

The Paradoxical Philosophy of American Mathematics Education, 1790–1840

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MAA Convergence

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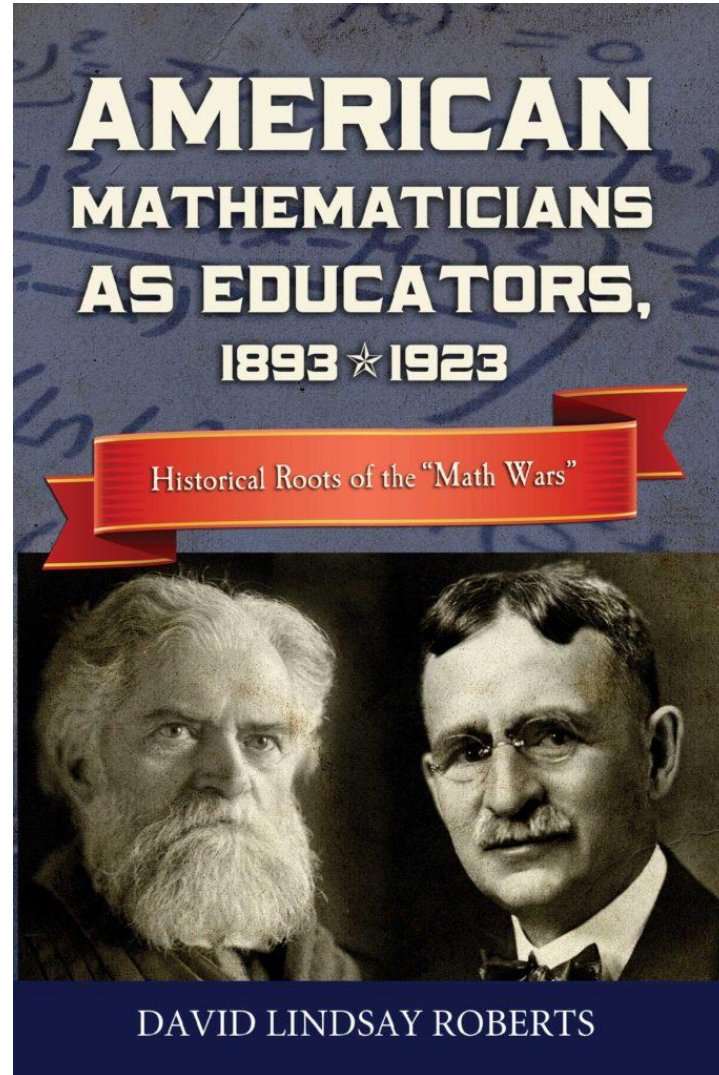
Mental Discipline Justification for Teaching Mathematics to Everyone

- Center College Curricula on Mathematics and Classical Languages
- All Students Take the Same Courses
- All Students Develop Methodical, Precise, Accurate Mental Habits
- All Students Become Skilled at Logical Reasoning . . . And Apply Skills to Theology, Law, Medicine
- Works when Colleges are Small Liberal Arts Institutions that Train Wealthy for Relatively Few Jobs

Harvard Professorships circa 1800

- Hollis Professor of Divinity
- Hollis Professor of Mathematics and Natural Philosophy
- Hancock Professorship of Hebrew and Other Oriental Languages
- Hersey Professorship of Anatomy and Surgery
- Hersey Professorship for the Theory and Practice of Physic
- Erving Professorship of Chemistry

What Happened to the Mental Discipline Thesis?



