

How to Start Writing a Primary Source Project (PSP)

Janet Heine Barnett (janet.barnett@csupueblo.edu), Dominic Klyve (dominic.klyve@cwu.edu),
Danny Otero (otero@xavier.edu) and David Pengelley (davidp@nmsu.edu)

This document seeks to offer guidance for those who wish to write a PSP in the style of the NSF-funded [TRansforming Instruction in Undergraduate Mathematics via Primary Sources \(TRIUMPHS\)](#) initiative. It was originally written for the TRIUMPHS grant project in 2020, and has since been updated on behalf of the [TRIUMPHS Society](#) (TRansforming Instruction: Understanding Mathematics via Primary Sources), founded in 2023 to carry on the legacy of the TRIUMPHS grant and its predecessors. Through its peer-reviewed journal, the *Annals*, the Society publishes PSPs that are ready for classroom use, as well as artifacts related to the development of such projects and works that support their implementation.

Questions about something you find in this document? Feel free to contact any (or all) of its authors, or the editor(s) of the *Annals of the TRIUMPHS Society* whose contact information you can find here:

<https://triumphsannals.journals.publicknowledgeproject.org/index.php/triumphsannals/about/contact>

You may also reach out to the *Annals* editor(s) at any point during the process of creating a new PSP to request that a mentor be assigned to assist you through the process.

In outline form, our advice consists of the following six steps. As you are ready to undertake each of these steps, you will find further details on what is involved in each within the remainder of this document, along with information about how the TRIUMPHS Society or an assigned authorship mentor might help out with the process of PSP creation.

Before you begin writing, here are some steps you could take (but not necessarily in the order listed!).

1. Familiarize yourself with the **pedagogical motivation for and design of PSPs**.
2. Familiarize yourself with the basic **structure of a TRIUMPHS-style PSP, and the variations that exist within that structure**.
3. **Once you have a potential PSP topic in mind**, familiarize yourself with the **history of your topic by reading the secondary literature**; this may also help you with your primary source selection.
4. To further hone your choice of topic, or to set the stage for the actual writing process on your chosen topic, **begin selecting your primary source materials**.

Begin **the writing process itself** only after you have done the necessary groundwork:

5. Contact the editor(s) in chief of the *Annals* to tell them what your chosen source and topic are, and to request a copy of the **LaTeX file of the PSP template** and/or review the **list of vital PSP features** on the [Information for Authors page of the *Annals*](#).

Even if you have not requested a mentor before this point in the process, the *Annals* editors are available to assign someone who can, among other things, look at preliminary or partial drafts, make suggestions about possible tasks or task types, and answer any individual questions that may arise during the writing process.

Once you have a complete draft (including Notes to Instructors)

6. Please submit it for possible publication in the *Annals*! The submission portal and further information for authors, including the journal's copyright policy, is available at

<https://triumphsannals.journals.publicknowledgeproject.org/index.php/triumphsannals/about/submissions>

Before you begin writing, here are some steps you could take (but not necessarily in the order listed!).

1. Familiarize yourself with the **pedagogical motivation for and design of PSPs**.

Two particular articles you may find useful for this purpose include:

- “Designing Student Projects for Teaching and Learning Discrete Mathematics and Computer Science via Primary Historical Sources,” Authors: Barnett, et al. Available at <https://www.cs.nmsu.edu/historical-projects/Papers/HPM-collected-volume-historical-projects-rev01.pdf>

This article describes 15 pedagogical design goals for what PSPs can accomplish for students, and discusses the design elements for achieving these goals in two specific PSPs.

- “The Pedagogy of Primary Historical Sources in Mathematics: Classroom Practice Meets Theoretical Frameworks,” Authors: Barnett, Lodder & Pengelley. Available at https://drive.google.com/file/d/1JjhZEe8DYpZ-gAJ7-YPJHBNbqm4Iu0n-/view?usp=drive_link

This article describes the evolution of TRIUMPHS’ guided reading approach for student projects, analyzes that pedagogy within the context of various theoretical frameworks on the use of history in mathematics education, and discusses its advantages and challenges.

Interested in reading more? Take a look at some of the other articles on the [TRIUMPHS Society Resource List](#).

2. Familiarize yourself with the basic **structure of a TRIUMPHS-style PSP, and the variations that exist within that structure**.

The best way to do this is to read some PSPs! We recommend studying a variety of PSPs for their commonalities, their differences, their content, their writing style for historical context, for narrative, and for tasks, and for their fit with standard courses.

