Activity 10.1: Characteristics of Inductive Models

**Learning Outcomes**

**Learning Outcome 1:** Students can distinguish among the inductive models.

**Standards:**

**INTASC Standard 3: Diverse Learners:** The teacher understands how students differ in their approaches to learning and creates instructional opportunities that are adapted to diverse learners.

3.1 designs instruction appropriate to students’ stages of development, learning styles, strengths and needs.

The Interstate New Teacher Assessment and Support Consortium (INTASC) standards were developed by the Council of Chief State School Officers and member states. Copies may be downloaded from the Council’s website at [http://www.ccsso.org](http://www.ccsso.org).


**Assignment Introduction Text:** In the Induction Models Template folder, you will see outlines for the four inductive models: General Inductive, Concept Attainment, Concept Development, and Integrative. Read each of the templates carefully and return to this exercise and answer the questions.

**Asset:** Induction Models Template Folder

[http://media.pearsoncmg.com/ab/ab_ab_mymyeducationlab_1/artifacts/Inductive_Template.pdf](http://media.pearsoncmg.com/ab/ab_ab_mymyeducationlab_1/artifacts/Inductive_Template.pdf)

**Question 1 Text:** How are all four models of inductive instruction similar?

**Question 1 Hint:** What are students doing in the model? What are teachers doing in the model?

**Question 1 Feedback:** In all four models, teachers structure their lessons by providing specific examples that are aligned with lesson objectives and deciding when to present the examples or when to encourage students to continue examination of the examples. Teachers also control pacing. They look for and remediate student misconceptions and make explicit links to prior knowledge. Teachers also structure a collaborative, social, and safe learning community in which inductive thinking is promoted. Students are asked to examine examples, and come up with or induce ideas about concepts and/or generalizations. They are drawing relationships between prior knowledge and
experiences and the new information being presented as they construct their personal knowledge. Students are working collaboratively with others to identify important characteristics and rules.

**Question 2 Text:** What are the similarities and differences between the concept development and concept attainment models?

**Question 2 Hint:** What types of knowledge and skills do students have at the end of the lessons?

**Question 2 Feedback:** Both the concept attainment and concept development models have narrow lesson objectives. In a concept development lesson, the objective is to explore a specific concept and its relationships with other concepts. The objective of the concept attainment model is even narrower—to construct a definition of a specific concept by identifying its essential characteristics. In both types of lessons, the teacher organizes the concept examples. In concept attainment, the teacher also identifies non-examples of the concept. The similarities of the models are that (1) the environment is structured so that students can construct new knowledge by adding to or making new knowledge schema; (2) students work collaboratively to construct this knowledge; (3) students identify essential characteristics of concepts and generalizations; and (4) examples, non-examples, generalizations, and rules and principles are selected and organized by the teacher.

**Question 3 Text:** What are the similarities and differences between the inductive model and the integrative model?

**Question 3 Hint:** What types of knowledge and skills do students have at the end of the lesson?

**Question 3 Feedback:** Both the inductive and integrative models allow students to induce concept characteristics and/or relationships among concepts. In both lessons, the teacher structures the amount and format of data, the social structure of the classroom environment, and the pacing of the lesson. The inductive lesson allows students to focus on concepts and generalizations. The integrative model typically focuses on complex bodies of information so that the objectives of the lesson are ideas about the relationships among concepts. In both cases, data can be in abstract or physical form.

**Activity 10.2: Using Inductive Models**

**Learning Outcomes**

**Learning Outcome 2:** Students will be able to identify when to use general inductive, concept attainment, concept development, and integrative models in their teaching.

**Standards:**
INTASC Standard 4: Multiple Instructional Strategies: The teacher understands and uses a variety of instructional strategies to encourage student development of critical thinking, problem solving, and performance skills.
   4.1 selects and uses multiple teaching and learning strategies (a variety of presentations/explanations) to encourage students in critical thinking, problem solving.

INTASC Standard 7: Planning: The teacher plans instruction based upon knowledge of subject matter, students, the community, and curriculum goals.
   7.2 develops plans that are appropriate for curriculum goals and are based on effective instruction.

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Assignment Introduction Text: In the Induction Models Template folder, you will see outlines for the four inductive models: General Inductive, Concept Attainment, Concept Development, and Integrative. Read each of the templates carefully, and return to this exercise and answer the questions about the individual scenarios.

