Beginning Teacher Assistance Program (BTAP)
Have You Ever?
AGENDA

1. Review Andragogy
2. 6 Step Lesson Plan
3. Think Alouds-Active Learning-Scaffolding- Mini Lessons
4. Differentiated Instruction
5. College and Career Readiness Standards
6. Lesson Plan Development
7. Classroom Management
Find the Fact-
Find the Fiction

Cooperative Group Strategy
6-Step Teaching Process

1. State Objectives or Learning Targets.
2. Warm-up.
3. Presentation/Modeling.
4. Guided Practice.
5. Independent Practice.
6. Closure.
STEP ONE: STATE OBJECTIVES/LEARNING TARGETS
STEP TWO:
THE
WARM-UP
STEP THREE: PRESENT THE MATERIAL OR MODEL
Think Alouds
in the math classroom
“Learning is Not a Spectator Sport!”
STEP FOUR: GUIDED PRACTICE
How to Give Specific Feedback

Provide feedback before the next practice attempt.

Be selective. Target student errors that:
• are easiest for the student to learn to fix.
• occur most frequently.
• most likely to produce the greatest gain, once corrected.
• greatly impair successful outcomes.
Scaffolding

Supporting learners as they progress toward a goal, gradually shifting responsibility from the teacher to the student as the student becomes more able.
Word Walls

Spanish Word Wall Set

Palabras

- la nariz (nose)
- la boca (mouth)
- el ojo (eye)
- el ceño (brow)
- la oreja (ear)
- la espalda (back)
- el cuerpo (body)
- la cabeza (head)
- el torso (torso)
- la mano (hand)
- la mano (hand)
- el codo (elbow)
- el pie (foot)
- la pierna (leg)

- azul (blue)
- verde (green)
- rojo (red)
- negro (black)
- morado (purple)
- blanco (white)
- pera (pear)
- rosa (pink)
- manzana (apple)
- naranja (orange)
- huevo (egg)

- el agua (water)
- el café (coffee)
- el té (tea)

- la casa (house)
- el coche (car)
- el teléfono (phone)
- la mesa (table)
- la silla (chair)

- el pavo (turkey)
- la pata (leg)
- el hueso (bone)
- la piel (skin)

- el árbol (tree)
- el pájaro (bird)
- la flor (flower)
- el pájaro (bird)
- el buitre (vulture)

- el estudiante (student)
- el profesor (teacher)
- el libro (book)
- el mapa (map)
- el cuaderno (notebook)

- la ciudad (city)
- el país (country)
- el mundo (world)
- el universo (universe)
- el universo (universe)

- el libro (book)
- el cuaderno (notebook)
- el lápiz (pencil)
- el borrador (eraser)
- el bolígrafo (pen)

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What Does Effective Instruction Look Like in the Classroom?

Fisher and Frey, 2007

Student Responsibility

Independent Work

Collaboration

Guided Instruction

Whole Class

I do

We do

You do together

You do on your own
STEP FIVE: INDEPENDENT PRACTICE
Checking for Understanding-Informal Assessments

Provides feedback to teachers and students and guides decisions on the next steps for instruction.

- Index Card.
- Brain Dump.
- One-minute essay.
- Journal entry.
- Concept map.
- Exit Ticket.
STEP SIX: CLOSURE

That's a Wrap
Formative Assessments Are Like Driver’s Permits
• AGENDA

• Review Andragogy
• 6 Step Lesson Plan
• Think Alouds-Active Learning-Scaffolding- Mini Lessons
• Differentiated Instruction
• College and Career Readiness Standards
• Lesson Plan Development
• Classroom Management
Why is Differentiated Instruction Effective?

- Engages higher level students
- Supports students with learning disabilities
- Supports lower level students
- Supports English Language Learners
Differentiating Instruction

Tiered Assignments
- Providing Leveled Texts
- Using Visual Aids
- Learning Styles
Tiered Assignments Should Be...

- Different work, not simply more or less work
- Equally active
- Equally interesting and engaging
- Requiring the same key concepts, skills, or ideas
- Fair in terms of work expectations and time needed
Differentiating Instruction Using Leveled Texts

- Matching students instructional materials to their reading abilities.
- www.newsela.com
**Visual Aids**

- Graphic Organizers
- Pictures
- Charts
Learning Styles

Visual
See It

Auditory
Hear It

Kinesthetic
Do It
Strategies for Visual Learners

Close eyes and visualize.

