The Learning Cycle

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Why Use the Learning Cycle?

- **Students learn through concrete experiences**
- **All students are given common experience from which concepts are developed.**
- **Students develop thinking skills**
- **Students generalize their learning to new situations**
- **Students share responsibility for learning**

There are several variations of the Learning Cycle, but most use a three-phase approach to teaching the lesson objectives. The purpose of the Learning Cycle is to develop learning situations that provide students with concrete experiences prior to the introduction of vocabulary or concepts. After students have been guided to construct the intended concepts, they apply their new knowledge in new situations. This allows them to generalize their learning and reinforces the newly developed mental structures.

A detailed explanation of each phase as well as a lesson plan based on the Learning Cycle follows.

Exploration Phase

In the Exploration Phase students are presented with a problem that requires them to use process skills to gather and organize data. During this motivational phase students are encouraged to manipulate materials and explore ideas without specific outcomes designated by the teacher. The teacher closely monitors group activities and guides students through the use of open-ended questions addressed to individuals and groups. The exploration phase provides common experiences from which all students can draw during the more directed phases that follow.

The Teacher's Role

During this phase the teacher sets up experiences that will motivate the learners. She facilitates interaction between the learner and the lesson materials. She facilitates by questioning, clarifying procedures, and monitoring interactions. Questioning should be done using the open-ended format so that students are provided the opportunity to explore the concept and come up with their own answers.

The Students' Role

The students pursue activity questions utilizing process skills to gather and organize data. Students compare their answers with those of others.

The Classroom Arrangement
Usually exploration activities are best conducted by students in small groups (using cooperative learning). Motivational open-ended questions to the large group may precede small group activities.

Exploration Phase	
The Teacher:	**The Students:**
• Motivates the learners	• Develop interest
• Facilitates with open-ended	• Develop common experiences questions
• Clarifies procedures	• Gather and organize data
• Monitors behavior	• Begin to explain concepts in their own words

Concept Development Phase

The Concept Development Phase of the cycle focuses on patterns that students find in the data they have collected and in the observations they have made. Students are guided to create explanations, classifications, or hypotheses. Based on the experiences of the students during the Exploration stage, teachers provide appropriate terminology and vocabulary as they give information and guide whole class discussions. Although teachers traditionally use "mini-lectures" in explaining concepts, materials such as textbooks, supplemental readings, audio-visual aids, and other resources can be use to clarify ideas.

Students are more likely to listen to and retain concepts presented in the Concept Development Phase because it follows the Exploration Phase where they have discovered its relevance. Students can communicate more easily with one another and with the teacher during the Concept Development Phase because of their shared experiences in the Exploration Phase.

The Teacher's Role

During this phase the teacher provides direct instruction for clarifying ideas and concepts to explain student experiences. She helps the students develop appropriate vocabulary and poses questions to clarify understanding.

The Students' Role

The students describe and compare their observations from data collected in the Exploration Phase. They begin to look for patterns that emerge. They present and share interpretations while drawing conclusions. They construct scientific concepts based on their experiences and the new information provided through lecture, discussion, reading, or other methods. They should begin using appropriate terminology and vocabulary related to the scientific principles involved.

The Classroom Arrangement

Whole class instruction can be used to introduce vocabulary, clarify concepts, and provide explanations. Instruction can vary from "mini-lecture" to videos, textbooks, or other instructional materials.

Concept Development Phase	
The Teacher:	**The Students:**
• Provides information	• Look for emerging patterns in collected data
• Develops the concepts	• Share interpretations of experiences with other students
• Clarifies the explanations	• Construct scientific concepts
• Directs whole group discussions	• Begin to use appropriate terminology

Concept Application Phase

The Concept Application Phase extends the discoveries made by the students in the Exploration Phase and the knowledge obtained in the Concept Development Phase by requiring students to explore in more depth through additional experimentation and/or discussion. They are encouraged to apply the concepts they have learned to "real world" situations. This phase serves as a connection between broad scientific constructs and students' daily lives. The Concept Application Phase can also introduce a new, related topic that can become the Exploration Phase of the next lesson.

The Teacher's Role

During this phase the teacher poses new situations or problems that can be solved using concepts developed during the previous phases. She provides indirect instruction by posing divergent questions. The teacher acts as observer and facilitator rather than as "imparter of knowledge." She monitors students closely as they are actively engaged in the learning process.

The Students' Role

Students interact with one another as they compare ideas and explanations. They are involved in active learning as they use their newly acquired skills and understandings to construct deeper meanings and broader applications of their discoveries. They apply their new knowledge to new, preferably "real life," situations.

The Classroom Arrangement

Cooperative learning in small groups enables students to share ideas and remain actively engaged in the learning process. Close teacher monitoring is essential to ensure student participation and understanding.

Concept Application	
The Teacher:	**The Students:**
• Poses new situations and divergent questions for newly learned concepts	• Apply newly learned concepts to new situations
• Closely observes and monitors student interactions	• Become involved in deeper meanings and extended implications of concepts

Discussion

Our observations have shown that using the Learning Cycle's "discovery approach" is a very effective way to teach. It provides preliminary concrete experiences that give all learners a more even starting point from which to construct the science concepts. Vocabulary and concepts are linked to common prior experience. Students are encouraged to become active rather than passive learners.

It should be noted that the model is cyclical. At any point students can move from one phase to another. Often they will move from one phase to another several times during the lesson. Exploration will lead to concept development that will require concept application which may lead to another exploration, and so on.

At all times during the learning cycle evaluation and discussion are integral parts of the process. Evaluation by the teacher as well as by the students is ongoing.

The Learning Cycle can be incorporated into most teaching situations with very little modification of classroom arrangement. It does not require extensive changes in traditional teaching materials. It primarily involves a re-ordering of the traditional elements of a lesson. Teachers become facilitators of learning rather than "tellers of facts." Students are encouraged to find their own answers within their own experiences so that the knowledge they acquire becomes meaningful to their lives. Students think about what they are learning and learn about how to think.

Teachers of all grade levels and all subjects can use the Learning Cycle to provide meaningful, positive learning experiences for their students.

Learning Cycle Check-List

Use the following check-list to evaluate lessons to determine whether they use the Learning Cycle format.

Exploration Phase	YES	NO
1. The lesson contains a motivational activity that provides common experiences.	___	___
2. Students are given sufficient time to use materials and explore open-ended questions.	___	___
3. Students are asked to collect and organize data.	___	___
Concept Development Phase		
1. The concepts and vocabulary developed are appropriate outgrowths of the exploration activity.	___	___
2. Explanations are based on emerging patterns observed in the exploration phase.	___	___
Concept Application Phase		
1. Students are required to apply newly learned concepts to "real life" situations.	___	___
2. Students interact with one another and compare ideas and explanations.	___	___