CONTENT:	***Dinosaur Names Teacher Lesson Plan (1.3.3.1) (FKA How Dinosaurs are Named Teacher Lesson Plan)***
SECTION:	***Teacher Resources/Group Lesson Plans/Dino Hunters/Dinosaur Names Teacher Lesson Plan (1.3.3.1)***
DATE:	**January 23, 2002**
DRAFT NO:	***Final***
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LESSON OBJECTIVES

1. Students will identify the conventions used to name dinosaurs.
2. Students will describe the relationship between the appearance of dinosaurs and their names.
3. Students will compare the appearance of dinosaurs and their names.
4. Students will apply their dinosaur naming knowledge to create fictitious dinosaurs and dinosaur names.

* Note: Student activities associated with this lesson plan can be found in the Dino Hunters section of the Dinosaur Academy in the Dino Lab. Click here to view the student activities.

TOOLS AND MATERIALS NEEDED

1. This activity will require the use of the Dino Lab's online or printable Dino Cards that can be found in the student activity (click here to view the student activity).
2. Online information about how dinosaurs are named (see the naming activity in main JPI site <http://www.jpinstitute.com/activity/activityIns3.jsp>, dinosaur name roots, and pictures of dinosaurs from the Dinopedia. Click here for a downloadable PDF that contains a few name roots and their translations.
3. Student journals (click here to download a blank journal page).
4. Drawing materials.

ESTIMATED TIME TO COMPLETE LESSON

This lesson will take one 45-minute class period.

TEACHING STRATEGY

- Background Information

  Have you ever wondered how dinosaurs get their names, or why their names seem so complicated? Did you know that one of the perks of discovering a new dinosaur species is that the discoverer gets to name it?

  Investigating dinosaur names, or nomenclature, is a great way to get students to examine dinosaurs and learn about scientific classification. Through this investigation, students will consider how dinosaurs are related, they will make careful observations of dinosaur characteristics, and they will get a sense of the excitement generated by a new dinosaur discovery.

When a new dinosaur is discovered, the scientist who discovers it gets to name it. The paleontologist names the new species by using Greek or Latin. This is because they are dead languages, thus making the new dinosaur name both international and universal because the names don't have any cultural or political connotations. It also means that a Stegosaurus is called a Stegosaurus in English, Chinese, Russian, and any other language.

There are three primary ways in which dinosaurs get their names; the most common one is by description. The paleontologist will identify a prominent physical feature of the dinosaur, such as "three-horned face" and then translate the name into Greek of Latin; in this case the result is the famous *Triceratops*! The other two methods used to name dinosaurs include the location of the discovery - for example *Albertosaurus* is named after the province of Alberta in Canada, or after people, like Bob Bakker's *Drinker,* which was named after a famous dino hunter named Edward Drinker Cope.

- Procedure
  1. Warm-up: Give your students a list of common job names, such as electrician or Paleontologist and have them hypothesize about what people in these occupations do based on their names.
  2. Introduce the activity with a KWL chart that asks the students what they already know about dinosaur names and what they want to know. (click here for information about KWL charts)
  3. Dinosaur Name Game
     a. **Offline -** Print out a set of dinosaur picture cards and the matching set with the scientific name cards. You will need one set of cards per group. In their groups, have your students look carefully at the dinosaur pictures. Ask them if there are any characteristics that will help them identify which name matches each dinosaur. When they are done with their matches have them answer the following questions in their journals:

        1) Why did you organize the cards they way you did?
        2) How do you think dinosaurs get their names?

        Offline description (for DNA)
        The off-line version would be for the teachers to printout the cards so the game can be played in class. The cards should be arranged in a printable fashion, about the size of a playing card. The cards should look similar to the examples given on the activity page. They should also be available within this page.

     b. **Online**: Students try to determine the dinosaur names by playing the online Dinosaur Name Game. Once they successfully complete the game, they then must download and print it.

        Online description (for DNA)
        For the online version there are various possibilities on how it can be designed. The page needs to present the cards mixed-up and then have the ability to move the cards next to each other for a match. Because of the number of cards there could be a 'difficulty level' added by changing the number of mixed-up cards. There also needs to be an

on-line request for the students to explain why they chose the organization they did. It would be useful to have a feature that allows students to organize the cards and then click somewhere that says something like, "Am I correct?", where the cards then organize themselves in the correct way. Another option would be for the page to tell the students how many they have correct without indicating which ones. The students could then fix them until they are correct.

