

## Project: Teaching mathematics with history

This assignment is part of the Historical Aspects course. Students are required to work in groups of 3 (or 2).

**Objective** The objective is to design educational material for the teaching of mathematics incorporating history. The material must be targeted at senior high school students or beginning bachelors, nominally within the age range of 16–20 years; you can narrow this down as much as you wish. The mathematical content must be suitable for the specific target group that you choose. History must make a convincing and important contribution to the material. All kinds of activities, such as field work, experiments, games, quizzes or whatever can form part of your plan.

Aim for a simple yet illustrative topic, one that you think you will be able to work out properly in only a few pages. If you need inspiration, have a look in journals such as *The Mathematical Intelligencer*, *College Mathematics Journal*, or their Dutch equivalents *Nieuw Archief voor Wiskunde*, *Euclides*, *Nieuwe Wiskrant* (now discontinued), *Pythagoras*, or surf the web (e.g., google for “Loci:Convergence”). A visit to Museum Boerhaave in Leiden may also be inspiring. You may want to use text [3] in the reader (the ICMI Study Ch. 7) for further inspiration. In fact, you *must* relate your project to that text in your end product.

**Prospectus** When you have a rough idea of your project, search for applicable literature (historical and/or factual and/or didactical). Make sure you consult some, but not necessarily all, of this literature. Gradually interpolate and (re)shape your plan until you are in a position to write down a preliminary sketch of maximum 1 page, describing:

- the target group;
- the mathematical subject;
- the main activity for the students;
- the contribution of history;
- a preliminary list of literature.

The style of this prospectus can be sketchy and informal. See website for hand-in deadline of the prospectus.

After you have handed in your prospectus, you will soon receive a reply within the following spectrum:

- Go Ahead: good luck to you and have fun with the project. I am looking forward to the results.
- Not Quite: your prospectus has potential, but needs some adjustment because it is too ambitious/unrealistic/vague/whatever. You need to tailor it and I will offer some suggestions.
- Quite Not: this doesn't seem to be a good idea for specified reasons. Substantial adjustments need to be made.

In order to proceed with the project, you must first reach the “go ahead” signal.

**Output** Your final product consists of two parts, optionally three.

1. Part one is a **manual** for other teachers who could use your teaching material in class. It contains your **motivation**: explain your objectives, the target group and topic, and any other choices that you made. Here you justify that your approach fulfills the stated objectives. In this part you also detail **how history is integrated**. Explain how your work relates to the framework of Tzanakis et.al. in the ICMI Study Ch. 7 (reader text [3]): indicate and motivate with which parts of each of §7.2, 7.3, and 7.4 your project matches. Make clear what the added value of the historical components is. This part also contains a **lesson plan** and anything else that is needed in order to make it a manual for part two.
2. The actual **implementation** of your plan is in part 2. It should be as specific as possible. It contains a ready-to-use instructional text accompanied by all the necessary material needed for the students. It is very important that this part is complete and concise, so don't make your project too ambitious.
3. Optionally, you may include a third part dedicated to **field tests**. This part may contain the results of any experiments that you have performed to test if your material is suitable. If this part forms a useful addition to the other two parts, then it will be rewarded with a bonus.

### Boundary Conditions

- Your text is written in correct and understandable English or Dutch.<sup>1</sup> Correctness includes spelling, syntax, and semantics.
- Your text must have a clear and explicit structure.
- Clearly state the title, authors, occasion, and date of your project on the title page.
- Parts 1 and 2 together encompass  $20 \pm 4$  pages. This excludes material copied from existing sources (hereafter termed "additional"). Contact me if your text converges significantly below or above this margin.
- The status of the additional, their role in the project, and their provenance must be explicit.
- Pay credit to all the sources that you have used. Use a reference mechanism and list all the consulted literature in a Bibliography. Failure to pay due credits will be considered as plagiarism and will be reported to the responsible examination committee.
- Quotations must be properly marked as such, and must be traceable to the exact pages in the literature.
- You bear sole and complete responsibility for all text and other material (except additional). It is a condition that you understand what you have written, unless you explicitly state otherwise *and* you have made clear why this not-understood passage is included.
- Your final paper must be handed in before the deadline (see website).

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<sup>1</sup>If written in Dutch then the language criterium will weigh heavier.

**Criteria** Compliance with the above conditions implies sufficient marks. Further factors weighed in the grading include:

- correctness and level of apprehension of mathematics and history;
- suitability of the material for the target group;
- adequate motivation;
- originality of the project;
- command of language;
- presentation.

An additional bonus may be awarded for a useful part 3.

**Peer review** It is *highly recommended* that you have a peer group with which you exchange the draft versions of your project papers. These peers will spot weaknesses in your text that you overlooked or weren't aware of. Taking note of their remarks will result in a better paper. Meanwhile, you return the favour by criticizing their paper. Research has shown that your own critical attitude towards texts benefits from this experience and that you increase your own writing skills.

In your review, pay attention to:

- correctness of language (spelling, grammar);
- semantics: clear, precise, and unambiguous language;
- is the text well structured?
- clear exposition: can you follow the reasoning? in which places is the text difficult or impossible to understand? Are the authors vague about something?

The last point is the most important but also the most neglected part of the peer review procedure. Remember that you are an intelligent person and that it is the author's responsibility to make things clear to his/her audience. In other words: if you do not understand the text then blame the author, not yourself! You are not required to comment upon the applicability of the text or its historical correctness, but doing so is not ruled out either. See the website for a *recommended* time window for the peer review process.