AIM Teacher Questionnaire
User Manual

Overview

The AIM Teacher Questionnaire is a three part multiple-choice questionnaire developed for elementary and middle grades science teachers to describe their teaching of a science unit on one of four topics: Evolution and Diversity, Force and Motion, Populations and Ecosystems, and Properties of and Changes in Matter. Eight versions of the questionnaire exist, one for each of the four topics at two grade ranges (grades 3–5 and 6–8).

This user manual describes the background, development, measurement properties, and appropriate uses of the questionnaire. User manuals for other AIM instruments may be found at http://www.horizon-research.com/aim/instruments/.

Background

Horizon Research, Inc. (HRI) developed the AIM Teacher Questionnaire as part of a larger study. The project—Assessing the Impact of the MSPs: K–8 Science (AIM)—was funded by the National Science Foundation under Grant no. DUE-0928177.[1] One goal of AIM was to develop instruments that researchers could use to study the theory of action that underlies much professional development for science teachers. Briefly, the model asserts that changes in teacher knowledge lead to changes in classroom practice (mediated by instructional materials), and ultimately, changes in student learning (see Figure 1). Despite the prominent role this model plays in professional development design, it has not been studied systematically, in part because of a lack of instruments. Among other products, AIM developed a teacher questionnaire—for elementary and middle school science teachers—to examine the relationships among teacher content knowledge, classroom practices, and student learning, controlling for a variety of factors that may mediate these relationships.

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[1] Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

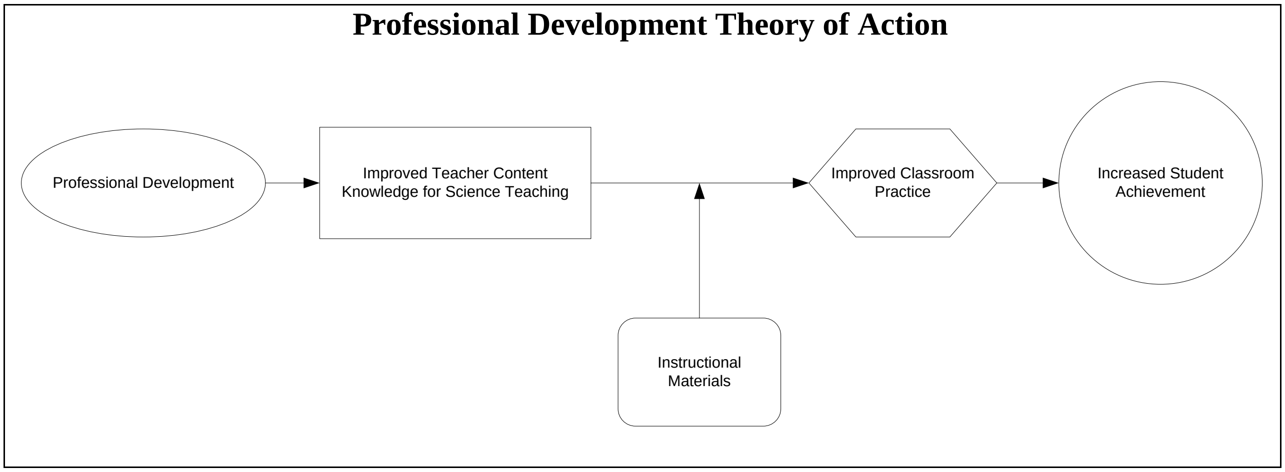

Figure 1

Development of the AIM Teacher Questionnaire

As described above, this development effort was part of a much larger and well-funded project, which afforded a thorough development process for the Teacher Questionnaire.

Clarifying the Questionnaire Content

The logic model in Figure 1 was unpacked in order to determine the domains to be addressed by the teacher questionnaire. Within each domain, several constructs to be measured were identified. The final domains and constructs are shown in Table 1. The domains cover a range of topics, from teachers' perceived notions of their own preparedness to teach science topics, to the practices they employed in their science unit.

Item Development

The developers looked to existing instruments, such as the Surveys of Enacted Curriculum (CCSSO, 2005), to address the identified domains and constructs. When necessary, the existing items were modified in order to better align with AIM's goals. Additional items were newly developed to address the remaining areas. Table 1 lists the sources of each of the items on the AIM Teacher Questionnaire.

In order to reduce teachers' time burden, the items were split among three instruments. The teacher background and class information items are included on a registration page that teachers complete before joining the study. Items about factors that affect science instruction, teachers' perceptions of preparedness, views on effective instruction, and student attitudes about science, were designated for the pre-instruction questionnaire, which teachers complete prior to teaching their science unit. The remaining items, including items related to teachers' instruction during the targeted science unit, and are found on the post-instruction questionnaire. The location and sources of the items on the three instruments is listed in Table 1.

Table 1
Teacher Questionnaire Domains and Constructs

Domain	Construct	Location	Source
Teacher background	Years teaching	Registration Q3	
	Years teaching science	Registration Q4	
	Years teaching this content	Pre Q7	
Class Information	Number of learning disabled	Registration Q10	
	Number of LEP	Registration Q11	
Enablers/inhibitors of science instruction	Teacher collaboration	Pre Q1 all	Adapted from the Chicago Consortium on Chicago School Research survey[2]
	Principal support	Pre Q2 all	Local Systemic Change Teacher Questionnaire[3]
	Supportiveness of context	Pre Q3	Adapted from the Local Systemic Change Teacher Questionnaire[4]
	Science coach support	Post Q7	
Perceptions of preparedness	Preparedness to teach different subjects (self-contained teachers only)	Pre Q4 all	2000 National Survey of Science and Mathematics Education, Science Questionnaire[5]
	Preparedness to teach the topic	Pre Q6 all	
	Self-Efficacy	Pre Q5 all	
Teacher views on effective instruction	Confirmatory Science Instruction	Pre Q8 a, b, f, g, k, m, s, v, x	Teacher Beliefs about Effective Science Teaching (TBEST) Questionnaire[6]
	Hands-on is always good	Pre Q8 e, j, p	
	Learning theory aligned instruction	Pre Q8 c, d, h, i, l, n, o, q, r, t, u, y	
Student Attitudes	Towards school	Post Q1 all	Adapted from the Student Attitudes

[2] Bryk, A. S. & Schneider, B. (2002). *Trust in schools: A core resource for improvement.* New York, NY: Russell Sage Foundation.
[3] Horizon Research, Inc (2006). Local systemic change through teacher enhancement science K-8 teacher questionnaire. Chapel Hill, NC: Author.
[4] Horizon Research, Inc (2006). Local systemic change through teacher enhancement science K-8 teacher questionnaire. Chapel Hill, NC: Author.
[5] Weiss, I. R., Banilower, E. R., McMahon, K. C., & Smith, P. S. (2001). *Report of the 2000 National Survey of Science and Mathematics Education*. Chapel Hill, NC: Horizon Research, Inc.
[6] Smith, P. S., Smith, A. A., & Banilower, E. R. (2014) Situating beliefs in the theory of planned behavior: The development of the teacher beliefs about effective science teaching questionnaire. In R Evans, J. Luft, C. Czerniak, & C. Pea (Eds.), *The role of science teachers' beliefs in international classrooms: From teacher actions to student learning* (pp. 81–102). Rotterdam, The Netherlands: Sense Publishers.

			Towards Astronomy Pre-Test[7]
	Towards science	Post Q2 all	
Instruction	Time on topic	Post Q3, 5, 6	
	Coverage of topic	Post Q4	
	Focus on topic during unit	Post Q5-6	
	Instructional materials used for topic	Post Q8-9	
	Student grouping	Post Q10	
	Instructional practices (not necessarily aligned with learning theory)	Q11 c, e, g, h, j, k, l	Adapted from the Surveys of Enacted Curriculum[8]
	Instructional practices (aligned with learning theory)	Post Q11 a, b, d, f, i, m, n, o	

Measurement Properties of the Questionnaire

The following section includes a description of the validity and reliability of the questionnaire.

Validity

Two lines of evidence support the argument that the questionnaire is a valid measure of science teachers' instructional practice. First, members of the AIM Advisory Board provided feedback on the questionnaire's domains and constructs, as well as the initial draft of items. The questionnaire was subsequently revised based on this feedback. Second, a small pilot study was conducted on three local teachers consisting of a cognitive interview regarding the pre-instruction questionnaire, observation by an AIM researcher for one week of instruction, and a cognitive interview regarding the post-instruction questionnaire. The cognitive interviews provided valuable feedback for improving the item wording, and the observation data provided some evidence of the validity of the questionnaire items regarding instruction.

Reliability

Some of the individual questionnaire items were grouped into composite variables, which have the advantage of being more reliable than individual items. The composites created from the questionnaire items align with the constructs listed in Table 1.

Definitions for the composites, along with their reliabilities, can be found in Tables 2 and 3.

Table 2
Pre-Instruction Teacher Questionnaire Composite Definitions and Reliability

Composite Name	Items in Composite	Cronbach's Coefficient Alpha Reliability
Teacher	1a. Teachers at my grade level have a shared vision of effective science instruction.	.900

[7] Zeilik, M., Schau, C., & Mattern, N. (1999). Conceptual astronomy. II. Replicating conceptual gains, probing attitude changes across three semesters. *American Journal of Physics*, *67*(10), 923-927.
[8] Council of Chief State School Officers. (2005). Surveys of Enacted Curriculum: Tools and Services to Assist Educators. Washington, DC: Author.

Collaboration	1b. Teachers in this school have a shared vision of effective science instruction. 1c. I feel supported by colleagues to try out new ideas in teaching science. 1d. Teachers in this school share ideas for teaching science. 1e. Teachers in this school discuss samples of student science work. 1f. Teachers in this school discuss science lessons for teaching a concept. 1g. Teachers in this school discuss teaching approaches for students under-performing in science. 1h. Teachers in this school discuss science concepts to improve their own understanding. 1i. Teachers in this school share ideas for preparing students for district/state science assessments. 1j. Teachers in this school discuss the instructional implications of student performance on district/state science assessments.	
Beliefs about Principal Support	2a. My principal encourages me to select science content and instructional strategies that address individual students' learning. 2b. My principal accepts the noise that comes with an active science classroom. 2c. My principal encourages the implementation of state/district standards in science education. 2d. My principal encourages innovative science instructional practices. 2e. My principal enhances the science program by providing me with needed materials and equipment. 2f. My principal provides times for teachers to meet and share ideas about science teaching. 2g. My principal encourages me to observe exemplary science teachers. 2h. My principal is knowledgeable about effective instructional practices in science. 2i. My principal provides useful feedback to teachers about their science instruction. 2j. My principal acts as a buffer between teachers and external pressures (e.g., parents).	.904
Perceptions of Science Teaching Ability	5a. I am continually finding better ways to teach science. 5b. I know how to teach science concepts effectively. 5c. I am not very effective in monitoring science experiments/investigations. 5d. I generally teach science ineffectively. 5e. I understand science concepts well enough to be effective in teaching science. 5f. I find it difficult to explain to students why science experiments/investigations work. 5g. I am typically able to answer students' science questions. 5h. I wonder if I have the necessary skills to teach science. 5i. Given a choice, I would not invite the principal to evaluate my science teaching. 5j. When a student has difficulty understanding a science concept, I am usually at a loss as to how to help the student understand it better. 5k. When teaching science, I usually welcome student questions. 5l. I don't know what to do to turn students on to science.	.834
Perceptions of Preparedness to Teach Elementary Force and Motion	6a. An object's position can be described by locating the object relative to other objects or a background. 6b. The description of an object's motion from one observer's view may be different from that reported from a different observer's view. 6c. An object is in motion when its position is changing. 6d. The speed of an object is defined by how far it travels divided by the amount of time it took to travel that far. 6e. The motion of objects can be changed by pushing or pulling. 6f. The size of the change is related to the size of the force (push or pull) and the weight (mass) of the object on which the force is exerted. 6g. Earth pulls down on all objects with a force called gravity. 6h. A change in an object's motion is a change in its speed, or its direction, or both. 6i. A force is a push or pull exerted on one object by another object when they interact with one another. 6j. An object's motion can be described completely by its speed and the direction in which it is moving. 6k. Some forces between objects act when the objects are in direct contact or when	.912

	they are not touching. 6l. Forces have magnitude and direction.	
Perceptions of Preparedness to Teach Elementary Diversity of Life	6a. Different environments have different features that affect organisms' abilities to survive and reproduce. Some important features are climate, light level, soil nutrients, and the presence of other organisms. 6b. A characteristic provides an advantage if it usually allows the number of individuals that have it to increase; a characteristic provides a disadvantage if it usually causes the number of individuals that have it to decrease. 6c. Organisms with characteristics that best meet the challenges of their environment are most likely to survive and reproduce. 6d. A set of characteristics that provides an advantage in one environment is likely to be different than one that provides an advantage in other environments. 6e. Different sets of characteristics allow different types of organisms to survive and reproduce in the same environment. 6f. Organisms of the same type differ in their characteristics. 6g. Organisms of the same type living in the same environment differ in their ability to survive and reproduce.	.898
Beliefs about Teaching Science Using Learning Theory-Aligned Practices	8d. Students should rely on evidence from classroom activities, labs, or observations to form conclusions about the science concept they are studying. 8h. Teachers should provide students with opportunities to connect the science they learn in the classroom to what they experience outside of the classroom. 8i. Teachers should ask students to support their conclusions about a science concept with evidence. 8l. At the beginning of instruction on a science concept, students should have the opportunity to consider what they already know about the concept. 8n. Teachers should provide students with opportunities to apply the concepts they have learned in new or different contexts. 8o. Students should use evidence to evaluate claims about a science concept made by other students. q. At the beginning of lessons, teachers should "hook" students with stories, video clips, demonstrations, or other concrete events/activities in order to focus student attention. r. Students' ideas about a science concept should be deliberately brought to the surface prior to a lesson or unit so that students are aware of their own thinking. t. Students should have opportunities to connect the concept they are studying to other concepts. u. Students should consider evidence that relates to the science concept they are studying. y. Students should consider evidence for the concept they are studying, even if they do not do a hands-on or laboratory activity related to the concept.	.734
Beliefs about Teaching Science Using Confirmatory Practices	8a. At the beginning of instruction on a science concept, students should be provided with definitions for new scientific vocabulary that will be used. 8b. Hands-on activities and/or laboratory activities should be used primarily to reinforce a science concept that the students have already learned. 8g. Teachers should explain a concept to students before having them consider evidence that relates to the concept. 8m. Students should do hands-on activities after they have learned the related science concepts. 8s. Teachers should provide students with the outcome of an activity in advance so students know they are on the right track as they do the activity. 8v. When students do a hands-on activity and the data don't come out right, teachers should tell students what they should have found. 8x. Students should know what the results of an experiment are supposed to be before they carry it out.	.781
Beliefs about Teaching Science Using Hands-on Over	8e. Teachers should have students do hands-on activities, even if the data they collect are not closely related to the concept they are studying. 8j. Students should do hands-on or laboratory activities, even if they do not have opportunities to reflect on what they learned by doing the activities.	.722

All Else Practices	8p. Teachers should have students do interesting hands-on activities, even if the activities do not relate closely to the concept being studied.	