STIMULI

QUIET
Strategies for Auditory Learners

- Call on them to answer questions.
- Oral vs. written assignments.
- Paired readings.
- Group work.
- Listen to music while working.
Strategies for Kinesthetic Learners

- Manipulatives.
- Role playing.
- Field trips.
- Moving around.
- Items to touch/play with.
- Experiments.
“Jigsaw” - Cooperative Group Strategy

- Divide into groups of three.
  These are the HOME groups.
- Home groups number off 1, 2, 3.
- Each number goes to a different corner of the room.
  These are the EXPERT groups.
- Assign topic to each expert group.
- Record the most important things to know about the assigned topic on chart paper.
- Be prepared to be the “expert” in the home group.
- Return to HOME groups and share.
Lesson Plan Development

1. Design a lesson for one of the College and Career Readiness Standards (CCRS).
2. Differentiate the lesson.
3. Complete the 6-step lesson plan form.
4. Present lesson to the entire group (5-10 min).
Time to Plan
... the wide variety of skills and techniques that teachers use to keep students organized, orderly, focused, attentive, on task, and academically productive during a class.
Classroom Management Tips

- Establish classroom norms.
- Create a “parking lot” for questions or comments.
- Treat students like adults, not children.
- Be “strictly” flexible. Teach creatively.
Classroom Environment

- Warm, welcoming, and safe.
- Organized and accessible.
- Use a variety of colors and textures to create interest.
- Posters, bulletin boards, plants, etc.
- Reflect diversity of your students in classroom environment.
Addressing Mild Disruptions

• Make eye contact.
• Remind the group of the agreed-upon norms.
• Move toward the disruptive person.
• Be silent and wait for the disruption to end.
• Rearrange the seating if you think it will help.
• Take a break.
4 Reasons for Disruptive Behavior

Power
Revenge
Attention
Wanting to Be Left Alone/
Disinterest or Feelings of
Inadequacy
Power- The Student Who Tries to Attack or Embarrass the Teacher

Don’t take the bait.
Postpone these students.
Offer to listen to his point of view after class.
Take him on a Walk and Talk.
Revenge: The Resenter

Stay Calm.
Don’t Take it Personal.
Work Hard for the Rest, and
Hope for the Best.
Attention- The Student Who Tries to Dominate Class

Avoid Looking in his Direction
Move Away from Him
Increase Wait Time
Encourage Other Students
Don’t Try to Talk Over Students
Feelings of Inadequacy

Take an interest in them. Build a relationship.
Let them know what to expect to remove stress of uncertainty.
Set high, though not unrealistic expectations.
Have few rules, but strictly and fairly enforce them.
Assignments should be challenging - not boring.
Celebrate small successes to build their confidence.

THE DREAM IS FREE BUT THE HUSTLE IS SOLD SEPARATELY.
Activity
“If you are very lucky, you may find a teacher!”

- John Steinbeck
Closure Activities

In pairs or small groups, have students discuss. Ask questions like:

- What was the most important thing you learned today?
- How does today’s lesson influence your thinking?
- What was the most challenging concept in today’s lesson?

Give another example of the concept by applying information to previous learning (from a past lesson) or a new situation (link to content for the next day’s lesson).

Have students summarize the lesson by accounting the beginning, middle, and end of the lesson. “Today we started by ____, then we ____, and we pulled it all together when we ____.” The students can present the summary with or without prompts from the teacher.

Use nonverbal closures like writing a journal entry.

Make the closure into a game by playing Jeopardy, Pictionary of key concepts, or by constructing riddles about terms introduced.

Discuss briefly the next day’s lesson to build interest.

Collect students’ reflections or target tickets as they walk out the door.

Paper Slide- On paper, small groups sketch and write what they learned. Then team representatives, one and a time, slide their work under a video camera while quickly summarizing what was learned. The camera doesn't stop recording until each representative has completed his or her summary.

Gallery Walk- On chart paper, small groups of students write and draw what they learned. After the completed works are attached to the classroom walls, others students affix Stickies to the posters to extend on the ideas, add questions, or offer praise.

Sequence It- Students can quickly create timelines with Timetoast to represent the sequence of plot or historical events.

Simile Me-Have students complete the following sentence: “The [concept, skill, word] is like ______ because ______.”

Group Mural- Tape to a wall approximately four flipcharts, depending on how many participants you have for the training. At the end of the training, ask everyone to draw one element they have learned during the course of the presentation. Ask participants to interpret each other’s drawing.
Vocabulary Activity

Vocabulary Word
____________________________________

Write a Definition in Your Own Words.
____________________________________

Draw a Picture or Pictorial Representative of the Vocabulary Word.

Write 3-4 Synonyms for the Vocabulary Word.
____________________________________

Write 3-4 Antonyms for the Vocabulary Word.
____________________________________

Use the vocabulary word in a sentence of your own.
____________________________________
Active Learning Classroom Activities

The following list summarizes some of the many approaches.

**Clarification Pauses:** This simple technique fosters “active listening.” Throughout a lecture, particularly after stating an important point or defining a key concept, stop presenting and allow students time to think about the information. After waiting, ask if anyone needs to have anything clarified. Ask students to review their notes and ask questions about what they’ve written so far.

**Writing Activities such as the “Minute Paper”:** At an appropriate point in the lecture, ask the students to take out a blank sheet of paper. Then, state the topic or question you want students to address. For example, “Today, we discussed emancipation and equal rights. List as many key events and figures as you can remember. You have two minutes – go!”

