Appendix 1. Sequence of activities of the TLS in relation to the phase of the modelling cycle and the core ideas addressed.

Phase of the modelling cycle	Core Ideas	Sequence of activities
1. Anchoring phenomenon	Idea 1,2,3	A1. The air pollution phenomenon is presented through a real news item entitled "Children exposed to air pollution in schools could have more risk of suffering overweight and obesity". The context of the project is presented and students are asked what they think about air pollution in general terms.
2. Asking for the explicit expression or use of their initial model		A2. Students are asked to draw and describe in written form the air from two hypothetical samples: one polluted and the other without pollution. They have to describe the samples as seen with the naked eye and how they imagine them inside.
3. Empirically testing the model	Idea 1	A3.1. In small groups, they are asked to compare the different explanations of clean air in order to test their ideas.
4. Generating new points of view 5. Facilitating the structure in a final consensus model		A3.2. The explanations of all small groups are shared and a final consensus model of clean air is structured.
1. Anchoring phenomenon	Idea 2	A4. To connect their ideas about clean air with polluted air, it is asked if they think that the air of their city is exactly as they explained in the previous activity.
2. Asking for the explicit expression or use of their initial model	Idea 2.1	A5.1. An experiment to reproduce the combustion of a vehicle is proposed. In small groups, students have to burn a piece of paper and observe what happens with the watch glass above the smoke. Prior to reproducing the experiment, they are asked to think about their hypothesis and their explanations.
3. Empirically testing the model		A5.2. The experiment is conducted and students have to observe what happened with the watch glass using a microscope. From the results observed, students are asked to reconstruct their ideas about what smoke is.
4. Generating new points of view		A6. A video of how scientists study air pollution in cities is shown and an analogy with the experiment conducted is made.
4. Generating new points of view	Idea 2.2	A7. From the explanations made in A2 and an extract from a scientific paper, air pollution caused by gases is discussed.
4. Generating new points of view	Idea 2.3	A8. Is CO_2 an air pollutant in cities? From the air quality indicators shown on TV news (O_3, NO_2 and PM10 are shown as air quality indicators), it is discussed whether or not CO_2 is an air pollutant.
5. Facilitating the structure in a final consensus model	Idea 2	A9. To explain a final consensus model about air pollution.
4. Generating new points of view 5. Facilitating the structure in a final consensus model	Idea 3.1	A10. From an extract of a public understanding of science paper which explains the impact of PM on human health, we focus on what PM air pollution is like. In order to reflect on the scale and size of PM, students are asked to order some images according to the size of what is represented. These images include a grain of salt, a virus, the principal molecules which compose air, PM1 and PM10. A11. After reflecting on the size of PMs, they are asked how it is possible that PMs are suspended in the air. A video of movement of solid particles that include increasing and decreasing magnifications is seen. Finally, with the guidance of the teacher, ideas related to PM are summarised.

2. Asking for the explicit expression or use of their initial model	Idea 3.2	A12. Related to activity A10, they are asked what they think the effects of air pollution on human health are.
3. Empirically testing the model		A13. Students are asked to classify the effects of air pollution expressed in the different human systems and the mechanism that they think causes the illness.
4. Generating new points of view 5. Facilitating the structure in a final consensus model		A14. After watching a video and reading part of a paper about the effects of air pollution on human health, students have to rewrite the previous activity with the new ideas.
5. Facilitating the structure in a final consensus model	Idea 1,2,3	A15. Students are asked to draw and describe in written form the air from two hypothetical samples: one polluted and the other without pollution. They have to describe the samples as seen with the naked eye and how they imagine them inside. Finally, students are asked to reflect on how their explanations have changed from activity A2.