Introduction

Overview
Welcome to the Specific Teaching Practices: Math and Science course. This course provides you with an opportunity to learn how to teach two of the most important subjects in elementary school. Many elementary teachers suggest that they do not like mathematics or science. It is also known that teachers do not spend as much time teaching subjects they do not enjoy or find personally interesting. If you enjoy mathematics and science, this course will give you a chance to have fun extending what you know about the subjects and practicing with interesting and creative ways to teach children science and math concepts and procedures. If you do not already enjoy these subjects, the experience of working through the reading assignments and learning activities in this course may help you find a new appreciation for two fascinating subjects.

Have you ever seen an elementary student struggle in math or science? Were you one of those students? If so, perhaps you can remember feeling confused, overwhelmed, and frustrated at times. Teachers want to help their students avoid those feelings, and that is why it is so important for them to develop not only a strong knowledge base, but also a sense of confidence and enthusiasm for mathematics and science.

Throughout this course, you will strengthen your understanding in key mathematics and science competencies. Those competencies emphasize an approach that represents the kind of balanced instruction that is so necessary in the nation's schools today—that of both content and computation, or process and product. You have already gained a good foundation of basic math and science concepts, and in this course, you will apply your existing knowledge to best teaching practices.

Competencies
This course provides guidance to help you demonstrate the following 3 competencies:

- **Competency 602.4.15: Teaching Methods- Mathematics (Elementary)**
  The graduate provides effective, research-based mathematics curriculum instruction.

- **Competency 602.4.16: Teaching Methods- Mathematics Misconceptions**
  The graduate identifies and analyzes student responses to mathematical problems to detect misunderstandings and misconceptions.

- **Competency 602.4.17: Teaching Methods- Science (Elementary)**
  The graduate provides safe, effective, research-based science instruction.

Teaching Dispositions Statement
Please review the [WGU Statement of Teaching Dispositions](#).

As you prepare to successfully demonstrate competency in this subject, remember that course
instructors stand ready to help you reach your educational goals. As subject matter experts, mentors enjoy and take pride in helping students become reflective learners, problem solvers, and critical thinkers. Course instructors are excited to hear from you and eager to work with you.

Successful students report that working with a course instructor is the key to their success. Course instructors are able to share tips on approaches, tools, and skills that can help you apply the content you’re studying. They also provide guidance in assessment preparation strategies and troubleshoot areas of deficiency. Even if things don’t work out on your first try, course instructors act as a support system to guide you through the revision process. You should expect to work with course instructors for the duration of your coursework, so you are welcome to contact them as soon as you begin. Course instructors are fully committed to your success!

Preparing for Success

The information in this section is provided to detail the resources available for you to use as you complete this course.

Learning Resources
The learning resources listed in this section are required to complete the activities in this course. For many resources, WGU has provided automatic access through the course. However, you may need to manually enroll in or independently acquire other resources. Read the full instructions provided to ensure that you have access to all of your resources in a timely manner.

Enroll in Learning Resources

Take a moment to enroll in the learning resources listed in this section. To enroll, navigate to the “Learning Resources” tab, click the “Sections” button, and then click the “Enroll Now” button for each resource. Once your mentor approves your enrollment in the resource, you will receive an e-mail with further access instructions. Contact your mentor if you have questions.

You will need to enroll in or subscribe to learning resources as a part of this course. You may already have enrolled in these resources for other courses. Please check the “Learning Resources” tab and verify that you have access to the following learning resources. If you do not currently have access, please enroll or renew your enrollment at this time.

Teachscape
Check to ensure your Teachscape subscription is still current. If not, contact your mentor.

MyLabSchool
Check your subscription for CourseCompass MyLabSchool. If your subscription has expired, please contact Learning Resources at learning@wgu.edu to obtain a MyLabSchool Renewal access code.

Math: Teaching for Understanding DVDs
Acquire the Math: Teaching for Understanding DVDs.

Automatically Enrolled Resources
You will be automatically enrolled at the activity level for the following learning resources. Simply click on the links provided below and in the related activities to access the learning materials.

