



Design Report

For a computer or print-based instructional module

1. Behavioral Objectives and Sample Assessment

Instructional Goal	Performance Objective	Sample Assessment
1. Student will learn about the location of the biome	With access to the web site, students will acquire information about one biome and show they have learned the location with 100% accuracy.	Where would you find a temperate forest? A. Antarctica B. Near the equator C. In the water D. Between the polar and tropical regions
2. Student will learn the typical climate of the biome	After reviewing the program, students will be able to describe the climate of a biome with 100% accuracy.	What is the climate like in a temperate forest? A. Hot and rainy B. Cold and dry C. All four seasons D. Hot and dry
2.1 Student will learn the typical temperatures of the biome	After listening, students will be able to classify the typical temperatures of a biome with 100% accuracy.	What are temperatures like in a temperate forest? A. Hot in summer, cold winters B. Hot all year long C. Cold all year long D. Medium all year long
2.2 Student will learn the typical rainfall of the biome	After reviewing the materials, students will be able to describe (using relative terms) the typical rainfall of the biome with 100% accuracy.	What is rainfall like in a temperate forest? A. Lots – maybe 100 inches a year B. Average – not very much or very little C. Very little – 10 or fewer inches annually D. Not applicable
3. Student will learn about typical plants of the biome	When prompted after the lesson, students will be able to describe a plant in each biome with 100% accuracy.	See sub-objectives
3.1 Students will hear and read the name(s) of the	After the lesson, the student will be able to identify a plant typical	Which is a typical plant of the temperate forest? A. Palm tree

plants	to that biome by name with 100% accuracy.	B. Brown algae C. Maple tree D. Cactus
3.2 Students will see a picture of the plant with a description	After viewing and listening to materials, student will be able to match a plant name with a picture with 100 % accuracy.	Which of the following is detail of a maple tree?  (Picture will be larger)
3.3 Students will read and hear about unique characteristics of the plant	After reviewing materials, students will be able to match plant with characteristic with 100% accuracy.	What unique characteristic does a maple tree have? A. It can float in water B. It has needle-like leaves C. It withdraws sap in autumn D. It has floating seeds
3.4 Students will learn why the plant's unique characteristics suit it for its environment	After answering previous questions, students will be able to identify why the plant's characteristic(s) suit it to the environment with 100% accuracy.	How does withdrawing sap help a maple tree? A. Allows the tree to spread offspring B. Prevents water loss C. Keeps the plant closer to the light D. Prevents breakage in winter
4. Students will learn about the animals in the biome	After completion of readings and audio files, students will be able to match animals to their biomes with 100% accuracy.	See sub-objectives below.
4.1 Students will hear and read the name(s) of the animal	After hearing about an animal, students can identify appropriate animal from a list with 100% accuracy.	Which animal would you find in a temperate forest? A. Brown bear B. Prairie dog C. Dolphin D. Polar bear
4.2 Students will see a picture of the animal with a	After learning about the animals of the biome, students will be	Which is the brown bear?

description	able to choose the appropriate one with 100% accuracy.	
4.3 Students will read and hear about unique characteristics of the animal	After reviewing materials, student will be able to select correct characteristics of an animal with 100% accuracy.	What can a brown bear do? A. Be camouflaged in snow B. Hibernate in winter C. Hold its breath under water D. Live in colonies underground
4.4 Students will learn why the plant's unique characteristics suit it for its environment	After identifying the characteristics of an animal, a student will be able to identify how those characteristics allow it to live in its biome with 100% accuracy.	Why is hibernating necessary for a large animal to live in a temperate forest? A. Conserving energy through winter B. Communicating with others C. Allows it to swim D. Allows it to attack prey
5. Has student learned about all biomes?	Question: no objective, assessment or example	
6. Student will complete cumulative assessment (quiz)	After completion of reading materials and optional review, students will pass the application quiz with 90% accuracy.	See sub-objectives
6.1 Student will complete practice questions	After reviewing quiz instructions, students will be able to complete practice questions with 100% accuracy.	An animal that can survive through all seasons will most likely live in the... A. Polar tundra B. Tropical rainforest C. Hot desert D. Temperate forest
TERMINAL:	Given fictional or real	"This is a Vobex. It is a plant

<p>Take the quiz online – demonstrate knowledge</p>	<p>animals, students will be able to match them with their appropriate biome on a multiple choice test with 90% accuracy.</p>	<p>eater with climbing claws. When it gets cold, its heart slows and it stops eating, but it thrives in warmth. Where would you most likely find this animal?</p> <ul style="list-style-type: none">A. Temperate forestB. Cold desertC. SavannahD. Chaparral regions
---	---	---

2. Instructional Sequence

Note that steps 1-5 loop until student has completed information for all biomes.