Table 3
Post-Instruction Teacher Questionnaire Composite Definitions and Reliability

Composite Name	Items in Composite	Cronbach's Coefficient Alpha Reliability
Perceptions of Students' Attitudes Toward School	1a. Students in this class are interested in school. 1b. Students in this class usually complete their assignments. 1c. Students in this class don't like school. 1d. Students in this class get along well with teachers. 1e. Students in this class often disrupt other students. 1f. Students in this class usually try hard. 1g. Students in this class want to do well in school.	.919
Perceptions of Students' Attitudes Toward Science	2a. Students in this class like science. 2b. Students in this class enjoy science instruction. 2c. Students in this class find it difficult to understand science concepts. 2d. Students in this class think science is important for society. 2e. Students in this class are scared of science. 2f. Students in this class understand how they can use science in their everyday lives.	.772
Extent of Use of Instructional Practices (Not Learning Theory Aligned)	11c. Listen and/or take notes during presentations by teachers 11e. Watch a science demonstration 11g. Read from a science textbook in class 11h. Read other (non-textbook) science-related materials in class 11j. Do hands-on/laboratory science activities or investigations 11k. Answer textbook or worksheet questions 11l. Watch audiovisual presentations (e.g., videotapes, CD-ROMS, videodiscs, television programs, films, or filmstrips)	.706
Extent of Use of Instructional Practices (Learning Theory Aligned)	11a. Consider, individually or in small groups, their initial thinking about these concepts 11b. Make public/share their initial thinking about these concepts 11d. Consider data/examples that they can use to draw conclusions about the concepts 11f. Support claims about these concepts using data/examples as evidence 11i. Consider and discuss each other's claims about these concepts using data/examples as evidence 11m. Reflect on what they were supposed to learn from the activities related to these concepts 11n. Consider how their thinking about these concepts has changed 11o. Apply or connect what they learned about these concepts to other scenarios, contexts, or concepts	.882

Using the Questionnaire

All versions of the AIM Teacher Questionnaire can be found at the end of this user manual. The AIM Teacher Questionnaire is available at no cost; however, in any writing in which data from HRI's AIM questionnaire are included, the following citation must be used:

The questionnaire was developed by the Assessing the Impact of the MSPs: K–8 Science (AIM) project at Horizon Research, Inc., funded by the National Science Foundation under grant

number DUE-0928177. Any opinions, findings, and conclusions or recommendations expressed herein are those of the authors and do not necessarily reflect the views of the National Science Foundation or Horizon Research, Inc.

AIM
Interdependence
Grades 3–5 Teacher Questionnaire (PRE)

1. Please indicate the extent to which you agree or disagree with the following statements about the school in which you work. *(Select one on each line.)*

	Strongly disagree	Disagree	Agree	Strongly agree
a. Teachers at *my grade level* have a shared vision of effective science instruction.	○	○	○	○
b. Teachers in *this school* have a shared vision of effective science instruction.	○	○	○	○
c. I feel supported by colleagues to try out new ideas in teaching science.	○	○	○	○
d. Teachers in this school share ideas for teaching science.	○	○	○	○
e. Teachers in this school discuss samples of student science work.	○	○	○	○
f. Teachers in this school discuss science lessons for teaching a concept.	○	○	○	○
g. Teachers in this school discuss teaching approaches for students under-performing in science.	○	○	○	○
h. Teachers in this school discuss science concepts to improve their own understanding.	○	○	○	○
i. Teachers in this school share ideas for preparing students for district/state science assessments.	○	○	○	○
j. Teachers in this school discuss the instructional implications of student performance on district/state science assessments.	○	○	○	○

2. My principal: (*Select one on each line.*)

	Strongly disagree	Disagree	Agree	Strongly agree
a. Encourages me to select science content and instructional strategies that address individual students' learning.	○	○	○	○
b. Accepts the noise that comes with an active science classroom.	○	○	○	○
c. Encourages the implementation of state/district standards in science education.	○	○	○	○
d. Encourages innovative science instructional practices.	○	○	○	○
e. Enhances the science program by providing me with needed materials and equipment.	○	○	○	○
f. Provides time for teachers to meet and share ideas about science teaching.	○	○	○	○
g. Encourages me to observe exemplary science teachers.	○	○	○	○
h. Is knowledgeable about effective instructional practices in science.	○	○	○	○
i. Provides useful feedback to teachers about their science instruction.	○	○	○	○
j. Acts as a buffer between teachers and external pressures (e.g., parents).	○	○	○	○

3. Please rate the effect of each of the following on **your** science instruction. (*Select one on each line.*)

	Greatly inhibits effective science instruction	**Somewhat inhibits effective science instruction**	**Neutral/ mixed**	**Somewhat encourages effective science instruction**	**Greatly encourages effective science instruction**
a. State and/or district curriculum frameworks	○	○	○	○	○
b. State and/or district testing policies and practices in science	○	○	○	○	○
c. State and/or district testing policies and practices in other subjects	○	○	○	○	○
d. Quality of available instructional materials (e.g., textbooks, science kits)	○	○	○	○	○
e. Funds for purchasing equipment and supplies for science	○	○	○	○	○
f. Instructional time available for science	○	○	○	○	○
g. Time available to plan and prepare science lessons	○	○	○	○	○
h. Time available to work with other teachers on science instruction	○	○	○	○	○
i. Time available for teacher professional development in science	○	○	○	○	○
j. Importance that the school places on science	○	○	○	○	○
k. Parents' attitudes toward science instruction	○	○	○	○	○

4. Many teachers feel better qualified to teach some subject areas than others. How well qualified do you feel to teach each of the following subjects at the grade level(s) you teach, whether or not they are currently included in your curriculum? (*Select one on each line.*)

	Not well qualified	**Adequately qualified**	**Very well qualified**
a. Life science	○	○	○
b. Earth science	○	○	○
c. Physical science	○	○	○
d. Mathematics	○	○	○
e. Reading/Language Arts	○	○	○
f. Social Studies	○	○	○

5. Please indicate the extent to which you agree or disagree with each of the following statements. (*Select one on each line.*)

	Strongly disagree	**Disagree**	**Uncertain**	**Agree**	**Strongly agree**
a. I am continually finding better ways to teach science.	○	○	○	○	○
b. I know how to teach science concepts effectively.	○	○	○	○	○
c. I am **not** very effective in monitoring science experiments/investigations.	○	○	○	○	○
d. I generally teach science ineffectively.	○	○	○	○	○
e. I understand science concepts well enough to be effective in teaching science.	○	○	○	○	○
f. I find it difficult to explain to students why science experiments/investigations work.	○	○	○	○	○
g. I am typically able to answer students' science questions.	○	○	○	○	○
h. I wonder if I have the necessary skills to teach science.	○	○	○	○	○
i. Given a choice, I would not invite the principal to evaluate my science teaching.	○	○	○	○	○
j. When a student has difficulty understanding a science concept, I am usually at a loss as to how to help the student understand it better.	○	○	○	○	○
k. When teaching science, I usually welcome student questions.	○	○	○	○	○
l. I don't know what to do to turn students on to science.	○	○	○	○	○

AIM
Interdependence
Grades 3–5 Teacher Questionnaire (PRE)

6. How prepared do you feel to teach each of the following science concepts? (*Select one on each line.*)

	Not at all prepared	Somewhat prepared	Moderately well prepared	Very well prepared
a. Organisms interact and are interdependent in various ways, including providing food and shelter to one another.	○	○	○	○
b. An organism is any living thing, such as a plant or an animal. Organisms are categorized by how they get their food.	○	○	○	○
c. Organisms depend on other organisms for food and/or nutrients.	○	○	○	○
d. In some interactions, both organisms benefit by interacting and are more likely to survive and reproduce. This is called a mutually beneficial relationship.	○	○	○	○
e. In some interactions, one organism will benefit by interacting and is more likely to survive and reproduce while the other is harmed and its survival and/or reproduction may be limited.	○	○	○	○
f. Organisms can survive only in environments in which their needs are met.	○	○	○	○
g. Each type of organism has a specific range of environmental conditions under which it can survive. Environmental conditions include, but are not limited to, temperature, moisture, amount of oxygen, nutrient availability, and salinity.	○	○	○	○
h. Organisms have different traits; some traits are better than others for a given environment (i.e., help the organism meet its needs).	○	○	○	○
i. Organisms with traits that are favorable in an environment are more likely to survive and reproduce, whereas organisms that lack those traits are less likely to survive and reproduce.	○	○	○	○
j. Organisms, including humans, often change the environment in which they live through feeding, leaving waste, and/or competing with other organisms.	○	○	○	○
k. Sometimes, environments change and no longer provide for the needs of some or all of the organisms that live there. Some organisms will be able to survive in the new conditions, some will move to a new environment where their needs are met, and some will.	○	○	○	○

7. Including this school year, how many years have you taught some or all of the ideas listed in question 6? (Please enter your answer in the spaces provided, then darken the corresponding circle in each column. Enter your response as a 2-digit number; e.g., if 3 years enter as 03.)

⓪	⓪
①	①
②	②
③	③
④	④
	⑤
	⑥
	⑦
	⑧
	⑨

8. *Practical constraints aside*, do you agree that doing what is described in each statement would help most students learn science?

For the purpose of this question, we ask that you use the following definitions of "data" and "evidence."

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement.
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
a. At the beginning of instruction on a science concept, students should be provided with definitions for new scientific vocabulary that will be used.	○	○	○	○	○	○
b. Hands-on activities and/or laboratory activities should be used primarily to reinforce a science concept that the students have already learned.	○	○	○	○	○	○
c. Toward the end of a unit, teachers should provide students with opportunities to make connections among concepts from the various lessons.	○	○	○	○	○	○
d. Students should rely on evidence from classroom activities, labs, or observations to form conclusions about the science concept they are studying.	○	○	○	○	○	○
e. Teachers should have students do hands-on activities, even if the data they collect are not closely related to the concept they are studying.	○	○	○	○	○	○
f. Students should be provided with the purpose for a lesson as it begins.	○	○	○	○	○	○
g. Teachers should explain a concept to students before having them consider evidence that relates to the concept.	○	○	○	○	○	○
h. Teachers should provide students with opportunities to connect the science they learn in the classroom to what they experience outside of the classroom.	○	○	○	○	○	○

8. (*continued*) *Practical constraints aside*, do you agree that doing what is described in each statement would help most students learn science?

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement.
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion.

	Strongly Disagree	**Moderately Disagree**	**Slightly Disagree**	**Slightly Agree**	**Moderately Agree**	**Strongly Agree**
i. Teachers should ask students to support their conclusions about a science concept with evidence.	○	○	○	○	○	○
j. Students should do hands-on or laboratory activities, even if they do not have opportunities to reflect on what they learned by doing the activities.	○	○	○	○	○	○
k. Lessons should begin by making students aware of how the concepts they will explore are relevant to their lives.	○	○	○	○	○	○
l. At the beginning of instruction on a science concept, students should have the opportunity to consider what they already know about the concept.	○	○	○	○	○	○
m. Students should do hands-on activities after they have learned the related science concepts.	○	○	○	○	○	○
n. Teachers should provide students with opportunities to apply the concepts they have learned in new or different contexts.	○	○	○	○	○	○
o. Students should use evidence to evaluate claims about a science concept made by other students.	○	○	○	○	○	○
p. Teachers should have students do interesting hands-on activities, even if the activities do not relate closely to the concept being studied.	○	○	○	○	○	○
q. At the beginning of lessons, teachers should “hook” students with stories, video clips, demonstrations or other concrete events/activities in order to focus student attention.	○	○	○	○	○	○
r. Students’ ideas about a science concept should be deliberately brought to the surface prior to a lesson or unit so that students are aware of their own thinking.	○	○	○	○	○	○
s. Teachers should provide students with the outcome of an activity in advance so students know they are on the right track as they do the activity.	○	○	○	○	○	○
t. Students should have opportunities to connect the concept they are studying to other concepts.	○	○	○	○	○	○
u. Students should consider evidence that relates to the science concept they are studying.	○	○	○	○	○	○
v. When students do a hands-on activity and the data don't come out right, teachers should tell students what they should have found.	○	○	○	○	○	○
w. Students should consider data that they collected themselves rather than data provided to them.	○	○	○	○	○	○

8. (*continued*) *Practical constraints aside*, do you agree that doing what is described in each statement would help most students learn science?

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement.
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
x. Students should know what the results of an experiment are supposed to be before they carry it out.	○	○	○	○	○	○
y. Students should consider evidence for the concept they are studying, even if they do not do a hands-on or laboratory activity related to the concept.	○	○	○	○	○	○

AIM Study
Populations and Ecosystems
Grades 3–5 Teacher Questionnaire (POST)

Instructions: This questionnaire asks about a specific class.

1. Thinking about this particular class, to what extent do you agree or disagree with the following statements about student attitudes ***toward school***? (*Select one on each line.*)

	Strongly disagree	Disagree	Agree	Strongly agree
a. Students in this class are interested in school.	○	○	○	○
b. Students in this class usually complete their assignments.	○	○	○	○
c. Students in this class don't like school.	○	○	○	○
d. Students in this class get along well with teachers.	○	○	○	○
e. Students in this class often disrupt other students.	○	○	○	○
f. Students in this class usually try hard.	○	○	○	○
g. Students in this class want to do well in school.	○	○	○	○

2. Thinking about this particular class, to what extent do you agree or disagree with the following statements about student attitudes ***toward science***? (*Select one on each line.*)

	Strongly disagree	Disagree	Agree	Strongly agree
a. Students in this class like science.	○	○	○	○
b. Students in this class enjoy science instruction.	○	○	○	○
c. Students in this class find it difficult to understand science concepts.	○	○	○	○
d. Students in this class think science is important for society.	○	○	○	○
e. Students in this class are scared of science.	○	○	○	○
f. Students in this class understand how they can use science in their everyday lives.	○	○	○	○

The remaining questions are about your instruction in this class during your recently completed populations and ecosystems unit. Do not be concerned if your instruction included only a subset of these attributes and/or if it included other attributes not addressed in this instrument.

