

Guidelines for Mathematical Problem-Solving Units

The following suggestions are intended to help Teachers Institute of Philadelphia Fellows organize their writing as they prepare units on problem-solving in mathematics. The recommended sections below, labeled as Rationale, Background, and Strategies, constitute the Unit Narrative.

Overview

The Overview should provide a brief description of the subject of your Unit and how it is organized. In particular, does your unit focus on the application of a particular problem-solving strategy to a variety of situations and levels of mathematical sophistication, or does it apply a variety of strategies to a particular mathematical topic or application?

The Overview should also provide an educational context for the content of your Unit. This should include a brief description of you, and your teaching philosophy and/or experiences, as well as a brief description of your school and/or students as they are relevant to your Unit.

Rationale

This section of the Unit should provide an argument for the importance and interest of the topic of your Unit. It might include quotations from educational research or authorities, it might explain how the Unit is relevant to the needs of students in later school or in life, and it can include extracts from district, state or NCTM standards, etc.

Additionally, in this section you can describe your own experiences regarding the importance and/or difficulty of teaching this material, any insights you have had into student difficulties, and/or specific ideas you have employed to overcome them.

(Mathematical) Background

This is a key section. It should give a cogent exposition of the main mathematical ideas and techniques you want to treat. It should explain each topic and problem-solving strategies, and discuss how the topics and strategies are connected. This is your chance to make sure that your reader understands the mathematical issues you are addressing. Even if the topics you want to deal with appear in many curricula, it is likely that some of your emphases or approaches are somewhat non-standard. Make sure to provide the reader sufficient context and mathematical content to be able to follow your lead.

Strategies

This should explain both the mathematical problem-solving strategies you will use and the pedagogical steps you will take to ensure that your main mathematical goals will get across to your students. It should describe teaching moves, projects, problems, and materials you will use. It can include summaries of books and other materials you plan to use. It is distinct from lesson plans, in that it is organized around the mathematics rather than around a timetable or classroom logistics.

For example, in discussing books, you should talk about what mathematical points you wish to make by using each book, and how the book will help you do this, not the details of sequencing or who will read what.

Often, considerable work must be done to make sure that use of ancillary materials really does support the learning that you want to happen. You must work to make sure that your students see the same mathematics you do in any materials or projects.

Lesson Plans

This is a detailed description of three or perhaps a few more of the central lessons in your Unit. Begin by summarizing the mathematics and/or problem-solving strategies to be dealt with in the lesson, and then describe how you will go about getting it across.