**Self-Assessment:** Students receive a quiz (typically ungraded) or a checklist of ideas to determine their understanding of the subject. Concept inventories or similar tools may be used at the beginning of a semester or the chapter to help students identify misconceptions.

**Large-Group Discussion:** Students discuss a topic in class based on a reading, video, or problem. The instructor may prepare a list of questions to facilitate the discussion.

**Think-Pair-Share:** Have students work individually on a problem or reflect on a passage. Students then compare their responses with a partner and synthesize a joint solution to share with the entire class.

**Cooperative Groups in Class (Informal Groups, Triad Groups, etc.):** Pose a question for each cooperative group while you circulate around the room answering questions, asking further questions, and keeping the groups on task. After allowing time for group discussion, ask students to share their discussion points with the rest of the class.

**Peer Review:** Students are asked to complete an individual homework assignment or short paper. On the day the assignment is due, students submit one copy to the instructor to be graded and one copy to their partner. Each student then takes their partner’s work and, depending on the nature of the assignment, gives critical feedback, and corrects mistakes in content and/or grammar.

**Group Evaluations:** Similar to peer review, students may evaluate group presentations or documents to assess the quality of the content and delivery of information. Brainstorming: Introduce a topic or problem and then ask for student input. Give students a minute to write down their ideas, and then record them on the board. An example for an introductory political science class would be, “As a member of the minority in Congress, what options are available to you to block a piece of legislation?”

**Case Studies:** Use real-life stories that describe what happened to a community, family, school, industry, or individual to prompt students to integrate their classroom knowledge with their knowledge of real-world situations, actions, and consequences.

**Hands-on Technology:** Students use technology such as simulation programs to get a deeper understanding of course concepts. For instance, students might use simulation software to design a simple device or use a statistical package for regression analysis.

**Interactive Lecture:** Instructor breaks up the lecture at least once per class for an activity that lets all students work directly with the material. Students might observe and interpret features of images, interpret graphs, make calculation and estimates, etc.

**Active Review Sessions (Games or Simulations):** The instructor poses questions and the students work on them in groups or individually. Students are asked to show their responses to the class and discuss any differences.

**Role Playing:** Here students are asked to “act out” a part or a position to get a better idea of the concepts and theories being discussed. Role playing exercises can range from the simple to the complex.

**Jigsaw Discussion:** In this technique, a general topic is divided into smaller, interrelated pieces (e.g., a puzzle is divided into pieces). Each member of a team is assigned to read and become an expert on a
different topic. After each person has become an expert on their piece of the puzzle, they teach the other team members about that puzzle piece. Finally, after each person has finished teaching, the puzzle has been reassembled, and everyone on the team knows something important about every piece of the puzzle.

**Structured Notes:** A detailed outline of the presentation with key words or phrases left out. Students fill

**Get One, Give One** – Students fold a piece of paper in half and write “Give One” on one side and “Get One” on the other side. On the “Give One” side, as them to write four insights from today’s material. Have them stand up and find a partner. Each student shares one idea from their “Give One” side of the paper and writes down one idea on the “Get One” side of the paper. Find a new partner until your “Get One” side of paper is full of new ideas!

**One-Minute Papers** – Students write for one minute on a specific question (which might be generalized to “what was the most important thing you learned today”). Best used at the end of the class session.

**Gallery Walk** – Provide colored dot stickers to students and ask them to “vote” on statements they agree with the most, by using up their limited dot supply on the pre-written topics displayed around the room on poster boards.

**Fingers on Chest** – Students vote on multiple choice questions by showing a finger count (1 through 4). Rather than raise them into the air, they hold their fingers across their chests so other students don’t see what the majority is voting. Often used as a check for understanding. Show me a 1-4, 1 meaning I don’t get this at all, and 4 meaning I could teach this to someone else and anything in between.

**Ticket out the Door** – At the end of class, ask students to summarize the lecture today, or provide one new personal significant learning outcome (in 3-5 sentences), and give their response to the professor for their ticket out of the door.

**Pictionary** – For important concepts and especially vocabulary terms, have students play Pictionary: one draws images only, the rest must guess the term.

**Role-Playing** – Assign roles for a concept, students research their parts at home, and they act it out in class. Observers critique and ask questions.

**Role Reversal** – Teacher role-plays as the student, asking questions about the content. The students are collectively the teacher, and must answer the questions. Works well as test review/prep.

**Student-Generated Test Questions** – Students create likely exam questions and model the answers. Variation: same activity, but with students in teams, taking each others’ quizzes.

**Concept Mapping** – Students write keywords onto sticky notes and then organize them into a flowchart. Could be less structured: students simply draw the connections they make between concepts.

**One-Sentence Summary** – Summarize the topic into one sentence that incorporates all of who/what/when/where/why/how creatively.