3. On days you teach science to this class, approximately how many minutes is a typical science lesson?

4. Did your instruction during this unit (related to populations and ecosystems) cover each of the following science concepts?

		Yes	No
a.	Organisms interact and are interdependent in various ways, including providing food and shelter to one another.	○	○
b.	An organism is any living thing, such as a plant or an animal. Organisms are categorized by how they get their food.	○	○
c.	Organisms depend on other organisms for food and/or nutrients.	○	○
d.	In some interactions, both organisms benefit by interacting and are more likely to survive and reproduce. This is called a mutually beneficial relationship.	○	○
e.	In some interactions, one organism will benefit by interacting and is more likely to survive and reproduce while the other is harmed and its survival and/or reproduction may be limited.	○	○
f.	Organisms can survive only in environments in which their needs are met.	○	○
g.	Each type of organism has a specific range of environmental conditions under which it can survive. Environmental conditions include, but are not limited to, temperature, moisture, amount of oxygen, nutrient availability, and salinity.	○	○
h.	Organisms have different traits; some traits are better than others for a given environment (i.e., help the organism meet its needs).	○	○
i.	Organisms with traits that are favorable in an environment are more likely to survive and reproduce, whereas organisms that lack those traits are less likely to survive and reproduce.	○	○
j.	Organisms, including humans, often change the environment in which they live through feeding, leaving waste, and/or competing with other organisms.	○	○
k.	Sometimes, environments change and no longer provide for the needs of some or all of the organisms that live there. Some organisms will be able to survive in the new conditions, some will move to a new environment where their needs are met, and some will.	○	○

5. About how many total lessons were spent on the concepts listed above? ________________________

6. About how many total lessons were spent on other concepts in this unit? _______________________

7. Did you work with a district or school science coach/specialist in planning and/or delivering this content?

Yes	○
No	○

8. Which of the following *best* describes the instructional materials you used to teach populations and ecosystems to this class? (*Select only one.)*

a.	I predominantly used materials from a single textbook/program.	○
b.	I used some materials from a textbook/program and some supplemental materials.	○
c.	I used lots of different materials (**skip to question 10**).	○

9. Please complete the information on the science textbook/program used to teach these concepts (from Question 4) most often in this class.

Textbook/program title: ______________________________

Publisher: ______________________________

Edition: ______________________________

Copyright Date: ______________________________

10. For what percentage of the time teaching the science concepts from Question 4 were students working in each of the following ways? (*Select one response in each row; responses to these questions should total 100 percent.*)

	0	10	20	30	40	50	60	70	80	90	100
a. individually	○	○	○	○	○	○	○	○	○	○	○
b. in pairs/small groups	○	○	○	○	○	○	○	○	○	○	○
c. as a whole group	○	○	○	○	○	○	○	○	○	○	○

Please refer to the list of concepts below when answering question 11.

- Organisms interact and are interdependent in various ways, including providing food and shelter to one another.
- An organism is any living thing, such as a plant or an animal. Organisms are categorized by how they get their food.
- Organisms depend on other organisms for food and/or nutrients.
- In some interactions, both organisms benefit by interacting and are more likely to survive and reproduce. This is called a mutually beneficial relationship.
- In some interactions, one organism will benefit by interacting and is more likely to survive and reproduce while the other is harmed and its survival and/or reproduction may be limited.
- Organisms can survive only in environments in which their needs are met.
- Each type of organism has a specific range of environmental conditions under which it can survive. Environmental conditions include, but are not limited to, temperature, moisture, amount of oxygen, nutrient availability, and salinity.
- Organisms have different traits; some traits are better than others for a given environment (i.e., help the organism meet its needs).
- Organisms with traits that are favorable in an environment are more likely to survive and reproduce, whereas organisms that lack those traits are less likely to survive and reproduce.
- Organisms, including humans, often change the environment in which they live through feeding, leaving waste, and/or competing with other organisms.
- Sometimes, environments change and no longer provide for the needs of some or all of the organisms that live there. Some organisms will be able to survive in the new conditions, some will move to a new environment where their needs are met, and some will.

AIM Study
Populations and Ecosystems
Grades 3–5 Teacher Questionnaire (POST)

11. In this unit, how much of the total instructional time on these concepts did students in this class do each of the following? (*Select one on each line*.)

For the purpose of this question, we ask that you use the following definitions of "data," "evidence," and "claim."

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion
Claim—a scientific conclusion that is supported by evidence

	None	Little (10% or less of instructional time for these concepts)	Some (11-25% of instructional time for these concepts)	Moderate (26-50% of instructional time for these concepts)	Considerable (Over 50% of instructional time for these concepts)
a. Individually or in small groups consider their initial thinking about these concepts	○	○	○	○	○
b. Make public/share their initial thinking about these concepts	○	○	○	○	○
c. Listen and take notes during presentations by teacher	○	○	○	○	○
d. Consider data/examples that provide evidence for these concepts	○	○	○	○	○
e. Watch a science demonstration	○	○	○	○	○
f. Use data/examples as evidence to support claims about these concepts	○	○	○	○	○
g. Read from a science textbook in class	○	○	○	○	○
h. Read other (non-textbook) science-related materials in class	○	○	○	○	○
i. Consider and discuss each other's claims about these concepts using data/examples as evidence	○	○	○	○	○
j. Do hands-on/laboratory science activities or investigations	○	○	○	○	○
k. Answer textbook or worksheet questions	○	○	○	○	○
l. Watch audiovisual presentations (e.g., videotapes, CD-ROMS, videodiscs, television programs, films, or filmstrips)	○	○	○	○	○
m. Reflect on what they were supposed to learn from the activities related to these concepts	○	○	○	○	○
n. Consider how their thinking about these concepts has changed	○	○	○	○	○
o. Apply or connect what they learned about these concepts to other scenarios, contexts, or concepts	○	○	○	○	○

AIM
Interdependence
Grades 6–8 Teacher Questionnaire (PRE)

1. Please indicate the extent to which you agree or disagree with the following statements about the school in which you work. *(Select one on each line.)*

	Strongly disagree	Disagree	Agree	Strongly agree
a. Teachers at *my grade level* have a shared vision of effective science instruction.	○	○	○	○
b. Teachers in *this school* have a shared vision of effective science instruction.	○	○	○	○
c. I feel supported by colleagues to try out new ideas in teaching science.	○	○	○	○
d. Teachers in this school share ideas for teaching science.	○	○	○	○
e. Teachers in this school discuss samples of student science work.	○	○	○	○
f. Teachers in this school discuss science lessons for teaching a concept.	○	○	○	○
g. Teachers in this school discuss teaching approaches for students under-performing in science.	○	○	○	○
h. Teachers in this school discuss science concepts to improve their own understanding.	○	○	○	○
i. Teachers in this school share ideas for preparing students for district/state science assessments.	○	○	○	○
j. Teachers in this school discuss the instructional implications of student performance on district/state science assessments.	○	○	○	○

2. My principal: (*Select one on each line.*)

	Strongly disagree	Disagree	Agree	Strongly agree
a. Encourages me to select science content and instructional strategies that address individual students' learning.	○	○	○	○
b. Accepts the noise that comes with an active science classroom.	○	○	○	○
c. Encourages the implementation of state/district standards in science education.	○	○	○	○
d. Encourages innovative science instructional practices.	○	○	○	○
e. Enhances the science program by providing me with needed materials and equipment.	○	○	○	○
f. Provides time for teachers to meet and share ideas about science teaching.	○	○	○	○
g. Encourages me to observe exemplary science teachers.	○	○	○	○
h. Is knowledgeable about effective instructional practices in science.	○	○	○	○
i. Provides useful feedback to teachers about their science instruction.	○	○	○	○
j. Acts as a buffer between teachers and external pressures (e.g., parents).	○	○	○	○

3. Please rate the effect of each of the following on **your** science instruction. (*Select one on each line.*)

	Greatly inhibits effective science instruction	**Somewhat inhibits effective science instruction**	**Neutral/ mixed**	**Somewhat encourages effective science instruction**	**Greatly encourages effective science instruction**
a. State and/or district curriculum frameworks	○	○	○	○	○
b. State and/or district testing policies and practices in science	○	○	○	○	○
c. State and/or district testing policies and practices in other subjects	○	○	○	○	○
d. Quality of available instructional materials (e.g., textbooks, science kits)	○	○	○	○	○
e. Funds for purchasing equipment and supplies for science	○	○	○	○	○
f. Instructional time available for science	○	○	○	○	○
g. Time available to plan and prepare science lessons	○	○	○	○	○
h. Time available to work with other teachers on science instruction	○	○	○	○	○
i. Time available for teacher professional development in science	○	○	○	○	○
j. Importance that the school places on science	○	○	○	○	○
k. Parents' attitudes toward science instruction	○	○	○	○	○

4. Many teachers feel better qualified to teach some subject areas than others. How well qualified do you feel to teach each of the following subjects at the grade level(s) you teach, whether or not they are currently included in your curriculum? (*Select one on each line.*)

	Not well qualified	**Adequately qualified**	**Very well qualified**
a. Life science	○	○	○
b. Earth science	○	○	○
c. Physical science	○	○	○
d. Mathematics	○	○	○
e. Reading/Language Arts	○	○	○
f. Social Studies	○	○	○

5. Please indicate the extent to which you agree or disagree with each of the following statements. (*Select one on each line.*)

	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
a. I am continually finding better ways to teach science.	○	○	○	○	○
b. I know how to teach science concepts effectively.	○	○	○	○	○
c. I am **not** very effective in monitoring science experiments/investigations.	○	○	○	○	○
d. I generally teach science ineffectively.	○	○	○	○	○
e. I understand science concepts well enough to be effective in teaching science.	○	○	○	○	○
f. I find it difficult to explain to students why science experiments/investigations work.	○	○	○	○	○
g. I am typically able to answer students' science questions.	○	○	○	○	○
h. I wonder if I have the necessary skills to teach science.	○	○	○	○	○
i. Given a choice, I would not invite the principal to evaluate my science teaching.	○	○	○	○	○
j. When a student has difficulty understanding a science concept, I am usually at a loss as to how to help the student understand it better.	○	○	○	○	○
k. When teaching science, I usually welcome student questions.	○	○	○	○	○
l. I don't know what to do to turn students on to science.	○	○	○	○	○

AIM
Interdependence
Grades 6–8 Teacher Questionnaire (PRE)

6. How prepared do you feel to teach each of the following science concepts? (*Select one on each line.*)

	Not at all prepared	**Somewhat prepared**	**Moderately well prepared**	**Very well prepared**
a. Two types of organisms may interact with one another in several ways: producer/consumer, predator/prey, or parasite/host relationship. Or, one organism may scavenge or decompose another.	○	○	○	○
b. Producers, including green plants and algae, are the primary food source within an ecosystem.	○	○	○	○
c. Competitive relationships exist when multiple organisms rely on the same resource(s). Often only some organisms survive because they are better adapted for acquiring resources in that environment.	○	○	○	○
d. Mutually beneficial relationships (mutualisms) exist when organisms interact and both or all are more likely to survive and/or reproduce.	○	○	○	○
e. Co-evolution occurs when multiple species have existed together long-term, influencing changes in each other.	○	○	○	○
f. A population is a group of individuals of the same type that live and breed together in a particular area. Population density varies based on availability of resources and presence of other organisms.	○	○	○	○
g. All populations living together and abiotic factors (such as quantity of light and water, range of temperatures, and soil composition) with which they interact compose an ecosystem.	○	○	○	○
h. Ecological succession occurs in areas where prior life has been removed or reduced (e.g., volcanoes, fire). Organisms successively change the environment, making it more suitable for other organisms.	○	○	○	○
i. An ecological niche is the role that an organism plays in its environment, including how it acquires and uses resources.	○	○	○	○
j. No two species can occupy the same niche at the same time. Competition between two species sometimes leads to increased niche specialization (resource partitioning).	○	○	○	○
k. Individuals of a species or population have variation in their traits. Natural selection favors organisms whose traits promote survival and reproduction better than the traits of others.	○	○	○	○

7. Including this school year, how many years have you taught some or all of the ideas listed in question 6? (Please enter your answer in the spaces provided, then darken the corresponding circle in each column. Enter your response as a 2-digit number; e.g., if 3 years enter as 03.)

⓪	⓪
①	①
②	②
③	③
④	④
	⑤
	⑥
	⑦
	⑧
	⑨

8. *Practical constraints aside*, do you agree that doing what is described in each statement would help most students learn science?

For the purpose of this question, we ask that you use the following definitions of "data" and "evidence."

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement.
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion.

	Strongly Disagree	**Moderately Disagree**	**Slightly Disagree**	**Slightly Agree**	**Moderately Agree**	**Strongly Agree**
a. At the beginning of instruction on a science concept, students should be provided with definitions for new scientific vocabulary that will be used.	○	○	○	○	○	○
b. Hands-on activities and/or laboratory activities should be used primarily to reinforce a science concept that the students have already learned.	○	○	○	○	○	○
c. Toward the end of a unit, teachers should provide students with opportunities to make connections among concepts from the various lessons.	○	○	○	○	○	○
d. Students should rely on evidence from classroom activities, labs, or observations to form conclusions about the science concept they are studying.	○	○	○	○	○	○
e. Teachers should have students do hands-on activities, even if the data they collect are not closely related to the concept they are studying.	○	○	○	○	○	○
f. Students should be provided with the purpose for a lesson as it begins.	○	○	○	○	○	○
g. Teachers should explain a concept to students before having them consider evidence that relates to the concept.	○	○	○	○	○	○

8. (*continued*) *Practical constraints aside*, do you agree that doing what is described in each statement would help most students learn science?

