

Teaching Reasoning and Problem-Solving Strategies

Course Overview and Schedule

Through the readings and exercises in this course, you will learn about reasoning and problem-solving strategies that will enhance your teaching of mathematics and numeracy.

Format: Scheduled, facilitated

Estimated Completion Time: 2 hours per week (12 hours total)

Contact: literacy@worlded.org

Course Objectives

By the end of course, you will be able to:

- Describe the three components of numeracy—context, content, and cognitive and affective—and why it is important to address each component;
- Understand the five processes of the cognitive and affective component, which we use to solve problems;
- Explain ways to build students' comfort and skills in numeracy for success in learning;
- Use a variety of reasoning and problem-solving strategies in your own teaching.

Course Completion

To successfully complete this course, the instructor will assess your work based on whether and to what extent you have:

1. Participated in asynchronous discussions: 30%
2. Completed the required assignments: total of 60%
 - Post *Cognitive and Affective Component* discussion (10%)
 - Post to *The Four Operations* discussion (10%)
 - Post to *Inductive and Deductive Reasoning* discussion (10%)
 - Post to the *Problem-solving Strategies* discussion (20%)
 - Habits of Mind review (10%)
3. Completed the course exam: 10%

If you score an 80% or above, you will successfully complete the course and earn a Certificate of Completion.

COURSE SCHEDULE

Lesson 1

Getting Started

Lesson Activities

- Update computer software
- Become familiar with online tools
- Download course journal
- Review course objectives, schedule, and requirements
- Journal: Online learning plan
- Journal: Personal learning goal

Forum Posts

- Course Goals*

Lesson 2

The Components of Numeracy

Readings

- The Components of Numeracy: “The Cognitive and Affective Component”* by Lynda Ginsburg, Myrna Manly, and Mary Jane Schmitt

Lesson Activities

- Journal: “The Context and Content of Numeracy in My Life”
- Journal: Define each of the five processes.

Forum Posts

- Context Role*
- Cognitive and Affective Component* (required)

Lesson 3

Conceptual Understanding

- The Problem with Key Words
- Building Conceptual Understanding of the Four Arithmetic Operations

Lesson Activities

- Classroom Application: Acting out mathematical operations or writing word problems (required)

Forum Posts

- The Four Operations* (required)

Lesson 4

Adaptive Reasoning

- Adaptive Reasoning
- Prediction and Mathematical Reasoning
- Validating Conjectures through Inductive Reasoning
- Practice with Inductive Reasoning
- Validating Conjectures through Deductive Reasoning
- Practice with Deductive Reasoning
- Facilitation Questions

Lesson Activities

- Journal: Ideas for helping students use predictions
- Classroom Application: Inductive or deductive reasoning exercises (required)

Forum Posts

- Prediction Suggestions*
- Vocabulary Chart*
- Inductive and Deductive Reasoning* (required)

Lesson 5

Strategic Competence and Problem Solving

- Strategic Competence
- Problem-Solving Strategies
- Games for Developing Strategic Skills

Lesson Activities

- Journal: Recollections of using problem-solving strategies
- Journal: Website review, noting good

Lesson 6

Procedural Fluency and Productive Disposition

- Procedural Fluency
- Productive Disposition

Lesson Activities

- Journal: Habits of Mind chart
- Classroom Application: Habits of Mind conversation with students
- Quiz: Habits of Mind (required)

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- problems for your students
- Journal: Create your own math problems and solutions
 - Classroom Application: Try problem-solving strategies in your classroom (required)

Forum Posts

- Procedural Fluency*
- Habits of Mind*

Forum Posts

- My Math Problems*
- Games*
 - *Problem-Solving Strategies* (required)

Course Closure

Activities

- Course Exam (required)
- Course Evaluation
- E-mail course facilitator when all course activities are complete and ready for evaluation.
- Print Certificate of Completion

Forum Posts

- Reflections*

Course materials are available for one month from the course end date.

This course was produced by World Education and ProLiteracy, and written by Barbara Goodridge, Lowell Adult Education Center, Lowell, MA, and revised by Amy Vickers, Math/Numeracy Consultant, in 2015.

Minimum Technical Requirements

World Education’s online courses are offered via the Moodle learning management system (LMS) and WebEx Internet conferencing system. To participate in courses, you must have access to a reliable computer with an Internet connection. We recommend a high speed Internet connection. For courses that include Webinar sessions, you must have the ability to be on an Internet-connected computer and a telephone at the same time. We recommend a screen resolution 800×600 or higher. If you are using a mobile device, we recommend that you review these [FAQs from Moodle](#).

System Requirements

Moodle requires that JavaScript, cookies, and Java be enabled in a recommended browser. (Note: Enabled pop-up blockers may interfere with accessing content.) Recommended browsers consist of any standards-supporting browser. Examples are:

- Mozilla Firefox 3 or later
- Safari 3 or later
- Google Chrome 4 or later
- Opera 9 or later
- Microsoft Internet Explorer 7 or later

Additional Plug-ins

Some courses require additional plug-ins to access media and course resources, such as Flash and Adobe Acrobat. You should have the ability to download and install these plug-ins on your computer, or have access to a technical support staff person who can do this for you.