**Hand Held Response Cards** – Distribute (or ask students to create) standardized cards that can be held aloft as visual responses to instructor questions. Example: hand-write a giant letter on each card to use in multiple choice questions.

**Plickers** – free handheld response cards for download (https://www.plickers.com/) that get scanned by teacher’s smartphone, even at a distance, to “collect” results.
Quick & Easy Formative Assessments

Index Card
Give each student an index card. Ask them to write on both sides to answer the following:

Side 1: Based on our study of [topic], list a big idea that you understand.

Side 2: Identify something about [content] that you do not yet fully understand.

Brain Dumps
A three minute pause gives students a chance to stop and reflect on what they’ve just been introduced to. This also lets them make connections to prior knowledge/experiences and to seek clarification. You can have students talk to a partner or write ideas down. Here are some prompts to use:

- “I felt…”
- “I changed my attitude about…”
- “I related to…”
- “I found it interesting that…”
- “One new thing I learned was…”
- “This reminds me of…” (text to text, text to world, text to self)

One Minute Essay
A one minute essay question is focused with a specific goal that can actually be answered within a minute or two. Specific prompts are usually the most helpful.

Journal Entry
Students record their understanding of the topic, concept or lesson in a personal journal. The teacher reviews the journal entry and responds as needed. This provides a private place for students to express concerns or questions that they might not be comfortable sharing in public.

The key to this method of assessment is to actually read and respond to student journal entries. If the teacher doesn’t respond, the students will be less inclined to be truthful and provide details of their understanding.

Hand Signals
Ask students to display a designated hand signal to indicate their understanding of a specific concept, principle or process. Examples include thumbs up/down and showing fingers on a scale of 1-5.

Concept Map
Any of several forms of graphic organizers that allow students to recognize the relationships between ideas through diagramming key words and phrases.

Examples include Venn diagrams, webs, etc.

Exit Card
Exit cards are written responses from each student that must be turned in before the end of the activity or the end of the day. They are “required” before a student can exit the class. Prompts may be general (“list one thing you didn’t know about the topic before this lesson”) or specific (“put the following steps in order”). You can ask students to write a response on a sticky tab, note card or piece of paper. Many teachers designate a space in their classroom where students must post or turn in responses.
**Exit Ticket**

**Background**

The Exit-Ticket strategy requires students to write responses to questions you pose at the end of class. Exit Tickets help students reflect on what they have learned and express what or how they are thinking about the new information. Exit Tickets easily incorporate writing into your content area classroom and require students to think critically.

**Benefits**

Exit Tickets are great because they take just a few minutes and provide you with an informal measure of how well your students have understood a topic or lesson. They help the teacher decide whether to go next. Did the students understand the skill presented today? If so, move on. Were they confused? If so, address during the next class period and reteach. Were there just a few who were confused? Pull them back in a small group and do a mini-lesson.

**Procedure**

- Five minutes before the end of class, ask students to respond to a prompt.
- You may state the prompt or project it visually on a flip chart or board.
- Distribute 3X5 cards for students to write on or use their own loose-leaf paper.
- As students leave your room, they turn in their exit tickets.

There are three categories of exit slips:

- Prompts that document learning,
  - Ex. Write two things you learned today.
  - Ex. Discuss how today's lesson could be used in the real world.

- Prompts that emphasize the process of learning,
  - Ex. I didn't understand…
  - Ex. Write one question you have about today's lesson.

- Prompts to evaluate the effectiveness of instruction
  - Ex. What did you enjoy working in small groups today and what could be changed to improve the effectiveness of your group?

Other exit prompts include:

- I would like to learn more about…
- Please explain more about…
- The most important thing I learned today is…
- The thing that surprised me the most today was…
- I wish…
Tiered Activities

Tiering Reading
Students work on the same outcomes, but use a different process to get there.
Example: What are the characteristics of a hero?
Tier one: Make a chart of specific heroes and what they did to make them become a hero.
Tier two: Choose two or three heroes and compare them in a Venn diagram.
Tier three: List personal characteristics exhibited by heroes and rank them from most to least important.

Tiering Reading Using Bloom’s Taxonomy
Lower levels of Blooms:
- List story elements (knowledge)
- Book summary (comprehension)
- Support a conclusion about a character with evidence from the book. (application)
Higher levels of Blooms:
- Discuss the theme or author’s purpose for writing the book (analysis)
- Create a new ending for the story (synthesis)
- Critique the author’s writing and support your opinion (evaluation)

Tiered Writing
Tier one: Students decide where they stand on an issue. They write a claim and a 5 paragraph sentence with 3 supporting details and a conclusion.
Tier two: Students write two paragraphs on an issue, stating their claim. They will support their claim with facts and add their own thoughts.
Tier three: Students will write a 5 paragraph argumentative essay. They will state a claim, support it with facts from multiple resources and add their own thoughts. In addition, they will write a counterclaim and a conclusion.