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement.
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
h. Teachers should provide students with opportunities to connect the science they learn in the classroom to what they experience outside of the classroom.	○	○	○	○	○	○
i. Teachers should ask students to support their conclusions about a science concept with evidence.	○	○	○	○	○	○
j. Students should do hands-on or laboratory activities, even if they do not have opportunities to reflect on what they learned by doing the activities.	○	○	○	○	○	○
k. Lessons should begin by making students aware of how the concepts they will explore are relevant to their lives.	○	○	○	○	○	○
l. At the beginning of instruction on a science concept, students should have the opportunity to consider what they already know about the concept.	○	○	○	○	○	○
m. Students should do hands-on activities after they have learned the related science concepts.	○	○	○	○	○	○
n. Teachers should provide students with opportunities to apply the concepts they have learned in new or different contexts.	○	○	○	○	○	○
o. Students should use evidence to evaluate claims about a science concept made by other students.	○	○	○	○	○	○
p. Teachers should have students do interesting hands-on activities, even if the activities do not relate closely to the concept being studied.	○	○	○	○	○	○
q. At the beginning of lessons, teachers should “hook” students with stories, video clips, demonstrations or other concrete events/activities in order to focus student attention.	○	○	○	○	○	○
r. Students’ ideas about a science concept should be deliberately brought to the surface prior to a lesson or unit so that students are aware of their own thinking.	○	○	○	○	○	○
s. Teachers should provide students with the outcome of an activity in advance so students know they are on the right track as they do the activity.	○	○	○	○	○	○
t. Students should have opportunities to connect the concept they are studying to other concepts.	○	○	○	○	○	○
u. Students should consider evidence that relates to the science concept they are studying.	○	○	○	○	○	○
v. When students do a hands-on activity and the data don't come out right, teachers should tell students what they should have found.	○	○	○	○	○	○

8. (*continued*) *Practical constraints aside*, do you agree that doing what is described in each statement would help most students learn science?

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement.
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
w. Students should consider data that they collected themselves rather than data provided to them.	○	○	○	○	○	○
x. Students should know what the results of an experiment are supposed to be before they carry it out.	○	○	○	○	○	○
y. Students should consider evidence for the concept they are studying, even if they do not do a hands-on or laboratory activity related to the concept.	○	○	○	○	○	○

AIM Study
Interdependence
Grades 6–8 Teacher Questionnaire (POST)

This questionnaire asks about a specific class.

1. Thinking about this particular class, to what extent do you agree or disagree with the following statements about student attitudes ***toward school***? (*Select one on each line.*)

	Strongly disagree	Disagree	Agree	Strongly agree
a. Students in this class are interested in school.	○	○	○	○
b. Students in this class usually complete their assignments.	○	○	○	○
c. Students in this class don't like school.	○	○	○	○
d. Students in this class get along well with teachers.	○	○	○	○
e. Students in this class often disrupt other students.	○	○	○	○
f. Students in this class usually try hard.	○	○	○	○
g. Students in this class want to do well in school.	○	○	○	○

2. Thinking about this particular class, to what extent do you agree or disagree with the following statements about student attitudes ***toward science***? (*Select one on each line.*)

	Strongly disagree	Disagree	Agree	Strongly agree
a. Students in this class like science.	○	○	○	○
b. Students in this class enjoy science instruction.	○	○	○	○
c. Students in this class find it difficult to understand science concepts.	○	○	○	○
d. Students in this class think science is important for society.	○	○	○	○
e. Students in this class are scared of science.	○	○	○	○
f. Students in this class understand how they can use science in their everyday lives.	○	○	○	○

The remaining questions are about your instruction in this class during your recently completed populations and ecosystems unit. Do not be concerned if your instruction included only a subset of these attributes and/or if it included other attributes not addressed in this instrument.

3. On days you teach science to this class, approximately how many minutes is a typical science lesson?

4. Did your instruction during this unit (related to populations and ecosystems) cover each of the following science concepts?

		Yes	No
a.	Two types of organisms may interact with one another in several ways: producer/consumer, predator/prey, or parasite/host relationship. Or, one organism may scavenge or decompose another.	○	○
b.	Producers, including green plants and algae, are the primary food source within an ecosystem.	○	○
c.	Competitive relationships exist when multiple organisms rely on the same resource(s). Often only some organisms survive because they are better adapted for acquiring resources in that environment.	○	○
d.	Mutually beneficial relationships (mutualisms) exist when organisms interact and both or all are more likely to survive and/or reproduce.	○	○
e.	Co-evolution occurs when multiple species have existed together long-term, influencing changes in each other.	○	○
f.	A population is a group of individuals of the same type that live and breed together in a particular area. Population density varies based on availability of resources and presence of other organisms.	○	○
g.	All populations living together and abiotic factors (such as quantity of light and water, range of temperatures, and soil composition) with which they interact compose an ecosystem.	○	○
h.	Ecological succession occurs in areas where prior life has been removed or reduced (e.g., volcanoes, fire). Organisms successively change the environment, making it more suitable for other organisms.	○	○
i.	An ecological niche is the role that an organism plays in its environment, including how it acquires and uses resources.	○	○
j.	No two species can occupy the same niche at the same time. Competition between two species sometimes leads to increased niche specialization (resource partitioning).	○	○
k.	Individuals of a species or population have variation in their traits. Natural selection favors organisms whose traits promote survival and reproduction better than the traits of others.	○	○

5. About how many total lessons were spent on the concepts listed above? ________________________

6. About how many total lessons were spent on other concepts in this unit? _______________________

7. Did you work with a district or school science coach/specialist in planning and/or delivering this content?

Yes	○
No	○

8. Which of the following *best* describes the instructional materials you used to teach populations and ecosystems to this class? (*Select only one.)*

a. I predominantly used materials from a single textbook/program.	○
b. I used some materials from a textbook/program and some supplemental materials.	○
c. I used lots of different materials (**skip to question 10**).	○

9. Please complete the information on the science textbook/program used to teach these concepts (from Question 4) most often in this class.

Textbook/program title: ____

Publisher: ____

Edition: ____

Copyright Date: ____

10. For what percentage of the time teaching the science concepts from Question 4 were students working in each of the following ways? (*Select one response in each row; responses to these questions should total 100 percent.*)

	0	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
a. individually	○	○	○	○	○	○	○	○	○	○	○
b. in pairs/small groups	○	○	○	○	○	○	○	○	○	○	○
c. as a whole group	○	○	○	○	○	○	○	○	○	○	○

AIM Study
Interdependence
Grades 6–8 Teacher Questionnaire (POST)

Please refer to the list of concepts below when answering question 11.

• Two types of organisms may interact with one another in several ways: producer/consumer, predator/prey, or parasite/host relationship. Or, one organism may scavenge or decompose another.
• Producers, including green plants and algae, are the primary food source within an ecosystem.
• Competitive relationships exist when multiple organisms rely on the same resource(s). Often only some organisms survive because they are better adapted for acquiring resources in that environment.
• Mutually beneficial relationships (mutualisms) exist when organisms interact and both or all are more likely to survive and/or reproduce.
• Co-evolution occurs when multiple species have existed together long-term, influencing changes in each other.
• A population is a group of individuals of the same type that live and breed together in a particular area. Population density varies based on availability of resources and presence of other organisms.
• All populations living together and abiotic factors (such as quantity of light and water, range of temperatures, and soil composition) with which they interact compose an ecosystem.
• Ecological succession occurs in areas where prior life has been removed or reduced (e.g., volcanoes, fire). Organisms successively change the environment, making it more suitable for other organisms.
• An ecological niche is the role that an organism plays in its environment, including how it acquires and uses resources.
• No two species can occupy the same niche at the same time. Competition between two species sometimes leads to increased niche specialization (resource partitioning).
• Individuals of a species or population have variation in their traits. Natural selection favors organisms whose traits promote survival and reproduction better than the traits of others.

11. In this unit, how much of the total instructional time on these concepts did students in this class do each of the following? (*Select one on each line.*)

For the purpose of this question, we ask that you use the following definitions of "data," "evidence," and "claim."

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement **Evidence**—analyzed or processed data that are used to support a scientific claim or conclusion **Claim**—a scientific conclusion that is supported by evidence

	None	**Little (10% or less of instructional time for these concepts)**	**Some (11-25% of instructional time for these concepts)**	**Moderate (26-50% of instructional time for these concepts)**	**Considerable (Over 50% of instructional time for these concepts)**
a. Individually or in small groups consider their initial thinking about these concepts	○	○	○	○	○
b. Make public/share their initial thinking about these concepts	○	○	○	○	○
c. Listen and take notes during presentations by teacher	○	○	○	○	○
d. Consider data/examples that provide evidence for these concepts	○	○	○	○	○
e. Watch a science demonstration	○	○	○	○	○
f. Use data/examples as evidence to support claims about these concepts	○	○	○	○	○
g. Read from a science textbook in class	○	○	○	○	○

11. *(continued)* In this unit, how much of the total instructional time on these concepts did students in this class do each of the following? (*Select one on each line*.)

For the purpose of this question, we ask that you use the following definitions of "data," "evidence," and "claim."

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion
Claim—a scientific conclusion that is supported by evidence

	None	**Little (10% or less of instructional time for these concepts)**	**Some (11-25% of instructional time for these concepts)**	**Moderate (26-50% of instructional time for these concepts)**	**Considerable (Over 50% of instructional time for these concepts)**
h. Read other (non-textbook) science-related materials in class	○	○	○	○	○
i. Consider and discuss each other's claims about these concepts using data/examples as evidence	○	○	○	○	○
j. Do hands-on/laboratory science activities or investigations	○	○	○	○	○
k. Answer textbook or worksheet questions	○	○	○	○	○
l. Watch audiovisual presentations (e.g., videotapes, CD-ROMS, videodiscs, television programs, films, or filmstrips)	○	○	○	○	○
m. Reflect on what they were supposed to learn from the activities related to these concepts	○	○	○	○	○
n. Consider how their thinking about these concepts has changed	○	○	○	○	○
o. Apply or connect what they learned about these concepts to other scenarios, contexts, or concepts	○	○	○	○	○

AIM
Force and Motion
Grades 3–5 Teacher Questionnaire (PRE)

1. Please indicate the extent to which you agree or disagree with the following statements about the school in which you work. *(Select one on each line.)*

	Strongly disagree	Disagree	Agree	Strongly agree
a. Teachers at *my grade level* have a shared vision of effective science instruction.	○	○	○	○
b. Teachers in *this school* have a shared vision of effective science instruction.	○	○	○	○
c. I feel supported by colleagues to try out new ideas in teaching science.	○	○	○	○
d. Teachers in this school share ideas for teaching science.	○	○	○	○
e. Teachers in this school discuss samples of student science work.	○	○	○	○
f. Teachers in this school discuss science lessons for teaching a concept.	○	○	○	○
g. Teachers in this school discuss teaching approaches for students under-performing in science.	○	○	○	○
h. Teachers in this school discuss science concepts to improve their own understanding.	○	○	○	○
i. Teachers in this school share ideas for preparing students for district/state science assessments.	○	○	○	○
j. Teachers in this school discuss the instructional implications of student performance on district/state science assessments.	○	○	○	○

2. My principal: (*Select one on each line.*)

	Strongly disagree	Disagree	Agree	Strongly agree
a. Encourages me to select science content and instructional strategies that address individual students' learning.	○	○	○	○
b. Accepts the noise that comes with an active science classroom.	○	○	○	○
c. Encourages the implementation of state/district standards in science education.	○	○	○	○
d. Encourages innovative science instructional practices.	○	○	○	○
e. Enhances the science program by providing me with needed materials and equipment.	○	○	○	○
f. Provides time for teachers to meet and share ideas about science teaching.	○	○	○	○
g. Encourages me to observe exemplary science teachers.	○	○	○	○
h. Is knowledgeable about effective instructional practices in science.	○	○	○	○
i. Provides useful feedback to teachers about their science instruction.	○	○	○	○
j. Acts as a buffer between teachers and external pressures (e.g., parents).	○	○	○	○

3. Please rate the effect of each of the following on **your** science instruction. (*Select one on each line.*)

	Greatly inhibits effective science instruction	**Somewhat inhibits effective science instruction**	**Neutral/ mixed**	**Somewhat encourages effective science instruction**	**Greatly encourages effective science instruction**
a. State and/or district curriculum frameworks	○	○	○	○	○
b. State and/or district testing policies and practices in science	○	○	○	○	○
c. State and/or district testing policies and practices in other subjects	○	○	○	○	○
d. Quality of available instructional materials (e.g., textbooks, science kits)	○	○	○	○	○
e. Funds for purchasing equipment and supplies for science	○	○	○	○	○
f. Instructional time available for science	○	○	○	○	○
g. Time available to plan and prepare science lessons	○	○	○	○	○
h. Time available to work with other teachers on science instruction	○	○	○	○	○
i. Time available for teacher professional development in science	○	○	○	○	○
j. Importance that the school places on science	○	○	○	○	○
k. Parents' attitudes toward science instruction	○	○	○	○	○

4. Many teachers feel better qualified to teach some subject areas than others. How well qualified do you feel to teach each of the following subjects at the grade level(s) you teach, whether or not they are currently included in your curriculum? (*Select one on each line.*)

	Not well qualified	**Adequately qualified**	**Very well qualified**
a. Life science	○	○	○
b. Earth science	○	○	○
c. Physical science	○	○	○
d. Mathematics	○	○	○
e. Reading/Language Arts	○	○	○
f. Social Studies	○	○	○

AIM
Force and Motion
Grades 3–5 Teacher Questionnaire (PRE)

5. Please indicate the extent to which you agree or disagree with each of the following statements. (*Select one on each line.*)

	Strongly disagree	**Disagree**	**Uncertain**	**Agree**	**Strongly agree**
a. I am continually finding better ways to teach science.	○	○	○	○	○
b. I know how to teach science concepts effectively.	○	○	○	○	○
c. I am **not** very effective in monitoring science experiments/investigations.	○	○	○	○	○
d. I generally teach science ineffectively.	○	○	○	○	○
e. I understand science concepts well enough to be effective in teaching science.	○	○	○	○	○
f. I find it difficult to explain to students why science experiments/investigations work.	○	○	○	○	○
g. I am typically able to answer students' science questions.	○	○	○	○	○
h. I wonder if I have the necessary skills to teach science.	○	○	○	○	○
i. Given a choice, I would not invite the principal to evaluate my science teaching.	○	○	○	○	○
j. When a student has difficulty understanding a science concept, I am usually at a loss as to how to help the student understand it better.	○	○	○	○	○
k. When teaching science, I usually welcome student questions.	○	○	○	○	○
l. I don't know what to do to turn students on to science.	○	○	○	○	○

AIM
Force and Motion
Grades 3–5 Teacher Questionnaire (PRE)

6. How prepared do you feel to teach each of the following science concepts? (*Select one on each line.*)

	Not at all prepared	Somewhat prepared	Moderately well prepared	Very well prepared
a. An object's position can be described by locating the object relative to other objects or a background.	○	○	○	○
b. The description of an object's motion from one observer's view may be different from that reported from a different observer's view.	○	○	○	○
c. An object is in motion when its position is changing.	○	○	○	○
d. The speed of an object is defined by how far it travels divided by the amount of time it took to travel that far.	○	○	○	○
e. The motion of objects can be changed by pushing or pulling.	○	○	○	○
f. The size of the change is related to the size of the force (push or pull) and the weight (mass) of the object on which the force is exerted.	○	○	○	○
g. Earth pulls down on all objects with a force called gravity.	○	○	○	○
h. A change in an object's motion is a change in its speed, or its direction, or both.	○	○	○	○
i. A force is a push or pull exerted on one object by another object when they interact with one another.	○	○	○	○
j. An object's motion can be described completely by its speed and the direction in which it is moving.	○	○	○	○
k. Some forces between objects act when the objects are in direct contact or when they are not touching.	○	○	○	○
l. Forces have magnitude and direction.	○	○	○	○

7. Including this school year, how many years have you taught some or all of the ideas listed in question 6? (Please enter your answer in the spaces provided, then darken the corresponding circle in each column. Enter your response as a 2-digit number; e.g., if 3 years enter as 03.)