1. With access to the web site, students will listen to and read about one biome and show they have learned the location with 100% accuracy.



2. After reviewing the program, students will be able to describe the climate of a biome with 100% accuracy



2.1 After listening, students will be able to classify the typical temperatures of a biome with 100% accuracy.



2.2 After reviewing the materials, students will be able to describe (using relative terms) the typical rainfall of the biome with 100% accuracy.



3. When prompted after the lesson, students will be able to describe a plant in each biome with 100% accuracy.



3.2 After viewing and listening to materials, student will be able to match a plant name with a picture with 100 % accuracy.



3.3 After reviewing materials, students will be able to match plant with characteristic with 100% accuracy.



3.4 After answering previous questions, students will be able to identify why the plant's characteristic(s) suit it to the environment with 100% accuracy.



4.1 After hearing about an animal, students can identify appropriate animal from a list with 100% accuracy.



4. After completion of readings and audio files, students will be able to match animals to their biomes with 100% accuracy.



4.3 After reviewing materials, student will be able to select correct characteristics of an animal with 100% accuracy.



4.4 After identifying the characteristics of an animal, a student will be able to identify how those characteristics allow it to live in its biome with 100% accuracy.



(5. Question: no objective, assessment or example) This question will either send a student back to the beginning to repeat steps 1-5 for each biome, or will send students on to the final quiz.



6. After completion of reading materials and optional review, students will pass the application quiz with 90% accuracy.



6.1 After reviewing quiz instructions, students will be able to complete practice questions with 100% accuracy.



Given fictional or real animals, students will be able to match them with their appropriate biome on a multiple choice test with 90% accuracy.

3. Pre-instructional activities

Science may seem to be a daunting subject for many students, but most of it involves basic logic and observation with new vocabulary. Before this lesson is considered, it may be a good idea to help students learn to pay attention to the natural world around them and characteristics of different organisms and items in their world. This is not designed to be the first lesson of the year, and groundwork ought to be laid for such an activity.

To capture student attention, this activity will be online. This is more effective if all of the other lessons are not presented in the same format, but are varied. The bright colors and cartoon-like images will aid to capture the imagination of the students. Sounds will be used to aid in student understanding. The final quiz will involve a story to keep students motivated.

Other pre-instructional activities may include:

- Keeping text simple and straightforward. Students are learning new science concepts and don't need excessive amounts of jargon at this stage. It will be hard enough becoming familiar with the new biomes without more words to learn.
- Preparation of the online materials. As this instruction is solely computer-based, much effort must go into this lesson. Once it has been created, it will not need to be re-created, although modifications are encouraged.
- Students can learn the goal of the instruction. This is available online via a mouse click.
- Very basic entry-level skills are needed to keep novices from becoming discouraged.
- Observation to determine whether students will need help using the computer.
- Students will be told at the beginning what their final product (quiz completion) must be.

4. Information and Practice for each objectives (Objectives 1-5 repeat)

Objective #1	With access to the web site, students will listen to and read about one biome and show they have learned the location with 100% accuracy.
Content Presentation	
Content: (Online)	Student will select a biome and then read the materials enclosed.
Examples: (Online)	There are many types of forests. First, we will discuss the temperate forest. This forest is called temperate because it experiences all four seasons. Temperate forests are located roughly half way between the poles and the equator.
Student Participation	
Activities and practice item:	Where would you find a temperate forest? A. Antarctica B. Near the equator C. In the water D. Between the polar and tropical regions
Feedback:	Correct: D. Students either can proceed or are told the correct answer and are made to review material until question is answered correctly.

Objective 2	After reviewing the program, students will be able to describe the climate of a biome with 100% accuracy.
Content Presentation	
Content: (Online)	Pictures and description of temperate forests, including temperatures, rainfall (sub-objectives) and seasonal variation.
Examples: (Online)	Because the temperate forests are located in this region between the poles, it experiences all four seasons. It must survive warm or hot summers, cold winters, and everything in between.

Student Participation	
Activities and Practice item:	What is the climate like in a temperate forest? A. Hot and rainy B. Cold and dry C. All four seasons D. Hot and dry
Feedback:	Correct: C. Students either can proceed or are told the correct answer and are made to review material until question is answered correctly.

