**Scheme of work – R070 Using Augmented Reality to present information**

**About this scheme of work**

**Our redeveloped Cambridge National in IT Level 1/2 J836 is for first teaching from September 2022.**

This qualification provides lots of flexibility, allowing you to find the best route to suite your centre’s needs. Our curriculum planner shows you at a high level how you could teach the course over two or three years. Our schemes of work provide examples for how you could deliver each unit, integrating the knowledge and understanding learned in the externally assessed unit.

All schemes of work should provide opportunity for integrating the knowledge and understanding learned from the externally assessed unit content alongside the NEA assessment content. This scheme of work provides one example for delivery of this unit. You may find that a different approach would work better in your centre. We have provided a blank template should you wish to create your own or adapt one of the approaches provided.

You’ve given us lots of feedback on what you need from a scheme of work, so we’ve made sure this resource features:

* a **unit-specific** and **lesson by lesson** approach
* **simple** and **editable** Word format – or you can use our [blank template](https://www.ocr.org.uk/Images/639549-scheme-of-work-template.docx) to create your own version
* links to our [curriculum planner’s first model](https://www.ocr.org.uk/Images/619706-curriculum-planner.docx) which is one teacher teaching the qualification over two years, broken down into half terms
* each lesson’s **key words**
* **ideas** for teaching and learning with useful **links**
* some ‘warm up’ teaching ideas if you’re teaching over three years.



## Units and guided learning hours

Here is a reminder of the 3 units in the redeveloped Cambridge National in IT Level 1/2 J836:

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| **Unit** | **Unit title** | **Guided learning hours (GLH)** | **How are they assessed?** | **Mandatory or optional?** |
| R050 | IT in the digital world | 48 | OCR set and marked | Mandatory |
| R060 | Data manipulation using spreadsheets | 36 | Centre-assessed tasks, OCR moderated | Mandatory |
| **R070** | **Using Augmented Reality to present information** | **36** | **Centre-assessed tasks, OCR moderated** | **Mandatory** |

## Assumptions

* You will adapt the SOW and lesson content to match your own timetabling arrangements and will choose how to spread the 36 GLH over the two years as best fits your needs. We have worked on the basis that the average lesson time is around 45 minutes.
* Students can access some resources outside of lessons for any online homework or extension tasks.
* You will refer to the [specification](https://www.ocr.org.uk/Images/610951-specification-cambridge-nationals-it-j836.pdf) as the key document for detailed insight into the qualification’s content and assessment requirements.

Summary of software/other equipment in this scheme of work

* Any available software that will enable students to view examples of AR and create a prototype model. There are a number of free AR software available that can be found by searching “Free Augmented Reality software”.
* PC, smartphone, tablets or laptops to enable students to view examples of AR, create and test an AR model prototype.

## First year of teaching

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|  Autumn 1 |
| **Summary of what you will cover from the** [**curriculum planner**](https://ocr.org.uk/Images/619706-curriculum-planner.docx)**:** | TA 2 - Designing an AR model prototype (2.1 Planning and design consideration, 2.2 Design tools): Year 10 |

| Lesson no/week no | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key word | Lesson outcome(s)At the end of the lesson, students will be able to: | Useful links/resources | How does this link to other units? |
| --- | --- | --- | --- | --- | --- | --- |
| 1  | TA 2.1: Planning and design considerationsPurposeUser RequirementsTarget AudienceContent  | You could display the Ikea Place AR app video and have a group discussion on the following:* Purpose
* User requirements
* Content

You could divide the class into small groups and provide them with a short scenario representing a client who wants an AR app / resource designed for a specific purpose. E.g. the local council wants an AR app that people could use when visiting the town.In their groups, the students could be asked to make notes on the following:* Purpose and user requirements for the AR app
* Target audience
* Content e.g. navigation, images, video, audio, text etc.

The groups could feedback their ideas to the main class and share any additional ideas. | * User requirements
* Purpose
* Target audience
* Content
 | * Describe the purpose for an AR app
* Describe the user requirements of the AR
* Identify the target audience
* Identify the content required
 | [Home furniture design ideas](https://www.ikea.com/gb/en/customer-service/mobile-apps/)(ikea.com)[Design process for creating an AR recipe app](https://www.youtube.com/watch?v=WZJaVgvzib0)(YouTube)[Designing an AR dashboard](https://www.youtube.com/watch?v=g48RTKe2Me8)(YouTube)[Use of augmented reality in education](https://www.youtube.com/watch?v=GG90QEvwmEU)(YouTube) | R050 TA2R050 TA5R060 TA4 |
| 2  | TA 2.1: Planning and design considerationsAssets | This is a follow on from the previous lesson with the focus on assets.You could* explain the keyword ‘asset’
* introduce the list of assets that could be used for an AR app.
* Initially focus on charts and graphs, hyperlink/weblink, text
* explain what makes a good and a bad asset showing examples (the quality considerations for the use of assets). Use visual examples to aid explanations.
* explain the importance of copyright and licensing regulations
 | * Assets
* Charts and graphs
* Hyperlinks / weblinks
* Text
 | Identify and determine appropriate quality of assets for an AR app design | [Where to source AR assets and what to look for](https://www.zappar.com/blog/where-to-source-assets-for-your-next-ar-project/)(zappar.com)[**Design process for creating an AR recipe app**](https://www.youtube.com/watch?v=WZJaVgvzib0) (YouTube)[**AR Dashboard design and prototype**](https://www.youtube.com/watch?v=g48RTKe2Me8) (YouTube) | R050 TA4.4R050 TA 5.1R060 TA 1.2 |
| 3  | TA 2.1: Planning and design considerationsAssets | This is a continuation from the previous lesson to continue with the remaining list of assets.For the remaining assets of audio, video, photographs / images you could:* explain what makes a good and a bad asset showing examples (the quality considerations for the use of assets). Use visual examples to aid explanations.
* explain the importance of copyright and licensing regulations

Either in class or for homework you could:* ask the students to identify assets that could be used for the assignment scenario provided in lesson 1.
* ask them to justify why the assets they have selected would be appropriate and what consideration they have given to any legislative requirements.
 | * Assets
* Audio
* Video
* Photographs / images
 | Identify and determine appropriate quality of assets for an AR app | [Where to source AR assets and what to look for](https://www.zappar.com/blog/where-to-source-assets-for-your-next-ar-project/) (zappar.com)[AR Dashboard design and prototyp**e**](https://www.youtube.com/watch?v=g48RTKe2Me8) (YouTube) | R050 TA 4.4R050 TA 5.1R060 TA 1.2 |
| 4  | TA 2.1: Planning and design considerationsTriggersLayers / User Interaction | You could:* ask the class to research definitions for each of the trigger types and provide a photograph or video of each type.

