



Bloom's Taxonomy of Learning

Using Bloom's Taxonomy in Teaching Physics

A- What is Bloom's Taxonomy?

- A taxonomy is an arrangement of ideas or a way to group things together.
- Bloom's Taxonomy is a chart of ideas about learning named after Benjamin Bloom.
- One of the most widely used ways of organizing levels of knowledge is according to Bloom's Taxonomy.



1913-1999



PhD Student of Bloom

Bloom's Taxonomy

- Bloom's Taxonomy uses a multi-layered scale to express the level of knowledge required to achieve each measurable student outcome.
- What is the use of Bloom's taxonomy so important?

Organizing measurable student outcomes in this way (according to Bloom's taxonomy) will allow us to select appropriate classroom assessment techniques for the course.



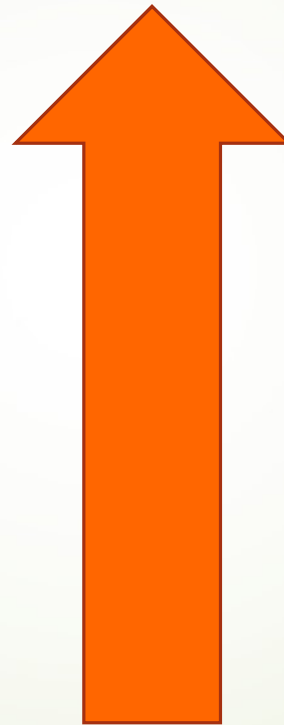
The levels of learning according to Bloom's taxonomy.

Kno-Co-Ap- An- S-Ev

B- The levels of learning

- There are six main categories of learning according to Bloom's taxonomy. It is in continuum from **simple** to **complex**, from **concrete** to **abstract**
- The levels build on one another. The six levels all have to do with learning.
- Level -1- is the lowest level of learning and the level -6- is the highest level of learning.

COMPLEX/ABSTRACT



SIMPLE/CONCRETE



Evaluation



Synthesis



Analysis



Application



Comprehension



Knowledge

New names of Bloom's Taxonomy

- Some people have renamed these levels to make them easier to remember.



Evaluation- Evaluation



Synthesis- Creating



Analysis- Analyzing



Application- Applying



Comprehension- Understanding



Knowledge- Remembering

1-Knowledge or Remembering

- Observation and recall (remember) of information
- Knowledge of dates, events, places
- Knowledge of major ideas
- Knowing mastery of subject matter
- Key words:
list, define, tell, describe, identify, show, label, collect, examine, tabulate, quote, name, who, when, where, etc.



1- Knowledge/Remembering - Do it...

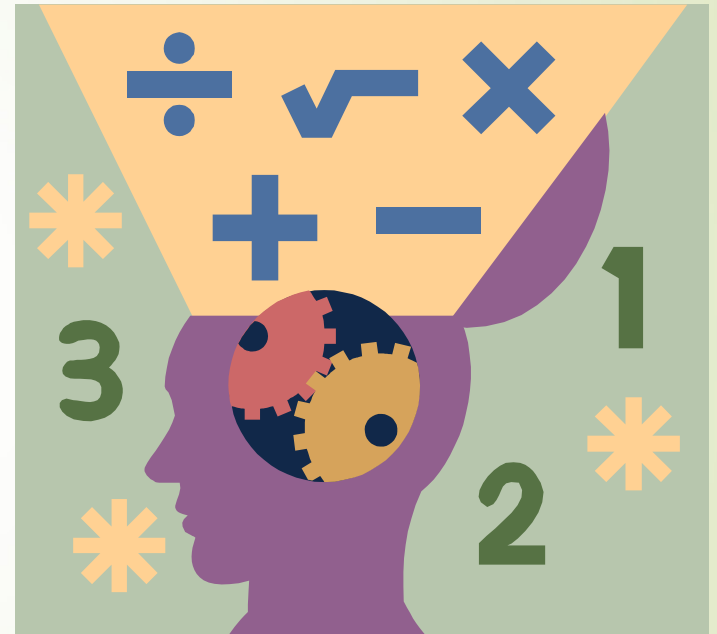
Examples

- Write the order of planets in the solar system.
- What is the date for summer solstice?
- What happened after...?
- How many...? What is...?
- Who was it that...? Can you name ...?
- Find the definition of...
- Describe what happened after...
- Who spoke to...?
- Which is true or false...?