Tiered Math
Tier one: Students will learn their math facts.
Tier two: Students will multiply two-digit numbers by two digit numbers.
Tier three: Students create their own multiplication word problems.
Citizen scientists track effects of climate change in Pacific Northwest

By Seattle Times, adapted by Newsela staff

MOUNT RAINIER NATIONAL PARK, Washington — A group of six hikers moves down the Sunrise Rim Trail on a recent Wednesday morning. Over their left shoulders, Mount Rainier’s Emmons Glacier wilts against a blue backdrop.

Suddenly, Tucker Grigsby, an intern with the National Park Service, bounds down the trail. With a snap of the wrist, he flicks a net through the air and captures his floating prize, a magnificent orange and black butterfly.

The hikers crowd around Grigsby, who holds up a ventilated bug jar with the specimen.

The group studies the markings on the butterfly and determines it to be an Edith’s Checkerspot, one of five species captured that day.

These hikers are not collectors; they catch and release their finds. Most of them are not scientists. They’re volunteers with the Cascades Butterfly Project, learning to gather data to help measure the effect of climate change on these important pollinators and Mount Rainier National Park itself.

The hikers also catalog plant varieties. Volunteers will gather data each week this summer at 10 sites in the Cascade Range.

Scientists can check the data for patterns and compare plants’ growth with the emergence of the butterflies, said Regina Rochefort of North Cascades National Park. The big question is, as the climate changes, “are plants responding at the same rate as the butterflies?”

The question mirrors what scientists worldwide are asking of any number of environmental features: How will nature adapt to a world growing warmer?

Citizen Scientists Making A Comeback

To collect the expansive data sets needed to explore climate change’s questions, scientists are turning to unpaid volunteers known as citizen scientists. Washington state — with hikers, climbers, and skiers exploring nature — has many potential volunteers.

Citizen science is both centuries old and a new movement.
Many point to 1900 as citizen science's birth. At the time, sportsmen commonly hunted birds on Christmas Day. Concerned about conservation, scientist Frank Chapman proposed counting birds instead of shooting them, and the Christmas Bird Count was born. Now, data from 116 years of the Audubon Society-sponsored activity is available on the society’s website.

However, Julia Parrish, a University of Washington professor, said the concept of citizen science is as old as humanity.

"Every culture ... pays attention to natural phenomena, and we refer to that as an almanac," Parrish said. Knowing when birds would be around and when the salmon were returning kept people alive, she said. "That is the real start of citizen science."

Passionate Volunteers Make Good Citizen Scientists

Once a target of skepticism among researchers, citizen science is now so popular it has its own association and a conference dedicated to its development. It also has a number of websites that host data or match people with projects.

"There was some concern that citizen science wouldn't be good enough to publish in journals, but that has been dispelled," Martin Storksdieck said. He is an Oregon State University professor studying the topic. Storksdieck noted that passionate volunteers are no less reliable than undergraduates making minimum wage.

Popularity has grown in terms of the number of projects, the variety of projects, the disciplines and the people engaging with it, he said.

Climate study is a natural fit for citizen science, Storksdieck said.

Citizen Science Explores Pika

It's been a busy summer for citizen science in the Pacific Northwest.

The Mountaineers, a climbing club based in Seattle, has been training its members on how to identify pika. They are rabbitlike mammals with Mickey Mouse ears that live in alpine environments.

"We're already up there," said Becca Polglase, education manager for The Mountaineers. "Everyone already looks for pika."

So why not document where they live for science?

"Nobody knows much about the range of pika in the Pacific Northwest," said David Shepherdson of the Oregon Zoo.

Polglase has trained members to identify pika, and members upload pika sightings to a database kept by the Point Defiance and Oregon zoos. The zoos have led the Cascades Pika Watch program.
Pika do not tolerate high temperatures. They live in rockfall for shade and protection from flying predators, rarely going far from their rock piles.

"They're kind of on little islands," Shepherdson said.

Warming temperatures could threaten those islands, scientists fear.

With volunteer-submitted data, scientists will be able to map pika's range, know where to study further and examine changes over time.

**Studying Snow Algae In The North Cascades**

Meanwhile, on the snow-covered slopes of the North Cascades, skiers and climbers have been looking for "watermelon snow," which is the pink bloom of snow algae. It can contribute to snow melt and glacier loss because it changes how sunlight reflects off snow and ice.

Surprisingly little is known about the algae, said Robin Kodner, a professor at Western Washington University studying it with students in her lab.

"We don't know how snow algae get there or how they spread," Kodner said. "One of the goals of my project is to understand when and where the algae are blooming in the North Cascades."

The rugged environment in the North Cascades makes that difficult. The algae are often found on remote snowfields or glaciers that can be dangerous to access.

"I can't send my students to go climb Mount Shuksan because I got a report there's snow algae blooming there," Kodner said.

Skiers and climbers have helped by carrying test tubes to scoop up the algae.