Or* you could display images and/or videos for each type of trigger and explain what they are and how they work.

You could:* explain the purpose of layers and how users can interact with augmented reality and navigate through the layers
* explain the importance of the action flow to navigate the layers
* explain the difference between a static an interactive layer.

For homework you could ask the class to identify the following for the assignment scenario from the previous lessons:* the types of triggers that could be used and for what purpose
* the type of user interaction for navigating then layers and initiating the triggers
* how they have considered the action flow of the AR app design
* whether they are using static, interactive or both forms of user interaction and layers.
 | * Triggers
* Object recognition / marker-based
* Location (GPS) based / Markerless
* Superimposition
* Layers/user interaction
* Action flow
* Static
* interactive
 | * explain the term trigger
* explain the different forms of triggers
* select appropriate types of triggers for a defined AR app context
* explain the terms layers/user interaction
* select appropriate forms of layers/user interaction for a defined AR app context
 | [Learn more about triggering augmented reality experiences with AR markers](https://www.linkedin.com/pulse/learn-more-triggering-augmented-reality-experiences-ar-silvestro/)(linkedin.com/pulse)[Top tools to build augmented reality mobile apps](https://www.infoq.com/articles/augmented-reality-best-skds/) (infoq.com)[What a Race: the world’s first live augmented reality race with the 2018 Acura TLX](https://www.youtube.com/watch?v=JYIrHnfobyY) -(YouTube)[Live Texturing of Augmented Reality Characters from Colored Drawings](https://www.youtube.com/watch?v=SWzurBQ81CM)(YouTube) |  |
| 5  | TA 2.2: Design toolsTools used to design the content and action flow for anAR product | You could start by introducing the tools used for designing AR solutions.You could:* introduce three of the six different types of design tools and their components
* explain the advantages and disadvantages of each type of design tool
* summarise the software that can be used to create the different design tools
 | * Components
* Flow charts
* Mind maps
* Mood boards
 | * summarise the key components of different design tools used for AR
* describe the advantages and disadvantages for each type of design tool:
	+ flowcharts
	+ mind maps
	+ mood boards
 | [Guide to Flowchart Symbols, from Basic to Advanced](https://www.gliffy.com/blog/guide-to-flowchart-symbols)(gliffy.com)[3 Basic Types of Mind Maps](https://www.edrawsoft.com/3-basic-mind-map-types.html)(edrawsoft.com)[How to create great mood boards](https://youtu.be/QLTbT2bqsj0)(YouTube)[Mind map software summary](https://thedigitalprojectmanager.com/mind-mapping-software/)[Flowchart software](https://www.lucidchart.com/pages/examples/flowchart_software)(lucidchart.com)[Ten best online flowchart software of 2021](https://thedigitalprojectmanager.com/flowchart-software/)(thedigitalprojectmanager.com) | R050 TA1R060 TA1Students are required to use a range of design tools to plan their products for task 1 of the NEA |
| 6  | TA 2.2: Design toolsTools used to design the content and action flow for anAR product | This is a follow on from the previous lesson.You could:* introduce the final three different types of design tools and their components
* explain the advantages and disadvantages of each type of design tool
* summarise the software that can be used to create the different design tools
 | * Components
* Storyboards
* Visualisation diagrams
* Wireframes
 | * summarise the key components of different design tools used for AR
* describe the advantages and disadvantages for each type of design tool:
	+ storyboards
	+ visualisation diagrams
	+ wireframes
 | [Storyboarding and wireframing (part 1)](https://www.coursera.org/lecture/user-experience-interaction-design-augmented-virtual-mixed-extended-reality/storyboarding-wireframing-part-1-YZLxZ)(cousera.org)[Visualisation diagrams](http://www.lakelandscomputing.com/visualisation-diagrams.html)(lakelandscomputing.com)[What is a wireframe and how to design them: a beginners guide](https://designshack.net/articles/graphics/what-is-a-wireframe/)(designshack.net)[Flowchart software](https://www.lucidchart.com/pages/examples/flowchart_software)(lucidchart.com)[Ten best online flowchart software of 2021](https://thedigitalprojectmanager.com/flowchart-software/)(thedigitalprojectmanager.com)[Ten tools for creating infographics and visualisations](https://moz.com/blog/10-tools-for-creating-infographics-visualizations)(moz.com)[Wireframe software](https://www.mockflow.com/)(mockflow.com)[Wireframe software](https://balsamiq.com/)(balsamiq.com) | R050 TA1R060 TA1Students are required to use a range of design tools to plan their products in the task 1 for both NEAs. |

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| Spring 1 |
| **Summary of what you will cover from the** [**curriculum planner**](https://ocr.org.uk/Images/619706-curriculum-planner.docx)**:** | **No teaching for R070 this term for Year 10** |

| Lesson no. | Topic areas/subtopic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)At the end of the lesson, students will be able to: | Useful links/resources | How does this link to other units? |
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| Spring 2 |
| **Summary of what you will cover from the** [**curriculum planner**](https://ocr.org.uk/Images/619706-curriculum-planner.docx)**:** | **TA 1: Augmented Reality (AR) (1.1 – Purpose and uses of AR, 1.2 – Types of AR and user interaction, 1.3 – Devices used with AR)** |

| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)At the end of the lesson, students will be able to: | Useful links/resources | How does this link to other units? |
| --- | --- | --- | --- | --- | --- | --- |
| 1  | TA 1: Augmented Reality (AR)1.1 The purposes and Uses of Augmented Reality (AR) | You could:* Explain to the students what augmented reality is and how it is different to virtual reality.
* Get the students to research the different uses of AR in the different sectors and how AR is used. Encourage them to find examples for each sector.

