**O3.2\_Framework of the lesson plan**

**Age group/class: 15 years old and above**

**Lesson title: Electron Microscope:** **Metal alloys, Disc brake structure.**

**School Discipline: Chemistry**

**Key concepts: Using an electron microscope to study metal alloys, disc brake structure and other materials**.

**Aims:**

* How an electron microscope is used to study different materials
* How imaging can speed up and improve development of different objects

**Skills developed**: observation, description, analysis

**Materials/Equipment needed**:

* VR headset
* VR video/link <https://eloquent-ramanujan-887aa5.netlify.app/optical-microscope.html>

**Lesson plan:**

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| --- | --- | --- |
| **Stages** | **Description of activity** | **Time** |
| **Preparation before the lesson** | This lesson focuses on different materials studied using an electron microscope.  If this is a first VR experience for students – go through the safety rules: -  Learners are to sit down whilst using the VR glasses and not hold anything in their hands, unless the experience is of such a nature that it requires you standing, in which case, ensure enough space is allowed around all students.  -  Learners will be told to expect a feeling of vertigo. If it gets worse, students must remove VR glasses.  -  Learners need to know how to adjust the viewing focus before using the headsets.  -  Learners must not use the headset when they are: tired, need sleep, under emotional stress or anxiety, when suffering from cold, flu, headaches, migraines as this can worsen their susceptibility to adverse reactions.  -  Learners should be given the choice to opt out of using VR. |  |
| **Introduction** | Share Learning Intentions with students.  Ask learners to think and write any questions they have regarding the learning objectives, as for example: *What is a microscope? What does it do?How can we use an electron microscope to study different materials? What are we looking for? Why are we studying these materials?* | 5 min. |
| **Initial Immersive Experience** | Learners put on the VR headsets and explore the video at their own pace.  Turn the headsets off and bring students back into the classroom. | 3 min. |
| **Guided Immersive Experience** | Learners begin to explore the VR material on microscopes and materials analyzed using an electron microscope.  Students put on the VR headsets and start the immersive experience focusing on finding more information on electron microscopes.    Allow time for this guided exploration or on and off for as long as it is needed for learners to familiarise with the tools. | 5 min. |
| **Follow up** | When the VR moment is over, learners gather in groups of 2 or 3and share their ideas.  Learners compare notes and discuss to complete their knowledge and understanding. The teacher facilitates the discussion and ensures there are no misunderstandings.  Learners use their research stations (laptops/tablets/phones) to add to the knowledge gained through the VR experience by completing their notes.  The task is:  - determine what materials can be studied with an electron microscope;  - how to gain knowledge about a material using a microscope.  - how microscopy improves products in industry | 5 min.  10 min. |
| **Formative Assessment** | Teacher shows materials regarding various tests for different materials using an electron miscroscope. | 5 min. |