"It helps me sample more broadly," Kodner said, noting her plan is to make a map and see how it changes over time.

For those contributing to citizen science, snagging butterflies or tracking pika gives purpose to their adventures.

"I see these (pika) all the time — I'd like to help these guys out," said Sam McNerney, 17, a high-school student in Sammamish who was learning how to identify pika earlier this summer from The Mountaineers.

"Scientists can't be everywhere," said Kathy Moorhouse, Sam's mother. "Plus, it's better than finding Pokemon."

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Suddenly, Tucker Grigsby raced down the trail. He flicked a net through the air and captured an orange and black butterfly.

The hikers studied the markings on the butterfly and found it to be an Edith's Checkerspot. It was one of five types captured that day.

These people are not collectors. They let the butterflies go. Most of them are not scientists. They are volunteers with the Cascades Butterfly Project, gathering data to help study butterflies and Mount Rainier National Park.

The hikers also note plant varieties. Volunteers will gather data this summer at 10 sites in the Cascade Range.

How Will Plants And Butterflies Adapt To Climate Change?

Regina Rochefort works for North Cascades National Park. She said scientists can compare what plants and butterflies are doing. The question is, are plants responding to climate change in the same way as butterflies?

Scientists around the world have a question like it. How will nature adapt to a world growing warmer?

The Earth is heating up. This is called climate change. Scientists say people burn too much fossil fuels. Fossil fuels come from nature. These include fuel from wood, oil, and coal.

Volunteers Become Citizen Scientists

Scientists are asking volunteers for help. They want information to study climate change. Washington state has many hikers, climbers, and skiers who could be volunteers.

When people who are not scientists help with study, it is called citizen science.

Julia Parrish is a professor. She said citizen science goes back to people's earliest times.
People pay attention to what happens in nature, she said. Knowing when animals would be around kept people alive, she said. It gave them food. "That is the real start of citizen science," she said.

Martin Storksdieck is a professor. He said there was worry that citizen science would not be good enough, but that concern is gone.

**Citizen Scientists Train To Identify Pika**

The Mountaineers is a climbing club in Seattle, Washington. It has been training its members to identify pika. They are small rabbit-like animals with Mickey Mouse ears. The mountains are their homes.

Becca Polglase is a leader of The Mountaineers. The climbers are already in the mountains, and "everyone already looks for pika," she said. So it is easy for them to help.

David Shepherdson works for the Oregon Zoo. "Nobody knows much about the range of pika" around there, he said. The climbers help to find where they are.

They add pika sightings to information kept by the Point Defiance and Oregon zoos. The zoos have led to the Cascades Pika Watch program.

Pika do not like high temperatures. They live in rock piles for shade and protection from flying predators.

They are kind of on "little islands," said Shepherdson.

Warming temperatures could hurt those islands, scientists fear.

With help from volunteers, scientists will be able to map pika's living spaces. They will know where to study more and see changes over time.

**Exploring Snow Algae**

In snowy parts of the mountains, skiers and climbers look for the pink bloom of snow algae. Algae is like a water plant. It has no roots, stems or leaves. Too much algae can cause problems. The algae can make snow melting worse.

People do not know much about the algae, said Robin Kodner, a professor at Western Washington University. She studies it with students in her lab.

They do not know how snow algae got there or how they spread, Kodner said. She hopes to learn when and where the algae are blooming.

Skiers and climbers help by carrying test tubes to scoop up the algae.
They give her more samples, Kodner said. Her plan is to make a map of where algae bloom. Then she will see how it changes over time, she said.

For those adding to citizen science, catching butterflies or tracking pika gives purpose to their adventures.

Sam McNerney is a high school student in Sammamish. He sees pika all the time. "I'd like to help these guys out," he said. Earlier this summer, he joined The Mountaineers. He is learning how to identify pika. "Scientists can't be everywhere," said Kathy Moorhouse, Sam's mother. "Plus, it's better than finding Pokemon."
Largest Shark Was Mostly Likely 392 Years Old

Scientists determine Greenland sharks live as long as 400 years

By Nicola Davis, The Guardian, adapted by Newsela staff

She was born during the reign of James I, and was a youngster when the great fire of London raged in 1666. She lived her adolescent years as George II ascended the throne, and she reached adulthood around the time that the American revolution started. Living to an estimated age of nearly 400 years, a female Greenland shark has set a new record for long life, scientists have revealed.

The discovery places the lifespan of the Greenland shark far ahead of even the oldest elephant in captivity, Lin Wang, who died at age 86. It is also far longer than the official record for humans, held by 122-year-old Frenchwoman Jeanne Louise Calment.

“It kicks off the bowhead whale as the oldest vertebrate animal,” said Julius Nielsen, lead author of the research from the University of Copenhagen. He says bowhead whales have lived as long as 211 years, but this shark is the oldest creature with a backbone alive today.

The title of the world’s longest lived animal is held by Ming, an Icelandic clam known as an ocean quahog, who made it to 507 years before scientists killed it.

