



# EMPATHY AS A MOTIVATION FOR SCIENTIFIC ADVANCEMENTS

Epistemology: Familiarising with the philosophical work of Edith Stein

<b>Learning Objectives</b>	This lesson plan aims to teach Empathy and the philosophical work of Edith Stein in STEM classrooms to explain the importance of empathy in scientific and technological advancements.
<b>Subjects</b>	Biology, Chemistry, Technology
<b>Recommended Age (10-12 or 12-14)</b>	12-14 years old
<b>Number of students involved</b>	This is a discussion-based lesson plan so it is suggested to limit the number of students to approx. 15-20 students in total.
<b>Duration</b>	90 minutes
<b>Skills Developed</b>	Empathy, problem-solving, cooperation, critical thinking
<b>Material Needed</b>	Projector, laptop, access to the internet, paper, colours, pens.
<b>Inclusion Best Practices</b>	n/a



## Instructions for implementing the lesson plan

This lesson plan offers an interdisciplinary approach to teaching science to young children. It aims to engage students in a science classroom with the philosophical work of Edith Stein. Students will discuss empathy and how it can influence scientific research, using the discovery of the structure of the DNA as a reference.

First, students will be introduced to the philosophical theory of empathy, and then they will be introduced to the scientific work of Rosalind Franklin, James Watson and Francis Crick.

Once they are introduced to the DNA structure, they will be separated into groups and discuss how empathy can serve as motivation for scientists, researchers, and academics to discover new scientific and technological advancements.

The lesson plan includes some videos and it requires a projector and/or laptops so students can watch the videos in their groups.

### Step 1: Introduction to the philosophical topic (25 minutes)

At this stage, you should give a short introduction to empathy and the philosophical work of Edith Stein. Some of the information you could share with your students is:

Edith Stein was a philosopher known primarily for her work on empathy. Stein also advocated for women's rights in education, employment and civic and political life ([Stanford Encyclopedia of Philosophy, 2020](#)).

Edith Stein was born in 1891 in a city called Breslau, then located in Germany. Today this region is known as Wroclaw and it is in Poland. Stein was born into an Orthodox Jewish family but later converted to Catholicism. Her philosophical work was greatly influenced by religion and she wrote many Spiritual papers (ibid.). As a philosopher, she was mainly concerned with **phenomenology** and **empathy**.

Phenomenology is the philosophy of experience. According to this philosophical theory, the ultimate source of meaning and value comes from the lived experience of human beings ([Armstrong, 2005](#)). In addition, Phenomenology offers an excellent framework for the Natural Sciences as it treats all processes and discoveries as a way of learning, and it uses inquiry and investigation as the major source of knowledge ([Internet Encyclopedia of Philosophy, n.d.](#)). As a theory, phenomenology has greatly contributed to our understanding of relativity, quantum mechanics and evolution (ibid.).

According to Stein, knowledge is the grasping of something new by an individual. This statement entails that a knowledge claim should not be based solely on personal experience, but rather on common experiences ([Ozoliņš, 2020](#)). In other terms, true knowledge is something that can be experienced and understood by a group of individuals and not only by one person (ibid.).



It is based upon this argument that Stein based her philosophical work on empathy. According to Stein, empathy is a feeling-based experience in which one person is able to understand and experience the feelings of another person ([Svenaesus, 2018](#)). She described two different levels of empathy. The first level is the basic form of empathy which shares common features. For example, if someone is crying it is possible they feel sad. So, the change in a person's voice, body language and other features might be enough to understand how they feel.

The second level of empathetic experience is more complex. This process involves a form of experiential re-enactment of the other person's experience. In this case, as Stein argues, we try to be alongside the other person, but not one with them (*ibid.*). This level of empathy involves understanding the reasons behind a person's emotions, understanding their position and familiarising with the situation, while at the same time remaining objective and able to make clear judgments about the situation ([Stanford Encyclopedia of Philosophy, 2020](#)).

For a better understanding of the philosophical work of Edith Stein and her arguments on empathy, students can read the Little Philosophers E-book 'Learning about Empathy – Epistemology: Edith Stein'.

Link to the e-book: <https://littlephilosophers.eu/r2-e-books-and-augmented-reality-books/>.

## Step 2: Learning about the discovery of the structure of the DNA (25 minutes)

Once your students become familiar with the notions of phenomenology and empathy, you can move on to the next part of this lesson plan and introduce the work of Franklin, Watson and Crick and how they discovered the structure of the DNA.

The discovery of the structure of the DNA in 1953 marked a milestone scientific achievement in human history and it created the foundations for further discoveries related to biology and the story of life ([King's College London, 2016](#)).

The discovery of the structure of the DNA is often attributed to Watson and Crick, two of the scientists who won the Nobel Prize for their discovery. There is however another scientist whose contribution remained hugely underplayed in the process of discovering the 'Double Helix', Rosalind Franklin ([TED-Ed, 2016](#)).

Franklin, obtained in 1952, the most famous x-ray image of DNA, known as 'Photograph 51' ([Sutton, 2023](#)). As she reported in her lab diary, the DNA was exposed to X-rays for 62 hours in order for 'Photograph 51' to be obtained (*ibid.*). In this image, the pattern of the spots formed by the DNA suggests a helical structure, which was figured out by Watson and Crick (*ibid.*).



The only problem was that Franklin was unaware that Watson and Crick had seen the image as it was given to them by Wilkins, Franklin's colleague. So, when in 1953 Watson and Crick announced their model of the 'Double Helix', Franklin's Photograph 51 appeared merely to confirm their model, whereas in fact, it played a crucial role in its construction (ibid.).

To introduce your students to the importance of Franklin's contribution to the discovery of the DNA structure, you can show them this video:

<https://youtu.be/BIP0lYrdirl>. The video is in English, but there is automated translation in different languages, embedded in the YouTube video.

For a short introduction to the structure of DNA, you can show them this video: <https://youtu.be/gz6ouKK6sLl>. The video is in English, but there is automated translation in different languages, embedded in the YouTube video.

At this stage, you should give some questions to your students to think about and discuss during the next part of this lesson plan, the group discussion.

- Is it important to learn more things about human life (and life in general)? Why?
- Is there a connection between empathy and scientific research?

### **Step 3: Students create their own DNA samples (25 minutes)**

To help your students understand the structure of DNA better, you can divide them into groups and ask each group to create their own models of DNA.

You can share some images showing the structure of the DNA, to help your students to create their own models. For this activity, your students will need colours, pens and some paper.

Give your students approximately 20 minutes for each group to complete their drawings. After this activity, you can leave all the drawings in a corner of the classroom so the students can spend some time over the break to observe the DNA models.

### **Step 4: An Interdisciplinary Discussion (15 minutes)**

At this stage, you should ask your students to consider how an interdisciplinary approach can enhance their understanding and approach to scientific inquiry. At this step of the lesson plans students can discuss the links between Phenomenology, Empathy and Science.

The discovery of the structure of the DNA, for example, is the result of years of scientific research from scientists who wanted to understand and learn about life. Inquiring and trying to find evidence to base their theories shows how the philosophy of phenomenology is useful in explaining the process of reaching new scientific discoveries.



Furthermore, empathy is a way for scientists to try to understand, and to a certain degree (whenever possible) relate to the needs they try to address ([Tangible Day, n.d.](#)).

Some questions that might be useful in guiding the students to discuss in their groups are:

- How did the discovery of the structure of the DNA contributed in science?
- Are you aware of other famous scientists and/or philosophers?
- Can you give an example of empathy from our daily life?
- Is there a connection between phenomenology and empathy?





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