VitalSource E-Text
The following textbook is available to you as an e-text within this course. You will be directly linked to the specific readings required within the activities that follow.


Note: This e-text is available to you as part of your program tuition and fees, but you may purchase a hard copy at your own expense through a retailer of your choice. If you choose to do so, please use the ISBN listed to ensure that you receive the correct edition.

Purchase Your Materials

Listed below are the learning resource materials you will need to obtain.


Note: The WGU Bookstore has these books available for immediate purchase and delivery. You may shop at other online bookstores, but be sure to order early and use the correct ISBN to get the correct edition.

Basic Processes for Mathematics

The activities for this subject will focus on an introduction to mathematics problem solving, counting, and place value. Elementary teachers need to understand the processes of doing mathematics, which includes problem solving. To solve problems, teachers and students alike need to understand counting and have a basic sense of numbers.

Because mathematics includes conceptual, procedural, and computational learning outcomes, teachers must provide learning conditions that align with these learning outcomes.

After completing the activities in this section, you will be able to

- identify prerequisites for problem solving,
- understand counting skills,
- consider principles and processes for addition and subtraction,
- understand how to help children learn place value,
- assess student learning of mathematics, and
- adapt lessons related to math concepts.

When you think of yourself as a math teacher, what skills and knowledge do you believe
children need as starting points for learning mathematics? As a teacher, what mathematics and pedagogy skills do you need to have as starting points so you can provide effective math instruction?

**Problem Solving, Counting, and Place Value**

You will begin your exploration of teaching methods of elementary mathematics by understanding problem solving. You will consider problem solving strategies as well as the prerequisite math and thinking skills children need to possess before they solve mathematical problems of different types.

This topic addresses the following competency:

- **Competency 602.4.15: Teaching Methods- Mathematics (Elementary)**
  - The graduate provides effective, research-based mathematics curriculum instruction.

**Problem Solving**

Read the following chapter in your *Helping Children Learn Mathematics* textbook:

- chapter 6 ("Helping Children with Problem Solving")

As you read this chapter, pay special attention to the different kinds of problem solving techniques that are presented. Try to think of situations where you could use each of the techniques to solve perplexing mathematical problems. What skills do children need in order to use the given problem solving strategies?

View programs 2 and 3 of the *Math: Teaching for Understanding DVD*.

Access the following resource:

- "Problem Solving Bookmark"

Develop a list of prerequisite skills students need to have in order to be successful in solving problems.

**Problem Solving Teaching Practices**

View program 7 of the *Math: Teaching for Understanding DVD*. Complete the following exercise after viewing the DVD program:

- According to the video, there are seven teaching practices that facilitate problem solving. Please create a graphic organizer that identifies each of these seven practices, and briefly define each one. Then, provide at least one concrete example of how you might incorporate each of these seven practices into a problem solving lesson of your choosing.

**Counting Skills**

Read the following chapter in your *Helping Children Learn Mathematics* textbook:
- chapter 7 ("Developing Counting and Number Sense in Early Grades")

As you read the chapter, take notes to identify ways in which you can engage children in counting. Consider principles and strategies for counting.

**Place Value**

Read the following chapter in your *Helping Children Learn Mathematics* textbook:

- chapter 8 ("Extending Number Sense: Place Value")

As you read, think about how you will teach students the concept of place value.

Specifically, explain to a friend or WGU peer how you would teach children to read and write multi-digit numbers that contain various place values such as ones, tens, hundreds, thousands, tenths, hundredths, thousandths, etc.

**602.4.15-04, 38, 39 Performance Task**

Complete the following task in TaskStream:

- EFT4: 602.4.15-04, 38, 39

For details about this performance assessment, see the "Assessment" tab in this course.

**Mathematics Dispositions and Their Effect on Learning**

This subject will focus on an introduction to mathematics accuracy and fluency as well as attitudes toward mathematics that can affect performance and achievement.

Have you ever considered that math performance is directly related to individual attitudes about mathematics? Some individuals have the attitude that mathematics aptitude is something you are born with or also believe that there is nothing they can do to learn mathematics if they are born without a "math brain." Consider how that kind of attitude limits children from learning math. If you believe you cannot learn something, you are inclined not to practice the skills or display interest.

