

## PEC methodology as educational strategy for students

When students start their first formal though elementary course on coding, they have some ideas about the topic, which are influenced by the media and by what the students heard from other people. Therefore, it is unavoidable that they have pre-conceptions and conceptual mistakes. Many education specialists and neurologists think that a good strategy for extracting and correcting misconceptions is the so-called PEC methodology, where PEC is the acronym for Prevision, Experience, Correction (or Comparison).

These three letters stand for three different phases of a didactical activity: Prevision means that the students predict what can happen given data or situation, asking for questions or predictions. Experience means that they practice in the lab and have their scientific experience. Correction (comparison) is the last phase when the students compare their previous predictions or thoughts with what the actual result from their experience.

To start you can prepare a form with questions like these

- Do you know how a thermostat controls the temperature in a room?
- What do you do when you feel too warm?
- What do you do when you feel cold?
- What or who did tell you to do what you decided to do?
- What is a sound warning based parking system for? How does the driver react when the sound is emitted by the system? When the car emits a sound warning?
- Do you have an induction hob in your kitchen? What does a lightened LED mean?
- What is a sensor?
- What is an actuator?
- How can you tell that an object's temperature is very high? What does happen if you touch it? What is your reaction? How do you think your body's system would issue a warning to your brain, so that you can move your finger away from the object?
- How can your eyes measure light intensity? Can you feel a change in light intensity?
- How do you react to high-level light intensity?
- How do you react to poor light intensity?
- Why do you turn on the light at night? What does warn you that you need more light?
- How do automatic lighting systems work when ambient light decreases? How do they work when the light level increases?

You had better tell the students that the answers would not be evaluated. The questions aim to reveal possible naïve ideas and misconceptions, so the more spontaneous and genuine the answers the better.

Your students' answers to these questions (**P** phase) can help you find out naïve misconceptions about the world of microcontrollers and sensors, and to correct any mistakes and misunderstandings at the very beginning of your activities, while trying the first design of your  $\mu$ C-based device (**E** phase).

At the end of the activity, if you submit again the questions, they will get the chance to make corrections to their previous ideas. (**C** phase)

For this reason, the questions are generally known as IN-OUT Test. The teacher can measure the difference between the answers given the first time and the second time the questions were submitted, getting a rough idea on how effective the activity was.