

The Tao of Climate Journals

The world we have made as a result of the level of thinking we have done thus far creates problems that we cannot solve at the same level of thinking(of consciousness) at which we have created them...We shall require a substantially new manner of thinking if humankind is to survive.- Albert Einstein

We are at the begging of a change of worldview as radical as the Copernican Revolution - a shift from a mechanistic to a holistic and ecological view, from a value system based on domination to one based on partnership. - Fritjof Capra

One of the most highly developed skills in contemporary Western Civilization is dissection: the split-up of problems into their smallest possible components. We are good at it, So good, we often forget to put the pieces back together again... Alvin Toffler

Science journaling is a wonderful way to practice fine motor skills, schedule time for observations, link all disciplines, collect data, view nature, and watch climate change. Many articles and guides have been written on nature journaling and the thoughts of many a famous “observer” have been recorded in nature journals. Many western-style journals concentrate on sketching and painting intriguing parts of nature as follows from modern western thinkers such as de Vinci and de Carte but these “journals” often used reductionist theory and lost sight of the forest through the trees. The Tao of Climate Journals hopes to highlight the ability of journaling to emphasis seeing the forest because of the trees, collecting thoughts on how the whole is greater than the sum of its parts, and especially using journals to collect data for promoting long and short-term climate studies. It follows a bit of the understandings of the Ghia Principle that the Earth is a multi-faceted system that functions as a result of its parts and no component can spin independently. Ultimately there needs to be a shift from the parts to the whole so that the “parts” are understood as “relationships”. It is these relationships then that are inseparable relationship of the whole. Also too often we do “science” without actually following the scientific method. Science journaling helps put the observations back into the scientific method and allows for student understanding of the why.

Journals should allow for multiple intelligences as well as promote writing, sketching, poetry, art, science anatomy, and careful, precise observations as part of good science. Many aspects of climate change are subtle and change happens imperceptibly but happens none-the-less and can be recorded within the scope of students studies

Procedure

1. Practice observing.

Depending on your pedagogy you may want to talk to your students about nature, the environmental “web of life”, or climate. Since kids expect there to be answers to science “questions” they may have a very difficult time just recording random observations. Because the things we often find are not the ones we are looking for and too much front-

loading may spoil an unforeseen observation, I suggest only a thin spreading of the “loading” and only at appropriate times. Random observations often result in connections we never thought of and questions about connections we never imagined. Also, don’t be afraid to have your students play a part from the Dead Poets Society. Have them stand on chairs, look under logs, use magnifying glasses, look for the small and look for the tall. And when they find something to add to their journal ask them to take a look at it from various directions.

Always include:

Name

Time

Date

Place

Partners

Purpose(immediate focus) noted

Altitude and azimuth of the sun

Weather (barometric pressure, temperature, clouds – type, precipitation)

Geologic features

References to research/back ground information (include people and all contact info)

Questions/insights.

Hints for regular observations

1. Moon -Phase and position
2. Sun -Position and angle to your location
3. Temperature and Barometric pressure
4. Clouds -Number, type, and direction of travel
5. Water -Clarity and chemistry
6. Tide -Position and sequence in cycle
7. Earth surface -Ground cover and erosion
8. Earth quakes -Magnitude and location
9. Plant life cycle -Leaf on/leaf off, buds, flower
10. Animals -IDs, habitat, tracks

2. Define climate parameters.

Depending on the experience level of your students you may or may not want to define each climate parameter. The art of understanding what your observing often depends on your discovering the “definitions” on your own. For students to truly understand what they are doing they have to become involved in the process of developing their own definitions.

3. Skill development

Practice writing and drawing. Inability to make nice marks in a journal can turn some kids off from journaling. Add color and 3-D to your journal art.

4. Long-term program.

The journal can be used all year long with the understanding that the “kinks” will be worked out throughout the year. In the beginning of the year observations/assignments can be “canned” and progress to more ownership throughout the year, spiraling upward each year. Though the first observations should be completely unconstrained.

5. Play “Connections”

Connections is a game much like “Name That Tune” but with earth system science connections. The teacher could pick any two objects (in nature) and ask how are they connected. There are always multiple correct answers, some “easy” answers, and always a few “complicated” though quality answers. For example, the teacher (or student) may pick an apple and a snail. The easy answer is that the apple may fall to the ground, start decomposing, and be eaten by the snail. A more complicated answer would involve the snail producing waste which contains nitrogen. The nitrogen is “fixed” in the ground by other organisms. The nitrogen is then used from the ground by the apple tree helping to produce apples, which fall to the ground and are eaten by the snail. Or add more detail by adding Yellow sweet clover (*Melilotus indicus*) is a member of the pea family (Fabaceae). The roots of this legume contain swollen nodules containing nitrogen-fixing bacteria of the genus *Rhizobium* or *Bradyrhizobium* in the bacteria family Rhizobiaceae. Nitrogen fixation is a remarkable prokaryotic skill in which inert atmospheric nitrogen gas is converted into ammonia. Through another bacterial process called nitrification, the ammonia is converted into nitrites and nitrates, thereby making the vital element nitrogen readily available to the roots of higher plants. Which is why you often find sweet yellow clover growing in orchards. This simple game will help your students make connections to the objects they have drawn in their journal. The connections can then be recorded in any form in the journals. Depending on the level of your students and/or the assignment at hand you can make it as complicated as you like. After some period of time you might require students to pick an object and record another object that the first object is recorded to and to explain the connection in some manner.

6. Brainstorm/discuss before and especially after journaling.

Have your kids ask questions about what they might find and possibly what to look for before journaling. And always try to “debrief” your journaling session to make sure everyone is on the “same page”, that day or the next. Added safety in answering questions since there are few patent answers.

