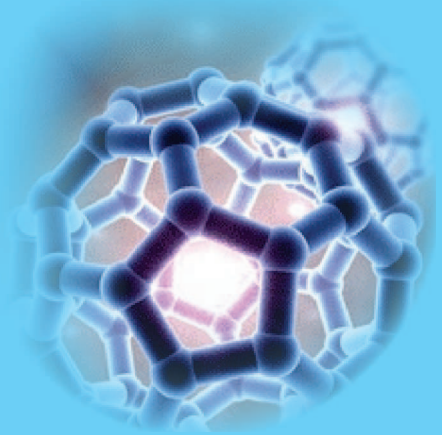
3

Training as researchers to qualify for Innovation



3.1. WE WORK THE REVERSE ENGINEERING

Have you ever heard about the term "*Reverse Engineering*"? It seems a complex term but it actually has a very simple meaning. You have certainly applied reverse engineering sometime in your life when you have disassembled a toy or when you saw as an appliance was being disassembled to fix it. Reverse Engineering is a process used when you want to know the parts of a technical object or a computer program and that are coupled and together integrated.

In some cases, the object disassembly procedure is done without knowing how it operates. Thus, by observing each piece separately and their function within the set how the device works could be achieved to be understood. In the case of software, technicians, who apply Reverse Engineering to a software application, review the program, how it is encoded in low-level language, for instance, language used internally the machine, and encoding it in the high-level language that was originally written.

Today, information technology has evolved to the point you can scan the components of a technical object and treat them separately using CAD tools (Computer Aided Design). In this section, you must choose an object to be disassembled. It may be a little old appliance to be disposed at home, a toy that moves or makes sounds or lights, an old computer, or other similar object.

You must know that often, some companies make Reverse Engineering in order to copy a competence company's creation. The simple fact of doing it cannot be considered as a fault, but surely the object could be protected by patent's laws. In this case, if reverse engineering is done to copy and manufacture it as yours, you will be breaking law.

Now, choose an object you want to disassemble and take a picture. You can paste the picture in your company notebook or upload it to your digital company area. Once this is done, use the necessary tools (screwdrivers, wrenches, etc.) to make the dismantling in an organized way. Use the following table or your own company spreadsheet to organize the identification of each of the pieces. Note that many parts are standard, and can be purchased at any hardware or department store. However others have been manufactured specifically for a particular purpose, such as the case of racks, external parts, etc. In this case, you will need to draw each. You can use the templates that have technical drawings provided in this section or if digital drawing looks more interesting, use Inkscape to make the drawings and save views, perspectives and detail parts.

The object we have decided to apply Reverse Engineering to is:

The object picture

Paste here the picture of the object or upload the image file to the digital platform.

The main components block scheme

Use a software application to show a presentation with *Impress*, *PowerPoint* or similar to make a block diagram of the object. Print the scheme and paste it in this area, or upload the file to the platform.

	FECHA	NOMBRE	FIRMA	I.E.S. _____
Dibujado por:				
Comprobado por:				
Escala:	Título			Versión

	FECHA	NOMBRE	FIRMA	I.E.S. _____
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Description of components blocks

To describe each of the blocks you have represented in the scheme, you can use the following template. However, it would be easier to develop your own template in a spreadsheet using LibreOffice Calc or Microsoft Excel in order to explain each of the functions. In this case, you can copy each column headers.

Item number	Description	Reference to drawing (if available)	Assemble with item number …
1			
2			
3			
4			
5			
6			
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16			

3.2. A NEW PERSPECTIVE FOR RESEARCHING: THE REMOTE LAB

Perhaps the concept of Remote Lab is not familiar to you. When researching, the lab is the suitable place to carry out experiments, check hypothesis and contrast results. In a remote lab the same type of activities can be made with the difference you are located in a different place than the one in which the experiment is being carried out. To be able to interact with the experiment environ, a software interface is available and accessible by a web browser. In such an interface, you may interact with some software tools that control the parameters of the experiment, a web camera to be able to see the experiment live and a board where you can annotate the obtained results.

The Remote Lab Workshop is now available for you to be studied in order to be able to better understand about this kind of researching experience.

Previous test

Answer the following questions as a previous step to Access the experiment, indicating in each square the number of answers from the members of the enterprise:

A. Have you ever used a remote lab at home or in the classroom?

Answer	Members
0. No, this is the first time I Heard about this	
1: No, but I know what it is	
2: I haven't been able to use it, but I've seen someone	
3: Yes and I have seen how it was being used	
4: Yes, I have used someone at home	
5: Yes, I have used someone in the classroom	

B. Do you think that using a remote lab in the classroom would be useful?

Answer	Members
0: No, no way.	
1: No, I prefer traditional classes with book or annotations.	
2: Yes, but if it wasn't part of the exam	
3: Yes, I think it would be useful	
4: Yes, it would help me to understand some theoretical contents	
5: Yes, I would like to use it as much as possible in my classes	

Access to experiment

After passing the workshop, you probably have a better knowledge about what it's about. In the following space, describe what the experiment you'll make is about and indicate some working hypothesis.

Make a documentary of the experiment environ

Make four pictures or snapshots from the web interface when accessing to the different areas of the remote lab. Paste them in the notebook or upload them to InnoEscuela digital platform. Together with the picture areas, some text boxes are available to describe the stage of the experiment in the remote lab in order to write how it's evolving.

Picture	Description of the experiment
Picture of the initial stage	
Picture 2	
Picture 3	
Picture of the experiment end	

Final test

Indicate the number of members that prefer each answer, wiritting it inthe right column, once you have finished the experience with the remote lab.

A. Do you think the web interface is easy to access to the lab?

Answer	Members
0: No, it's very complex and I asked for help to teacher permanently	
1: It could be easier, I have asked for help to the teacher some time	
2: The first time the teacher helped me but then I was by my own	
3: Yes, Little by Little I have learnt to use the lab in a easy way	
4: Yes, once you've learnt, the use looks automatic	
5: Yes, I have started to use labs easy and quickly	

Do you think the use of the remote lab has been useful?

Answer	Members
0: I hasn't been useful, I was not interested to use them	
1: I used them to check how it was working some minutes	
2: I have used them just in the classroom a couple of times because it looks interesting	
3: Yes, it was useful, I have used labs to understand the theoretical aspects of the subject	
4: Yes, and it has been useful and I liked it a lot to carry out the experiment and I want to know a bit more about it and how it works	
5: Yes, and even I would like to use them at home as well	

What conclusions have you got from the experiment?

Describe, in the text area or upload the text to your space in the platform, the conclusions you have got once you've done the experiment. Explain how similar are the results obtained in the lab with what you were expecting by your hypothesis previously described?

What ideas do you propose for researching by means of a remote lab?