State of mind influences motivation and mathematics performance. Students need to become so familiar with specific mathematical processes that they can execute them without giving them conscious thought. Attitude influences whether or not students are anxious as they approach math situations or if they have a sense of curiosity about problems to be solved.

After completing the activities in this section, you will be able to

- identify strategies for helping children build fluency and accuracy,
- understand how attitude affects performance,
- provide instruction that helps children understand they can learn mathematics, and
- structure learning activities that promote curiosity about mathematics.
What are your attitudes about mathematics? How do you believe your attitudes influence the amount of time you spend on math, the kind of activities you provide, and the subtle messages you send children about mathematics?

**Accuracy, Fluency, and Attitudes**

Working memory holds a limited amount of information at one time. Mathematical operations can be conducted much more rapidly and accurately if some of the facts are automatic. Developing automaticity is a critical component of mathematics instruction.

This topic addresses the following competency:

- **Competency 602.4.15: Teaching Methods- Mathematics (Elementary)**
  The graduate provides effective, research-based mathematics curriculum instruction.

**Accuracy and Automaticity**

Review the following chapter in your *Helping Children Learn Mathematics* textbook:

- chapter 9 ("Operations: Meanings and Basic Facts")

Access and read the following document:

- "A White Paper on Computational Fluency (K-12)"

As you read, think about how fluency in mathematics is developed and how you might structure your math instruction to help your students attain greater accuracy and great automaticity in this subject.

**Motivating Children to Learn Mathematics**

Read the following chapters in your *Helping Children Learn Mathematics* textbook:

- chapter 1 ("School Mathematics in a Changing World")
- chapter 2 ("Helping All Children Learn Mathematics with Understanding")
- chapter 3 ("Planning for and Teaching Diverse Learners")

As you read these chapters, think about what you have learned in previous work about motivation (intrinsic and extrinsic). Can you create a list of at least three activities that would promote interest and motivation in mathematics?

View program 5 of the *Math: Teaching for Understanding* DVD. Think of a learning activity that will promote interest in learning a specific concept or skill (e.g., automaticity, place value, problem solving).

**602.4.15-14 Performance Task**

Complete the following task in TaskStream:

- EFT4: 602.4.15-14
Understanding and Measuring Shapes, Space, and Probability

School-aged children need to understand spatial relationships, how to measure, and basic concepts related to probability. The skills children learn in elementary school enable them to pursue higher mathematics courses that involve data collection and measurement, geometry, and probability and statistics.

The activities associated with this subject focus on helping elementary-aged students develop their knowledge and understanding in geometry, measurement, and probability concepts.

After completing the activities in this section, you will be able to

- identify lessons that help children learn principles of geometry,
- consider strategies for teaching measurement, and
- explore with lessons that relate to probability.

**Geometry, Measurement, and Probability**

So much of mathematics is related to practical applications. People are confronted with principles and elements of shapes every day. They measure quantities and qualities without giving them much thought and consider whether or not events occur through chance or based on probability.

This topic addresses the following competency:

- **Competency 602.4.15: Teaching Methods- Mathematics (Elementary)**
  The graduate provides effective, research-based mathematics curriculum instruction.

**Geometry and Measurement Instruction**

Review the following chapters in your *Helping Children Learn Mathematics* textbook:

- chapter 15 (“Geometry”)
- chapter 16 (“Measurement”)

Try out at least two of the learning activities recommended by the authors with the child of a friend or family member (with permission). What worked well? What might you need more practice at?

View program 10 of the *Math: Teaching for Understanding* DVD. Then consider the following questions:

- What prerequisite skills must students have in order to learn what a parallelogram is, for example?
- How would you make certain that your students have these skills?
Review your textbook for sections on measurement and important formulas such as volume, surface area, area, circumference, and so on. Consider the following question:

- How might you use at least one of the formulas from the "Surface Area Formulas" web page when working with an elementary-aged child?

Review chapter 16 in your Helping Children Learn Mathematics textbook and view program 12 of the Math: Teaching for Understanding DVD.

