

Chapter 8

Historical support for particular subjects

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Abstract: This chapter provides further specific examples of using historical mathematics in the classroom, both to support and illustrate the arguments in chapter 7, and to indicate the ways in which the teaching of particular subjects may be supported by the integration of historical resources.

8.1 Introduction

Some of the ways in which history of mathematics can help mathematics students, teachers and researchers were examined in the previous chapter. Reasons were put forward for concluding that history can help us to

- (i) grasp more profoundly the meaning of concepts, theories, methods and proofs in mathematics;
- (ii) identify crucial steps, difficulties and obstacles in the evolution of a subject;
- (iii) organise teaching better and provide motivation for the study of a subject;
- (iv) build up a reservoir of examples, problems and alternative viewpoints about a subject;
- (v) appreciate mathematics better as a creative process;
- (vi) see mathematics as a human endeavour which is related to other human activities;
- (vii) maintain an open and human attitude towards the study of mathematics.

Many examples were given to illustrate various ways of implementing the integration of history of mathematics with mathematics teaching in mathematics education. While these many examples are certainly illustrative and useful, they are by design, in order to illustrate a wide range of implementations, a potpourri with only sketchy descriptions. In this chapter we will offer a further list of selected examples from classroom teaching experience, to be accompanied by discussion more detailed than could be afforded in chapter 7.

To help readers better orientate their attention and interests we discuss these examples against the background of a three-dimensional framework:

1. the level of the curriculum, which in most countries has a tripartite layering, from primary or elementary school (from age 6 to 12) to secondary or high school (from age 12 to 15) up to university or college (from age 18 and beyond);
2. the mathematical topic within the curriculum, such as algebra; geometry, analysis, probability theory, etc.;
3. the ways by which history of mathematics is integrated with mathematics teaching in mathematics education.

Clearly, a historical example will not often have a set of clear-cut coordinates in this three-dimensional framework. The same topic may be presented at different levels (often to different depth) or with the historical content integrated in different ways, and the same example may involve different areas of mathematics. In fact, as we witness time and again in history, many instances of mathematical development arose from or resulted in the fruitful marriage of different areas of mathematics. Thus, readers are requested to regard this framework only as a rough schematic tool in a broad sense rather than as a strict compartmentalisation. One example (§ 8.4.7) is even selected to display how the same piece of historical material can be used at different levels in different subject areas for different purposes.

Of course, there are as many different ways to integrate history of mathematics into classroom teaching as there are teachers. Different teachers have different styles, hold different beliefs and place emphasis on different aspects, despite the fact that they all agree on the value of history of mathematics—and even on this point teachers may differ in their conception of what history means, not to mention the different views a historian of mathematics, a mathematician and a mathematics teacher may adopt on this issue! This is natural and not a bad thing: variety implies richness, which when gathered under combined effort will yield a fuller vista. Hence, instead of attempting to tailor the variety of examples contributed by different authors into one uniform mould, we prefer to retain the individual style and emphasis, while grouping the examples into a more structured whole in a format closely related to the general directions and emphases given in section 7.2 and 7.3 of chapter 7. Name(s) of contributing author(s) are attached to each section.

Section 8.2 consists of examples of teaching specific topics in which history of mathematics inspires the whole structure of the teaching. Section 8.3 includes examples that unfold the evolving nature of mathematics, both in intent and in form, as well as to present (some small piece of) mathematics in the context of different cultures. Section 8.4 treats some specific examples from various areas of mathematics and levels of the curriculum. Finally, section 8.5 highlights the social and cultural aspects of mathematics in a broad sense. Readers are requested not to interpret this structure too inflexibly—sometimes examples in one section can equally be placed in another. Certainly such a small list of examples can hardly do justice to the wide variety of possible ways of integrating history in teaching and learning mathematics. But we hope to exhibit a wide coverage so as to stimulate other teachers across the world to think of more examples and to make available further didactical source material.

This chapter, then, is both supplementary and complementary to chapter 7: supplementary in the sense that it provides further specific examples to support the arguments presented there; complementary in that the historical dimension of teaching, as illustrated, mainly through the content of these examples, complements the practical implementations described in section 7.4 of chapter 7. With this in mind, we present the examples for the convenience of the reader by giving clearly marked references to relevant sections in chapter 7 in bold face such as **7.2.c2**.