4. Discuss the names of the dinosaurs on the cards and background information on how dinosaurs get their names. Emphasize the idea that it is the dinosaur's discoverer that gets the honor of naming it.
5. Tell your students that they are going to create a dinosaur! Give them a list of dinosaur name roots and have the students, either individually or in groups, combine 2, 3, or 4 of the roots to 'create' a dinosaur. Give your students a choice to complete some or all of the follow-up activities listed below.
   a. Based on the name roots, sketch a picture of their dinosaurs.
   b. Write a scientific description of the dinosaur's behavior and the environment where it lived when it was alive.
   c. Write a story about the dinosaur when it was alive - describing how it acted and the environment in which it lived.
6. Have them complete a KWL chart on what they now know about how dinosaurs are named.

- Discussion Questions
  1. How do we give names to the jobs people do?
  2. What are the different ways paleontologists name dinosaurs?
  3. Why do paleontologists use Greek and Latin to name dinosaurs?
  4. What clues can you get about a dinosaur's appearance or behavior based on their names?
  5. What other information about a dinosaur can you get from its name (environment, what it ate, parenting)?
  6. Should animals with similar characteristics have similar names? Do these similarities mean the animals are related somehow?

- Resources
  1. Online Activity Page
  2. KWL Chart
  3. Dino Cards
  4. News articles
     a. *Scientists Don't Dig New Name!* (article describing controversy over *T. rex's* name). http://more.abcnews.go.com/sections/science/dailynews/trex_name000613.html
     b. *Was There a Dinosaur Called Brontosaurus?* (article describing the controversy over the name *Brontosaurus)*. http://www.sciencenet.org.uk/database/Archaeology/9809/a00092d.html
     c. *Brontosaurus is Back!* (article with new information about this well known dinosaur)
        We will need a link to the JPI site to see the article

- Vocabulary
  1. Translated Greek or Latin dinosaur names may contain new words.

2. Fossil (*fossilis* meaning "dug up") - Remains of living things that have been changed into rocks through natural earth processes over millions of years.
3. Paleontologist (*palaios+onta+logos* meaning word or discourse of ancient existing things) - Scientist who studies history of life on earth by analyzing the remains of ancient organisms.
4. Nomenclature - A scientific naming system.
5. Dead languages - Languages that are no longer spoken.

EXTENSIONS/ADAPTATIONS

1. Students can present their pictures, scientific descriptions, and stories to the class.
2. Students can pretend that they discovered dinosaurs by exchanging their pictures and then creating new names for them based on the characteristics the previous student or group described. This activity can lead to a discussion on why it is important that every dinosaur has a unique and universally accepted scientific name.
3. Have students read the article *Was there a Dinosaur Called Brontosaurus?* and reflect on the controversy. http://www.sciencenet.org.uk/database/Archaeology/9809/a00092d.html
4. Have students read the article *Scientists Don't Dig New Name* and reflect on the controversy. http://more.abcnews.go.com/sections/science/dailynews/trex_name000613.html
5. Students can gather all the dinosaurs created in class and decide how the animals might have been related. Students can classify their creatures based on similar characteristics by creating a dichotomous key.

SCIENCE STANDARDS

1. Unifying Concepts and Processes in Science.
   - Systems, order, and organization
   - Constancy, change, and measurement
   - Evolution and equilibrium
   - Form and function

2. Science as Inquiry *(CONTENT STANDARD A)*
   - As a result of their activities in grades K-4 and 5-8, all students should develop an understanding of the following:
     - Abilities necessary to do scientific inquiry
     - Understanding about scientific inquiry

3. Life Science (*CONTENT STANDARD C*)
   - As a result of their activities in grades K-4, all students should develop understanding of the following:
     - The characteristics of organisms
     - Organisms and environments
   - As a result of their activities in grades 5-8, all students should develop understanding of the following:
     - Structure and function in living systems
     - Regulation and behavior
     - Diversity and adaptations of organisms

4. Science and Technology (*CONTENT STANDARD E*)
   - As a result of their activities in grades K-4, all students should develop understanding of the following:
     - Understanding about science and technology
   - As a result of activities in grades 5-8, all students should develop understanding of the following:
     - Understandings about science and technology

5. History and Nature of Science (*CONTENT STANDARD G*)
   - As a result of their activities in grades K-4, all students should develop understanding of the following:
     - Science as a human endeavor
   - As a result of activities in grades 5-8, all students should develop understanding of the following:
     - Science as a human endeavor
     - Nature of science
     - History of science

ASSESSMENT/EVALUATION RECOMMENDATIONS

1. Student work: Pictures of dinosaurs, descriptions and stories.
2. Student Journal: KWL as pre and post reflection on what they know about dinosaurs.