Greenland Shark Grows Less Than Half An Inch A Year

Grey, plump and growing to lengths of around 16 feet, the Greenland shark is one of the world’s largest carnivores. With a reported growth rate of less than half an inch a year, they were already thought to be long-lived creatures. But just how long they lived was a mystery.

“Fish biologists have tried to determine the age and longevity of Greenland sharks for decades, but without success,” said Steven Campana. He is a shark expert from the University of Iceland.

The new research, he says, is the first hard evidence of just how long these creatures can live.

“It definitely tells us that this creature is extraordinary and it should be considered among the absolute oldest animals in the world,” said Nielsen.
Scientists Focused On Eye Lens Proteins

Writing in the journal Science, Nielsen and an international team of researchers describe how they set about determining the age of 28 female Greenland sharks, which they caught during scientific surveys between 2010 and 2013.

The ages of many fish can be determined by counting the growth layers of calcium carbonate “stones” in their ears, in a manner similar to counting tree rings. However, sharks do not have such earstones or other calcium-rich tissues suitable for this type of analysis.

Instead, the team had to rely on a different approach: scrutiny of the lenses in their eyes.

The lens of the eye is made of proteins that build up over time, with the proteins at the very center of the lens laid down while the shark is developing in its mother’s womb. Scientists say if they can figure out how old these proteins are, they can get an estimate of the shark’s age.

Radiocarbon Dating Helps Determine Age

In order to determine when the proteins were laid down, the scientists turned to radiocarbon dating. This method looks for levels of a type of carbon, known as carbon-14, in a material. Carbon-14 is radioactive, and is everywhere — in the air, water and ground. All living things have carbon-14 in them, and usually get it through the plants or animals they eat. Over time the radiation in carbon-14 decays, and as radiation leaves the carbon, its chemical makeup changes. That’s how scientists can tell how old it is.

By applying this technique to the proteins at the center of each lens, the scientists can figure out a broad range of ages for each shark.

The scientists used information from a side-effect of atomic bomb tests which took place in the 1950s. When the bombs were detonated, they increased the levels of carbon-14 in the atmosphere. The spike, or pulse, in carbon-14 entered the marine food supply across the North Atlantic in the 1950s and early 1960s.

That provides a useful time-stamp, Nielsen said.

Nielsen and the team found the eye lens proteins of the two smallest of their 28 Greenland sharks had the highest levels of carbon-14. This suggested they were born after the early 1960s. The third smallest shark, however, had carbon-14 levels only slightly above those of the 25 larger sharks, which hinted that it was born in the early 1960s, just when bomb-related carbon-14 began to get into the food sharks were eating. Nielsen said that showed most of the sharks they tested were older than 50 years.

The scientists then combined the carbon dating results with estimations of how Greenland sharks grow to create a model that allowed them to probe the age of the 25 sharks born before the 1960s.
Largest Shark Was Mostly Likely 392 Years Old

Their findings revealed that the largest shark of the group, a female measuring just over 16 feet in length, was most likely around 392 years old. Nielsen points out, though, that she could be from 272 to 512 years old.

“The Greenland shark is now the best candidate for the longest living vertebrate animal,” he said.

Scientists also found that since adult female Greenland sharks cannot become pregnant until they reach more than 13 feet in length, that means they must be at least 150 years old before they can produce young.

Not everyone is convinced Greenland sharks can live for four centuries, though. Clive Trueman, professor of marine ecology at the University of Southampton, agrees it is possible to get a record of the early life of a vertebrate from eye lens proteins. However, the proteins in the lenses — and hence the carbon-14 within them — came from nutrients taken in by the shark’s mother. This adds a number of uncertainties to the calculations, he says.

Campana says while the approach taken by the researchers is sound, he remains unconvinced Greenland sharks live for almost 400 years. But, he adds, “future research should be able to nail the age down with greater certainty.”
Chain of Linked Events

When a teacher wishes to build links between events or when the topic involves a series of interlinked events, this model can be used. This visual method assists students who find it difficult to memorise from notes. It can help to bring coherence to a large quantity of information and to establish or clarify the links in the pupil's mind.

As with previous organisers it can be used for pre-teaching i.e. identify what pupils know about the topic so teaching can be accurately focused at the level of students knowledge. It can be used for teaching a topic where information is provided in disjointed form and pupils have to link it correctly.

It works best when a small group (2/3) students work together. One records agreed information on the model, one researches, one ensures that all contribute ideas and reach consensus or checks that all understand the material.

Four Corner Organiser

When characteristics of four related concepts/topics/people are being explored, the four are placed in the centre of the organiser and two criteria are placed on the outside.

Examples of criteria are route and accomplishments of explorers, rights and responsibilities of stakeholders, formulae for and examples of how to solve equations, sources and uses of vitamins, examples and evidence for physics laws, characteristics and actions of characters.