Asset: Inductive Models Template Folder
http://media.pearsoncmg.com/ab/ab_ab_myeducationlab_1/artifacts/Inductive_Template.pdf

Question 1 Text: Mabel Ross is preparing her first-grade class for a science lesson. The students will be classifying liquids and solids that will and will not dissolve in water. She will be using vinegar, milk, baking soda, powdered drink mix, sugar, salt, sand, oil, and rocks and both hot and cold water. Students will make a graph of their findings, and Ms. Ross would like to use that graph to help students make some generalizations about the role of temperature in how materials dissolve in water. Which inductive model should Ross use in her class and why?

Question 1 Hint: Students will be examining data, describing, predicting, and making generalizations.

Question 1 Feedback: Ross should use the integrative model so that her students can begin to construct important generalizations from the information. By examining the data set (the graph that represents their scientific inquiry), her young students will be able to note patterns in their findings and construct personal knowledge about how specific items dissolve in water. Through careful questioning and scaffolding, Ross will be able to help
her students explain the similarities and differences of each substance in water and hypothesize about why a particular reaction happened as it did. Students may even be able to predict what would happen with different substances in hot or cold water. Ross can then help students come up with summary statements (generalizations) that will hold true for all the events that the students tested.

**Question 2 Text:** In her seventh-grade classroom, Wanda Fink is preparing a lesson on energy resources. Her objective is that students will be able to classify energy resources so the pros and cons of each resource will be identified. She especially wants students to identify the following resources: coal, hydropower, geothermal, natural gas, nuclear, oil, solar, and wind. Which inductive model could Fink use in her classroom and why?

**Question 2 Hint:** Students will be classifying different ideas about energy resources into groups and labeling the groups.

**Question 2 Feedback:** Students will be classifying knowledge about energy resources from their prior understandings. The objective of the lesson asks students to refine, develop, and extend the concept of energy resources—the purpose of a concept development lesson. The concept development model allows students to increase their understanding of complicated concepts by working together to group and regroup and label categories of concepts, eventually making generalizations based on the groups.

**Question 3 Text:** In an economics unit, Tom Holcomb wants his students to understand that patterns of consumer spending represent commonly held values. He wants students to make generalizations about a specific consumer item and decides that the item will be gift bags. He notices that gift bags are sold in many different stores and come in what appears to be an infinite variety. By asking students to think about gift bags and the values that gift bags represent, Holcomb is hoping students will be able to look at a variety of consumer items and analyze the commonly held values that they represent. Which inductive model is a good fit for the goals of this lesson?

**Question 3 Hint:** Students are asked to examine a variety of items and make sense of what they have in common and how they are different, so that the students can make generalizations about the items.

**Question 3 Feedback:** The general inductive model is a good fit for this lesson. The inductive model is based on the idea that we construct our own knowledge by building conceptual categories. The gift bag lesson will allow students to work together to identify the surface similarities and differences in the gift bags, why and when the gift bags are used, and how gifts are seen in our society. The teacher’s questions are essential for helping students gain deep conceptual understanding during the lesson, which allows for the identification of relationships among the items and the way we live our lives.

**Question 4 Text:** Tom Daly is beginning a unit on animal adaptation in winter. He will be discussing how animals hibernate, migrate, or adapt during the cold winter months. To begin the unit, Tom wants students to engage in thinking about the concept of a
hibernating animal and has decided he will show pictures, stuffed animals, and a video of hibernating animals as examples. He will then contrast those pictures, stuffed animals, and video with animals that either adapt or migrate in the winter. To which inductive model should Tom refer as he plans this introductory lesson and why?

**Question 4 Hint:** Which model asks students to compare examples and non-examples?

**Question 4 Feedback:** Concept attainment is an instructional model that helps students define a concept by looking at examples and non-examples of the concept and paying attention to what attributes are essential to that concept. Once the essential attributes of the concept are identified, students can construct their own definition. This is a collaborative activity that is a good beginning for a unit. Students use the concept attainment process in their everyday life, but may need structure when first using it in the classroom.

**Activity 10.3: Choosing Appropriate Content**

**Learning Outcomes**

**Learning Outcome 3:** Identify and distinguish between specific facts, concepts, generalizations, and skills that are aligned with the instructional procedures of inductive models.

**Standards:**

**INTASC Standard 1: Content Pedagogy:** The teacher understands the central concepts, tools of inquiry, and structures of the discipline he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

1.1 demonstrates an understanding of the central concepts of his or her discipline.
1.2 uses explanations and representations that link curriculum to prior learning.
1.3 evaluates resources and curriculum materials for appropriateness to the curriculum and instructional delivery.