Create a list of at least three ways that you might teach measurement to elementary-aged children; perhaps make a list for elementary students and another list for intermediate grades. Consider the following question:

- Can you identify the steps you would take in order to teach an elementary-aged child the formula for finding the circumference of a circle?

**Probability**

Read the following chapter in your Helping Children Learn Mathematics textbook:

- chapter 17 ("Data Analysis, Statistics, and Probability")

List the steps used to teach students how to find the probability of obtaining four heads when flipping a coin four times.

Also, search the Internet or other teacher resources to find at least one or two games that would be appropriate for teaching elementary students the concept of probability.

**Complete: 602.4.15-21 Performance Task**

Complete the following task in TaskStream:

- EFT4: 602.4.15-21

For details about this performance assessment, see the "Assessment" tab in this course.

**Problem Solving With Related Concepts**

The activities associated with this subject will help you develop a foundational knowledge of mathematics problem solving, fractions, and decimals.

This section of the course revisits problem solving with an emphasis on how problem solving relates to fractions and decimals. Fractions and decimals, as related concepts, provide opportunities to think about how information is represented, related, and reasoned.

Consider the following scenarios:

- You hand the store clerk a $20 bill for an item that costs $12.42, and you expect to
receive correct change back.

- A parent has seven hungry members of the family but only a single pizza, and that parent wants to treat everyone fairly.
- A carpenter is forming a foundation for a new kitchen addition to a home, and he needs to make very sure that the new addition will be level, plumb, and tied into the existing structure correctly.

These scenarios are examples of mathematical problem solving involving fractions, decimals, computation, reasoning, and other calculations. The activities associated with this subject will help you to develop a foundational knowledge of mathematics problem solving, factions, and decimals. This section of the course revisits problem solving with an emphasis on how problem solving relates to fractions and decimals. Fractions and decimals, as related concepts, provide opportunities to think about how information is represented, related, and reasoned.

Because mathematics includes conceptual, procedural, and computational learning outcomes, teachers must provide learning conditions that align with these learning outcomes.

After completing the activities in this section, you will be able to

- identify, compute, and teach children about fractions;
- understand the relationship between fractions and decimals; and
- use problem solving strategies to help children learn the relationships between fractions and decimals.

Problem Solving, Fractions, and Decimals
How many different ways are there to represent related mathematical concepts? How, as an elementary teacher, can you help children detect and understand relationships that exist?

This topic addresses the following competency:

- **Competency 602.4.15: Teaching Methods- Mathematics (Elementary)**
The graduate provides effective, research-based mathematics curriculum instruction.

Fractions

Read the following chapter in your *Helping Children Learn Mathematics* textbook:

- **chapter 12 ("Fractions and Decimals: Concepts and Operations")**

Then view program 9 of the *Math: Teaching for Understanding* DVD.

Access and review "A Lesson on Fractions" from MyLabSchool in order to gain a richer understanding of how best to teach equivalent fractions using manipulatives.

- Log in to "Course Compass" > "MyLabSchool" > "Foundations of Teaching Pre-clinical Experience (PCE) Videos" > "A Lesson on Fractions".
- Consider how you would teach your own students to learn more about number
operations by introducing the concept of equivalent fractions.

- There are four “follow-up” questions after the video clip; try responding to those four questions to test your understanding of this important math concept.

### Decimals

Review the following chapter in your *Helping Children Learn Mathematics* textbook:

- chapter 12 (“Fractions and Decimals: Concepts and Operations”)

Also review programs 2 and 3 of the *Math: Teaching for Understanding* DVD.

Then, examine a fourth and a sixth grade math textbook. Consider the following questions:

- What are some examples of times when rounding and truncating are appropriate?
- Also, can you list at least two different ways in which you might teach decimals to a third grader? What about a fifth grader?
- How might what you have learned previously about problem solving fit into the context of decimals?

### Complete: 602.4.15-11 Performance Task

Complete the following task in *TaskStream*:

- EFT4: 602.4.15-11

For details about this performance assessment, see the "Assessment" tab in this course.

