LEARNING SCENARIO: Nurturing Curiosity with Inquiry-Based Learning

Educational level: Secondary | **Age:** 12-15
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Design FILS

LEARNING OBJECTIVES/ ASPIRATIONS

The present scenario introduces the inquiry-based learning approach to teach students to question, discover facts, and interest in the world around them. The main objective of inquiry-based learning is to emphasize the student's role in the learning process as students are encouraged to explore the material, ask questions and share ideas. Instead of memorizing facts and material, students learn by doing. This allows them to build knowledge through exploration, experience, and discussion.

NARRATIVE OVERVIEW

Inquiry-based learning is an active pedagogy which uses different approaches to learning, including small-group discussion and guided learning. It can be defined as a process of discovering new causal relations, with the learner formulating hypotheses and testing them by conducting experiments and making observations, involving problem solving skills.

It is organized around an inquiry cycle with five basic steps that represent the outline of a simple scenario:

1. Orientation. Relevant variables are identified and the problem to be investigated is defined. Curiosity is aroused about the topic to be investigated.

2. Conceptualization. Students develop a problem statement that compels them to pose their question and find hypotheses to be tested.

3. Research. The process of data collection and analysis is planned and executed in order to provide solutions to the questions posed.

4. Conclusions. Conclusions are drawn from the information obtained and the results of the analysis are compared with the hypothesis initially proposed.

5. Discussion. Students reflect on what has worked in the process and what has not and propose new problems for another inquiry cycle. Finally, students present their findings and conclusions and receive feedback.

In any case it is necessary to point out that inquiry-based learning is not a prescribed, uniform linear process, but a flexible one. Connections between the phases may vary depending on the context.

As ideas play such an important role throughout the inquiry process, students see the need to express them in a variety of ways. In this way, inquiry-based learning is used to develop skills, such as reading and writing, in ways that blur the conventional boundaries between discrete subject areas and supports an integrative and creative thinking about curriculum.

Inquiry-based learning is fundamental for the development of higher order thinking skills, such as analyze, synthesize, and evaluate information or new understandings. These higher order thinking skills that students develop during inquiry activities will assist in the critical thinking skills that they will be able to transfer to other subjects. Also, at a social level, students feel members of a responsive learning community where all of them collaborate and take ownership of their learning.

APPROACH TO TEACHING AND LEARNING

Start with an **engaging topic** that goes beyond the classroom.

Choose **concrete questions** that trigger student interest and highlight the richness of the topic.

Support students in the development and use of **scientific skills.**

Promote **discussions.**

Guide the recording of students' work in a **digital logbook.**

ASSESSMENT: Assessment should be present throughout the process and should focus on both "knowing" and "knowing how to do" achievements.

Ongoing assessment is integrated as part of the design of the enquiry by providing descriptive and timely feedback. Assessment uses a range of methods, including peer assessment, co-assessment, self-assessment, and hetero-assessment that helps to evaluate the products produced by students such us a mind map, the presentation of the research, a logbook... as well as the organization of the group, the achievement of the tasks within the group. It is appropriate to use rubrics to assess the enquiry product, as well as the knowledge gained.

ROLES

TEACHERS: Teachers act as guides of the learners through the process. They generate a cognitive conflict in the students through questions that allow them to carry out a process of analysis of their actions, which builds their knowledge and develops their skills. They expose students to new ideas and issues that are in the world and connect these to students' interests.

LEARNERS: Be more self-directed, learn to think creatively and be open-minded. Take risks and be ready to find new ways. Support peers.

Nurturing Curiosity with Inquiry-Based Learning

LEARNING ENVIRONMENT

1. Orientation: Teachers can start by translating the expected learning into concrete questions, to arouse curiosity about the topic. This first phase is about interacting between the teacher and students.

2. Conceptualization: In this space students, divided into groups, can exchange by analyzing, synthesizing and relating the information provided with the help of the teacher. Teachers must also be sure that the students have understood, and, for this purpose, it is best to ask a student to summarize what they are going to do, as they interact.

3. Research: Now students investigate. They are encouraged to work autonomously or in groups using different technological tools. In this area the furniture would allow a distribution of the students to work in pairs or in groups.

4. Conclusions: The students reflect on the results obtained trying to explain them and communicate their conclusions. Students exchange their views, and outcomes. The teacher interacts with students by asking questions that trigger reflection.

5. Discussion: In this final phase, students present and communicate their findings and conclusions and receive feedback and comments from others.

POSSIBLE CHALLENGES

A common concern among educators is how to teach with an inquiry approach when there are so many curriculum expectations to address.However, by focusing on the "big ideas" rather than on the specific expectations alone, students' questions often lead to overall curriculum expectations.

RESOURCES

Orientation Phase: Mindmeister, Youtube/Vimeo, Padlet, Socrative

Conceptualization Phase: Wikipedia, Google Scholar, Scientific papers and other sources of information

Research Phase: Remote Labs, Phet Colorado and other simulators, QR Codes, Pearltrees

Conclusions: Prezi, Canva, Glogster, PowToon, Mobile devices

Discussion: Flipgrid, Google Jamboard, Collaborative documents, Digital tools for **presentations**

All Phases: Computer equipment, WiFi, Mobile devices, LMS Moodle

LEARNING SCENARIO VIDEO

https://www.youtube.com/watch?v=mxFYCTSTxkM

LEARNING ACTIVITIES

1. Orientation: As a first step, to give instructions on the different concepts to be worked in this learning scenario, it's interesting to transform the learning objectives into questions: What means of transport would you devise to make your city more friendly?

To encourage reflection, it is suggested to watch a video where different questions are posed in different moments to be answered throughout the development of the scenario.

2.Conceptualization: Students are encouraged to participate as a group in the elaboration of a collaborative document, where different aspects to be taken into account in the design of the means of transport are collected (public safety, design, technology, pollution, economy...).

3. Research: Students are required to carry out an individual research project in which they will consult different sources of information to analyze the current means of transportation.

Then, students, divided into groups, elaborate a first draft of the ideal transport system, including design, technology, safety and efficiency, through brainstorming and using an online tool.

4. Conclusions: A debate is organized to enable the group to analyze the information and reach a consensus on the chosen option. A mind map can be made where a relation of ideas and acquired learnings are represented in a visual way by means of drawings, codes, symbols or signs. It will be a collaborative work among the members of the group.

During the whole process the working group will collaboratively elaborate a logbook where the learning process will be documented.

In order to make the final conclusions known to the whole group, different tools can be used, such as creating a cartoon in which a visual story is constructed through drawings or vignettes, containing short texts. They also can create a prototype and present it to the rest of the group.

LITERATURE TO SUPPORT

Environmental inquiry. A resource for teachers:
- Definition and guide
- Phases of inquiry
- Learning activities
- Interactive video