For homework you could:Get the students to continue with the research exercise and produce a presentation or a report. | * Augmented reality
* Purpose
* Sectors
* Uses
* Training
* Virtual tours
* Visualisation
* Marketing
 | * Explain the term augmented reality
* Explain the purpose of augmented reality
* Describe how AR is used within different sectors
 | [What is augmented reality?](https://www.investopedia.com/terms/a/augmented-reality.asp)(Investopedia.com)[Examples some sectors that use AR and how it is used](https://www.xrtoday.com/mixed-reality/the-top-6-industries-for-enterprise-ar-vr-in-2021/) (xrtoday.com)[Top ten industries adopting AR in 2021](https://www.vsight.io/top-industries-adopting-augmented-reality-in-2021/) (vsight.io)[Use of augmented reality in education](https://www.youtube.com/watch?v=GG90QEvwmEU)(YouTube)[Augmented Reality use cases](https://www.youtube.com/watch?v=3YqaRrzkM4c)(YouTube) |  |

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| 2  | TA 1: Augmented Reality (AR)1.2 Types of Augmented (AR) and user interaction | You could:* Explain the different types of AR and ask the students to look for one example of each type.
* Divide the class into small groups and give each group a different sector. Ask them to find one example of how the sector has used each of the AR types. If they cannot find a particular type, you could tell them to think of a way that the ‘missing’ AR type could be used by the sector.
 | * Object recognition
* Marker-based
* Location based
* Markerless
* Superimposed
 | * Know the different types of AR
* Know how each type of AR is used by different sectors
 | [Object recognition and tracking augmented reality](https://youtu.be/nm-2oN3Mv9U) - (YouTube)[Object recognition based augmented reality](https://youtu.be/g9eI93ooBHo)(YouTube)[Types of AR](https://digitalpromise.org/initiative/360-story-lab/360-production-guide/investigate/augmented-reality/getting-started-with-ar/types-of-ar/)(digitalpromise.org)[Powerful Augmented Reality Experiences with Internet of Things](https://youtu.be/TNuYbFPWFus) (YouTube) | **R050/R060 (HCI)****R050 – TA6** |
| 3 | TA 1: Augmented Reality (AR)1.2 Types of Augmented (AR), user interaction and layers | You could:* Explain the term user interaction/layer showing examples through possible YouTube clips or images.
* As the students to look at the examples of the use of AR that they found in the previous lesson and ask them to identify the types of user interaction and layers that have been used.
* Give the students a short scenario context and ask them what type of user interaction(s) would be most appropriate when designing an AR app.
 | * User interaction Layers
* Static
* Interactive
 | * Know the different ways that users can interact with an AR ap
* Know how different sector user different types of user interaction
 | [Multi-device interaction in AR](https://www.youtube.com/watch?v=0CPcc2xp3_s)(YouTube)[A beginner’s guide to AR](https://www.youtube.com/watch?v=H7ZHemE2nRs) (YouTube) |  |
| 4 | TA 1: Augmented Reality (AR)1.3 Devices used with Augmented Reality (AR) | You could:* Divide the students into small groups and give each group a set of cards with the names of different devices used for AR. They then have to decide which category they come under advising them that a device could come under more than one category e.g. a smartphone is also a mobile device.
* Discuss the outcomes of the game and provide the students with a list of the AR devices and the categories they belong to.
 | * Mobile devices
* Smart devices
* Laptop / PC
 | * Know the different types of devices AR can be used on
* Know the type of AR to be used on specific devices
 | [Examples of AR devices](https://blog.assemblrworld.com/types-of-augmented-reality-devices/) (blog.assemblrword.com) |  |

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| Summer 1 |
| **Summary of what you will cover from the** [**curriculum planner**](https://ocr.org.uk/Images/619706-curriculum-planner.docx)**:** | **R070: TA 2 (2.1 Planning and design considerations, 2.2 Design tools) – Recap and practice** |

| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)At the end of the lesson, students will be able to: | Useful links/resources | How does this link to other units? |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | TA2 - designing an AR model prototype 2.1 Planning and design considerations | You could:* Recap over the previous lessons where TA2 was covered in Autumn 1
* Provide students with a small / practice assignment and ask them to:
	+ Plan the design of an AR app for a specified purpose.
 | * User requirements
* Purpose
* Target audience
* Content
* Assets
* Charts and graphs
* Hyperlinks/weblinks
* Text
* Audio
* Video
* Photographs / images
 | Plan and design an AR model prototype for a defined purpose | [Guide to Flowchart Symbols, from Basic to Advanced](https://www.gliffy.com/blog/guide-to-flowchart-symbols)(gliffy.com)[3 Basic Types of Mind Maps](https://www.edrawsoft.com/3-basic-mind-map-types.html)(edrawsoft.com)[How to Create Great Mood Boards](https://youtu.be/QLTbT2bqsj0)(YouTube)[Mind map software](https://thedigitalprojectmanager.com/mind-mapping-software/)(thedigitalprojectmanager.com)[Flowchart software](https://www.lucidchart.com/pages/examples/flowchart_software)(lucidchart.com)[Flowchart software](https://thedigitalprojectmanager.com/flowchart-software/)(thedigitalprojectmanager.com) | R050 TA 2R050 TA 5R060 TA 4 |
| 2 | TA2 - designing an AR model prototype 2.1 Planning and design considerations | This lesson follows-on from the lesson above.You could:* Ask the students to continue with planning their design for the AR model prototype
 | * Triggers
* Object recognition/marker-based
* Location (GPS) based / Markerless
* Superimposition
* Layers/user interaction
* Action flow
* Static
* interactive
 | Plan and design an AR model prototype for a defined purpose | [How to create triggers for augmented reality](https://www.youtube.com/watch?v=v4l25iIxEi0) (YouTube)[Image recognition that triggers augmented reality](https://www.ted.com/talks/matt_mills_image_recognition_that_triggers_augmented_reality?language=en#t-60698) (Ted.com)[9 essential terms you need to know in AR and virtual reality](https://www.indestry.com/blog/9-essential-terms-you-need-to-know-in-augmented-and-virtual-reality) (industry.com)[How to make an AR app in 6 minutes](https://www.youtube.com/watch?v=khavGQ7Dy3c) (YouTube) [How to create an augmented reality app](https://www.youtube.com/watch?v=MtiUx_szKbI)(YouTube)[Create an AR app using Vuforia and Unity](https://www.youtube.com/watch?v=yECYjgx5Byw) (YouTube)[Markerless augmented reality tutorial](https://www.youtube.com/watch?v=T6bd_MQ2ass)(YouTube)[Marker-based AR explained](https://www.youtube.com/watch?v=qAaUSmVfpaU)(YouTube)[Markerless AR explained](https://www.youtube.com/watch?v=16jT1_MtTXs)(YouTube) | R050 TA 2R050 TA 5R060 TA 4 |
| 3 | TA2 - designing an AR model prototype 2.2 Design tools | This is a follow-on lesson from above.You could:* + Ask the students to refer to their plans for the AR app and use design tools to document the design of their AR model prototype.
 | * Components
* Flow charts
* Mind maps
* Mood boards
* Storyboards
* Visualisation diagrams
* Wireframes
 | Use a wide range of design tools to design an AR app | [Storyboarding and wireframing (part 1)](https://www.coursera.org/lecture/user-experience-interaction-design-augmented-virtual-mixed-extended-reality/storyboarding-wireframing-part-1-YZLxZ)(coursera.org)[Visualisation Diagrams](http://www.lakelandscomputing.com/visualisation-diagrams.html)(lakelandscomputing.com)[What Is a Wireframe & How to Design Them: A Beginner’s Guide](https://designshack.net/articles/graphics/what-is-a-wireframe/)(designshack.net)[Flowchart software](https://www.lucidchart.com/pages/examples/flowchart_software)(lucidchart.com)[Ten best online flowchart software of 2021](https://thedigitalprojectmanager.com/flowchart-software/)(thedigitalprojectmanager.com)[Ten tools for creating infographics and visualisations](https://moz.com/blog/10-tools-for-creating-infographics-visualizations) (moz.com)[Wireframe software](https://www.mockflow.com/) (mockflow.com)[Wireframe software](https://balsamiq.com/)(balsamiq.com) | R050 TA 1R060 TA 1Students are required to use a range of design tools to plan their products for task 1 of the NEA |
| 4 | TA2 - designing an AR model prototype 2.2 Design tools | You could:* Ask the students to continue with using the design tools to document the design of their AR model prototype
 | * Components
* Flow charts
* Mind maps
* Mood boards
* Storyboards
* Visualisation diagrams
* Wireframes
 | Use a wide range of design tools to design an AR app | [Storyboarding and wireframing (part 1)](https://www.coursera.org/lecture/user-experience-interaction-design-augmented-virtual-mixed-extended-reality/storyboarding-wireframing-part-1-YZLxZ)(coursera.org)[Visualisation Diagrams](http://www.lakelandscomputing.com/visualisation-diagrams.html)(lakelandscomputing.com)[What Is a Wireframe & How to Design Them: A Beginner’s Guide](https://designshack.net/articles/graphics/what-is-a-wireframe/)(designshack.net)[Flowchart software](https://www.lucidchart.com/pages/examples/flowchart_software)(lucidchart.com)[Ten best online flowchart software of 2021](https://thedigitalprojectmanager.com/flowchart-software/)(thedigitalprojectmanager.com)[Ten tools for creating infographics and visualisations](https://moz.com/blog/10-tools-for-creating-infographics-visualizations) (moz.com)[Wireframe software](https://www.mockflow.com/) (mockflow.com)[Wireframe software](https://balsamiq.com/)(balsamiq.com) | R050 TA 1R060 TA 1Students are required to use a range of design tools to plan their products for task 1 of the NEA |

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| Summer 2 |
| **Summary of what you will cover from the** [**curriculum planner**](https://ocr.org.uk/Images/619706-curriculum-planner.docx)**:** | **R070: TA 3: Creating and augmented reality prototype (3.1 AR model prototype, 3.2 Triggers, 3.3 Layers/User interaction, 3.4 Information output)** |

| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)At the end of the lesson, students will be able to: | Useful links/resources | How does this link to other units? |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | TA 3: Creating an AR model prototype 3.1 Augmented reality (AR) model prototype | You could explain:* what a prototype is and its importance
* the different types of prototypes and their purpose
* the characteristics of a prototype
* the most appropriate prototype for the design and development of an AR app.
* ways in which a prototype could be created.
 | * Prototype
* Functionality
* Aesthetics
* Real data
 | * Understand the term prototype
* Know the characteristics of a prototype
* Select an appropriate prototype for an AR model to demonstrate working functionality
* Know how to create a model prototype
 | [Prototyping designing software](https://balsamiq.com/)(balsamiq.com)[Design and prototyping tool for web and mobile apps](https://www.justinmind.com/)(justmind.com)[A design platform](https://www.figma.com/)(figma.com)[Transformative collaboration](https://www.invisionapp.com/)(invisionapp.com)[Different types of prototypes](https://www.reforge.com/brief/the-4-different-types-of-product-prototypes#gMU7cmRMzBlIqqVcJY_Rgg) (reforge.com) |  |

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| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)**At the end of the lesson, students will be able to:** | Useful links/resources | How does this link to other units? |
| 2 | TA 3: Creating an AR model prototype 3.2 Triggers | You could:* Recap over lessons for TA1 concerning triggers and markers.
* Ask the students to identify the triggers they would use for their AR model prototype planned and designed during the Summer 1 term.
 | * Triggers
* Characteristics
* Unique
* Object recognition
* Marker-based
* Location based
* Markerless
* Superimposition
 | * Understand that triggers must be unique
* Select and prepare suitable assets for triggers
* Use object recognition / marker-based triggers
* Use location based / markerless triggers
* Use superimposition
 | [How to create triggers for augmented reality](https://www.youtube.com/watch?v=v4l25iIxEi0) (YouTube)[Image recognition that triggers augmented reality](https://www.ted.com/talks/matt_mills_image_recognition_that_triggers_augmented_reality)(ted.com)[9 essential terms you need to know in augmented and virtual reality](https://www.indestry.com/blog/9-essential-terms-you-need-to-know-in-augmented-and-virtual-reality)(industry.com)[How to make an AR app in 6 minutes](https://www.youtube.com/watch?v=khavGQ7Dy3c)(YouTube)  |  |

