

# An Ice Experience

By Rick Shope



Ice CGI by Project Universe

Ice, frozen water, once considered a rarity, unique to Earth, but now known to travel throughout the solar system, found on comets, on moons, and on planets --even on the planet nearest the Sun: Mercury!

Exploring ice in the solar system begins with an experience of this deceptively commonplace mystery--perhaps an ice cube out of the freezer, or a block of ice from the local ice company, or icy crystals falling as winter snow, or the icy sheen after an ice storm, or perhaps a mountainous glacier, or an Arctic archipelago, or the Antarctic continental shelf.

Consider an ice experience from your life.... *Vivencia* is a wonderful Spanish word used by poets to describe a vividly remembered experience in which the details are as fresh and as tangible as the living moments from which the memories arose. Can you recall an ice *vivencia*? Perhaps the sheer beauty of ice or the utter strangeness or the refreshing coldness or the blocky hardness or the sudden slipperiness or...the icy iciness has frozen a memory of a moment in your life when the nature of ice awakened a *eureka discovery experience* that you can describe in detail to this very day.

Take a moment with pen or pencil and paper right now. Write and storyboard an ice experience, a *vivencia* from your life. Take the time to bring it so clearly into your mind that it becomes tangible, as present as the four-dimensional sensory experience that it was, moving through spacetime, recording it now in your science notebook as a reflective expression of a prior experience that you are willing to share.... *Ready! ... Set! ... Write!...*

Now, by taking the time to observe and record your own ice experience, you have taken the first step to enter a community of science learners. Your writing, your storyboard and your soon-to-be-shared presentation might also enter the world of literature, art, and the performing arts as well. Our focus is draw out the science learning from these experiences and to create new knowledge about ice today.

Find a group of colleagues nearby. Form a literary science circle where each one of you will read, tell, show, or otherwise share your *vivencia* with your colleagues. After you have all shared, decide together which of the *vivencias* would be most meaningful for everyone to hear in an audience of the whole. At that point, we will all focus together on a few of the recommended sharings.

We will discuss the nature of the shared meanings and tease out the emerging science questions that will lead us toward a *eureka discovery experience* together.

Continuing to work with the same group of colleagues, we will explore the ice that we have available to us today. We will create new *vivencias*, by observing our thoughts and perceptions as we explore the phenomenon of ice in the solar system, and begin a process of purposeful conceptual change, as we move from our current understanding toward a deeper, more connected understanding about ice in the solar system...*and beyond!*

# Evolvable ED<sup>3</sup>U Teaching for Conceptual Change Cycle

Explore + Diagnose + Design + Discuss + Use

**LEARNING OBJECTIVE:** What is the nature of the knowledge domain we are about to explore?

## EXPLORE

a natural phenomenon

## DIAGNOSE

precursor understandings

prior experience

existing conceptions

## DESIGN

ways to explain,  
model, test  
hypotheses

## DISCUSS

shared  
meanings,  
construct new  
knowledge

**CONCEPTUAL CHANGE FOCUS:**  
What is the desired conceptual understanding?

**Conceptual  
Change Focus**

## USE

the new knowledge,  
draw implications,  
make connections

## LEARNING ASSESSMENT:

What is the meaning of these science results?

What new questions emerge?

Toward what new research directions are we drawn?

# An Ice Experience

Explore + Diagnose + Design + Discuss + Use

**LEARNING OBJECTIVE:** What science questions emerge from our shared prior experiences of ice?

## EXPLORE

Personal Ice Experiences

## DIAGNOSE

Share Ice Experiences,  
Observe Emergent Concepts

## DESIGN

Write, Draw,  
Storyboard Ice  
Vivencias

## DISCUSS

Ice Experiences  
in groups, then  
as a whole

**CONCEPTUAL  
CHANGE FOCUS:**  
Science investigation  
can emerge from life  
experiences

# Ice is an experience

## USE

Share meaningful  
ice experiences, Cull  
science questions

**LEARNING ASSESSMENT: Success Criteria**

1. Each participant recalls a vivencia and records it in writing, drawing, and/or storyboard form.
2. Each participant shares experience by reading, telling, and/or acting out vivencia.
3. Each participant derives science research questions about ice that lead into a desire for more investigation of ice.