### Operations: Facts and Meanings

The activities associated with this subject will help you to more clearly understand pedagogical principles pertaining to order of operations, error correction, and multiplication. What do these three math topics have in common? How is the order or operations related to the kind of errors children make? What is the process of multiplication?

Because mathematics includes conceptual, procedural, and computational learning outcomes, teachers must provide learning conditions that align with these learning outcomes. Learning is a process rather than a product. Learning how to do mathematics involves understanding why errors are made, the thought-processes that led to those errors, and strategies for helping correct misconceptions and computational errors.

After completing the activities in this section, you will be able to

- identify the meanings of order of operations,
• suggest thinking strategies for mathematical operations, and
• detect the kind of errors students make when multiplying or dividing.

**Order of Operations, Error Correction, and Multiplication**

What does order of operations mean? How does the order of operations influence accuracy? What kind of errors do children make when completing problems that depend on operations?

This topic addresses the following competency:

• **Competency 602.4.15: Teaching Methods- Mathematics (Elementary)**
  The graduate provides effective, research-based mathematics curriculum instruction.

**Order of Operations**

Read the following chapters in your *Helping Children Learn Mathematics* textbook:

- chapter 9 ("Operations: Meanings and Basic Facts")
- chapter 11 ("Standard and Alternative Computational Algorithms")

Write a division word problem that would correspond to $24 \div 6$. As you write out the steps to solving this problem, be sure to outline the steps in proper order.

As an added challenge, develop a set of four math problems that would help elementary students work through the four basic math operations.

**Elementary Mathematics Properties**

Review your *Helping Children Learn Mathematics* textbook for the commutative, associative, and distributive properties.

Then access the following web page:

- "[Basic Number Properties: Associative, Commutative, and Distributive](#)"

Create a graphic organizer that will help you to understand and remember these three properties. Consider the following questions:

- How might you teach these properties to a fourth or fifth grade student?
- What examples might you use?
- How might you help the student to understand the differences between these properties?

**Error Correction and Multiplication**

Review the following chapters in your *Helping Children Learn Mathematics* textbook:

- chapter 4 ("Assessment: Enhancing Learning and Teaching")
- chapter 10 ("Computation Methods: Calculators, Mental Computation, and Estimation")
Review the following chapters in your *Helping Children Learn Mathematics* textbook:

- chapter 9 ("Operations: Meanings and Basic Facts")
- chapter 11 ("Standard and Alternative Computational Algorithms")

As you read, develop a matrix of misconceptions that elementary students might develop. For example, what misconception might a student have who solves the following problem incorrectly: $5 \times -7 = 35$?

After reviewing chapter 11 in your textbook, write five things you have learned about teaching multiplication. Try to work with at least one elementary-aged family member or friend; give them a multiplication word problem that involves two-digit numbers. Evaluate how they solved the problem and conduct an analysis for apparent misconceptions.

**Complete: 602.4.15-20 Performance Task**

Complete the following task in **TaskStream**:

- 602.4.15-20

For details about this performance assessment, see the "Assessment" tab in this course.

**Assessing Student Learning**

Because mathematics includes conceptual, procedural, and computational learning outcomes, teachers must provide learning conditions that align with these learning outcomes. How many different ways are there to assess mathematical learning? Which strategies help teachers understand misconceptions, check for understanding, and determine if students "get it"? You might think of mathematics assessments as measuring both what students learn as well as how they think. In that respect, math assessments have the potential to measure problem solving skills and thinking. The activities associated with this subject will introduce you to effective methods of teaching problem solving and assessing students’ mathematical learning in the elementary classroom.

After completing the activities in this section, you will be able to

- break complex mathematical problems into smaller parts,
- identify assessment strategies to measure student learning, and
- identify assessment strategies that measure student thinking.

**Problem Solving and Assessment**

This section of the course will help you think about assessment of learning and thinking. How is it possible to assess what children are thinking as they solve math problems?

This topic addresses the following competency:

- **Competency 602.4.15: Teaching Methods- Mathematics (Elementary)**
  The graduate provides effective, research-based mathematics curriculum instruction.
Multi-Step Problem Solving

Read or review the following in your *Helping Children Learn Mathematics* textbook:

- chapter 5 ("Mathematical Processes and Practices")
- chapter 6 ("Helping Children with Problem Solving")

Then, view the Teachscape video clip entitled "Number & Operations: Division with Remainders".