Objective 2.1	After listening, students will be able to classify the typical temperatures of a biome with 100% accuracy.
---------------	--

Content Presentation	
Content: (online)	Student see pictures of the temperate forest in each season. A thermometer may be present.
Examples: (Online)	In a temperate forest, the temperature in winter is often below freezing. Ice and snow are common. In summer, temperatures can be very hot.

Student Participation	
Activities and practice item	What are temperatures like in a temperate forest? A. Hot in summer, cold winters B. Hot all year long C. Cold all year long D. Medium all year long
Feedback: (online)	Correct: A. Students will be given correct answer if missed and be sent back to unit.

Objective 2.2	After reviewing the materials, students will be able to describe (using relative terms) the typical rainfall of the biome with 100% accuracy.
---------------	---


Content Presentation	
Content: (online)	Students will be shown pictures of temperate forests. Written text accompanies.
Examples:	Temperate forests receive enough rain that most plants don't struggle to survive, but not so much that they're considered rain forests.

Student Participation	
Activities and Practice question:	<p>What is rainfall like in a temperate forest?</p> <p>A. Lots – maybe 100 inches a year B. Average – neither very much or very little C. Very little – 10 or fewer inches annually D. Not applicable</p>
Feedback:	Correct: B. Student is allowed to proceed if correct or redirected if incorrect.

Objective #3	When prompted after the lesson, students will be able to describe a plant in each biome with 100% accuracy.
Content Presentation	
Content: (Online)	Student will be shown a sample plant from the temperate forest. It will have pictures and a description.
Examples:	One plant common in some temperate forests is the maple tree. (see also sub-objectives)
Student Participation	
Activities and practice item:	Contained in sub-objectives.
Feedback:	None. See above.

Objective 3.1	After the lesson, the student will be able to identify a plant typical to that biome by name with 100% accuracy.
Content Presentation	
Content: (online)	Student will be shown a specific plant (in this case a maple) and will be able given a description.
Examples:	Notice the wide leaves of the maple which gather sunlight. The woody bark of the tree protects it from both animals and from the weather. This tree is usually green in spring and summer, but turns bright red in fall and is bare in winter.

Student Participation	
Activities and Practice item	Which is a typical plant of the temperate forest? A. Palm tree B. Brown algae C. Maple tree D. Cactus
Feedback:	Correct answer is C. Student can proceed or returns to lesson.

Objective 3.2	After viewing and listening to materials, student will be able to match a plant name with a picture with 100 % accuracy.	
Content Presentation		
Content:	Student shown detail of the maple and a description	
Examples:	(See also above) Note the leaves of the maple tree. They are veined and wide.	
Student Participation		
Activities and sample item	(online) Which of the following is detail of a maple tree?	
Feedback: (online)	Correct answer is A. Students will be informed immediately and directed forward or back to review.	

Objective 3.3	After reviewing materials, students will be able to match plant with characteristic with 100% accuracy.	
Content Presentation		
Content:	Students are given pictures of maple leaves and a description of what happens to them in autumn.	
Examples:	The maple tree has a feature that allows it to survive the cold winters characteristic of the temperate forest. Inside the leaves is sap. This is the fluid that gives the tree energy. In autumn, the tree draws the sap back out of the leaves.	

Student Participation	
Activities and practice item:	<p>What unique characteristic does a maple tree have?</p> <p>A. It can float in water B. It has needle-like leaves C. It withdraws sap in autumn D. It has floating seeds</p>
Feedback:	Correct answer: C. Immediate redirection as feedback.

Objective 3.4	After answering previous questions, students will be able to identify why the plant's characteristic(s) suit it to the environment with 100% accuracy.
Content Presentation	
Content:	Students will see pictures of a temperate forest in winter and read the above information.
Examples:	(See also above) This turns the leaves the brilliant red color seen in fall. The leaves will then fall off and die, which ensures the branches won't break under the weight of the snow.

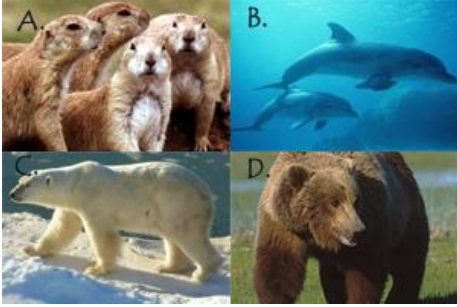
Student Participation	
Activities and practice item:	<p>How does withdrawing sap help a maple tree?</p> <p>A. Allows the tree to spread offspring B. Prevents water loss C. Keeps the plant closer to the light D. Prevents breakage in winter</p>
Feedback:	Correct answer: D. Immediate redirection.