⓪	⓪
①	①
②	②
③	③
④	④
	⑤
	⑥
	⑦
	⑧
	⑨

8. *Practical constraints aside*, do you agree that doing what is described in each statement would help most students learn science?

For the purpose of this question, we ask that you use the following definitions of "data" and "evidence."

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement.
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
a. At the beginning of instruction on a science concept, students should be provided with definitions for new scientific vocabulary that will be used.	○	○	○	○	○	○
b. Hands-on activities and/or laboratory activities should be used primarily to reinforce a science concept that the students have already learned.	○	○	○	○	○	○
c. Toward the end of a unit, teachers should provide students with opportunities to make connections among concepts from the various lessons.	○	○	○	○	○	○
d. Students should rely on evidence from classroom activities, labs, or observations to form conclusions about the science concept they are studying.	○	○	○	○	○	○
e. Teachers should have students do hands-on activities, even if the data they collect are not closely related to the concept they are studying.	○	○	○	○	○	○
f. Students should be provided with the purpose for a lesson as it begins.	○	○	○	○	○	○
g. Teachers should explain a concept to students before having them consider evidence that relates to the concept.	○	○	○	○	○	○
h. Teachers should provide students with opportunities to connect the science they learn in the classroom to what they experience outside of the classroom.	○	○	○	○	○	○
i. Teachers should ask students to support their conclusions about a science concept with evidence.	○	○	○	○	○	○
j. Students should do hands-on or laboratory activities, even if they do not have opportunities to reflect on what they learned by doing the activities.	○	○	○	○	○	○
k. Lessons should begin by making students aware of how the concepts they will explore are relevant to their lives.	○	○	○	○	○	○
l. At the beginning of instruction on a science concept, students should have the opportunity to consider what they already know about the concept.	○	○	○	○	○	○
m. Students should do hands-on activities after they have learned the related science concepts.	○	○	○	○	○	○
n. Teachers should provide students with opportunities to apply the concepts they have learned in new or different contexts.	○	○	○	○	○	○

8. (*continued*) *Practical constraints aside*, do you agree that doing what is described in each statement would help most students learn science?

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement.
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
o. Students should use evidence to evaluate claims about a science concept made by other students.	○	○	○	○	○	○
p. Teachers should have students do interesting hands-on activities, even if the activities do not relate closely to the concept being studied.	○	○	○	○	○	○
q. At the beginning of lessons, teachers should “hook” students with stories, video clips, demonstrations or other concrete events/activities in order to focus student attention.	○	○	○	○	○	○
r. Students’ ideas about a science concept should be deliberately brought to the surface prior to a lesson or unit so that students are aware of their own thinking.	○	○	○	○	○	○
s. Teachers should provide students with the outcome of an activity in advance so students know they are on the right track as they do the activity.	○	○	○	○	○	○
t. Students should have opportunities to connect the concept they are studying to other concepts.	○	○	○	○	○	○
u. Students should consider evidence that relates to the science concept they are studying.	○	○	○	○	○	○
v. When students do a hands-on activity and the data don't come out right, teachers should tell students what they should have found.	○	○	○	○	○	○
w. Students should consider data that they collected themselves rather than data provided to them.	○	○	○	○	○	○
x. Students should know what the results of an experiment are supposed to be before they carry it out.	○	○	○	○	○	○
y. Students should consider evidence for the concept they are studying, even if they do not do a hands-on or laboratory activity related to the concept.	○	○	○	○	○	○

AIM
Force and Motion
Grades 3–5 Teacher Questionnaire (POST)

Instructions: This questionnaire asks about a specific class.

1. Thinking about this particular class, to what extent do you agree or disagree with the following statements about student attitudes ***toward school***? (*Select one on each line.*)

	Strongly disagree	Disagree	Agree	Strongly agree
a. Students in this class are interested in school.	○	○	○	○
b. Students in this class usually complete their assignments.	○	○	○	○
c. Students in this class don't like school.	○	○	○	○
d. Students in this class get along well with teachers.	○	○	○	○
e. Students in this class often disrupt other students.	○	○	○	○
f. Students in this class usually try hard.	○	○	○	○
g. Students in this class want to do well in school.	○	○	○	○

2. Thinking about this particular class, to what extent do you agree or disagree with the following statements about student attitudes ***toward science***? (*Select one on each line.*)

	Strongly disagree	Disagree	Agree	Strongly agree
a. Students in this class like science.	○	○	○	○
b. Students in this class enjoy science instruction.	○	○	○	○
c. Students in this class find it difficult to understand science concepts.	○	○	○	○
d. Students in this class think science is important for society.	○	○	○	○
e. Students in this class are scared of science.	○	○	○	○
f. Students in this class understand how they can use science in their everyday lives.	○	○	○	○

The remaining questions are about your instruction in this class during your recently completed force and motion unit. Do not be concerned if your instruction included only a subset of these attributes and/or if it included other attributes not addressed in this instrument.

3. On days you teach science to this class, approximately how many minutes is a typical science lesson?

4. Did your instruction during this unit (related to force and motion) cover each of the following science concepts?

	Yes	No
a. An object's position can be described by locating the object relative to other objects or a background.	○	○
b. The description of an object's motion from one observer's view may be different from that reported from a different observer's view.	○	○
c. An object is in motion when its position is changing.	○	○
d. The speed of an object is defined by how far it travels divided by the amount of time it took to travel that far.	○	○
e. The motion of objects can be changed by pushing or pulling.	○	○
f. The size of the change is related to the size of the force (push or pull) and the weight (mass) of the object on which the force is exerted.	○	○
g. Earth pulls down on all objects with a force called gravity.	○	○
h. A change in an object's motion is a change in its speed, or its direction, or both.	○	○
i. A force is a push or pull exerted on one object by another object when they interact with one another.	○	○
j. An object's motion can be described completely by its speed and the direction in which it is moving.	○	○
k. Some forces between objects act when the objects are in direct contact or when they are not touching.	○	○
l. Forces have magnitude and direction.	○	○

5. About how many total lessons were spent on the concepts listed above?

6. About how many total lessons were spent on other concepts in this unit?

7. Did you work with a district or school science coach/specialist in planning and/or delivering this content?

Yes	○
No	○

8. Which of the following *best* describes the instructional materials you used to teach force and motion to this class? (*Select only one.)*

a. I predominantly used materials from a single textbook/program.	○
b. I used some materials from a textbook/program and some supplemental materials.	○
c. I used lots of different materials (**skip to question 10**).	○

9. Please complete the information on the science textbook/program used to teach these concepts (from Question 4) most often in this class.

Textbook/program title: ____

Publisher: ____

Edition: ____

Copyright Date: ____

10. For what percentage of the time teaching the science concepts from Question 4 were students working in each of the following ways? (*Select one response in each row; responses to these questions should total 100 percent.*)

	0	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
a. individually	○	○	○	○	○	○	○	○	○	○	○
b. in pairs/small groups	○	○	○	○	○	○	○	○	○	○	○
c. as a whole group	○	○	○	○	○	○	○	○	○	○	○

AIM
Force and Motion
Grades 3–5 Teacher Questionnaire (POST)

Please refer to the list of concepts below when answering question 11.

• An object's position can be described by locating the object relative to other objects or a background.
• The description of an object's motion from one observer's view may be different from that reported from a different observer's view.
• An object is in motion when its position is changing.
• The speed of an object is defined by how far it travels divided by the amount of time it took to travel that far.
• The motion of objects can be changed by pushing or pulling.
• The size of the change is related to the size of the force (push or pull) and the weight (mass) of the object on which the force is exerted.
• Earth pulls down on all objects with a force called gravity.
• A change in an object's motion is a change in its speed, or its direction, or both.
• A force is a push or pull exerted on one object by another object when they interact with one another.
• An object's motion can be described completely by its speed and the direction in which it is moving.
• Some forces between objects act when the objects are in direct contact or when they are not touching.
• Forces have magnitude and direction.

11. In this unit, how much of the total instructional time on these concepts did students in this class do each of the following? (*Select one on each line*.)

For the purpose of this question, we ask that you use the following definitions of "data," "evidence," and "claim."

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion
Claim—a scientific conclusion that is supported by evidence

	None	**Little (10% or less of instructional time for these concepts)**	**Some (11-25% of instructional time for these concepts)**	**Moderate (26-50% of instructional time for these concepts)**	**Considerable (Over 50% of instructional time for these concepts)**
a. Consider, individually or in small groups, their *initial* thinking about these concepts	○	○	○	○	○
b. Make public/share their *initial* thinking about these concepts	○	○	○	○	○
c. Listen and/or take notes during presentations by teacher	○	○	○	○	○
d. Consider data/examples that they can use to draw conclusions about the concepts	○	○	○	○	○
e. Watch a science demonstration	○	○	○	○	○
f. Support claims about these concepts using data/examples as evidence	○	○	○	○	○
g. Read from a science textbook in class	○	○	○	○	○
h. Read other (non-textbook) science-related materials in class	○	○	○	○	○
i. Consider and discuss each other's claims about these concepts using data/examples as evidence	○	○	○	○	○
j. Do hands-on/laboratory science	○	○	○	○	○

activities or investigations					

11. (*continued*) How much of the total instructional time on these concepts did students in this class do each of the following? (*Select one on each line*.)

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion
Claim—a scientific conclusion that is supported by evidence

	None	**Little (10% or less of instructional time for these concepts)**	**Some (11-25% of instructional time for these concepts)**	**Moderate (26-50% of instructional time for these concepts)**	**Considerable (Over 50% of instructional time for these concepts)**
k. Answer textbook or worksheet questions	○	○	○	○	○
l. Watch audiovisual presentations (e.g., videotapes, CD-ROMS, videodiscs, television programs, films, or filmstrips)	○	○	○	○	○
m. Reflect on what they were supposed to learn from the activities related to these concepts	○	○	○	○	○
n. Consider how their thinking about these concepts has changed	○	○	○	○	○
o. Apply or connect what they learned about these concepts to other scenarios, contexts, or concepts	○	○	○	○	○

AIM
Force and Motion
Grades 6–8 Teacher Questionnaire (PRE)

1. Please indicate the extent to which you agree or disagree with the following statements about the school in which you work. *(Select one on each line.)*

	Strongly disagree	Disagree	Agree	Strongly agree
a. Teachers at *my grade level* have a shared vision of effective science instruction.	○	○	○	○
b. Teachers in *this school* have a shared vision of effective science instruction.	○	○	○	○
c. I feel supported by colleagues to try out new ideas in teaching science.	○	○	○	○
d. Teachers in this school share ideas for teaching science.	○	○	○	○
e. Teachers in this school discuss samples of student science work.	○	○	○	○
f. Teachers in this school discuss science lessons for teaching a concept.	○	○	○	○
g. Teachers in this school discuss teaching approaches for students under-performing in science.	○	○	○	○
h. Teachers in this school discuss science concepts to improve their own understanding.	○	○	○	○
i. Teachers in this school share ideas for preparing students for district/state science assessments.	○	○	○	○
j. Teachers in this school discuss the instructional implications of student performance on district/state science assessments.	○	○	○	○

2. My principal: (*Select one on each line.*)

	Strongly disagree	Disagree	Agree	Strongly agree
a. Encourages me to select science content and instructional strategies that address individual students' learning.	○	○	○	○
b. Accepts the noise that comes with an active science classroom.	○	○	○	○
c. Encourages the implementation of state/district standards in science education.	○	○	○	○
d. Encourages innovative science instructional practices.	○	○	○	○
e. Enhances the science program by providing me with needed materials and equipment.	○	○	○	○
f. Provides time for teachers to meet and share ideas about science teaching.	○	○	○	○
g. Encourages me to observe exemplary science teachers.	○	○	○	○
h. Is knowledgeable about effective instructional practices in science.	○	○	○	○
i. Provides useful feedback to teachers about their science instruction.	○	○	○	○
j. Acts as a buffer between teachers and external pressures (e.g., parents).	○	○	○	○

AIM
Force and Motion
Grades 6–8 Teacher Questionnaire (PRE)

3. Please rate the effect of each of the following on **your** science instruction. (*Select one on each line.*)

	Greatly inhibits effective science instruction	Somewhat inhibits effective science instruction	Neutral/ mixed	Somewhat encourages effective science instruction	Greatly encourages effective science instruction
a. State and/or district curriculum frameworks	○	○	○	○	○
b. State and/or district testing policies and practices in science	○	○	○	○	○
c. State and/or district testing policies and practices in other subjects	○	○	○	○	○
d. Quality of available instructional materials (e.g., textbooks, science kits)	○	○	○	○	○
e. Funds for purchasing equipment and supplies for science	○	○	○	○	○
f. Instructional time available for science	○	○	○	○	○
g. Time available to plan and prepare science lessons	○	○	○	○	○
h. Time available to work with other teachers on science instruction	○	○	○	○	○
i. Time available for teacher professional development in science	○	○	○	○	○
j. Importance that the school places on science	○	○	○	○	○
k. Parents' attitudes toward science instruction	○	○	○	○	○

4. Many teachers feel better qualified to teach some subject areas than others. How well qualified do you feel to teach each of the following subjects at the grade level(s) you teach, whether or not they are currently included in your curriculum? (*Select one on each line.*)

	Not well qualified	Adequately qualified	Very well qualified
a. Life science	○	○	○
b. Earth science	○	○	○
c. Physical science	○	○	○
d. Mathematics	○	○	○
e. Reading/Language Arts	○	○	○
f. Social Studies	○	○	○

5. Please indicate the extent to which you agree or disagree with each of the following statements. (*Select one on each line.*)