*Note: In order to access this video clip, you must be logged into your Teachscape account. If you are not already logged in, you can locate the video by logging in to your Teachscape account, navigating to "Resource Library" > "Effective Teaching Practices", and then selecting "Number & Operations: Division with Remainders" from the list of video clips.*

If possible, observe an elementary school classroom while students are engaged in a math lesson or investigative project.

- Make a list of instances in which the children show evidence of using one or more of the five mathematical processes.
- Jot down what the children were saying or doing and what possible misconceptions they may have demonstrated.
- What might be 1 or 2 things you could do to ensure their success in this problem?

Here is a fun challenge. Access the "Play With Numbers and Give Your Brain a Workout" web page. Take 15-20 minutes to answer several questions; note the various steps you have to take as you try to solve each problem. Consider how you might apply your insight to the classroom.

**Assessing Thinking**

Review the following chapters in your *Helping Children Learn Mathematics* textbook:

- chapter 4 ("Assessment: Enhancing Learning and Teaching")
- chapter 6 ("Helping Children with Problem Solving")

Develop a short assessment (quiz) that might be used to assess students' thinking about a specific mathematical concept or procedure. How do you know your assessment is an accurate measure of students' thinking?

**Complete: 602.4.15-33, 35 Performance Task**

Complete the following in **TaskStream**:

- EFT4: 602.4.15-33, 35

For details about this performance assessment, see the "Assessment" tab in this course.

**Errors: What Are They, and How Are They Detected?**
Have you ever tried to balance your checkbook and the figures did not match up with your bank statement? This is an example of making an error and not knowing why the mistake was made. It requires a careful analysis of each step in the process in order to detect the error and then know how to correct it. Elementary students face the same challenges each day in school, and it is the responsibility of teachers to help them improve their math skills. You must be very alert to the kinds of errors they are making, which may be indicative of misconceptions about important math concepts.

The activities associated with this subject will build upon what you have learned in previous sections to focus more deeply on the detection and analysis of mathematical errors.

A critical element of mathematics instruction is error analysis. Teachers must diagnose student misunderstandings and know how to correct misconceptions.

After completing the activities in this section, you will be able to

- identify the types of errors children make when doing mathematics and
- develop strategies for analyzing and correcting errors.

**Error Detection and Analysis**

One of the most important skills you need to possess as a mathematics teacher is identification and correction of errors. That does not mean that you simply know when a child is giving an incorrect response. More importantly, it means that you can think like the child, that you understand mathematics well enough to anticipate the kinds of misconceptions children will have and the kinds of errors they might make, and that you develop instructional strategies to minimize and correct errors.

This topic addresses the following competency:

- **Competency 602.4.15: Teaching Methods- Mathematics (Elementary)**
  The graduate provides effective, research-based mathematics curriculum instruction.

**Analyzing Student Errors**

Review the following chapters in your *Helping Children Learn Mathematics* textbook:

- chapter 3 (“Planning for and Teaching Diverse Learners”)
- chapter 9 (“Operations: Meanings and Basic Facts”)
- chapter 11 (“Standard and Alternative Computational Algorithms”)
- chapter 12 (“Fractions and Decimals: Concepts and Operations”)
- chapter 14 (“Algebraic Thinking”)
- chapter 15 (“Geometry”)

Make a list of the kinds of errors that are common for different types of mathematical computations. Think of an example students might make in math due to a misunderstanding or misconception. Jot down why the misconception occurs and how you would help students correct this misconception.
Complete: EFT4/EFT5 TaskStream Task 602.4.16-05

Complete the following in TaskStream:

- EFT4: 602.4.16-05

For details about this performance assessment, see the "Assessment" tab in this course.

**Elementary Science Instruction**

The world of elementary science is an exciting one that holds great value for children. Through science, children learn attitudes that are important in understanding life and the world. They learn essential life skills and build curiosity about the environment.