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| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)**At the end of the lesson, students will be able to:** | Useful links/resources | How does this link to other units? |
| 3 | TA 3: Creating an AR model prototype 3.2 Triggers | You could:* Demonstrate how to create the different types of triggers with software available to the centre.
* Give the students a short exercise to practice creating triggers and markers.
 | * Triggers
* Characteristics
* Unique
* Object recognition
* Marker-based
* Location based
* Markerless
* Superimposition
 | * Understand that triggers must be unique
* Select and prepare suitable assets for triggers
* Use object recognition/marker-based triggers
* Use location based/markerless triggers
* Use superimposition
 | [How to make an AR app in 6 minutes](https://www.youtube.com/watch?v=khavGQ7Dy3c)(YouTube)[How to create an augmented reality app](https://www.youtube.com/watch?v=MtiUx_szKbI)(YouTube)[Creating an AR app using Vuforia and Unity](https://www.youtube.com/watch?v=yECYjgx5Byw)(YouTube)[Markerless augmented reality tutorial](https://www.youtube.com/watch?v=T6bd_MQ2ass) m(YouTube)[Marker-based AR explained](https://www.youtube.com/watch?v=qAaUSmVfpaU)(YouTube)[Markerless AR explained](https://www.youtube.com/watch?v=16jT1_MtTXs)(YouTube)AR Software Development Kits (SDKs) with some independent platform with no coding requirement:[Arloopa](https://arloopa.com/#ar_projects) – open source online[Overlyapp](https://overlyapp.com/) – free online educational solution and paid plan[Brio](https://www.goodfirms.co/software/brio) – cloud-based platform, free and paid plan[Adobe Aero](https://www.goodfirms.co/software/adobe-aero) – paid plan and part of Adobe software package[DroidAR](https://bitstars.github.io/droidar/) – open source Android platform.Plugin for Windows, iOS and Android with no coding requirement for basic AR model prototype.[ARToolKit+](https://www.goodfirms.co/software/artoolkit) – open source [Unreal Plugin](https://ar.uplugins.com/) |  |
| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)**At the end of the lesson, students will be able to:** | Useful links/resources | How does this link to other units? |
|  |  |  |  |  | [Unity Plugin](https://www.artoolkitx.org/)[ARToolKitX](https://www.artoolkitx.org/) – open source[Vuforia Engine](https://www.goodfirms.co/software/vuforia-engine) – open source[Apple ARKit](https://developer.apple.com/augmented-reality/) – open-source iOS and iPadOS[AR Creation Tools](https://developer.apple.com/augmented-reality/arkit/)(developer.apple.com)[OCR blog - teaching AR](https://www.ocr.org.uk/blog/teaching-augmented-reality-in-our-redeveloped-cambridge-national-in-it/)(ocr.org.uk) |  |
| 4 | TA 3: Creating an AR model prototype 3.3 Layers / user interaction | You could explain the terms:* Single layers
* Multiple layers
* Access to layers
	+ Static
	+ Interactive
	+ Swipe
	+ Click/select
	+ Voice

You could demonstrate using the software available within your centre to:* demonstrate how to create single and multiple layers
 | * Single layers
* Multiple layers
* Access to layers
* Static
* Interactive
* Swipe
* Click/select
* Voice
 | * Understand the terms layers/user interaction
* Identify, select and create appropriate layers/user interaction for an AR model prototype for a defined purpose
 | [Exploring AR interaction](https://www.youtube.com/watch?v=bUGhG-AZpu0)(YouTube)[Best practices to design AR applications](https://www.youtube.com/watch?v=bNJJCREZgVM)(YouTube)[Multi-device interactions in augmented reality](https://www.youtube.com/watch?v=0CPcc2xp3_s)  m(YouTube)AR Software Development Kits (SDKs) with some independent platform with no coding requirement:[Arloopa](https://arloopa.com/#ar_projects) – open source online[Overlyapp](https://overlyapp.com/) – free online educational solution and paid plan[Brio](https://www.goodfirms.co/software/brio) – cloud-based platform, free and paid plan[Adobe Aero](https://www.goodfirms.co/software/adobe-aero) – paid plan and part of Adobe software package[DroidAR](https://bitstars.github.io/droidar/) – open source Android platform. | R050 TA2 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)**At the end of the lesson, students will be able to:** | Useful links/resources | How does this link to other units? |
|  |  | * demonstrate how to use the different user interaction methods
 |  |  | Plugin for Windows, iOS and Android with no coding requirement for basic AR model prototype.[ARToolKit+](https://www.goodfirms.co/software/artoolkit) – open source[Unreal Plugin](https://ar.uplugins.com/)[Unity Plugin](https://www.artoolkitx.org/)[ARToolKitX](https://www.artoolkitx.org/) – open source[Vuforia Engine](https://www.goodfirms.co/software/vuforia-engine) – open source [Unity Plugin](https://library.vuforia.com/articles/Training/getting-started-with-vuforia-in-unity.html)[Apple ARKit](https://developer.apple.com/augmented-reality/) – open source iOS and iPadOS[AR Creation Tools](https://developer.apple.com/augmented-reality/arkit/)(developer.apple.com)[OCR blog - teaching AR](https://www.ocr.org.uk/blog/teaching-augmented-reality-in-our-redeveloped-cambridge-national-in-it/)(ocr.org.uk) |  |
| 5 | TA 3: Creating an AR model prototype 3.3 Layers / user interaction | You could:* ask students to identify the types of layers, and how they will be accessed for the AR prototype model they planned and designed during summer term 1.
* get the students to create the layers/user interaction
 | * Single layers
* Multiple layers
* Access to layers
* Static
* Interactive
* Swipe
* Click/select
* Voice
 | * Understand the terms layers/user interaction
* Identify, select and create appropriate layers/user interaction for an AR model prototype for a defined purpose
 | [Exploring AR interaction](https://www.youtube.com/watch?v=bUGhG-AZpu0)(YouTube)[Best practices to design AR applications](https://www.youtube.com/watch?v=bNJJCREZgVM) (YouTube)[Multi-device interactions in augmented reality](https://www.youtube.com/watch?v=0CPcc2xp3_s) (YouTube)[Designing an Augmented Reality scene in Adobe Aero](https://youtu.be/fo8aG0vCY7k)(YouTube)[How to create an Augmented Reality App](https://youtu.be/MtiUx_szKbI)(YouTube)  | R050 TA3 |
| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)**At the end of the lesson, students will be able to:** | Useful links/resources | How does this link to other units? |
|  |  |  |  |  | [Augmented reality](https://developer.apple.com/design/human-interface-guidelines/ios/system-capabilities/augmented-reality/)(developer.apple.com)[Augmented reality](https://www.interaction-design.org/literature/topics/augmented-reality)(interation-design.org)AR Software Development Kits (SDKs) with some independent platform with no coding requirement:[Arloopa](https://arloopa.com/#ar_projects) – open source online[Overlyapp](https://overlyapp.com/) – free online educational solution and paid plan[Brio](https://www.goodfirms.co/software/brio) – cloud-based platform, free and paid plan[Adobe Aero](https://www.goodfirms.co/software/adobe-aero) – paid plan and part of Adobe software package[DroidAR](https://bitstars.github.io/droidar/) – open source Android platform.Plugin for Windows, iOS and Android with no coding requirement for basic AR model prototype.[ARToolKit+](https://www.goodfirms.co/software/artoolkit) – open source [Unreal Plugin](https://ar.uplugins.com/)[Unity Plugin](https://www.artoolkitx.org/)[ARToolKitX](https://www.artoolkitx.org/) – open source[Vuforia Engine](https://www.goodfirms.co/software/vuforia-engine) – open source [Apple ARKit](https://developer.apple.com/augmented-reality/) – open source iOS and iPadOS[AR Creation Tools](https://developer.apple.com/augmented-reality/arkit/)(developer.apple.com) |  |