2-Comprehension or Understanding

- Understanding information
- Grasp meaning
- Translate knowledge into new context
- Interpret facts, compare, contrast
- Order, group, infer causes
- Predict consequences
- Key words:
summarize, describe, interpret,
contrast, predict, associate,
distinguish, estimate, differentiate,
discuss, extend

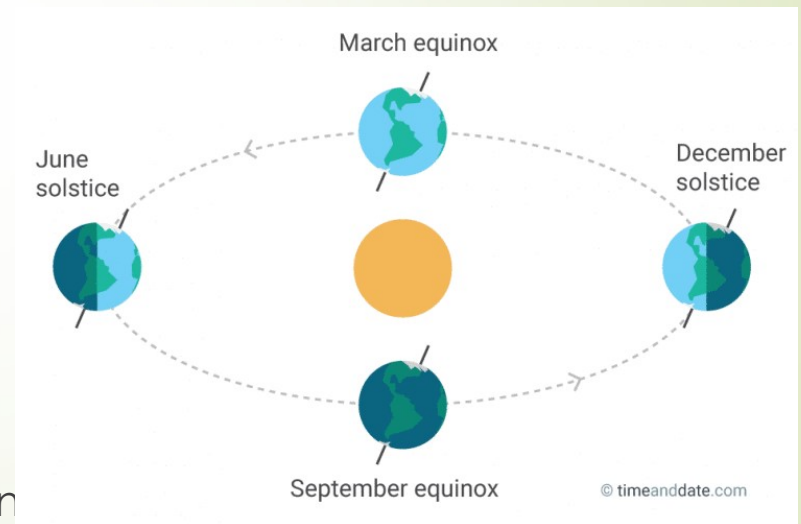


2- Comprehension/ Understanding-

Do it...

Examples

- ▶ What does the summer solstice represent?
- ▶ What is the meaning of mechanical energy?
- ▶ Can you explain why...?
- ▶ Can you write in your own words?
- ▶ How would you explain...?
- ▶ Can you write a brief outline...?
- ▶ Who do you think...?
- ▶ What was the main idea...?
- ▶ What do you think could have happened next?
- ▶ Can you illustrate...?



3- Application or Applying

- Use of information for new situations
- Use methods, concepts, theories in new situations
- Solve problems using required skills or knowledge
- Apply abstractions, general principles, or methods to specific situations.
- Key words:
apply, demonstrate, calculate, complete, illustrate, show, solve, examine, modify, relate, change, classify, experiment, discover



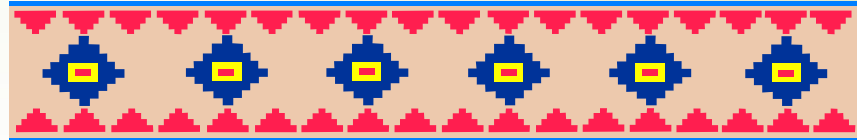
3- Application/Applying- Do it... Examples

- Make a model of a solar system with paper and explain how it works.
- What would Earth's seasons be like if its orbit was perfectly circular?
- Can you group by characteristics such as...?
- Which factors would you change if...?
- What questions would you ask of...?
- From the information given, can you develop a set of instructions about...?



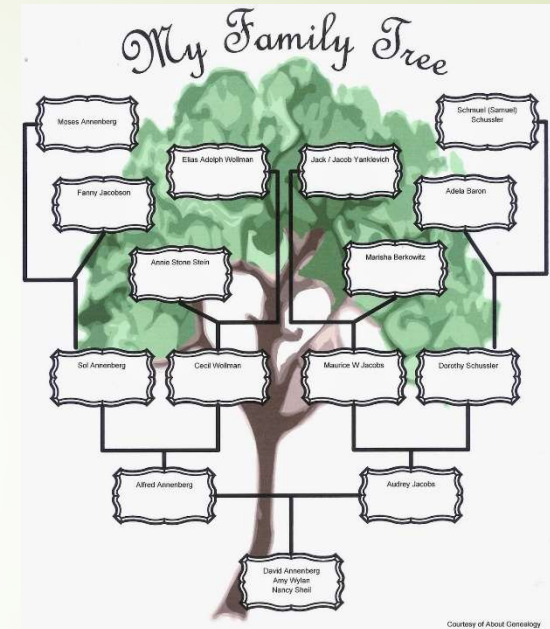
4- Analysis or Analyzing

- Separation of a complex idea into its parts and an understanding of organization and relationship between the parts.
- Seeing patterns
- Organization of parts
- Recognition of hidden meanings
- Identification of components
- Key words:
analyze, separate, order, explain,
connect, classify, arrange,
divide, compare, select, explain,
infer