7. Mathematics

Understand fractals? (A fractal is a rough or fragmented geometric shape that can be subdivided in parts, each of which is (at least approximately) a reduced-size copy of the whole. Fractals are generally self-similar and independent of scale). It sure is easy and

more fun looking at actual fractals in nature. Depending on your students age/ability you do not even have to mention “fractals” to see and understand what they are.

Journal Entries

What is recorded?

Observations on 9 climate parameters (see below) and hints listed above
Focus details
Time-lapse observations
“Particular way of seeing”
Connections
Subject/Purpose/Question/Title
Prediction
Planning/Procedure
Observations/data
Reflections/connections/summary

How is it recorded?

Art (colored pencil and/or water color) –
See the world in true or impressionistic color
Age appropriate art – 3-D is awesome!

Writing

Paragraph style
Labels (with arrows)
Musical form
Essays
Poetry - Haiku

Haiku-poems can describe almost anything, but you seldom find themes which are too complicated for normal PEOPLE's recognition and understanding. Some of the most thrilling Haiku-poems describe daily situations in a way that gives the reader a brand new experience of a well-known situation. The metrical pattern of Haiku poems consist of respectively 5, 7 and 5 syllables in three units. In japanese, this convention is a must, but in english, which has variation in the length of syllables, this can sometimes be difficult. Each Haiku must contain a kigo, a season word, which indicate in which season the Haiku is set. For example, cherry blossoms indicate spring, snow indicate winter, and mosquitoes indicate summer, but the season word isn't always that obvious.

When is it recorded?

As often as possible- daily is best
Regularly scheduled time to emphasis science controls

What is it used for?

Reference

Science data

“Capturing time”

Skills development – fine motor, careful observations, observing connections

Experiment development

Formative work and summative evaluation, emphasis on the former

9 Climate Observations

Length of growing season

The number of days between the last frost of spring and the first frost of winter is called the growing season because it roughly marks the period during which plants, especially agricultural crops, grow most successfully.

Ice-out / Ice-in dates

Ice-out date as defined as the day the majority of the lake ice is broken up in the spring and ice-in defined as the day the majority of the lake first freezes over in the winter.

Precipitation

Total amount received over a period of time. Snowfall and ice recorded as the amount of liquid equivalent. Significant regional importance.

Intense precipitation events

Number of precipitation events that resulted in more than two inches (5.1 cm) of rain (or water equivalent if the storm results in snowfall) during a 48-hour period

Sea level rise

Position of mean sea level at the coast is the “height of sea with respect to a local land benchmark, averaged over a period of time, such as a month or a year, long enough that fluctuations caused by waves or tides are largely removed.

Sea surface temperature

Surface water temperature data from buoys, ships and other platforms.

Snowfall

Total winter snowfall accumulation (water equivalent).

Days with snow on ground

Total number of days with snow on the ground.

Lilac bloom dates

First day with Lilac blooms.

Title
Purpose/Question
Prediction
Procedure
Obs/data
Reflections/summary

Link for additional data sets/data collection programs

Maine Environmental Monitoring and Assessment Program
Index

(MEMAP) <http://www.memapindex.org/>

Robins, Peepers, Sugar Maples, and Dandelions Project
<http://www.maine.gov/dep/blwq/doceducation/jeeppers/teacherinfo.htm>

Robins, Starlings, Peepers and Pussy Willows Project
<http://www.maine.gov/dep/blwq/doceducation/jeeppers/>
5 years of data, student collected

Audubon birds

<http://www.ebird.org/go/eBirdReports?cmd=PublicReportType>

The Normalized Difference Vegetation Index (NDVI) is
used to measure vegetation intensity

<http://www.yale.edu/ceo/DataArchive/DataArchive.html>

Beginners guide to using Earth Observation Data

<http://www.satproj.org.uk/earth2.html>

***Environmental Education for Kids: Phenology
(Wisconsin DNR)

<http://www.dnr.state.wi.us/org/caer/ce/eeek/nature/season/pheno.htm>

***Nature's Calendar (United Kingdom)

<http://www.phenology.org.uk/>

Signs of Spring - Journey North

<http://www.learner.org/jnorth/spring2002/species/robin/index.html>

GLOBE - Phenology Investigation: Budburst Protocol
[http://ael.physic.ut.ee/globe/globe.UUS!/fenologia/pun
gade_juhend.htm](http://ael.physic.ut.ee/globe/globe.UUS!/fenologia/pun
gade_juhend.htm)

U. Maine Cooperative Extension - Maine Tree Club
[http://www.umaine.edu/umext/mainetreeclub/PDF/SugarMapl
e.pdf](http://www.umaine.edu/umext/mainetreeclub/PDF/SugarMapl
e.pdf)

Ice out dates for many lakes in Maine for 2004 and 2003
http://www.mainelakecharts.com/ice_out04.html

Operation Migration
http://www.operationmigration.org/Field_Journal.html

Global map
<http://www.climatehotmap.org/namerica.html>

[http://www.maine.gov/dep/blwq/doceducation/jeepers/link
s.htm](http://www.maine.gov/dep/blwq/doceducation/jeepers/link
s.htm)

Frog Watch
<http://www.nwf.org/frogwatchusa/>

Kansas Science Program
<http://kck.pathfinderscience.net/phenology/index.cfm>

Christmas Bird Count
<http://audubon2.org/birds/cbc/hr/table.html>

Maine Environmental Monitoring and Assessment Program
Index
(MEMAP) <http://www.memapindex.org/>