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| --- | --- | --- | --- | --- | --- | --- |
| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)**At the end of the lesson, students will be able to:** | Useful links/resources | How does this link to other units? |
|  |  |  |  |  | [OCR blog - teaching AR](https://www.ocr.org.uk/blog/teaching-augmented-reality-in-our-redeveloped-cambridge-national-in-it/)(ocr.org.uk) |  |
| 6 | TA 3: Creating an AR model prototype 3.4 Information output | You could:* Ask the students to research three AR apps and identify the types of information output used. Ask them to explain why they think that these forms of information output were appropriate.
* Give the students the list of information output and ask them for what purpose each type of information output would be used
* Provide students with a short scenario and ask them to identify the information output types they could use and provide a justification for their choices.
 | * Audio
* Charts/Graphs
* Hyperlinks/Weblinks
* Photographs/images
* Text
* Videos
 | * Understand how information can be output in different formats for an AR App.
* Create a trigger to cause correct information output
 | Any of the resources already indicated in the previous lessons could be used to emphasise how the different types of information output are used. |  |

**Second year of teaching**

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| --- |
| Autumn 1 |
| **Summary of what you will cover from the** [**curriculum planner**](https://ocr.org.uk/Images/619706-curriculum-planner.docx)**:** | TA2 - Designing an Augmented Reality (AR) model prototype (2.1 Planning and design considerations, 2.2 Design tools):(Recap)TA3 – Creating an Augmented Reality (AR) model prototype (3.1 Augmented Reality (AR) Model prototype, 3.2 Triggers, 3.3 Layers/User interaction, 3.4 Information output): (Recap)TA4 – Testing and reviewing (4.1 Testing, 4,2 Reviewing the process of creating the Augmented Reality (AR) model prototype): |

| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)At the end of the lesson, students will be able to: | Useful links/resources | How does this link to other units? |
| --- | --- | --- | --- | --- | --- | --- |
| 1 (Year 11) | TA 2.1: Planning and design considerationsTA 2.2 Design tools | This is a recap from the lessons covered in Year 10For homework, you could:Provide them with a short assignment brief and ask them to provide their planning and design considerations and use the design tools to design the AR app. | * User requirements
* Purpose
* Target audience
* Content
* Assets
* Charts and graphs
* Hyperlinks/weblinks
* Text
* Triggers
* Object recognition/marker-based
* Location (GPS) based/markerless
* Superimposition
* Layers/user interaction
* Action flow
* Static
* Interactive
* Components
* Flow charts
* Mind maps
* Mood boards
* Storyboards
* Visualisation diagrams
* Wireframes
 | Consider an assignment brief to:* Describe the purpose for an AR app
* Describe the user requirements of the AR
* Identify the target audience
* Identify the content required
* Use design tools to design an AR app for a specified purpose
 | HCI[Augmented reality](https://developer.apple.com/design/human-interface-guidelines/ios/system-capabilities/augmented-reality/)(developer.apple.com)[Design guidelines](https://labs.imaginea.com/augmented-reality-design-guidelines/)(labs.imaginea.com)[Ten tools for creating infographics and visualisations](https://moz.com/blog/10-tools-for-creating-infographics-visualizations) (moz.com)[Wireframe software](https://www.mockflow.com/) (mockflow.com)[Wireframe software](https://balsamiq.com/)(balsamiq.com) | R050 TA 2R050 TA 5R060 TA 4 |
| 2 | TA 2.1 – Planning and design considerationsTA 2.2 Design tools | You could:Get the students to continue with the planning and design considerations aspects (2.1/2.2) for the assignment brief. | **As above** | * Plan and design an AR app for a specified context
* Use design tools to plan the design of the AR app
 | [Flowchart software](https://www.lucidchart.com/pages/examples/flowchart_software)(lucidchart.com)[Ten best online flowchart software of 2021](https://thedigitalprojectmanager.com/flowchart-software/)(thedigitalprojectmanager.com)[Ten tools for creating infographics and visualisations](https://moz.com/blog/10-tools-for-creating-infographics-visualizations) (moz.com)[Wireframe software](https://www.mockflow.com/) (mockflow.com)[Wireframe software](https://balsamiq.com/)(balsamiq.com) | R050 TA 2R050 TA 5R060 TA 4 |
| 3 | TA 3 – Creating an Augmented Reality (AR) model prototype 3.1 AR model prototype, 3.2 Triggers, 3.3 Layers/user interaction | Recap over the lessons from Year 10.You could:Get the students to create the AR model prototype based on the assignment brief they worked on from the previous lesson(s) | * Single/multiple layers
* Access to layers
* Static
* Interactive
* Swipe
* Click/select
* Voice
* Information output
* Audio/video
* Charts/graphs
* Hyperlinks/weblinks
* Text
* Prototype
* Triggers
* Object recognition/marker based
* Location based/markerless
* Superimposition
 | * Create an AR model prototype based on planning and design considerations and design documentation for a specified context.
 | [Designing an augmented reality scene in Adobe Aero](https://youtu.be/fo8aG0vCY7k)(YouTube)[How to create an augmented reality app](https://youtu.be/MtiUx_szKbI)(YouTube)[Augmented reality](https://developer.apple.com/design/human-interface-guidelines/ios/system-capabilities/augmented-reality/)(developer.apple.com)[Augmented reality human interface guidelines](https://www.interaction-design.org/literature/topics/augmented-reality)(interaction-design.org)Prototyping design software from:[Balsamiq.com/](https://balsamiq.com/)[Justinmind.com/](https://www.justinmind.com/)[Figma.com/](https://www.figma.com/)[Invisionapp.com/](https://www.invisionapp.com/)AR Software Development Kits (SDKs) with some independent platform with no coding requirement:[Arloopa](https://arloopa.com/#ar_projects) – open source online[Overlyapp](https://overlyapp.com/) – free online educational solution and paid plan[Brio](https://www.goodfirms.co/software/brio) – cloud-based platform, free and paid plan[Adobe Aero](https://www.goodfirms.co/software/adobe-aero) – paid plan and part of Adobe software package[DroidAR](https://bitstars.github.io/droidar/) – open source Android platform.Plugin for Windows, iOS and Android with no coding requirement for basic AR model prototype.[ARToolKit+](https://www.goodfirms.co/software/artoolkit) – open source [Unreal Plugin](https://ar.uplugins.com/)[Unity Plugin](https://www.artoolkitx.org/)[ARToolKitX](https://www.artoolkitx.org/) – open source[Vuforia Engine](https://www.goodfirms.co/software/vuforia-engine) – open source[Apple ARKit](https://developer.apple.com/augmented-reality/) – open source iOS and iPadOS[AR creation Tools](https://developer.apple.com/augmented-reality/arkit/)(developer.apple.com)[OCR blog - teaching AR](https://www.ocr.org.uk/blog/teaching-augmented-reality-in-our-redeveloped-cambridge-national-in-it/)(ocr.org.uk) | R050/R060 (HCI) |
| 4 | TA 3 – Creating an AR model prototype 3.1 AR model prototype 3.2 Triggers3.3 Layers / user interaction) | You could:Get the students to continue to work on the AR model prototype based on their design planning and considerations. | * As above
 | * Create an AR model prototype based on planning and design considerations and design documentation for a specified context.
 | Prototyping design software from:[Balsamiq.com/](https://balsamiq.com/)[Justinmind.com/](https://www.justinmind.com/)[Figma.com/](https://www.figma.com/)[Invisionapp.com/](https://www.invisionapp.com/)AR Software Development Kits (SDKs) with some independent platform with no coding requirement:[Arloopa](https://arloopa.com/#ar_projects) – open source online[Overlyapp](https://overlyapp.com/) – free online educational solution and paid plan[Brio](https://www.goodfirms.co/software/brio) – cloud-based platform, free and paid plan[Adobe Aero](https://www.goodfirms.co/software/adobe-aero) – paid plan and part of Adobe software package[DroidAR](https://bitstars.github.io/droidar/) – open source Android platform.Plugin for Windows, iOS and Android with no coding requirement for basic AR model prototype.[ARToolKit+](https://www.goodfirms.co/software/artoolkit) – open source [Unreal Plugin](https://ar.uplugins.com/)[Unity Plugin](https://www.artoolkitx.org/)[ARToolKitX](https://www.artoolkitx.org/) – open source[Vuforia Engine](https://www.goodfirms.co/software/vuforia-engine) – open source[Apple ARKit](https://developer.apple.com/augmented-reality/) – open source iOS and iPadOS[AR creation Tools](https://developer.apple.com/augmented-reality/arkit/)(developer.apple.com)[OCR blog - teaching AR](https://www.ocr.org.uk/blog/teaching-augmented-reality-in-our-redeveloped-cambridge-national-in-it/)(ocr.org.uk) |  |
| 5 | TA 4: Testing and reviewing4.1 Testing | You could:* Have a group discussion to ask the students what they have previously learnt about testing when working on R060.
* Ask students to explain the difference between technical testing and user testing
* Get the students to prepare a test plan for technical testing and user testing for their AR model prototype
* Get the students to use their test plans to test their AR model prototype and record and analyse the results
 | * Technical testing
* User testing
* Test plan
* Test number
* Expected result
* Actual result
* Remedial action
 | * Understand the importance of testing
* Understand the difference between technical testing and user testing
* Select appropriate tests (technical and user) to test an AR model prototype
* Carry out technical and user testing for an AR model prototype
* Analyse the results from testing and resolve any problems including adjusting the design if required.
 | [BBC Bitesize A definition of data - Data, information and knowledge](https://www.bbc.co.uk/bitesize/guides/zkfbkqt/revision/1)(bbc.co.uk)[Data types](https://www.teach-ict.com/gcse_new/data_info_knowledge/data_types/miniweb/index.htm)(teach-ict.com)[BBC Bitesize Databases and data capture - Databases and data capture](https://www.bbc.co.uk/bitesize/guides/z8yg87h/revision/1)(bbc.co.uk)[Theory Types of computers](https://www.teach-ict.com/ks3/year7/data_handling/miniweb/pg7.htm)(teach-ict.com)[OCR J808 teacher delivery pack module 1](https://www.ocr.org.uk/Images/467124-teacher-delivery-pack-module-1.zip)(ocr.org.uk) \*\* This link refers to current specification but are relevant to the new specification. | R060/R050 (TA3) |
| 6 | TA 4: Testing and reviewing4.1 Testing | You could:* Have a group discussion to ask the students what they have previously learnt about testing when working on R060.
* Ask students to explain the difference between technical testing and user testing
* Get the students to prepare a test plan for technical testing and user testing for their AR model prototype
* Get the students to use their test plans to test their AR model prototype and record and analyse the results
 | * Technical testing
* User testing
* Test plan
* Test number
* Expected result
* Actual result
* Remedial action
 | * Understand the importance of testing
* Understand the difference between technical testing and user testing
* Select appropriate tests (technical and user) to test an AR model prototype
* Carry out technical and user testing for an AR model prototype
* Analyse the results from testing and resolve any problems including adjusting the design if required.
 | [User testing design process](https://maze.co/blog/formative-summative-testing-design-process/)(maze.co)[Technical testing](https://www.pentalog.com/information-systems/information-systems-testing.htm)(pentalogy.com) | R060/R050 (TA3) |
| 7 | TA 4: Testing and reviewing 4.2 Reviewing the process of creating the Augmented Reality (AR) model prototype | You could:* Explain why reviewing processes is important.
* Explain the key points are to thing about when reviewing the effectiveness of the processes followed
* Have a class discussion on the tools and techniques used when creating their AR model prototype and why they think these were effective.
* Ask students to make a list of the lessons they have learnt and how they would improve what they do when presented with another AR model prototype to plan, design and create.
* Ask students to document how their AR model prototype met the defined purpose.
 | * Effectiveness
* Processes
* Tools
* Techniques
* Defined purpose
* Lesson learnt
 | Review an AR model prototype that they have created and:* Understand the importance of using design documentation
* Analyse how effective their use of AR tools and techniques were during the process
* Identify lessons learnt and how to improve when working on future AR model prototypes
* Consider how the AR model prototype met the defined purpose
 | [Review strategy and effective reviews](https://www.mindtools.com/pages/article/newISS_05.htm)(mindtools.com) | R060/R050 (TA3) |