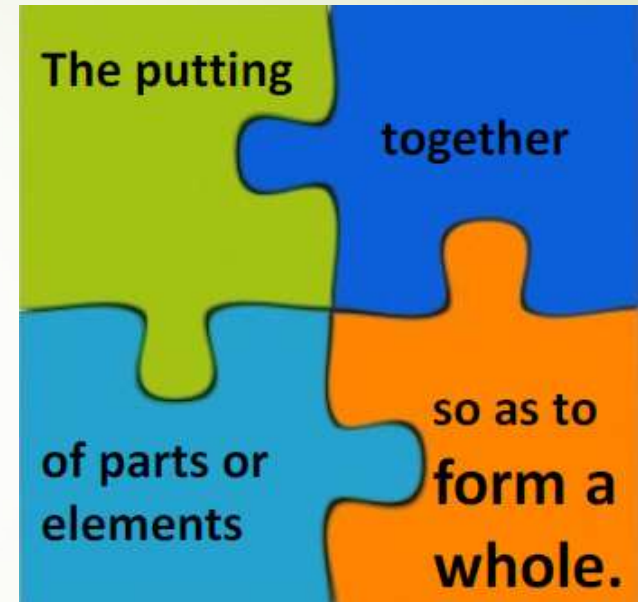
4- Analysis/Analyzing- Do it...

- Make a family tree showing relationships.
- Why are seasons reversed in the southern hemisphere?
- Why are nights take months in the north pole in winter?
- Why does the Sun not set in the north pole some part of summer?
- If. ..happened, what might the ending have been?
- How is...similar to...?
- What do you see as other possible outcomes?
- Why did...changes occur?
- What are some or the problems of...?
- Can you distinguish between...?
- What was the problem with...?



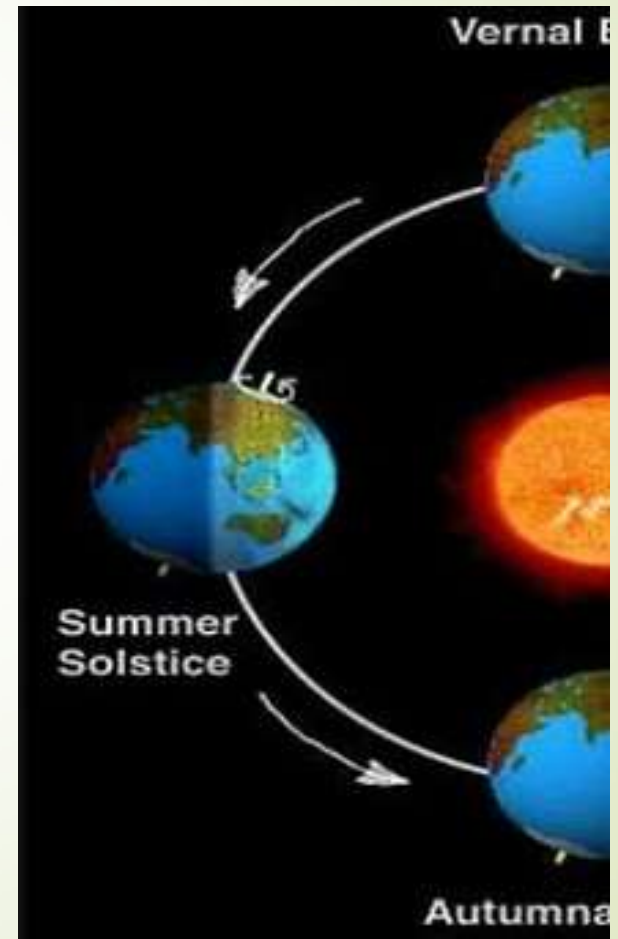
5- Synthesis or Creating

- Construction of ideas and concepts from multiple sources to form complex ideas into a new, integrated, and meaningful patterns.
- Use old ideas to construct new ones
- generalize from given facts
- relate knowledge from several areas
- predict, draw conclusions
- *Key words:*
combine, integrate, modify, rearrange, substitute, plan, create, design, invent, what if?, compose, formulate, prepare, generalize, rewrite



5- Synthesis/Creating- Do it...