Here is a list of PSPs with which you might wish to start:

- **F 05.** [Quantifying Certainty: the p-value](#) , Author: Dominic Klyve
- **M 05.** [Fermat’s Method for Finding Maxima and Minima](#) , Author: Kenneth M Monks
- **F 11.** [Greatest Common Divisor: Algorithm and Proof](#) , Author: Mary Flagg
- **F 14.** [Rigorous Debates about Debatable Rigor](#) , Author: Janet Heine Barnett

We selected this particular set of projects as we believe they illustrate the elements that are common to all PSPs, while showcasing some of the important differences that naturally arise between PSPs due, for instance, to the nature of the primary source used, the maturity level of the student audience for which the PSP is intended, or the author’s learning goals for the topic in question.

SUPPORT AVAILABLE FROM THE TRIUMPHS SOCIETY

We would be happy to make specific recommendations about PSPs that you may personally wish to study before you begin writing, based on a particular topic, a particular course or a particular primary source that you have in mind for your PSP.

3. **Once you have a potential PSP topic in mind**, familiarize yourself with the **history of your topic by reading the secondary literature**; this may also help you with your primary source selection.

Or, **if you're still searching for a specific topic**, do some **general background reading** related to the one of the following:

- the historical development of the standard content themes for a course that you regularly teach (or hope to teach soon);
- a historical time period and place of particular interest to you (e.g., 19th century analysis, algebra in the renaissance , number theory in India,)
- the works of a particular mathematician (e.g., Euler, Lagrange, ...but probably not Newton!).

Then, once you are ready to begin **navigating the secondary literature**:

- a. Consider starting your research by looking at a good general history. While not an exhaustive list by any means, here are some recommended sources:
- Gouvea and Berlinghoff's [*Math through the Ages*](#) is a “gentle introduction” to much of the history of mathematics, and may be an easy entry to your subject.
 - Katz's [*A History of Mathematics*](#) is probably the standard treatment of the subject, and can provide a lot more details.
 - Suzuki's [*Mathematics in Historical Context*](#) provides a wealth of useful information about the social, cultural, and political world in which much math was written in the past.

Each of these will contain references to more specialized literatures.

- b. Once you are ready to dig into more detail, an extensive list of specialized histories (and more!) can be found on David Pengelley's webpage, [*Resources for Using History in Teaching Mathematics*](#).

- c. Check current and back issues of major (and less major) HoM journals, e.g.,

- [*Historia Mathematica*](#)
- [*Archive for History of Exact Sciences*](#)
- [*British Journal for the History of Mathematics*](#)
[former title: *Bulletin of the British Society for History of Mathematics*]
- [*Convergence*](#) – freely available until sometime in 2025 at [*old Convergence website*](#)
- [*ISIS*](#)
- [*Revue d'histoire des mathématiques*](#)
- [*Revista Brasileira de História da Matemática*](#)

- d. Be wary of modern reconstructions of original works by historians and mathematicians. There is a tendency to alter original sources to make them easier for students (and other mathematicians) to understand. Books like Dunham's *Journey through Genius* provide lucid descriptions of mathematics, but often don't try to preserve the original sources in their original forms. “Trust, but verify” remains a necessary guard against a misunderstanding of the original source.

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For some topics, the secondary literature is quite extensive; for others, not so much. Feel free to reach out to us for suggestions if you're having trouble finding useful background on your topic, or are finding too much of it. In addition to recommending specific articles or books (if we can!), we may also be able to put you in direct contact with an expert in the field.

4. To further hone your choice of topic, or to set the stage for the actual writing process on your chosen topic, **begin selecting your primary source materials.**

You will find that the specific topic you choose for your PSP may be highly dependent on both the nature and availability of primary source material on that topic. So, you will need to do some source hunting with one or more topics in mind, and be flexible, depending on what sources you find.

Once you are ready to begin **navigating the primary source selection phase:**

- Be thankful that, with the advent of the internet, the availability of primary historical source material has increased enormously!
- In addition to web searching, make good use of your academic library and librarians, including interlibrary loan (ILL) as needed. In particular, there are a number of great original source collections available now that you could request via ILL. Also see the [Resource List for for PSP Authors](#) on the TRIUMPHS Society webpage.
- You may confront foreign language issues if your source is not in English. The only means we know of dealing with this is to find (a) an existing English translation, or (b) someone who can help you do the translating now; think of all the mathematicians you know and the languages they feel comfortable working with, and ask for help.
 - Beware: translating mathematics cannot be done reliably by non-mathematicians!
 - A translation done by a native speaker of English (the target language) is also generally more robust than one done by someone whose native language is that of the primary source.
 - You may only need a detailed translation of a very limited portion of a source; in this case, first get general help from a mathematical translator to help you narrow down what you need, and then choose very carefully what you need in detailed translation.
 - Google Translate (or something similar) might also be useful for a DIY translation, particularly if you have some familiarity with the source language already yourself. But *caveat emptor!*
 - If you plan to submit your PSP for publication in [The Annals of the TRIUMPHS Society](#), the translation you use (whether done by you or someone else) will eventually need to be vetted by a reviewer assigned by the *Annals* editorial board. Published translations by an established scholar are generally best in this regard, but we don't always have that luxury.