Objective 4	After completion of readings and audio files, students will be able to match animals to their biomes with 100% accuracy.
Content Presentation	
Content:	(See sub-objectives)
Examples:	(See sub-objectives)

Student Participation	
Activities and practice item:	(See sub-objectives)
Feedback:	(See sub-objectives)

Objective 4.1	After hearing about an animal, students can identify appropriate animal from a list with 100% accuracy.
Content Presentation	
Content:	Pictures of bears in a forest presented with following text.
Examples:	The brown bear is one animal you are likely to find a temperate forest. It is a large animal capable of eating both plants and meat.
Student Participation	
Activities and practice item	Which animal would you find in a temperate forest? A. Brown bear B. Prairie dog C. Dolphin D. Polar bear
Feedback:	Correct answer: A. Immediate redirection.

Objective 4.2	After learning about the animals of the biome, students will be able to choose the picture of the appropriate one with 100% accuracy.
Content Presentation	
Content:	Student is shown pictures of the bear in its environment.
Examples:	Brown bears have wooly coats, and claws capable of climbing trees and catching prey.
Student Participation	

Activities and practice item:	Which is the brown bear?	
Feedback:	Correct is D. The student is re-directed.	

Objective 4.3	After reviewing materials, student will be able to select correct characteristics of an animal with 100% accuracy.	
Content Presentation		
Content:	Bears are seen (and heard) with descriptions of hibernation.	
Examples:	A brown bear must be able to survive through all seasons in the temperate forest. This animal cannot get enough food to survive during the winter, so it has developed a unique adaptation. It will eat a lot during summer and autumn, and then enter a state of sleep for winter. This is called hibernation.	
Student Participation		
Activities and practice item:	What can a brown bear do? A. Be camouflaged in snow B. Hibernate in winter C. Hold its breath under water D. Live in colonies underground	
Feedback:	B is correct answer. Immediate redirection.	

Objective 4.4	After identifying the characteristics of an animal, a student will be able to identify how those characteristics allow it to live in its biome with 100% accuracy.	
Content Presentation		
Content:	Pictures of hibernating bears will be shown, along with description.	
Examples:	The bear will not eat while hibernating, but the	

heart rate body processes slow so the bear does not use much energy. This allows the bear to not starve when food is scarce.	
Student Participation	
Activities and practice item:	Why is hibernating necessary for a large animal to live in a temperate forest? A. Conserving energy through winter B. Communicating with others C. Allows it to swim D. Allows it to attack prey
Feedback: A is the correct answer. Immediate response and redirect.	

Objective 5	Has student learned about all biomes? (Question: no objective, assessment or example)
Content Presentation	
Content:	After completion of one biome, student is question automatically returned to main menu. This question allows student to complete more biomes. When question desired, student can click on “take the quiz”
Examples:	N/A – question (automatic)
Student Participation	
Activities and practice item:	N/A - question
Feedback:	N/A - question

Objective 6	After completion of reading materials and optional review, students will pass the application quiz with 90% accuracy.
Content Presentation	
Content:	Student will be given practice, then be allowed to take final assessment (see sub-objectives).
Examples:	Now that you have completed all six biomes, you are ready to take the final quiz. You will be given sample questions and then be given opportunity to continue on to the quiz, or return to the biomes and review.

Student Participation	
Activities and practice item:	See sub-objectives
Feedback:	See sub-objectives

Objective 6.1	After reviewing quiz instructions, students will be able to complete practice questions with 100% accuracy.
Content Presentation	
Content:	Student will be given a couple practice questions which will demonstrate what quiz questions will be like.
Examples:	Read the following question and respond with the best answer
Student Participation	
Activities and practice item:	An animal that can survive through all seasons will most likely live in the... A. Polar tundra B. Tropical rainforest C. Hot desert D. Temperate forest
Feedback:	Correct answer is B. Student will receive immediate feedback. Student can then choose whether to proceed or return and review.

5. Strategy for Teaching Terminal Objective

Terminal Objective	Given fictional or real animals, students will be able to match them with their appropriate biome on a multiple choice test with 90% accuracy.
Content Presentation	
Content:	A student is given a fictional scenario where strange plants and animals must be placed in the correct biomes.
Examples:	You are on a scientific expedition to a strange, alien planet. This planet has the same biomes that Earth has. Robots went out to gather plants and animals from this planet, and have brought the samples back to you. Your job is to decide which earth biome they would best survive in. You have 20 samples, and you must place at least 18 of them correctly.
Student Participation	
Activities and	<p>“This is a Vobex. It is a plant eater with climbing claws. When it gets cold, its heart slows and it stops eating, but it thrives in warmth. Where would you most likely find this animal?</p> <p>A. Temperate forest B. Cold desert C. Savannah D. Chaparral regions</p> <p>Feedback: Correct answer is A. Feedback given after all 20 questions are complete.</p>

6. Pre and posttests

1) Pre-test

No pretest is given. The only pre-requisite is the ability to use a computer (point and click technology) and that can be assessed through observation. Because this material can be applied to very basic learners, no additional pre-testing is needed. It is assumed that this will be applied to late-elementary through high school students.