- If the longest day of the year is in June, why is the northern hemisphere hottest in August?
- Can you design a...to...?
- Can you see a possible solution to...?
- If you had access to all resources, how would you deal with...?
- Why don't you devise your own way to...?
- How many ways can you...?



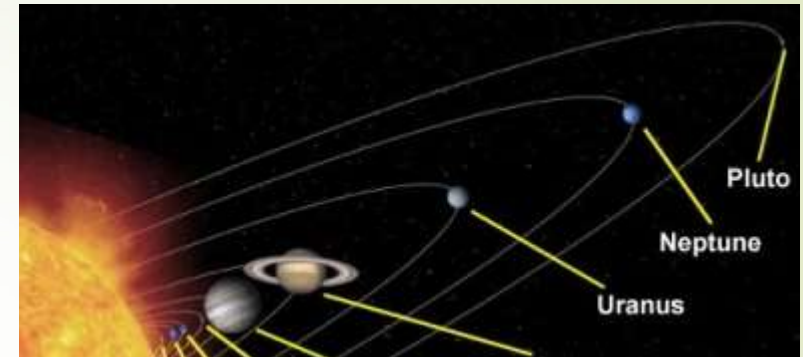
6- Evaluation or Evaluating

- To make a judgment of ideas or methods using external evidence or self-selected criteria substantiated by observations or informed rationalizations.
- Compare and discriminate between ideas
- Assess value of theories, presentations
- Make choices based on reasoned argument
- Verify value of evidence
- Recognize subjectivity
- Key words
assess, decide, rank, grade, test, measure,
recommend, convince, select, judge, explain,
discriminate, support, conclude, compare,
summarize



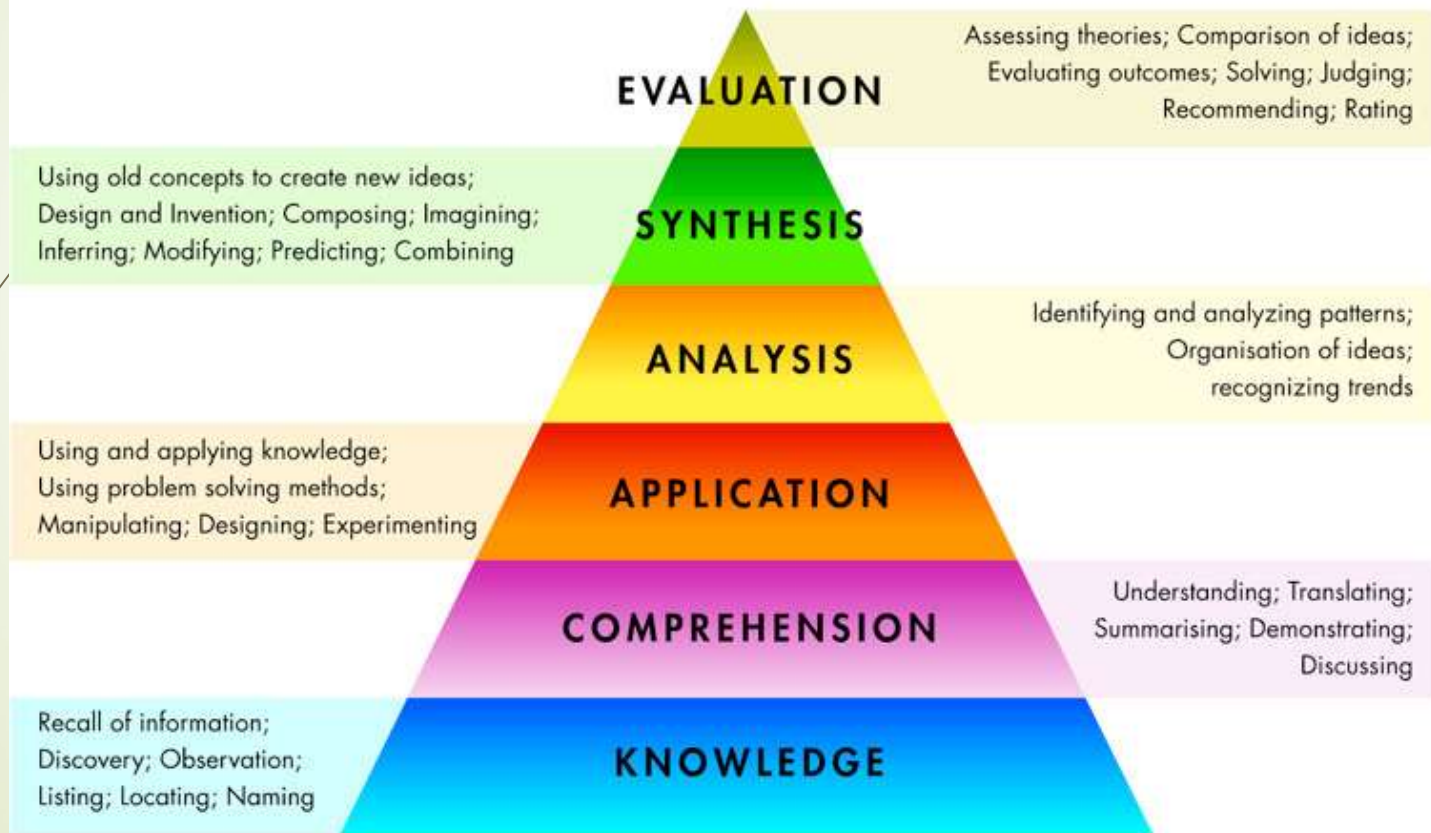
6- Evaluation/Evaluating- Do it...