Science provides opportunities for students to learn through discovery, problem solving, data collection, and analysis. The activities associated with these subjects will introduce you to effective, safe science teaching and learning.

After completing the activities in this section, you will be able to

- describe different kinds of science instructional/learning activities,
- understand principles that guide science curriculum, and
- design a science safety plan.

**Teaching Strategies, Curriculum, and Safety Issues**

There are numerous effective inquiry-based, problem-solving, and experiential learning strategies that teachers can structure to promote scientific thinking. Science instruction and curriculum pose great learning potential, but also carry some risks because children are exposed to materials and equipments that, if not handled properly, can cause injury. Teachers need to understand safety procedures and follow them when providing instruction.

This topic addresses the following competency:

- **Competency 602.4.15: Teaching Methods- Mathematics (Elementary)**
  The graduate provides effective, research-based mathematics curriculum instruction.

**Science Teaching Techniques**

Read the following chapters in your *Teaching Elementary Science* textbook:

- chapter 2 ("How Children Learn Science")
- chapter 3 ("Teaching Science by Constructivist Inquiry Methods")
- chapter 4 ("Teaching Elementary Science Using Full Spectrum Science Instruction")

Consider the following questions:

- What might your science classroom look like if you followed the concept learning model, the discovery model, the social constructivist model, or the experimental model?
• What might be characteristics that they all have in common? How might they be different?
• How might you differentiate instruction in each model to meet the needs of students who have reading difficulty (dyslexic), writing difficulty (dysgraphia), have physical disabilities, are gifted and/or are English Language Learners?
• Which model seems to best fit your own teaching style?

Read the following chapter in your Teaching Elementary Science textbook, as well as other pertinent chapters that focus on curriculum:

• chapter 9 ("Teaching Children to Solve Problems of Science, Technology, and Society")

Consider the following questions:

• If you could design your own elementary science curriculum for a grade of your choice, what topics would you include?
• What kind of learning experiences would you weave in?
• How would your science curriculum be integrated with other subject areas?

Science Safety and Legal Issues

Read the following chapter in your Teaching Elementary Science textbook:

• chapter 5 ("Planning for Instruction and Assessing Student Progress in the FSSI System")

Then, access and read the following:

• "Science & Safety: It's Elementary!"
• "Safety in the Elementary (K-6) Science Classroom"

As you read these documents, think about the kinds of safety hazards that exist in an elementary science classroom. Develop a list of ten important safety tips for your own science classroom.

Review the "Legal Aspects of Laboratory Safety".

As a teacher, you have an obligation to prevent children from being injured in the classroom. Consider the kinds of ramifications that may result by not planning ahead to prevent injuries from occurring.

Science as "Science"

All teachers need to possess skills that enable them to think like scientists, whether that occurs in a science classroom or other content areas.

Science provides opportunities for students to learn through discovery, problem solving, data
collection, and analysis. There are numerous effective inquiry-based, problem-solving, and experiential learning strategies that teachers can structure to promote scientific thinking. The activities associated with this subject will introduce you to data collection, error analysis, and the integration of science, which are three of the most important elements of effective science instruction.

After completing the activities in this section, you will be able to

- identify data collection, analysis, and interpretation procedures;
- understand how to incorporate science equipment in lessons; and
- consider ways to integrate science in other content areas.

### Data Collection, Error Analysis, and Integration of Science

You have learned about problem solving in the context of mathematics. Problem finding and problem solving are integral in the field of science as well. Critical thinkers make decisions based on information they collect, analyze, and use. They know how to integrate the decision making in a variety of contexts.

This topic addresses the following competency:

- **Competency 602.4.15: Teaching Methods- Mathematics (Elementary)**
  The graduate provides effective, research-based mathematics curriculum instruction.

### Thinking Like a Scientist

Complete the following in your *Teaching Elementary Science* textbook:

- Read chapter 1 ("An Introduction to Elementary School Science").
- Review chapter 2 ("How Children Learn Science").

Consider the following question:

- Why is science instruction an important part of the curriculum, despite the increasing emphasis on reading and math instruction as per the No Child Left Behind mandate?

A child observes that the outside of a cold soda bottle is moist and concludes that the bottle is leaking through the glass. What can you as a teacher do to correct this scientific misconception?

