students to then assign the following tasks among members of the group:
   * Identify the needs the device fulfils.
   * By whom, where, when and why it was invented?
   * What is the cost of the device?
   * How has the design evolved over time (eg rolling ball, optical, wired versus wireless mice).
2. 4. Have each group prepare a short presentation. In particular, they should identify the need(s) fulfilled by each of the devices

**Stage 2: creating an input device**

1. 1. Ask students to create their own input device for a smartphone.
2. 2. Assist students to construct a Cardboard VR viewer (possibly one between two). Teacher assists with construction of Cardboard VR kits. Note that a barcode accompanies most VR kits and needs to be used to adjust the settings of the stereo vision.
3. 3. Ask students to explore VRSE app’s VR movie Clouds Over Sidra using a smartphone. Should a viewer be unavailable, these VR experiences can be experienced via a data projector using the handheld mobile device as an input device by moving around and tilting.
   * Identify with your class what need this input device fulfils (immersive user involvement; relinquishes camera control to viewer; user controls viewport; different viewers have different experiences dependent on where they point camera).
   * Conduct a discussion about the advantages and disadvantages of this approach to interaction with data.
4. 4. Ask students to investigate other VR apps and explore navigation in these.
   * Have students locate an application which allows for interaction by users. How is this achieved?
5. 5. Ask students to imagine what might be an ideal input device for a desktop computer. This activity provides an opportunity for students to brainstorm and design their own devices that they think might be realised in the future.
   * Have the class discuss these ideas and vote on which is the most ‘ideal’. Students can demonstrate their understanding of what makes a good input device by attempting to justify their designs.

## Learning demo

Many suitable VR clips can be found on YouTube using the 360° Videos channel. Students can explore this channel in groups and select examples particularly suited to this form of input device.

## Curriculum links

| Links with Digital Technologies Curriculum Area | |
| --- | --- |
| **Strand** | **Content Description** |
| **Knowledge and Understanding** | Investigate the main internal components of common digital systems and their function (AC9TDI6K01). |

## Assessment

### Note: Criteria are cumulative.

|  | **Quantity of knowledge** | | | **Quality of understanding** | |
| --- | --- | --- | --- | --- | --- |
| **Input devices** | No evidence of understanding | Student is able to describe the purpose of an input device | Student is able to describe the function of an input device | Student is able to describe the particular need(s) met by an input device | Student is able to suggest improvements and alternatives to the operation of an input device |
| **Purposes of input devices in general** | No evidence of understanding | Student can identify a range of input devices | Student can describe the functions of a range of input devices | Student demonstrates an appreciation of the needs met by a number of devices studied | Student demonstrates an appreciation of the needs met by all devices studied |
| **Optional score** | 0 | 1 | 2 | 3 | 4 |