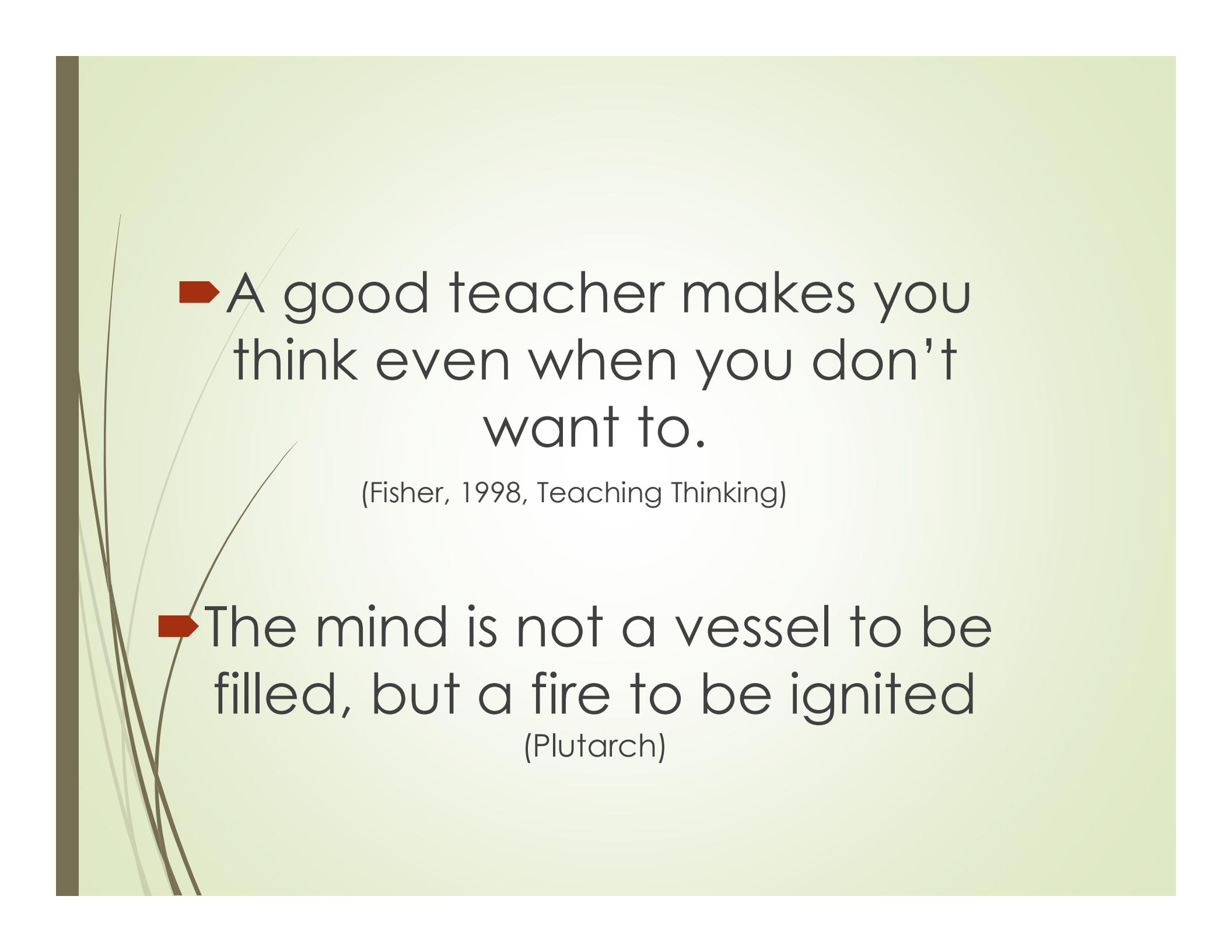
- What would be the important variables for predicting seasons on a newly discovered planet beyond Neptune?
- Is there a better solution to...?
- Judge the value of... What do you think about...?
- What are the consequences..? •
- What influence will....have on our lives? •
- What are the pros and cons of....?
- What are the alternatives?