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| Autumn 2 |
| **Summary of what you will cover from the** [**curriculum planner**](https://ocr.org.uk/Images/619706-curriculum-planner.docx)**:** | R070: TA 2 – 4 working on OCR set assignment (NEA). **Note: during this time students will have up to 10 hours to work on the OCR set assignment for the NEA. This will need to be assessed and internally standardised in preparation for submission in Spring Term 1** |

| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)At the end of the lesson, students will be able to: | Useful links/resources | How does this link to other units? |
| --- | --- | --- | --- | --- | --- | --- |

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| Spring 1 |
| **Summary of what you will cover from the** [**curriculum planner**](https://ocr.org.uk/Images/619706-curriculum-planner.docx)**:** | **No further lessons for R070 for the students as the NEA should have been completed and submitted to OCR.** |

| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)At the end of the lesson, students will be able to: | Useful links/resources | How does this link to other units? |
| --- | --- | --- | --- | --- | --- | --- |

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| --- |
| Spring 2 |
| **Summary of what you will cover from the** [**curriculum planner**](https://ocr.org.uk/Images/619706-curriculum-planner.docx)**:** | **No further lessons for R070 for the students as the NEA should have been completed and submitted to OCR.**R050 – exam preparation  |

| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)At the end of the lesson, students will be able to: | Useful links/resources | How does this link to other units? |
| --- | --- | --- | --- | --- | --- | --- |

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| Summer 1 |
| **Summary of what you will cover from the** [**curriculum planner**](https://ocr.org.uk/Images/619706-curriculum-planner.docx)**:** | **No further lessons for R070 for the students as the NEA should have been completed and submitted to OCR.**R050 Exam  |

| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)At the end of the lesson, students will be able to: | Useful links/resources | How does this link to other units? |
| --- | --- | --- | --- | --- | --- | --- |

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| --- |
| Summer 2 |
| **Summary of what you will cover from the** [**curriculum planner**](https://ocr.org.uk/Images/619706-curriculum-planner.docx)**:** | **No further lessons for R070 for the students as the NEA should have been completed and submitted to OCR.**  |

| Lesson no. | Topic areas/sub topic areas  | Lesson ideas and activities | Lesson key words | Lesson outcome(s)At the end of the lesson, students will be able to: | Useful links/resources | How does this link to other units? |
| --- | --- | --- | --- | --- | --- | --- |

## Teaching over three years

**The main point is for students to understand the difference between augmented reality and virtual reality. Students (and adults) often get them mixed up.**

**It is important for students to get used to what augmented reality is and how it can be used.**

|  |  |  |  |
| --- | --- | --- | --- |
| Topic area | Warm up / introductory activities | Length of time activity may take | Useful resources |
| TA1 | Ask students to explain what they understand augmented reality is. | 15 minutes | [Augmented Reality (AR) vs. Virtual Reality (VR): What's the Difference?](https://in.pcmag.com/vr/109911/augmented-reality-ar-vs-virtual-reality-vr-whats-the-difference)(in.pcmac.com) |
| TA1 | Ask students to research how augmented reality is used in different sectors. Use sectors that they will understand e.g. education, healthcare and games design | One lesson | [Augmented reality in education](https://elearningindustry.com/augmented-reality-in-education-staggering-insight-into-future)(elearningindustry.com)[Augmented reality in education](https://www.youtube.com/watch?v=fI6VlHg25v8)(YouTube)[Augmented reality in healthcare](https://healthmanagement.org/c/healthmanagement/issuearticle/the-future-of-augmented-reality-in-healthcare)(healthmanagement.org)[Real life cases of how augmented reality is improving patient experience](https://www.youtube.com/watch?v=2KwoJINf0Ug)(YouTube)[Augmented reality in games design](https://whatis.techtarget.com/definition/augmented-reality-gaming-AR-gaming)(whatis.techtarget.com)[Augmented Reality Games](https://www.youtube.com/watch?v=GS5ZEdGujxY)(YouTube) |

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