### Data Collection

Review the following chapter in your *Teaching Elementary Science* textbook:

- chapter 3 ("Teaching Science by Constructivist Inquiry Methods")

Test your understanding of data collection by creating a brochure on your computer or by hand that you might distribute to peers who are also seeking their elementary certification. In the
brochure, you should answer the following questions:

- What is data collection, and how can it be taught in an elementary classroom?
- How can oral questioning techniques be used effectively when talking about science concepts?
- What is constructivist inquiry, and what theorist is most closely associated with this theory?

**Science Equipment and Technology**

Read the following chapter in your *Teaching Elementary Science* textbook:

- chapter 6 ("Technology and Materials for the Elementary Science Classroom")

As you read, think about the simple and complex equipment that can be incorporated in science lessons to collect, analyze, and display data. Find out what types of equipment are available for use in the school where you will do your demonstration teaching.

Access and review the following web pages:

- "Integration of technology into elementary science instruction"
- "Kathy Schrock's Guide for Educators"

Create a checklist or a database of developmentally appropriate science technology and equipment. Be sure to include at least three examples of technology and at least three examples of equipment that you could use in a lesson of your choice.

**Integrating Science With Other Subjects**

Read the following chapter in your *Teaching Elementary Science* textbook:

- chapter 7 ("Integrating Science with Other Subjects")

Develop a concept map to show how you might integrate science into other subject areas such as language arts, mathematics, or social studies. The following are a few examples of integration to stimulate your thinking:

- Identify a science learning objective that depends on mathematical understanding. What prerequisite math skills would be necessary in order for students to successfully accomplish the science lesson? Create a table or chart that visually aligns the science objective with the necessary math skills.
- Use a science activity to develop oral language skills.
- Use a science activity to develop writing skills.
- Outline a lesson that integrates science and social studies.
- Outline a lesson that integrates science and art or music.
- Write a jingle (song) for the human skeleton or the water cycle.

**Complete: 602.4.17-15 Performance Task**
Understanding and Misunderstanding Science

The activities associated with this subject will focus on the naïve conceptions students have related to science that are based on their everyday experiences and their stages of cognitive development. Science teachers need to know about the kind of misconceptions children may hold and design learning activities that help students overcome their false beliefs.

Science provides opportunities for students to learn through discovery, problem solving, data collection, and analysis. There are numerous effective inquiry-based, problem-solving, and experiential learning strategies that teachers can structure to promote scientific thinking.

Science Misconceptions and Corrections

Elementary teachers must confront their own misconceptions and help children confront misunderstandings by providing experiences with science that create conceptual conflict or inconsistencies. In this section of the course you will learn about misconceptions and how to confront them.

This topic addresses the following competency:

- Competency 602.4.15: Teaching Methods- Mathematics (Elementary)
  The graduate provides effective, research-based mathematics curriculum instruction.

Science Misconceptions

Review the following chapter about science misconceptions in your Teaching Elementary Science textbook:

- chapter 2 ("How Children Learn Science")

Then access and read the "Misconceptions in Science" document.

As you read, think about specific misconceptions elementary students may have about science; consider the impact of life experiences or language barriers that may contribute to mistaken beliefs.

- What can you as a teacher do to help correct or prevent scientific misconceptions?
- What instructional techniques can you use to promote greater understanding?
- How can you provide instructional support for English Language Learners?
- How can instruction be differentiated to meet the needs of students with reading disabilities (dyslexic), writing disabilities (dysgraphia) and who are gifted?

Complete: 602.4.17-07 Performance Task
Complete the following task in TaskStream:

- EFT4/5: 602.4.17-07

For details about this performance assessment, see the "Assessment" tab in this course.

**Complete: 602.4.17-10 Performance Task**

Complete the following task in TaskStream:

- EFT4/5: 602.4.17-10

For details about this performance assessment, see the "Assessment" tab in this course

**Final Steps**

Congratulations on completing the activities in this course! This course has prepared you to complete the assessment associated with this course. If you have not already been directed to complete the assessment, schedule and complete your assessment now.