DNA: The following list should be made into a downloadable PDF entitled Name Root Translations.

Name	(Language of Origin)	Meaning in English
acantho	(from the Greek akanthos, meaning bear's foot)	spiny
acro	(Greek)	high
aeto	(Greek)	eagle
allo	(from the Greek word allos)	other
alti	(from the Latin word altus)	high
ambi	(Latin)	both or two
amphi	(Greek)	both or two
an	(Greek)	not or without
anato	(Latin)	duck
anchi	(from the Greek word agkhi)	near
ankylo	(from the Greek word ankylos)	hook, joint, fused, stiff or bent
anser	(Latin)	goose

antho	(from the Greek word anthos)	flower
anuro	(Greek)	no tail
apato	(Greek)	deceptive
archaeo	(from the Greek word archaios)	ancient
avi or **avis**	(Latin)	bird
bactro	(from the Greek word baktron)	baton or club
baga	(from the Mongolian word baga)	little
baro or **bary**	(from the Greek word barys)	heavy
bellu	(from the Latin word bellus)	beautiful
brachio	(from the Greek word brachion and the Latin word brachium)	arm
brachy	(Greek)	short
bronto	(from the Greek word bronte)	thunder
calamo	(from the Greek word kalamos)	reed
camara	(from the Greek word kamara)	chamber
campto	(from the Greek word kamptos)	flexible
campylo	(from the Greek word kampylos)	bent
carchar	(from the Greek word karkhar)	jagged
cardio	(from the Greek word kardia)	heart
carno	(Greek)	flesh
caud or **caudia**	(Latin)	tail
centro	(Latin)	left
cephalo	(from the Greek word kephale)	head
cera	(from the Greek word keras)	horn
cerno	(from the Latin word secerno)	divide or sever
cero	(from the Greek word keras)	horn
chasmo	(from the Greek word khasma)	chasm or yawning fissure
chiro or **cheirus**	(from the Greek word kheir)	hand
chondro	(from the Greek word khondros)	cartilage
cion	(from the Greek word kion)	column or pillar
clao	(from the Greek word klao)	break or crush
cneme	(from the Greek word kneme)	lower leg or shin bone
coeli or **coelo**	(from the Greek word koiloma)	opening or cavity
compso	(from the Greek word kompso)	elegant
coryth	(from the Greek word koryth)	helmet

costa	(from the Greek word costa)	rib
cryo	(from the Greek word kryos)	cold
crypto	(from the Greek word kryptos)	hidden
cyon	(from the Greek word kuon)	dog
dactly	(from the Greek word dactylos)	finger
deino	(from the Greek word deinos)	fearfully great or terrible
derm	(Greek)	skin
di	(Greek)	two
dino	(from the Greek word deino)	fearfully great or terrible
diplo	(from the Greek word diploos)	double or in pairs
docus	(from the Greek word dokos)	beam, bar or shaft
don or **dont**	(from the Greek word odon)	tooth
draco	(from the Greek word rakon)	dragon
dromeus or **dromeo**	(from the Greek word dromeus)	runner
drypto	(from the Greek word drypto)	wounding
echino	(Greek)	spiny
elasmo	(from the Greek word elasma)	metal plated or elastic, like beaten metal
elmi	(Greek)	foot
eo	(from the Greek godess of the dawn, Eos)	dawn
eu	(from the Greek word eus)	good or well
eury	(From the Greek word eurys)	wide
gnathus	(from the Greek word gnatos)	jaw
hadro	(from the Greek word hadros)	large
hetero	(from the Greek word heteros)	mixed or different
hypacro	(Greek)	top
hypselo or **hypsi**	(from the Greek word hypsos)	high
ichthyo	(from the Greek word ichthys)	fish
iguano	(from the Arawak word iwana)	iguana
kentro	(from the Greek word kentron)	sharp point or spur
krito	(from the Greek word kritos)	chosen or separated
lana	(from the Latin word lanatus)	woolly
lepto	(from the Greek word leptos)	thin or slender
lestes	(from the Greek word leistes)	robber
lio	(from the Greek word leios)	smooth
lite or **lithos**	(from the Greek word lithos)	stone