2) Post-test

Sample only. Questions will not be in this order, nor are all questions included on every sample quiz. As there are multiple biomes, approximately three questions from each biome (plus two others) will be in the final. There will be a sampling of all biomes and all objectives. Only sample questions related to the temperate forest are shown.

“This is a Vobex. It is a plant eater with climbing claws. When it gets cold, its heart slows and it stops eating, but it thrives in warmth

Objective 1

Where would you most likely find this animal?

- A. Antarctica
- B. Near the equator
- C. In the water
- D. Between the polar and tropical regions

Objective 2

What is the climate like where the vobex lives?

- A. Hot and rainy
- B. Cold and dry
- C. All four seasons
- D. Hot and dry

Objective 2.1

What is the temperature like in the area the vobex lives?

- A. Hot in summer, cold winters
- B. Hot all year long
- C. Cold all year long
- D. Medium all year long

Objective 2.2

What amount of rain will the vobex likely encounter?

- A. Lots – maybe 100 inches a year
- B. Average – not very much or too little
- C. Very little – 10 or fewer inches annually
- D. Not applicable

Objective 3

(See sub-objectives)

The following is a smalypsis tree. When the weather gets cold, the branches fold up like an umbrella, but when it's warm, the leaves extend (picture of an umbrella-like tree)

Objective 3.1

Which plant would probably live in a similar biome?

- A. Palm tree
- B. Brown algae
- C. Maple tree
- D. Cactus

Objective 3.2

What might a leaf from the smalypsis tree look like?

- A. Wide with veins
- B. Watery and held up with bubbles
- C. Sharp and needle-like
- D. Evergreen and large

Objective 3.3

What other characteristic would you expect for the smalypsis tree?

- A. It can float in water
- B. It has needle-like leaves
- C. It withdraws sap in autumn
- D. It has floating seeds

Objective 3.4

Why might the smalypsis fold?

- A. Allows the tree to spread offspring
- B. Prevents water loss
- C. Keeps the plant closer to the light
- D. Prevents breakage in winter

Objective 4.

(See sub-objectives)

Objective 4.1 (Review the Vobex from Objective 1 instructions)

What animal on earth does the vobex most resemble?

- A. Brown bear
- B. Prairie dog
- C. Dolphin
- D. Polar bear

Objective 4.2

Which is the vobex? (Student must choose between four pictures)

- A. Small ground creatures in holes
- B. Water-dwelling beast
- C. Ice-dwelling animal
- D. Forest meat-eater

Objective 4.3

What might a vobex be able to do?

- A. Be camouflaged in snow
- B. Hibernate in winter
- C. Hold its breath under water
- D. Live in colonies underground

Objective 4.4

Why is would a slower heart be good for the vobex?

- A. Conserving energy through winter
- B. Communicating with others
- C. Allows it to swim
- D. Allows it to attack prey

Objective 5.

No assessment

Terminal objective

20 questions from all six biomes will be selected from samples above and similar samples from each biome. Biomes will be mixed, and 3-4 questions for each biome area will be assessed.

Reflection:

Wow, this was a mess. I can see why this was supposed to be a team project. I have been swamped with the amount of work there is to do both to design and create my lesson. There is so much detail involved with the reports. I'm used to working without writing every detail down, and I'm having to think through steps I haven't thought about in a long time. This feels like writing the instructions on how to tie a shoe after you've done it automatically for 30 years.

I was waylaid by doing this incorrectly the first time. I had no idea that I was doing it wrong, and have been struggling to catch up. I have so much to do that I feel completely behind and frankly a bit discouraged. I have been working hard, but there is so much more to do. I had no idea I was headed wrong, and it has put me a couple weeks behind. I'll have to work extra hard to get where I need to be. Meanwhile, I'm missing points all over the place and am not sure how I can possibly do well.

Once I learned what I was doing wrong, this came together much easier. I can see why some questions are worded the way they are on national tests now. I don't necessarily agree it's the best way to write them, but I understand them better. I'm also getting an idea of how much work goes into single questions for assessment too.