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**Assignment Introduction Text:** In a list of facts, concepts, generalizations, and skills, you will choose those that are aligned with the inductive models of instruction.

**Asset:** List of Information and Skills
Question 1 Text: Which of the facts, concepts, generalizations, and skills on the list are aligned with inductive models of instruction? Explain why.

Question 1 Hint: Inductive models of instruction promote students’ inductive thinking—careful observation; collecting and organizing information; forming categories, generalizations, and hypotheses; and using knowledge and skills appropriately.

Question 1 Feedback: The following information and skills are appropriate for inductive teaching models because they are concepts or skills that can be shown to students through examples (and non-examples), allowing for careful observation and the construction of categories, definitions, and hypotheses: nutrition, peaceful conflict resolution, improper use of medicine, bullying prevention strategies, body systems, and strategies for handling stress. Designing a fitness program, determining the relationship of social and environmental factors to community health, writing a poem, learning a tennis serve, setting up an experiment, and the critical evaluation of how media presents health information are less congruent with the inductive models because they require more explicit instruction and feedback for student learning.

Activity 10.4: Examples and Non-Examples

Learning Outcomes

Learning Outcome 4: Defend the attention necessary for choosing examples and non-examples in inductive models.

Standards:

INTASC Standard 2: Student Development: The teacher understands how children learn and develop and can provide learning opportunities that support a child’s intellectual, social, and personal development.

2.2 creates relevance for students by linking with their prior experiences.
2.4 encourages student reflection on prior knowledge and its connection to new information.
2.5 accesses student thinking as a basis for instructional activities through group/individual interaction and written work (listening, encouraging, discussion, eliciting samples of student thinking orally and in writing).

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Assignment Introduction Text: In this video, a fifth-grade teacher is helping students understand the concept of arthropods. She has chosen several positive, negative, and test examples to help students construct the concept and relate it to prior knowledge and experiences. Watch the video, think about the examples, and return to answer this activity’s questions.

Video Asset: Concept Teaching: Arthropods


Question 1 Text: In the video, the teacher chooses positive and negative examples of arthropods. Explain why you believe she chose the specific examples that she did.

Question 1 Hint: The teacher uses the positive examples of a lobster and cockroach and the negative examples of a clam and turtle.

Question 1 Feedback: The teacher uses realia (real things) for the examples and non-examples of arthropods. Each is small enough to bring into the class and big enough to be seen by the naked eye. Each of the examples (positive and negative) is able to be walked around the classroom for closer examination. Most students are familiar with the specific examples, yet become engaged when the first example—the lobster—is unveiled. The teacher appears to have considered the size of the example, and how the examples will engage the students (surprise in the instance of the lobster and clam, familiarity of the cockroach and turtle). The most important consideration is that all the examples have the essential characteristics of arthropods (exoskeleton, segmented body, segmented legs) and the non-examples do not.

Question 2 Text: Ms. Lampkin identified the concept—arthropods—before asking students to observe the first example of the concept. Why do you think that she provided the students with the name of the category in which the examples fit?

Question 2 Hint: The essential characteristics of arthropods can be confusing to elementary students.

Question 2 Feedback: Because the teacher’s first concern was to help the students discover the essential characteristics of arthropods and the concept name—arthropod—was new to the students, it made sense to tell them the name of the category in which the examples fit. Students could then focus all their attention on its characteristics.
**Question 3 Text:** If you were teaching this lesson, what other examples and/or non-examples would you use? How would you decide?

**Question 3 Hint:** Other arthropod examples include spiders, scorpions, crabs, crayfish, ants, grasshoppers, and crickets. Non-examples could be people, whales, cranes, bluebirds, snakes, gorillas, frogs, and toads.

**Question 3 Feedback:** As teachers make decisions about what specific examples and non-examples are being used in a lesson, there are several things that need to be considered. Too many essential characteristics or characteristics that are complex and/or convoluted can be too difficult for some students and classes. An unfamiliar example can make identifying the essential characteristics more difficult. Non-examples must have contrasting characteristics so that by comparing the examples and non-examples, students will be able to identify which characteristics make an example. So, when you decide on examples and non-examples, you need to consider these three principles: (1) the number of essential characteristics; (2) familiarity; and (3) contrasting characteristics.