Revision

BLOOMS TAXONOMY





➡ A good teacher makes you think even when you don't want to.

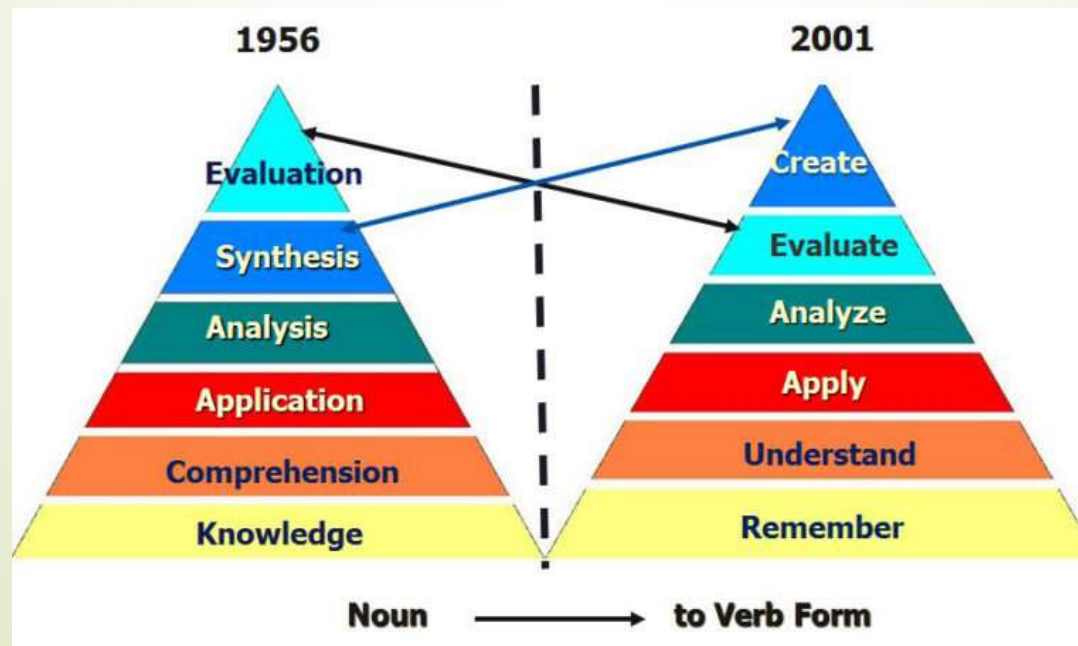
(Fisher, 1998, Teaching Thinking)

➡ The mind is not a vessel to be filled, but a fire to be ignited

(Plutarch)