- David Lindsay Roberts, *American Mathematicians as Educators, 1893–1923: Historical Roots of the "Math Wars"* (Docent Press, 2012), <https://www.docentpress.com/books/american-mathematicians-as-educators/>

Expansion of Mental Discipline Justification for Teaching Mathematics to Everyone

- **Originally:** Students Develop Methodical, Precise, Accurate Mental Habits and Become Skilled at Logical Reasoning
- **Additions:**
 - Practical Applications are Part of Mental Discipline
 - Higher Mathematics are Excluded from Classroom
- **Tensions:**
 - Emergence of Electives and Majors
 - Individual Definitions and Approaches in Textbooks

Expansion of Mental Discipline Justification for Teaching Mathematics to Everyone

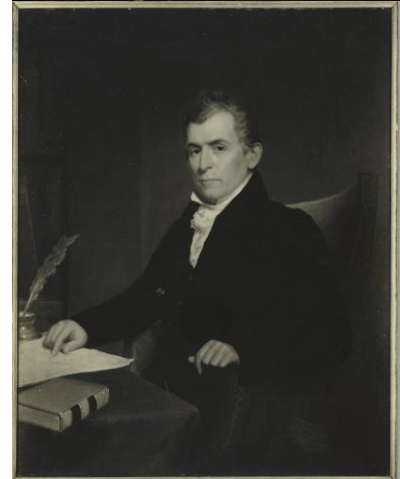
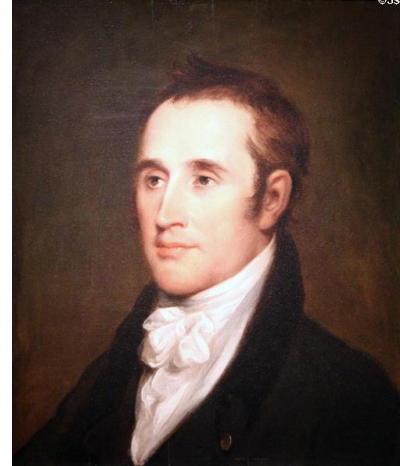
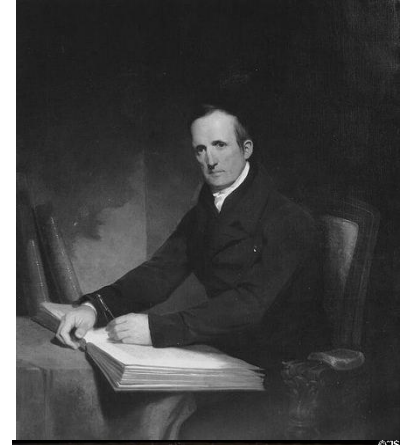
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Were Expansions of Mental Discipline Justification Actually Paradoxes?

- **Additions:**
 - Practical Applications are Part of Mental Discipline [paradoxical or unwieldy?]
 - Higher Mathematics are Excluded from Classroom [paradoxical or hypocritical?]
 - If Mental Discipline Works with College Students, Then It Should Work in Elementary and Secondary Schools [paradoxical or ironic?]
- **Tensions:**
 - Emergence of Electives and Majors [justification outdated?]
 - Individual Definitions and Approaches in Textbooks [paradoxical or inconsistent?]

Jeremiah Day,
Benjamin
Silliman, and
James Luce
Kingsley,
“Original Papers
in Relation to a
Course of Liberal
Education,”
*American Journal
of Science* 15
(1829): 297–351.

- Generally Seen as Key Articulation of Mental Discipline Thesis
- Day (1773–1867, 1795 portrait) President of Yale College, Compiler of Math Textbooks
- Silliman (1779–1864, 1825 portrait) Yale Professor of Chemistry and Natural History (Portrait from
- Kingsley (1778–1852, 1828 portrait) Yale Professor of Languages and Ecclesiastical History and Yale Librarian



Some Major Points Made in “Original Papers in Relation to a Course of Liberal Education”

- Curriculum Constantly Improved and Updated (e.g., Chemistry, Political Economy)
- Central Question is Purpose of College Education, Which is to Discipline Mind and Fill It with Useful Knowledge
- Theory and Practice are Partners in Teaching and Learning
- Well-Rounded Education Produces Well-Rounded Men
- College is Superior to Academy, Seminary, School, Etc.