	Strongly disagree	**Disagree**	**Uncertain**	**Agree**	**Strongly agree**
a. I am continually finding better ways to teach science.	○	○	○	○	○
b. I know how to teach science concepts effectively.	○	○	○	○	○
c. I am **not** very effective in monitoring science experiments/investigations.	○	○	○	○	○
d. I generally teach science ineffectively.	○	○	○	○	○
e. I understand science concepts well enough to be effective in teaching science.	○	○	○	○	○
f. I find it difficult to explain to students why science experiments/investigations work.	○	○	○	○	○
g. I am typically able to answer students' science questions.	○	○	○	○	○
h. I wonder if I have the necessary skills to teach science.	○	○	○	○	○
i. Given a choice, I would not invite the principal to evaluate my science teaching.	○	○	○	○	○
j. When a student has difficulty understanding a science concept, I am usually at a loss as to how to help the student understand it better.	○	○	○	○	○
k. When teaching science, I usually welcome student questions.	○	○	○	○	○
l. I don't know what to do to turn students on to science.	○	○	○	○	○

AIM
Force and Motion
Grades 6–8 Teacher Questionnaire (PRE)

6. How prepared do you feel to teach each of the following science concepts? (*Select one on each line.*)

	Not at all prepared	**Somewhat prepared**	**Moderately well prepared**	**Very well prepared**
a. The size of the change is related to the size of the force (push or pull) and the weight (mass) of the object on which the force is exerted.	○	○	○	○
b. Earth pulls down on all objects with a force called gravity.	○	○	○	○
c. A change in motion is a change in its speed, or its direction, or both.	○	○	○	○
d. A force is a push or pull exerted on one object by another object when they interact with one another.	○	○	○	○
e. An object's motion can be described completely by its speed and the direction in which it is moving.	○	○	○	○
f. An object's position can be measured and graphed as a function of time.	○	○	○	○
g. An object's speed can be measured and graphed as a function of time.	○	○	○	○
h. Some forces between objects act when the objects are in direct contact or when they are not touching.	○	○	○	○
i. Forces have magnitude and direction.	○	○	○	○
j. Forces can be added. The net force on an object is the sum of all the forces acting on the object.	○	○	○	○
k. A non-zero net force on an object changes the object's motion; that is, the object's speed and/or direction of motion changes.	○	○	○	○
l. A net force of zero on an object does not change the object's motion.	○	○	○	○
m. The force of friction acts to oppose the relative motion of two objects in contact.	○	○	○	○

7. Including this school year, how many years have you taught some or all of the ideas listed in question 6? (Please enter your answer in the spaces provided, then darken the corresponding circle in each column. Enter your response as a 2-digit number; e.g., if 3 years enter as 03.)

⓪	⓪
①	①
②	②
③	③
④	④
	⑤
	⑥
	⑦
	⑧

8. *Practical constraints aside*, do you agree that doing what is described in each statement would help most students learn science?

For the purpose of this question, we ask that you use the following definitions of "data" and "evidence."

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement.
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
a. At the beginning of instruction on a science concept, students should be provided with definitions for new scientific vocabulary that will be used.	○	○	○	○	○	○
b. Hands-on activities and/or laboratory activities should be used primarily to reinforce a science concept that the students have already learned.	○	○	○	○	○	○
c. Toward the end of a unit, teachers should provide students with opportunities to make connections among concepts from the various lessons.	○	○	○	○	○	○
d. Students should rely on evidence from classroom activities, labs, or observations to form conclusions about the science concept they are studying.	○	○	○	○	○	○
e. Teachers should have students do hands-on activities, even if the data they collect are not closely related to the concept they are studying.	○	○	○	○	○	○
f. Students should be provided with the purpose for a lesson as it begins.	○	○	○	○	○	○
g. Teachers should explain a concept to students before having them consider evidence that relates to the concept.	○	○	○	○	○	○
h. Teachers should provide students with opportunities to connect the science they learn in the classroom to what they experience outside of the classroom.	○	○	○	○	○	○
i. Teachers should ask students to support their conclusions about a science concept with evidence.	○	○	○	○	○	○
j. Students should do hands-on or laboratory activities, even if they do not have opportunities to reflect on what they learned by doing the activities.	○	○	○	○	○	○
k. Lessons should begin by making students aware of how the concepts they will explore are relevant to their lives.	○	○	○	○	○	○
l. At the beginning of instruction on a science concept, students should have the opportunity to consider what they already know about the concept.	○	○	○	○	○	○
m. Students should do hands-on activities after they have learned the related science concepts.	○	○	○	○	○	○
n. Teachers should provide students with opportunities to apply the concepts they have learned in new or different contexts.	○	○	○	○	○	○

8. (*continued*) *Practical constraints aside*, do you agree that doing what is described in each statement would help most students learn science?

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement.
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
o. Students should use evidence to evaluate claims about a science concept made by other students.	○	○	○	○	○	○
p. Teachers should have students do interesting hands-on activities, even if the activities do not relate closely to the concept being studied.	○	○	○	○	○	○
q. At the beginning of lessons, teachers should "hook" students with stories, video clips, demonstrations or other concrete events/activities in order to focus student attention.	○	○	○	○	○	○
r. Students' ideas about a science concept should be deliberately brought to the surface prior to a lesson or unit so that students are aware of their own thinking.	○	○	○	○	○	○
s. Teachers should provide students with the outcome of an activity in advance so students know they are on the right track as they do the activity.	○	○	○	○	○	○
t. Students should have opportunities to connect the concept they are studying to other concepts.	○	○	○	○	○	○
u. Students should consider evidence that relates to the science concept they are studying.	○	○	○	○	○	○
v. When students do a hands-on activity and the data don't come out right, teachers should tell students what they should have found.	○	○	○	○	○	○
w. Students should consider data that they collected themselves rather than data provided to them.	○	○	○	○	○	○
x. Students should know what the results of an experiment are supposed to be before they carry it out.	○	○	○	○	○	○
y. Students should consider evidence for the concept they are studying, even if they do not do a hands-on or laboratory activity related to the concept.	○	○	○	○	○	○

AIM
Force and Motion
Grades 6–8 Teacher Questionnaire (POST)

This questionnaire asks about a specific class.

1. Thinking about this particular class, to what extent do you agree or disagree with the following statements about student attitudes ***toward school***? (*Select one on each line.*)

	Strongly disagree	Disagree	Agree	Strongly agree
a. Students in this class are interested in school.	○	○	○	○
b. Students in this class usually complete their assignments.	○	○	○	○
c. Students in this class don't like school.	○	○	○	○
d. Students in this class get along well with teachers.	○	○	○	○
e. Students in this class often disrupt other students.	○	○	○	○
f. Students in this class usually try hard.	○	○	○	○
g. Students in this class want to do well in school.	○	○	○	○

2. Thinking about this particular class, to what extent do you agree or disagree with the following statements about student attitudes ***toward science***? (*Select one on each line.*)

	Strongly disagree	Disagree	Agree	Strongly agree
a. Students in this class like science.	○	○	○	○
b. Students in this class enjoy science instruction.	○	○	○	○
c. Students in this class find it difficult to understand science concepts.	○	○	○	○
d. Students in this class think science is important for society.	○	○	○	○
e. Students in this class are scared of science.	○	○	○	○
f. Students in this class understand how they can use science in their everyday lives.	○	○	○	○

The remaining questions are about your instruction in this class during your recently completed force and motion unit. Do not be concerned if your instruction included only a subset of these attributes and/or if it included other attributes not addressed in this instrument.

3. On days you teach science to this class, approximately how many minutes is a typical science lesson?

AIM
Force and Motion
Grades 6–8 Teacher Questionnaire (POST)

4. Did your instruction during this unit (related to force and motion) cover each of the following science concepts?

	Yes	No
a. The size of the change is related to the size of the force (push or pull) and the weight (mass) of the object on which the force is exerted.	○	○
b. Earth pulls down on all objects with a force called gravity.	○	○
c. A change in motion is a change in its speed, or its direction, or both.	○	○
d. A force is a push or pull exerted on one object by another object when they interact with one another.	○	○
e. An object's motion can be described completely by its speed and the direction in which it is moving.	○	○
f. An object's position can be measured and graphed as a function of time.	○	○
g. An object's speed can be measured and graphed as a function of time.	○	○
h. Some forces between objects act when the objects are in direct contact or when they are not touching.	○	○
i. Forces have magnitude and direction.	○	○
j. Forces can be added. The net force on an object is the sum of all the forces acting on the object.	○	○
k. A non-zero net force on an object changes the object's motion; that is, the object's speed and/or direction of motion changes.	○	○
l. A net force of zero on an object does not change the object's motion.	○	○
m. The force of friction acts to oppose the relative motion of two objects in contact.	○	○

5. About how many total lessons were spent on the concepts listed above?

6. About how many total lessons were spent on other concepts in this unit?

7. Did you work with a district or school science coach/specialist in planning and/or delivering this content?

Yes	○
No	○

8. Which of the following *best* describes the instructional materials you used to teach force and motion to this class? (*Select only one.)*

a. I predominantly used materials from a single textbook/program.	○
b. I used some materials from a textbook/program and some supplemental materials.	○
c. I used lots of different materials (**skip to question 10**).	○

9. Please complete the information on the science textbook/program used to teach these concepts (from Question 4) most often in this class.

Textbook/program title: ____

Publisher: ____

Edition: ____

Copyright Date: ____

10. For what percentage of the time teaching the science concepts from Question 4 were students working in each of the following ways? (*Select one response in each row; responses to these questions should total 100 percent.*)

	0	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
a. individually	○	○	○	○	○	○	○	○	○	○	○
b. in pairs/small groups	○	○	○	○	○	○	○	○	○	○	○
c. as a whole group	○	○	○	○	○	○	○	○	○	○	○

AIM
Force and Motion
Grades 6–8 Teacher Questionnaire (POST)

Please refer to the list of concepts below when answering question 11.

• The size of the change is related to the size of the force (push or pull) and the weight (mass) of the object on which the force is exerted.
• Earth pulls down on all objects with a force called gravity.
• A change in motion is a change in its speed, or its direction, or both.
• A force is a push or pull exerted on one object by another object when they interact with one another.
• An object's motion can be described completely by its speed and the direction in which it is moving.
• An object's position can be measured and graphed as a function of time.
• An object's speed can be measured and graphed as a function of time.
• Some forces between objects act when the objects are in direct contact or when they are not touching.
• Forces have magnitude and direction.
• Forces can be added. The net force on an object is the sum of all the forces acting on the object.
• A non-zero net force on an object changes the object's motion; that is, the object's speed and/or direction of motion changes.
• A net force of zero on an object does not change the object's motion.
• The force of friction acts to oppose the relative motion of two objects in contact.

11. How much of the total instructional time on these concepts did students in this class do each of the following? (*Select one on each line*.)

For the purpose of this question, we ask that you use the following definitions of "data," "evidence," and "claim."

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion
Claim—a scientific conclusion that is supported by evidence

	None	**Little (10% or less of instructional time for these concepts)**	**Some (11-25% of instructional time for these concepts)**	**Moderate (26-50% of instructional time for these concepts)**	**Considerable (Over 50% of instructional time for these concepts)**
a. Consider, individually or in small groups, their *initial* thinking about these concepts	○	○	○	○	○
b. Make public/share their *initial* thinking about these concepts	○	○	○	○	○
c. Listen and/or take notes during presentations by teacher	○	○	○	○	○
d. Consider data/examples that they can use to draw conclusions about the concepts	○	○	○	○	○
e. Watch a science demonstration	○	○	○	○	○
f. Support claims about these concepts using data/examples as evidence	○	○	○	○	○
g. Read from a science textbook in class	○	○	○	○	○
h. Read other (non-textbook) science-related materials in class	○	○	○	○	○
i. Consider and discuss each other's claims about these concepts using	○	○	○	○	○

data/examples as evidence					

11. (*continued*) How much of the total instructional time on these concepts did students in this class do each of the following? (*Select one on each line*.)

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion
Claim—a scientific conclusion that is supported by evidence

	None	**Little (10% or less of instructional time for these concepts)**	**Some (11-25% of instructional time for these concepts)**	**Moderate (26-50% of instructional time for these concepts)**	**Considerable (Over 50% of instructional time for these concepts)**
j. Do hands-on/laboratory science activities or investigations	○	○	○	○	○
k. Answer textbook or worksheet questions	○	○	○	○	○
l. Watch audiovisual presentations (e.g., videotapes, CD-ROMS, videodiscs, television programs, films, or filmstrips)	○	○	○	○	○
m. Reflect on what they were supposed to learn from the activities related to these concepts	○	○	○	○	○
n. Consider how their thinking about these concepts has changed	○	○	○	○	○
o. Apply or connect what they learned about these concepts to other scenarios, contexts, or concepts	○	○	○	○	○

AIM
Diversity of Life
Grades 3–5 Teacher Questionnaire (PRE)

1. Please indicate the extent to which you agree or disagree with the following statements about the school in which you work. *(Select one on each line.)*

	Strongly disagree	**Disagree**	**Agree**	**Strongly agree**
a. Teachers at *my grade level* have a shared vision of effective science instruction.	○	○	○	○
b. Teachers in *this school* have a shared vision of effective science instruction.	○	○	○	○
c. I feel supported by colleagues to try out new ideas in teaching science.	○	○	○	○
d. Teachers in this school share ideas for teaching science.	○	○	○	○
e. Teachers in this school discuss samples of student science work.	○	○	○	○
f. Teachers in this school discuss science lessons for teaching a concept.	○	○	○	○
g. Teachers in this school discuss teaching approaches for students under-performing in science.	○	○	○	○
h. Teachers in this school discuss science concepts to improve their own understanding.	○	○	○	○
i. Teachers in this school share ideas for preparing students for district/state science assessments.	○	○	○	○
j. Teachers in this school discuss the instructional implications of student performance on district/state science assessments.	○	○	○	○

2. My principal: (*Select one on each line.*)

	Strongly disagree	**Disagree**	**Agree**	**Strongly agree**
a. Encourages me to select science content and instructional strategies that address individual students' learning.	○	○	○	○
b. Accepts the noise that comes with an active science classroom.	○	○	○	○
c. Encourages the implementation of state/district standards in science education.	○	○	○	○
d. Encourages innovative science instructional practices.	○	○	○	○
e. Enhances the science program by providing me with needed materials and equipment.	○	○	○	○
f. Provides time for teachers to meet and share ideas about science teaching.	○	○	○	○
g. Encourages me to observe exemplary science teachers.	○	○	○	○
h. Is knowledgeable about effective instructional practices in science.	○	○	○	○
i. Provides useful feedback to teachers about their science instruction.	○	○	○	○
j. Acts as a buffer between teachers and external pressures (e.g., parents).	○	○	○	○