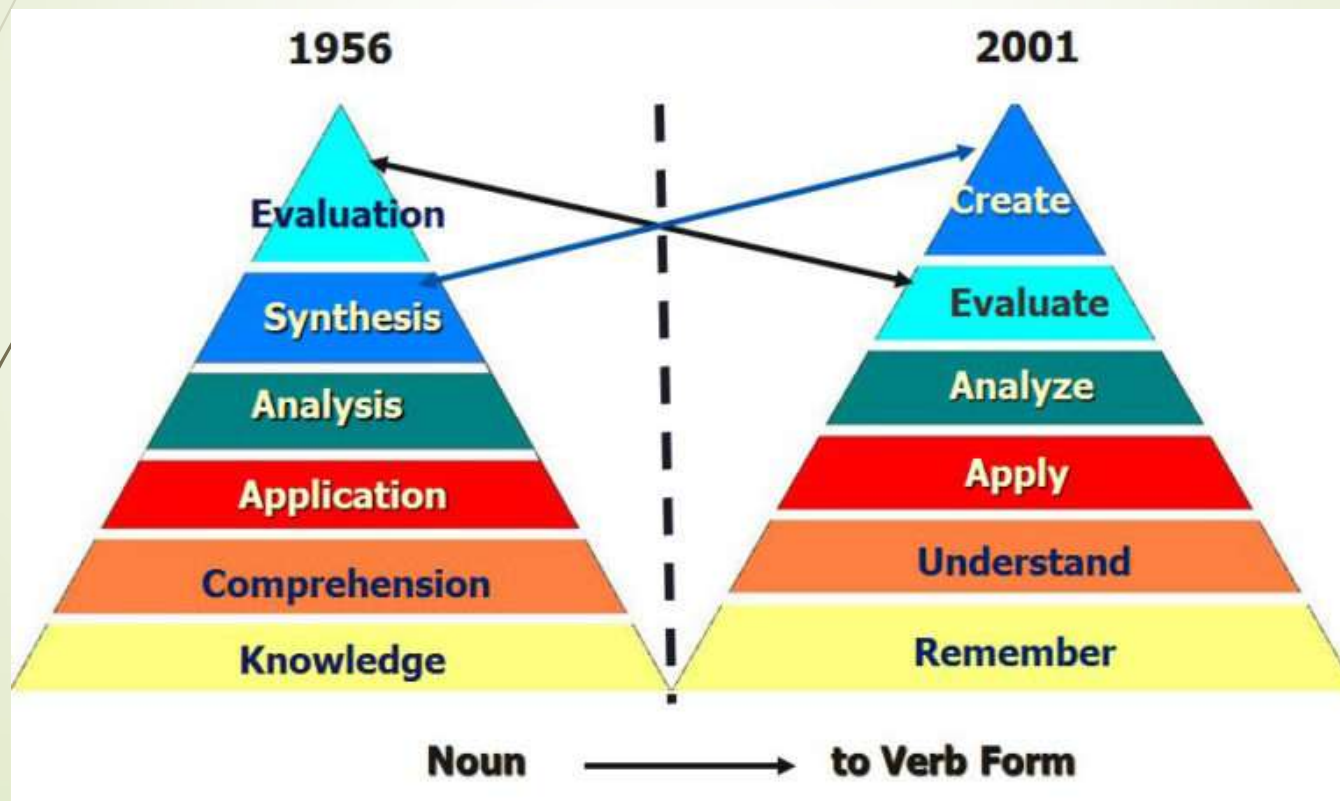
The Revised Bloom's Taxonomy (2001)

- A group of researchers, and testing and assessment specialists published in 2001 a revision of Bloom's Taxonomy with the title *A Taxonomy for Teaching, Learning, and Assessment*.
- This title draws attention away from the somewhat static notion of “educational objectives” (in Bloom's original title) and points to a more dynamic conception of classification.



The Revised Bloom`s Taxonomy (2001)

- Explain the differences between the old and revised Bloom`s taxonomy.



Why Use Bloom's Taxonomy?

- The authors of the revised taxonomy suggest a multi-layered answer to this question, to which the author of this teaching guide has added some clarifying points:
- Objectives (learning goals) are important to establish in a pedagogical interchange so that teachers and students alike understand the purpose of that interchange.
- Teachers can benefit from using frameworks to organize objectives because
- Organizing objectives helps to clarify objectives for themselves and for students.
- Having an organized set of objectives helps teachers to:
 - “plan and deliver appropriate instruction”;
 - “design valid assessment tasks and strategies”;and
 - “ensure that instruction and assessment are aligned with the objectives.”



Questions

- 1. Explain the categories about Bloom's taxonomy
- 2. Think about a high school physics topic. Then make a plan to teach this subject according to Bloom's taxonomy.
- 3. What is the difference between synthesis and evaluation step in Bloom's taxonomy?
- 4. Explain the differences between old and revised Bloom's taxonomy?



References

- <https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/>
- <https://www.slideshare.net/jeanettem1/blooms-taxonomy-3382852>
- <https://thesecondprinciple.com/teaching-essentials/beyond-bloom-cognitive-taxonomy-revised/>
- <https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/>