Charles Davies,
*The Logic and
Utility of
Mathematics,
With the Best
Methods of
Instruction
Explained and
Illustrated* (New
York: A. S.
Barnes & Co.,
1850)

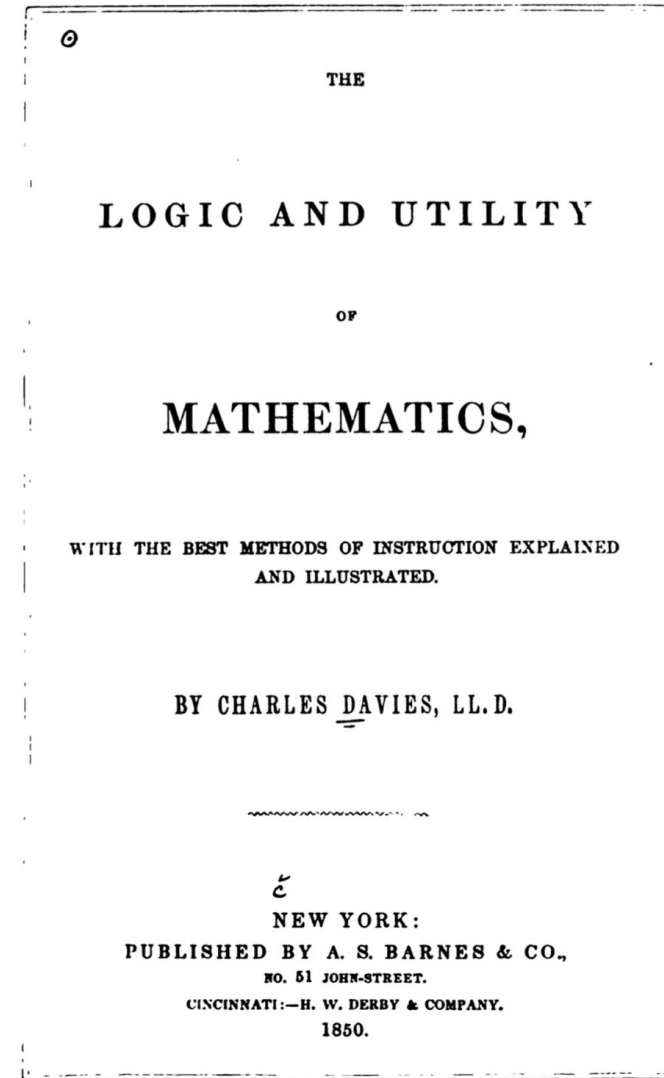
- Charles Davies (1798–1876)
- Employment
 - 1816–1837: United States Military Academy at West Point
 - 1839–1841: Trinity College, Hartford
 - 1848–1849: University of New York
 - 1852–1853: President, New York State Teachers' Association
 - 1857–1865: Columbia College, New York City
- Publications (Nearly 50 Separate Titles)
 - 7 Volumes for USMA
 - 15 Arithmetics
 - 8 Textbooks for Secondary Schools
 - 10 Solution Keys



CHARLES DAVIES.

Charles Davies,
*The Logic and
Utility of
Mathematics,
With the Best
Methods of
Instruction
Explained and
Illustrated* (New
York: A. S.
Barnes & Co.,
1850)

- 3 Parts/Books
 - Employing Logic in Mathematics Education (verbatim copying)
 - Davies's Principles for Teaching Mathematics (original)
 - Balance Mental Discipline and Utility of Mathematics (long quotations)
- AAH, "Charles Davies as a Philosopher of Mathematics Education," in *Research in History and Philosophy of Mathematics: The CSHPM 2018 Volume*, ed. Maria Zack and Dirk Schlimm, pp. 109–124, Proceedings of the Canadian Society for History and Philosophy of Mathematics (Birkhäuser, 2020).
https://link.springer.com/chapter/10.1007/978-3-030-31298-5_7



Davies's [Contradictory] Principles of Mathematics Teaching

- Mathematics is the Science of Quantity
- Valid Mathematical Reasoning Rests on Clear, Unambiguous Definitions
- Mathematics is Worth Learning Because It Imparts Mental Discipline
- Arithmetic is the Foundation of Civilized Life
- Teach Abstract Principles First, Then Applications
- Follow a Good Textbook

19th-Century Expansions of Mental Discipline: Were They Actually Paradoxes?

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