lopho	(from the Greek word lophos)	crest or tuft
lyco	(from the Greek word lykos)	wolf
lystro	(Greek)	shovel
maia	(from the Greek Maia, mythical mother of Hermes)	good mother
macro	(from the Greek word makros)	long or large
megal	(from the Greek word megas)	great
micro	(from the Greek word mikros)	small
mono	(Greek)	single or alone
masso	(Greek)	long or bulky
mega	(from the Greek megas)	huge
merus	(from the Greek meros)	part or portion
metro	(Greek)	measure
micro	(from the Greek word mikros)	tiny
mimus	(from the Greek word mimikos)	mimic
morph	(Greek)	shape
nano	(Greek)	dwarf or very small
neo	(from the Latin word neos)	new
neustes	(from the Greek word neustes)	swimmer
nodo	(from the Latin word nodulus)	knotted or lumpy
noto	(from the Greek word nodus)	node or nodulus
notos	(from the Greek word notos)	south
nycho or **nychus**	(from the Greek onykh)	clawed
odon or **odont**	(from the Greek word odon)	tooth
oid or **oides**	(Greek)	like
oligo	(from the Greek word oligos)	few or little
onyx	(from the Greek word onyx)	claw or talon
opistho	(from the Greek word opisthen)	at the back or behind
ops	(from the Greek word ops)	eye or face
opsis	(from the Greek word opsis)	face
ornis or **ornitho**	(from the Greek, ornis means bird)	bird
oro	(from the Greek word oros)	mountain
ortho	(from the Greek word orthos)	straight
ovo or **ovi**	(from the Latin word ovum)	egg

pachy	(from the Greek word pachys)	thick
para	(Greek)	beside
pedi	(Latin)	foot
pelon	(from the Greek word pelos)	mud or clay
peloro	(from the Greek word peloros)	monstrous
penta	(Greek)	five
phalanges	(from the Greek word phalanx)	fingers or toes
phyllo	(from the Greek word phyllon)	leaf
physis	(Greek)	form
placo	(Greek)	broad or flat
plateo	(from the Greek word plateos)	flat
plesio	(from the Greek word plesios)	near
pleuro	(from the Greek word pleuron)	side or rib
plio	(from the Greek word pleion)	more
poly	(from the Greek word polys)	many or much
pod or **pos**	(Latin)	foot or to put
preno	(Greek)	sloping
prio	(from the Greek word prion)	saw
pro	(Greek)	before
protero	(from the Greek word proteros)	earlier or former
proto	(from the Greek word protos)	first or earliest
psittaco	(from the Greek word psittakos)	parrot
pteron	(from the Greek word pteron)	feather or wing
pteryx	(from the Greek word pterygion)	wing or fin
pyro	(from the Greek word pyros)	fire
quadr	(Latin)	four
raptor	(Latin)	robber or plunderer
rex	(Latin)	king
rhinus or **rhino**	(Greek)	nose or snout
rhomale	(from the Greek word rhomaleos)	robust or strong
salto	(Latin)	leaping
sarco	(Greek)	flesh
saur, **sauro** or **sauros**	(from the Greek word sauros)	lizard
scapho	(from the Greek word skaphe, meaning boat)	canoe
scelida	(from the Greek word skelis)	hind leg

segno	(from the Latin word segnis)	slow
seismo	(from the Greek word seismos)	earthquake
Sino		Chinese
smilo	(Greek)	knife
spino	(Latin)	thorn or backbone
spondyl	(from the Greek word spondylos)	vertebrae
stego	(from the Greek word stegos)	roof or cover
steno	(from the Greek word stenos)	narrow, close or slender
strepto	(from the Greek word streptos)	reversed
struthio	(Greek)	ostrich
suchus	(from the Greek word soukhos)	crocodile
tetra	(Greek)	four
thallasso	(Greek)	sea
thero	(from the Greek word therion)	beast
titano	(Greek)	titanic
tops	(Greek)	face
tri	(Greek)	three
troo	(Greek)	wound
tyranno	(from the Greek word tyrannikos)	tyrant
ultra	(Latin)	extreme
urus		tail
veloci	(from the Latin word velocitas)	speedy
venator	(from the Latin word venator)	hunter
vulcano	(from the Latin god Vulcanus)	volcano
zo, zoa, zoon	(from the Greek zoia)	animals or life

Asset Needed for this page

Video: How Dinosaurs are Named
PDF Files: Journal Page, Name Root Translations