And, some advice for what to do **once you have a prospective primary source in hand** (in a language tyou can read),

- **Get to know the source well yourself, but on its own terms!** Do your best to set aside today's paradigm for the topic and fully immerse yourself in the source author's thinking. Read your source through, get confused, mark up the places where you are puzzled, read it again (and get confused again), go back to your secondary sources, maybe read some other primary sources that the author of your source would have known.

For those who are new to the reading of primary sources, and even for those of us who have done this for many years, we also **highly recommend reading the following** (relatively inexpensive!):

[*How to Read Historical Mathematics*](#), by Benjamin Wardhaugh. Princeton University Press, 2020.

- Once you feel pretty familiar with a source, think carefully about whether it will be *fruitful as the basis for a PSP*. Can you identify specific excerpts from the source that will guide students through the content you wish them to learn? What language (or other) difficulties might they encounter, and how will you guide them through those? Perhaps type up a few excerpts in LaTeX and try writing student tasks or secondary narrative based on them. Share your thoughts with the TRIUMPHS Society leadership or others, and see what they think.

SUPPORT AVAILABLE FROM TRIUMPHS SOCIETY

We are available to try to help out with suggesting potential sources for your topic, locating sources, obtaining or vetting English translations, and providing feedback on any preliminary writing you do related to a potential source. ***It would definitely be good to check in with the Society leadership about your chosen source and planned PSP before writing in earnest;*** they have a lot of experience to share, and might save you from trouble and other frustrations!

And what about **the writing process itself**, once you have done the necessary groundwork?

5. Contact the [editor\(s\) of the *Annals*](#) to report on your chosen source and topic, and to request a copy of the **LaTeX file of the PSP template**. Even if you don't plan to submit your PSP for publication in the *Annals*, this template will still give you a specific format with which to start. And, although using the template itself is not a requirement for PSPs submitted for publication in the *Annals*, it provides information concerning certain requirements that the *Annals* editors will be looking for. You can also find a **list of the vital PSP features on the [Information for Authors page of the *Annals*](#)**.
 - a. If you've followed our advice from earlier in this document, then by the time you start writing, you'll know that:
 - Some PSPs are short, intended for just one or two class days, while some are very long, requiring weeks for classroom implementation.
 - Some PSPs are built on substantial excerpts from primary sources, sometimes even from multiple sources or multiple authors, while other PSPs are built entirely around a single tiny primary source excerpt.
 - Some PSPs break up the primary source excerpt into small passages, or even individual sentences, with frequent narrative segues and individual Tasks for students to work on between the passages, while others have lengthier source passages with Tasks clustered together between passages.
 - Some PSP Tasks ask students to mimic a procedure in the source, verify a claim made in the source, or complete an explanation that guides them to make sense of the mathematics in the source on its own terms, while some PSP Tasks are more open-ended and seek to activate student thinking about the source without directing their attention to anything specific in it. Other PSP Tasks prompt students to exercise their mathematical understanding or skills in a way that does not directly refer to the source but instead sets the stage for understanding the source or connects more directly to the current course curriculum.

The following article provides a thorough discussion, with examples, of the various types of tasks that the authors identified as a result of their research on the topic:

Barnett, J. H., Can, C. & Otero, D. 2024. [Tagging Opportunities to Learn: A Coding Scheme for Student Tasks](#). *The Mathematics Enthusiast*, **21**(1&2):225–255.

You may wish to begin your writing process by deciding which of these various approaches will best fit your chosen mathematical topic, student audience, learning goals for that audience and selected source – or just start writing with these four factors in mind and see what develops.

- b. How you actually start writing the PSP is then up to you. You could start with historical background and PSP goals, and possibly a little content background. Or you could start at the core of the PSP, with the historical source excerpts, and start to craft mathematical Tasks for students based on interpretation of these sources, connected by narrative annotation that unites these into a coherent whole, and then fill in the historical background later. You will probably want to leave the Notes to Instructors section for last (and maybe even write those Notes after you or someone else has taught with an initial draft of the PSP). Other than that, what works best varies significantly from author to author, and source to source.

SUPPORT AVAILABLE FROM THE EDITORS OF THE ANNALS

Even if you have not requested a mentor before this point in the process, the *Annals* editors are available to assign a mentor who can, among other things, look at preliminary or partial drafts, make suggestions about possible tasks or task types, and answer any individual questions that may arise during the writing process.

6. **Once you have a complete draft** (including Notes to Instructors), congratulations!! Please (please!) submit your project for possible publication in the *Annals*! Again, the submission portal and further information for authors, including the journal's copyright policy, is available at

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