3. Please rate the effect of each of the following on **your** science instruction. (*Select one on each line.*)

	Greatly inhibits effective science instruction	**Somewhat inhibits effective science instruction**	**Neutral/ mixed**	**Somewhat encourages effective science instruction**	**Greatly encourages effective science instruction**
a. State and/or district curriculum frameworks	○	○	○	○	○
b. State and/or district testing policies and practices in science	○	○	○	○	○
c. State and/or district testing policies and practices in other subjects	○	○	○	○	○
d. Quality of available instructional materials (e.g., textbooks, science kits)	○	○	○	○	○
e. Funds for purchasing equipment and supplies for science	○	○	○	○	○
f. Instructional time available for science	○	○	○	○	○
g. Time available to plan and prepare science lessons	○	○	○	○	○
h. Time available to work with other teachers on science instruction	○	○	○	○	○
i. Time available for teacher professional development in science	○	○	○	○	○
j. Importance that the school places on science	○	○	○	○	○
k. Parents' attitudes toward science instruction	○	○	○	○	○

4. Many teachers feel better qualified to teach some subject areas than others. How well qualified do you feel to teach each of the following subjects at the grade level(s) you teach, whether or not they are currently included in your curriculum? (*Select one on each line.*)

	Not well qualified	**Adequately qualified**	**Very well qualified**
a. Life science	○	○	○
b. Earth science	○	○	○
c. Physical science	○	○	○
d. Mathematics	○	○	○
e. Reading/Language Arts	○	○	○
f. Social Studies	○	○	○

AIM
Diversity of Life
Grades 3–5 Teacher Questionnaire (PRE)

5. Please indicate the extent to which you agree or disagree with each of the following statements. (*Select one on each line.*)

	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
a. I am continually finding better ways to teach science.	○	○	○	○	○
b. I know how to teach science concepts effectively.	○	○	○	○	○
c. I am **not** very effective in monitoring science experiments/investigations.	○	○	○	○	○
d. I generally teach science ineffectively.	○	○	○	○	○
e. I understand science concepts well enough to be effective in teaching science.	○	○	○	○	○
f. I find it difficult to explain to students why science experiments/investigations work.	○	○	○	○	○
g. I am typically able to answer students' science questions.	○	○	○	○	○
h. I wonder if I have the necessary skills to teach science.	○	○	○	○	○
i. Given a choice, I would not invite the principal to evaluate my science teaching.	○	○	○	○	○
j. When a student has difficulty understanding a science concept, I am usually at a loss as to how to help the student understand it better.	○	○	○	○	○
k. When teaching science, I usually welcome student questions.	○	○	○	○	○
l. I don't know what to do to turn students on to science.	○	○	○	○	○

6. How prepared do you feel to teach each of the following science concepts? (*Select one on each line.*)

	Not at all prepared	**Somewhat prepared**	**Moderately well prepared**	**Very well prepared**
a. Different environments have different features that affect organisms' abilities to survive and reproduce. Some important features are climate, light level, soil nutrients, and the presence of other organisms.	○	○	○	○
b. A characteristic provides an advantage if it usually allows the number of individuals that have it to increase; a characteristic provides a disadvantage if it usually causes the number of individuals that have it to decrease.	○	○	○	○
c. Organisms with characteristics that best meet the challenges of their environment are most likely to survive and reproduce.	○	○	○	○
d. A set of characteristics that provides an advantage in one environment is likely to be different than one that provides an advantage in other environments	○	○	○	○
e. Different sets of characteristics allow different types of organisms to survive and reproduce in the same environment.	○	○	○	○
f. Organisms of the same type differ in their characteristics.	○	○	○	○
g. Organisms of the same type living in the same environment differ in their ability to survive and reproduce.	○	○	○	○

7. Including this school year, how many years have you taught some or all of the ideas listed in question 6? (Please enter your answer in the spaces provided, then darken the corresponding circle in each column. Enter your response as a 2-digit number; e.g., if 3 years enter as 03.)

⓪	⓪
①	①
②	②
③	③
④	④
	⑤
	⑥
	⑦
	⑧
	⑨

8. *Practical constraints aside*, do you agree that doing what is described in each statement would help most students learn science?

For the purpose of this question, we ask that you use the following definitions of "data" and "evidence."

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement.
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
a. At the beginning of instruction on a science concept, students should be provided with definitions for new scientific vocabulary that will be used.	○	○	○	○	○	○
b. Hands-on activities and/or laboratory activities should be used primarily to reinforce a science concept that the students have already learned.	○	○	○	○	○	○
c. Toward the end of a unit, teachers should provide students with opportunities to make connections among concepts from the various lessons.	○	○	○	○	○	○
d. Students should rely on evidence from classroom activities, labs, or observations to form conclusions about the science concept they are studying.	○	○	○	○	○	○
e. Teachers should have students do hands-on activities, even if the data they collect are not closely related to the concept they are studying.	○	○	○	○	○	○
f. Students should be provided with the purpose for a lesson as it begins.	○	○	○	○	○	○
g. Teachers should explain a concept to students before having them consider evidence that relates to the concept.	○	○	○	○	○	○
h. Teachers should provide students with opportunities to connect the science they learn in the classroom to what they experience outside of the classroom.	○	○	○	○	○	○
i. Teachers should ask students to support their conclusions about a science concept with evidence.	○	○	○	○	○	○
j. Students should do hands-on or laboratory activities, even if they do not have opportunities to reflect on what they learned by doing the activities.	○	○	○	○	○	○
k. Lessons should begin by making students aware of how the concepts they will explore are relevant to their lives.	○	○	○	○	○	○
l. At the beginning of instruction on a science concept, students should have the opportunity to consider what they already know about the concept.	○	○	○	○	○	○
m. Students should do hands-on activities after they have learned the related science concepts.	○	○	○	○	○	○

8. (*continued*) *Practical constraints aside*, do you agree that doing what is described in each statement would help most students learn science?

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement.
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
n. Teachers should provide students with opportunities to apply the concepts they have learned in new or different contexts.	○	○	○	○	○	○
o. Students should use evidence to evaluate claims about a science concept made by other students.	○	○	○	○	○	○
p. Teachers should have students do interesting hands-on activities, even if the activities do not relate closely to the concept being studied.	○	○	○	○	○	○
q. At the beginning of lessons, teachers should "hook" students with stories, video clips, demonstrations or other concrete events/activities in order to focus student attention.	○	○	○	○	○	○
r. Students' ideas about a science concept should be deliberately brought to the surface prior to a lesson or unit so that students are aware of their own thinking.	○	○	○	○	○	○
s. Teachers should provide students with the outcome of an activity in advance so students know they are on the right track as they do the activity.	○	○	○	○	○	○
t. Students should have opportunities to connect the concept they are studying to other concepts.	○	○	○	○	○	○
u. Students should consider evidence that relates to the science concept they are studying.	○	○	○	○	○	○
v. When students do a hands-on activity and the data don't come out right, teachers should tell students what they should have found.	○	○	○	○	○	○
w. Students should consider data that they collected themselves rather than data provided to them.	○	○	○	○	○	○
x. Students should know what the results of an experiment are supposed to be before they carry it out.	○	○	○	○	○	○
y. Students should consider evidence for the concept they are studying, even if they do not do a hands-on or laboratory activity related to the concept.	○	○	○	○	○	○

AIM
Diversity of Life
Grades 3–5 Teacher Questionnaire (POST)

Instructions: This questionnaire asks about a specific class.

1. Thinking about this particular class, to what extent do you agree or disagree with the following statements about student attitudes ***toward school***? (*Select one on each line.*)

	Strongly disagree	Disagree	Agree	Strongly agree
a. Students in this class are interested in school.	○	○	○	○
b. Students in this class usually complete their assignments.	○	○	○	○
c. Students in this class don't like school.	○	○	○	○
d. Students in this class get along well with teachers.	○	○	○	○
e. Students in this class often disrupt other students.	○	○	○	○
f. Students in this class usually try hard.	○	○	○	○
g. Students in this class want to do well in school.	○	○	○	○

2. Thinking about this particular class, to what extent do you agree or disagree with the following statements about student attitudes ***toward science***? (*Select one on each line.*)

	Strongly disagree	Disagree	Agree	Strongly agree
a. Students in this class like science.	○	○	○	○
b. Students in this class enjoy science instruction.	○	○	○	○
c. Students in this class find it difficult to understand science concepts.	○	○	○	○
d. Students in this class think science is important for society.	○	○	○	○
e. Students in this class are scared of science.	○	○	○	○
f. Students in this class understand how they can use science in their everyday lives.	○	○	○	○

The remaining questions are about your instruction in this class during your recently completed diversity of life unit. Do not be concerned if your instruction included only a subset of these attributes and/or if it included other attributes not addressed in this instrument.

3. On days you teach science to this class, approximately how many minutes is a typical science lesson?

4. Did your instruction during this unit (related to diversity of life) cover each of the following science concepts?

		Yes	No
a.	Different environments have different features that affect organisms' abilities to survive and reproduce. Some important features are climate, light level, soil nutrients, and the presence of other organisms.	○	○
b.	A characteristic provides an advantage if it usually allows the number of individuals that have it to increase; a characteristic provides a disadvantage if it usually causes the number of individuals that have it to decrease.	○	○
c.	Organisms with characteristics that best meet the challenges of their environment are most likely to survive and reproduce.	○	○
d.	A set of characteristics that provides an advantage in one environment is likely to be different than one that provides an advantage in other environments.	○	○
e.	Different sets of characteristics allow different types of organisms to survive and reproduce in the same environment.	○	○
f.	Organisms of the same type differ in their characteristics.	○	○
g.	Organisms of the same type living in the same environment differ in their ability to survive and reproduce.	○	○

5. About how many total lessons were spent on the concepts listed above?

6. About how many total lessons were spent on other concepts in this unit?

7. Did you work with a district or school science coach/specialist in planning and/or delivering this content?

Yes	○
No	○

8. Which of the following *best* describes the instructional materials you used to teach diversity of life to this class? (*Select only one.)*

a. I predominantly used materials from a single textbook/program.	○
b. I used some materials from a textbook/program and some supplemental materials.	○
c. I used lots of different materials (**skip to question 10**).	○

9. Please complete the information on the science textbook/program used to teach these concepts (from Question 4) most often in this class.

Textbook/program title: ____

Publisher: ____

Edition: ____

Copyright Date: ____

10. For what percentage of the time teaching the science concepts from Question 4 were students working in each of the following ways? (*Select one response in each row; responses to these questions should total 100 percent.*)

	0	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
a. individually	○	○	○	○	○	○	○	○	○	○	○
b. in pairs/small groups	○	○	○	○	○	○	○	○	○	○	○
c. as a whole group	○	○	○	○	○	○	○	○	○	○	○

AIM
Diversity of Life
Grades 3–5 Teacher Questionnaire (POST)

Please refer to the list of concepts below when answering question 11.

• Different environments have different features that affect organisms' abilities to survive and reproduce. Some important features are climate, light level, soil nutrients, and the presence of other organisms.
• A characteristic provides an advantage if it usually allows the number of individuals that have it to increase; a characteristic provides a disadvantage if it usually causes the number of individuals that have it to decrease.
• Organisms with characteristics that best meet the challenges of their environment are most likely to survive and reproduce.
• A set of characteristics that provides an advantage in one environment is likely to be different than one that provides an advantage in other environments
• Different sets of characteristics allow different types of organisms to survive and reproduce in the same environment.
• Organisms of the same type differ in their characteristics.
• Organisms of the same type living in the same environment differ in their ability to survive and reproduce.

11. In this unit, how much of the total instructional time on these concepts did students in this class do each of the following? (*Select one on each line.*)

For the purpose of this question, we ask that you use the following definitions of "data," "evidence," and "claim."

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement **Evidence**—analyzed or processed data that are used to support a scientific claim or conclusion **Claim**—a scientific conclusion that is supported by evidence

	None	**Little (10% or less of instructional time for these concepts)**	**Some (11-25% of instructional time for these concepts)**	**Moderate (26-50% of instructional time for these concepts)**	**Considerable (Over 50% of instructional time for these concepts)**
a. Consider, individually or in small groups, their *initial* thinking about these concepts	○	○	○	○	○
b. Make public/share their *initial* thinking about these concepts	○	○	○	○	○
c. Listen and/or take notes during presentations by teacher	○	○	○	○	○
d. Consider data/examples that they can use to draw conclusions about the concepts	○	○	○	○	○
e. Watch a science demonstration	○	○	○	○	○
f. Support claims about these concepts using data/examples as evidence	○	○	○	○	○
g. Read from a science textbook in class	○	○	○	○	○
h. Read other (non-textbook) science-related materials in class	○	○	○	○	○
i. Consider and discuss each other's claims about these concepts using data/examples as evidence	○	○	○	○	○
j. Do hands-on/laboratory science activities or investigations	○	○	○	○	○

11. (*continued*) How much of the total instructional time on these concepts did students in this class do each of the following? (*Select one on each line*.)

