



## Leonardo da Vinci, the Naturalistic Engineer

**Age group/class:** 15 – 16 years old

**Lesson title:** Leonardo da Vinci, the Naturalistic Engineer

**School Discipline:** Engineering

**Key concepts:** engineering and natural observation

**Aims:**

- Introduce Leonardo da Vinci's discoveries
- Demonstrate the link between engineering and natural observation

**Skills developed:** observation, analysis and research

**Materials/Equipment needed:**

- <https://www.youtube.com/watch?v=9xtuXJo364> (to be used in the introduction activity to provide some basic information about Leonardo da Vinci)
- <https://eloquent-ramanujan-887aa5.netlify.app/da-vinci.html> (to be used for the practical VR experience)
- VR headset
- VR video / link
- <https://www.youtube.com/watch?v=b7hylqLxvPQ&t=1039s>
- <https://www.youtube.com/watch?v=p6SoEX-NedA>
- <https://www.youtube.com/watch?v=YT5TZY-emYM> (to be used for the follow-up activity)

**Lesson plan:**

Stages	Description of activity	Time
<b>Preparation before the lesson</b>	<p>If this is a first VR experience for students – go through the safety rules:</p> <ul style="list-style-type: none"><li>– 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.</li><li>– Learners will be told to expect a feeling of vertigo. If it gets worse, students must remove VR glasses.</li><li>– Learners need to know how to adjust the viewing focus before using the headsets.</li><li>– 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.</li><li>– Learners should be given the choice to opt out of using VR.</li></ul>	





<b>Introduction</b>	<p>Share Learning Intentions with students</p> <p>The aims of the current lesson plan are the following:</p> <ul style="list-style-type: none"> <li>– Introduce Leonardo da Vinci’ discoveries</li> <li>– Demonstrate the link between engineering and natural observation</li> </ul> <p>We're pretty good at inventing things, but stealing from nature is a great way to solve some problems. A lot of scientific discoveries are the result of an attentive observation of nature. The current lesson plan represents the best opportunity to discuss about this topic.</p>	5 min.
<b>Initial Immersive Experience</b>	<p>“Let’s move to Florence and lets’ enter the Leonardo da Vinci museum”: <a href="https://eloquent-ramanujan-887aa5.netlify.app/da-vinci.html">https://eloquent-ramanujan-887aa5.netlify.app/da-vinci.html</a></p> <p>Learners put on the VR headsets and explore the video at their own pace for about 10 minutes.</p>	10 min.
<b>Guided Immersive Experience</b>	<p>After a free exploration of the VR resource, teacher asks students to focus on one of the discoveries analysed within the video: the flywheel mechanical drawing.</p> <p>A detailed description of this invention is provided by the teacher, also with the support of the following videos:</p> <ul style="list-style-type: none"> <li>– <a href="https://www.youtube.com/watch?v=b7hylqLxvPQ&amp;t=1039s">https://www.youtube.com/watch?v=b7hylqLxvPQ&amp;t=1039s</a> (from minute 20 to minute 25)</li> <li>– <a href="https://www.youtube.com/watch?v=p6SoEX-NedA">https://www.youtube.com/watch?v=p6SoEX-NedA</a></li> </ul>	20 min.
<b>Follow up</b>	<p>Work group</p> <p>In the drawing of the mechanical flywheel, Leonardo was inspired by his observation of nature. In particular, birds flying movements were crucial in defining the engineering principles behind the mechanical flywheel. Students are divided into 2 groups and are asked to list scientific and engineering discoveries resulting from an attentive observation of nature. An assessment of this activity is provided in the following video: <a href="https://www.youtube.com/watch?v=YT5TZY-emYM">https://www.youtube.com/watch?v=YT5TZY-emYM</a></p>	20 min.
<b>Formative Assessment</b>	<ul style="list-style-type: none"> <li>– “Which are the engineering principles behind Leonardo’ mechanical flywheel?”</li> <li>– “List 3 discoveries done by Leonardo da Vinci”</li> <li>– “List 3 engineering discoveries resulting from an attentive observation of nature”</li> </ul>	5 min.

