Scenario 1: ***Basic approach*** (Confirmation Inquiry)

In the basic approach, the teacher provides students with the question, shows the use of the remote/virtual lab, illustrates the procedure and the method, but the results and their explanation are known in advance. Confirmation Inquiry is useful when the teacher purpose is to reinforce a previously introduced idea, introduce students to the experience of conducting investigations, or have students practice a specific inquiry skill, such as the collecting and recording of data.

In this case the microMOOC topic will be previously introduced by the teacher and explained in depth; the novelty will be represented by its contextualization in real-life environments (Engage). The virtual or remote laboratories will be exploited by the teacher (Exploration). All other phases (Explanations, Extention, Evaluation) are faced and discussed by the teacher in the microMOOC. After the microMOOC vision, the students have the possibility to explore the remote/virtual experiments in class (in small groups working with tablets connected to the internet), or at home. They will be invited to write a scientific report on the experience done and on acquired concepts.

Main student outcomes: Practical applications of the theory.

Recipe for the microMOOC realization (with an example):

STEM Laboratory: Faraday's Electromagnetic Lab -https://phet.colorado.edu/en/simulation/legacy/faraday - virtual laboratory, needs upload java applet on personal device

STEP 1: *Engagement* –

Teacher: introduces the microMOOC learning environment about a topic (Electromagnetic induction) already studied by students, contextualizing it in real-life interesting environments (Dynamo, alternators in power plants, eddy current brakes, electrical transformers, electric guitar, recording and reproduction of magnetic sound, etc).

Student assignment: stimulated and encouraged by the teacher, students make connections among their past knowledge and present inquiry, ask their own questions about the topic (electromagnetic induction in real life)

STEP 2: *Exploration* –

Teacher: provides materials, explains the involved phenomena, shows the use of the lab (Faraday's Electromagnetic Lab: https://phet.colorado.edu/en/simulation/legacy/faraday), illustrating the procedure and the method for the lab exploration, conduces the investigations, for example only exploiting “Bar magnet” and “Pickup coil”.

Student assignment: learn from the teacher how to search for information, raise questions, develop hypotheses to test, acquire and collect data (For example, how the effect depends on the polarity, on the velocity of the bar magnet, on the loop area, etc) .

STEP 3: *Explanation* –

Teacher: shows how to acquire information from the data recorded during the experimental phase by using all available resources in the labs (Flip polarity, see inside magnet, show field meter, number of loops, etc).

Student assignment: encouraged by the teacher, the students (individual groups or entire class) build models, verify hypotheses, discuss the findings, design new experiments, communicate which concepts they have reinforced by means of this learning experience.

STEP 4: *Extension* –

Teacher: together with the students (collaborative work) explores the remote/virtual experiments in class (for example working with tablets connected to the internet), showing how to search different variables or changing the experiments (for example by exploiting “Electromagnet”, “Transformer”, “Generator”); gives directions to the students about how to write a report explaining the results.

Student assignment: repeat the experiments with dc and ac fields. Under the guidance of the teacher apply their knowledge to the world around them in new ways, building possible generalizations. Create a scientific report (individual or for groups) about the work done and the reinforced concepts.

STEP 5: *Evaluation* –

Teacher: determines how much learning and understanding has taken place at the end of the learning experience by means of exercises, evaluation tests etc.

Student assignment: peer review of the reports.

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