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion
Claim—a scientific conclusion that is supported by evidence

	None	**Little (10% or less of instructional time for these concepts)**	**Some (11-25% of instructional time for these concepts)**	**Moderate (26-50% of instructional time for these concepts)**	**Considerable (Over 50% of instructional time for these concepts)**
k. Answer textbook or worksheet questions	○	○	○	○	○
l. Watch audiovisual presentations (e.g., videotapes, CD-ROMS, videodiscs, television programs, films, or filmstrips)	○	○	○	○	○
m. Reflect on what they were supposed to learn from the activities related to these concepts	○	○	○	○	○
n. Consider how their thinking about these concepts has changed	○	○	○	○	○
o. Apply or connect what they learned about these concepts to other scenarios, contexts, or concepts	○	○	○	○	○

AIM
Properties of and Changes in Matter
Grades 3–5 Teacher Questionnaire (PRE)

1. Please indicate the extent to which you agree or disagree with the following statements about the school in which you work. *(Select one on each line.)*

	Strongly disagree	**Disagree**	**Agree**	**Strongly agree**
a. Teachers at *my grade level* have a shared vision of effective science instruction.	○	○	○	○
b. Teachers in *this school* have a shared vision of effective science instruction.	○	○	○	○
c. I feel supported by colleagues to try out new ideas in teaching science.	○	○	○	○
d. Teachers in this school share ideas for teaching science.	○	○	○	○
e. Teachers in this school discuss samples of student science work.	○	○	○	○
f. Teachers in this school discuss science lessons for teaching a concept.	○	○	○	○
g. Teachers in this school discuss teaching approaches for students under-performing in science.	○	○	○	○
h. Teachers in this school discuss science concepts to improve their own understanding.	○	○	○	○
i. Teachers in this school share ideas for preparing students for district/state science assessments.	○	○	○	○
j. Teachers in this school discuss the instructional implications of student performance on district/state science assessments.	○	○	○	○

2. My principal: (*Select one on each line.*)

	Strongly disagree	**Disagree**	**Agree**	**Strongly agree**
a. Encourages me to select science content and instructional strategies that address individual students' learning.	○	○	○	○
b. Accepts the noise that comes with an active science classroom.	○	○	○	○
c. Encourages the implementation of state/district standards in science education.	○	○	○	○
d. Encourages innovative science instructional practices.	○	○	○	○
e. Enhances the science program by providing me with needed materials and equipment.	○	○	○	○
f. Provides time for teachers to meet and share ideas about science teaching.	○	○	○	○
g. Encourages me to observe exemplary science teachers.	○	○	○	○
h. Is knowledgeable about effective instructional practices in science.	○	○	○	○
i. Provides useful feedback to teachers about their science instruction.	○	○	○	○
j. Acts as a buffer between teachers and external pressures (e.g., parents).	○	○	○	○

AIM
Properties of and Changes in Matter
Grades 3–5 Teacher Questionnaire (PRE)

3. Please rate the effect of each of the following on **your** science instruction. (*Select one on each line.*)

	Greatly inhibits effective science instruction	**Somewhat inhibits effective science instruction**	**Neutral/ mixed**	**Somewhat encourages effective science instruction**	**Greatly encourages effective science instruction**
a. State and/or district curriculum frameworks	○	○	○	○	○
b. State and/or district testing policies and practices in science	○	○	○	○	○
c. State and/or district testing policies and practices in other subjects	○	○	○	○	○
d. Quality of available instructional materials (e.g., textbooks, science kits)	○	○	○	○	○
e. Funds for purchasing equipment and supplies for science	○	○	○	○	○
f. Instructional time available for science	○	○	○	○	○
g. Time available to plan and prepare science lessons	○	○	○	○	○
h. Time available to work with other teachers on science instruction	○	○	○	○	○
i. Time available for teacher professional development in science	○	○	○	○	○
j. Importance that the school places on science	○	○	○	○	○
k. Parents' attitudes toward science instruction	○	○	○	○	○

4. Many teachers feel better qualified to teach some subject areas than others. How well qualified do you feel to teach each of the following subjects at the grade level(s) you teach, whether or not they are currently included in your curriculum? (*Select one on each line.*)

	Not well qualified	**Adequately qualified**	**Very well qualified**
a. Life science	○	○	○
b. Earth science	○	○	○
c. Physical science	○	○	○
d. Mathematics	○	○	○
e. Reading/Language Arts	○	○	○
f. Social Studies	○	○	○

5. Please indicate the extent to which you agree or disagree with each of the following statements. (*Select one on each line.*)

	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
a. I am continually finding better ways to teach science.	○	○	○	○	○
b. I know how to teach science concepts effectively.	○	○	○	○	○
c. I am **not** very effective in monitoring science experiments/investigations.	○	○	○	○	○
d. I generally teach science ineffectively.	○	○	○	○	○
e. I understand science concepts well enough to be effective in teaching science.	○	○	○	○	○
f. I find it difficult to explain to students why science experiments/investigations work.	○	○	○	○	○
g. I am typically able to answer students' science questions.	○	○	○	○	○
h. I wonder if I have the necessary skills to teach science.	○	○	○	○	○
i. Given a choice, I would not invite the principal to evaluate my science teaching.	○	○	○	○	○
j. When a student has difficulty understanding a science concept, I am usually at a loss as to how to help the student understand it better.	○	○	○	○	○
k. When teaching science, I usually welcome student questions.	○	○	○	○	○
l. I don't know what to do to turn students on to science.	○	○	○	○	○

6. How prepared do you feel to teach each of the following science concepts? (*Select one on each line.*)

	Not at all prepared	Somewhat prepared	Moderately well prepared	Very well prepared
a. Matter is "stuff"; everything we can see and/or touch.	○	○	○	○
b. Some objects are composed of a single material; others are composed of more than one material.	○	○	○	○
c. Materials have properties; weight (mass) and volume are properties that can be measured using appropriate tools.	○	○	○	○
d. Materials exist in several different states; the most common states are solid, liquid, and gas. Each state of matter has characteristic properties.	○	○	○	○
e. One way to change matter from one state to another and back again is by heating and cooling.	○	○	○	○
f. Objects (materials) vary in the extent to which they absorb and reflect light and conduct heat (thermal energy) and electricity.	○	○	○	○
g. Some materials are permanent magnets, which can repel or attract other permanent magnets. Other materials can be magnetic or nonmagnetic. Materials that are magnetic are attracted to permanent magnets.	○	○	○	○

7. Including this school year, how many years have you taught some or all of the ideas listed in question 6? (Please enter your answer in the spaces provided, then darken the corresponding circle in each column. Enter your response as a 2-digit number; e.g., if 3 years enter as 03.)

⓪	⓪
①	①
②	②
③	③
④	④
	⑤
	⑥
	⑦
	⑧
	⑨

8. *Practical constraints aside*, do you agree that doing what is described in each statement would help most students learn science?

For the purpose of this question, we ask that you use the following definitions of "data" and "evidence."

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement.
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
a. At the beginning of instruction on a science concept, students should be provided with definitions for new scientific vocabulary that will be used.	○	○	○	○	○	○
b. Hands-on activities and/or laboratory activities should be used primarily to reinforce a science concept that the students have already learned.	○	○	○	○	○	○
c. Toward the end of a unit, teachers should provide students with opportunities to make connections among concepts from the various lessons.	○	○	○	○	○	○
d. Students should rely on evidence from classroom activities, labs, or observations to form conclusions about the science concept they are studying.	○	○	○	○	○	○
e. Teachers should have students do hands-on activities, even if the data they collect are not closely related to the concept they are studying.	○	○	○	○	○	○
f. Students should be provided with the purpose for a lesson as it begins.	○	○	○	○	○	○
g. Teachers should explain a concept to students before having them consider evidence that relates to the concept.	○	○	○	○	○	○
h. Teachers should provide students with opportunities to connect the science they learn in the classroom to what they experience outside of the classroom.	○	○	○	○	○	○
i. Teachers should ask students to support their conclusions about a science concept with evidence.	○	○	○	○	○	○
j. Students should do hands-on or laboratory activities, even if they do not have opportunities to reflect on what they learned by doing the activities.	○	○	○	○	○	○
k. Lessons should begin by making students aware of how the concepts they will explore are relevant to their lives.	○	○	○	○	○	○
l. At the beginning of instruction on a science concept, students should have the opportunity to consider what they already know about the concept.	○	○	○	○	○	○
m. Students should do hands-on activities after they have learned the related science concepts.	○	○	○	○	○	○
n. Teachers should provide students with opportunities to apply the concepts they have learned in new or different contexts.	○	○	○	○	○	○
o. Students should use evidence to evaluate claims about a science concept made by other students.	○	○	○	○	○	○

8. (*continued*) *Practical constraints aside*, do you agree that doing what is described in each statement would help most students learn science?

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement.
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
p. Teachers should have students do interesting hands-on activities, even if the activities do not relate closely to the concept being studied.	○	○	○	○	○	○
q. At the beginning of lessons, teachers should “hook” students with stories, video clips, demonstrations or other concrete events/activities in order to focus student attention.	○	○	○	○	○	○
r. Students’ ideas about a science concept should be deliberately brought to the surface prior to a lesson or unit so that students are aware of their own thinking.	○	○	○	○	○	○
s. Teachers should provide students with the outcome of an activity in advance so students know they are on the right track as they do the activity.	○	○	○	○	○	○
t. Students should have opportunities to connect the concept they are studying to other concepts.	○	○	○	○	○	○
u. Students should consider evidence that relates to the science concept they are studying.	○	○	○	○	○	○
v. When students do a hands-on activity and the data don't come out right, teachers should tell students what they should have found.	○	○	○	○	○	○
w. Students should consider data that they collected themselves rather than data provided to them.	○	○	○	○	○	○
x. Students should know what the results of an experiment are supposed to be before they carry it out.	○	○	○	○	○	○
y. Students should consider evidence for the concept they are studying, even if they do not do a hands-on or laboratory activity related to the concept.	○	○	○	○	○	○

AIM
Properties of and Changes in Matter
Grades 3–5 Teacher Questionnaire (POST)

Instructions: This questionnaire asks about a specific class.

1. Thinking about this particular class, to what extent do you agree or disagree with the following statements about student attitudes ***toward school***? (*Select one on each line.*)

	Strongly disagree	Disagree	Agree	Strongly agree
a. Students in this class are interested in school.	○	○	○	○
b. Students in this class usually complete their assignments.	○	○	○	○
c. Students in this class don't like school.	○	○	○	○
d. Students in this class get along well with teachers.	○	○	○	○
e. Students in this class often disrupt other students.	○	○	○	○
f. Students in this class usually try hard.	○	○	○	○
g. Students in this class want to do well in school.	○	○	○	○

2. Thinking about this particular class, to what extent do you agree or disagree with the following statements about student attitudes ***toward science***? (*Select one on each line.*)

	Strongly disagree	Disagree	Agree	Strongly agree
a. Students in this class like science.	○	○	○	○
b. Students in this class enjoy science instruction.	○	○	○	○
c. Students in this class find it difficult to understand science concepts.	○	○	○	○
d. Students in this class think science is important for society.	○	○	○	○
e. Students in this class are scared of science.	○	○	○	○
f. Students in this class understand how they can use science in their everyday lives.	○	○	○	○

The remaining questions are about your instruction in this class during your recently completed properties of matter unit. Do not be concerned if your instruction included only a subset of these attributes and/or if it included other attributes not addressed in this instrument.

3. On days you teach science to this class, approximately how many minutes is a typical science lesson?

[ ]

4. Did your instruction during this unit (related to matter) cover each of the following science concepts?

	Yes	No
a. Matter is "stuff"; everything we can see and/or touch.	○	○
b. Some objects are composed of a single material; others are composed of more than one material.	○	○
c. Materials have properties; weight (mass) and volume are properties that can be measured using appropriate tools.	○	○
d. Materials exist in several different states; the most common states are solid, liquid, and gas. Each state of matter has characteristic properties.	○	○
e. One way to change matter from one state to another and back again is by heating and cooling.	○	○
f. Objects (materials) vary in the extent to which they absorb and reflect light and conduct heat (thermal energy) and electricity.	○	○
g. Some materials are permanent magnets, which can repel or attract other permanent magnets. Other materials can be magnetic or nonmagnetic. Materials that are magnetic are attracted to permanent magnets.	○	○

5. About how many total lessons were spent on the concepts listed above?

6. About how many total lessons were spent on other concepts in this unit?

7. Did you work with a district or school science coach/specialist in planning and/or delivering this content?

Yes	○
No	○

8. Which of the following *best* describes the instructional materials you used to teach properties of matter to this class? (*Select only one.)*

a. I predominantly used materials from a single textbook/program.	○
b. I used some materials from a textbook/program and some supplemental materials.	○
c. I used lots of different materials (**skip to question 10**).	○

9. Please complete the information on the science textbook/program used to teach these concepts (from Question 4) most often in this class.

Textbook/program title: ____

Publisher: ____

Edition: ____

Copyright Date: ____

10. For what percentage of the time teaching the science concepts from Question 4 were students working in each of the following ways? (*Select one response in each row; responses to these questions should total 100 percent.*)

	0	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
a. individually	○	○	○	○	○	○	○	○	○	○	○
b. in pairs/small groups	○	○	○	○	○	○	○	○	○	○	○
c. as a whole group	○	○	○	○	○	○	○	○	○	○	○

AIM
Properties of and Changes in Matter
Grades 3–5 Teacher Questionnaire (POST)

Please refer to the list of concepts below when answering question 11.

- Matter is "stuff"; everything we can see and/or touch.
- Some objects are composed of a single material; others are composed of more than one material.
- Materials have properties; weight (mass) and volume are properties that can be measured using appropriate tools.
- Materials exist in several different states; the most common states are solid, liquid, and gas. Each state of matter has characteristic properties.
- One way to change matter from one state to another and back again is by heating and cooling.
- Objects (materials) vary in the extent to which they absorb and reflect light and conduct heat (thermal energy) and electricity.
- Some materials are permanent magnets, which can repel or attract other permanent magnets. Other materials can be magnetic or nonmagnetic. Materials that are magnetic are attracted to permanent magnets.

11. In this unit, how much of the total instructional time on these concepts did students in this class do each of the following? (*Select one on each line.*)

For the purpose of this question, we ask that you use the following definitions of "data," "evidence," and "claim."

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion
Claim—a scientific conclusion that is supported by evidence

	None	**Little (10% or less of instructional time for these concepts)**	**Some (11-25% of instructional time for these concepts)**	**Moderate (26-50% of instructional time for these concepts)**	**Considerable (Over 50% of instructional time for these concepts)**
a. Consider, individually or in small groups, their *initial* thinking about these concepts	○	○	○	○	○
b. Make public/share their *initial* thinking about these concepts	○	○	○	○	○
c. Listen and/or take notes during presentations by teacher	○	○	○	○	○
d. Consider data/examples that they can use to draw conclusions about the concepts	○	○	○	○	○
e. Watch a science demonstration	○	○	○	○	○
f. Support claims about these concepts using data/examples as evidence	○	○	○	○	○
g. Read from a science textbook in class	○	○	○	○	○
h. Read other (non-textbook) science-related materials in class	○	○	○	○	○
i. Consider and discuss each other's claims about these concepts using data/examples as evidence	○	○	○	○	○
j. Do hands-on/laboratory science activities or investigations	○	○	○	○	○

11. (*continued*) How much of the total instructional time on these concepts did students in this class do each of the following? (*Select one on each line*.)

Data—information that has not yet been analyzed or processed; typically gathered through observation or measurement
Evidence—analyzed or processed data that are used to support a scientific claim or conclusion
Claim—a scientific conclusion that is supported by evidence

	None	**Little (10% or less of instructional time for these concepts)**	**Some (11-25% of instructional time for these concepts)**	**Moderate (26-50% of instructional time for these concepts)**	**Considerable (Over 50% of instructional time for these concepts)**
k. Answer textbook or worksheet questions	○	○	○	○	○
l. Watch audiovisual presentations (e.g., videotapes, CD-ROMS, videodiscs, television programs, films, or filmstrips)	○	○	○	○	○
m. Reflect on what they were supposed to learn from the activities related to these concepts	○	○	○	○	○
n. Consider how their thinking about these concepts has changed	○	○	○	○	○
o. Apply or connect what they learned about these concepts to other scenarios, contexts, or concepts	○	○	○	○	○