This is a very powerful tool when used by small groups to actively construct and organise knowledge. It promotes higher level thinking.
Webbing, Cluster Graphic Organizer

Use a Webbing or Cluster Graphic Organizer when students are brainstorming a topic. It’s useful when reviewing or finding out what students know before beginning a new topic.

Triple Venn Diagram

This is a very powerful tool for answering higher level questions that require three items (books, texts, characters, regions, phenomena) to be compared and contrasted.

Exam questions prepared in class as a group can be attempted alone for homework.

The purpose of the team is to build stronger individuals — “What we can do together today we can do alone tomorrow”.

Formative assessment is facilitated as students can clearly see how much they know about a topic by the time they have finished the work. It may be used to develop the ability - "attack skills" - to tackle questions that students find challenging.
KWL Chart

K- What I Know

W- What I Want to Know

L- What I Learned
Fish Bone

A whole topic may be summarised in one coherent space. Many students find that information summarised in this way is easier to remember than pages of text. It helps to organise and structure the information in a comprehensible form. It can help to collate factors associated with a complex topic and show how they interrelate.

Each fishbone is built by a small team (2/3). The teacher can supply the headings and pupils fill in the details. It is suitable for use in mixed ability groups and students can contribute according to their ability, perception and interest.

Intergroup cooperation is encouraged—one member may become the scout and seek out ideas from other groups.

Students may repeat the exercise for homework/revision and then use the organiser for self assessment when they return to class.

Double Venn Diagram

The double Venn is a simple and highly effective model for examining the similarities and differences between two items. Students work in small groups to compare and contrast. One student records the agreed information in the organiser on behalf of the group.

Students of all abilities and learning styles can work together and contribute according to their interest, learning style and ability. No student is held back and the class does not move too fast for any student.

Students are actively involved in the learning. They learn to agree, disagree, listen, explain and help each other. They orally process the learning. These soft skills need to be encouraged and actively taught in the classroom.
A word problem can be easier to solve when it's broken down into pieces. This graphic organizer can help.

1. Write down your word problem in the top box. You may want to highlight numbers and key words.
2. In the second box, write down what you know from the information provided in the problem.
3. In the bottom left box, write what you need to find and how to find it.
4. In the bottom right boxes, solve and check your answer.
Argumentative Writing Frames

There is a lot of discussion about whether…. The people who support … claim that… They also argue that… A further point they make is…

On the other hand, there are also arguments against this point of view. Opponents of … believe… They say that… Furthermore, they claim that…

After weighing both sides of the debate about…, it is clear that… because…
Graphic Organizer for Argumentative Essay

Issue + Position + Claim → Supporting Details

#1 Add Personal Experience

#2 Add Personal Experience

#3 Add Personal Experience
# T-Chart for Argumentative Essay

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Scoring Your Learning Styles Inventory

Directions: Tally by adding up only the YES answers. Put the number that corresponds to the yes question in the appropriate box. Add up the number of questions in each box and write a total for each box.

The highest area is your preferred learning style. Don’t worry if a dominant mode doesn’t emerge. You’re a versatile learner! If you have a high score in more than one area, you’re using additional modalities. Remember that there are no answers. Everyone is an individual and has his own style of learning.

Use the knowledge you gain about your preferred learning style to create excellent study tools, the ones that are right for you.

Example: If you answered questions number 9 with a yes, write 9 in the VISUAL box. If you answered number 11 with a yes, write number 11 in the AUDITORY box. If you answered number 7 with a yes, write 7 in the KINESTHETIC box.

Visual Style: Questions 1, 4, 9, 10, 13, 16, 19, 24, 25, 28
Auditory Style: Questions 2, 5, 8, 11, 14, 18, 20, 23, 26, 29
Kinesthetic Style: Questions 3, 6, 7, 12, 15, 17, 21, 22, 27, 30

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Total: | Total: | Total:
6 Step Lesson Plan

Content Area:
Length of Lesson:
Technology Used:
College and Career Readiness Standard:

Objective or Learning Target: At the end of this lesson, the student will be able to:

1. **Warm-Up**- A 5-10 minute review activity that uses previously learned material or a fun activity that gets students up and moving.

2. **State Objectives or Learning Targets**- Tell the students what they will be learning and why it is important to their lives.

3. **Presentation/Modeling**- Teachers provide a clear example of the skill students will be expected to master. Think alouds may be used.

4. **Guided Practice**- Students practice the new skill as teachers monitor and help as needed.

5. **Independent Practice**- Students work independently. Not much help is needed from the teacher at this point.

6. ** Closure**- Review activity that summarizes the lesson. Preview the lesson for the next meeting time. Short formative quiz may be given at this time to drive the next day’s instruction.
DEPTH OF KNOWLEDGE (DOK)

It is about CRITICAL THINKING! Not VERBS!
# A-Z Listing

**Topic**: Effective Instruction

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**Directions**: Fill in ideas or concepts related to the topic.
## A-Z Listing

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