History of Mathematics Curriculum (C&I 8860)
University of Missouri
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Course Overview

This course is designed to familiarize you with the changing curriculum in school mathematics. It will examine the history and evolution of K-12 mathematics curricula in the United States from about 1890 to 1980. It will examine various forces that have helped shape and change mathematics curriculum.

Course Goals

- Identify different issues and forces that influence mathematics curriculum change.
- Characterize some significant periods and trends of significant mathematics curriculum development in the United States.
- Identify and describe some of the major committees, commissions and task forces which have provided curriculum direction for mathematics.
- Identify and describe the nature, goals and audiences of major mathematics curricular projects.
- Recognize that mathematics is indeed a changing curriculum and be able to identify current agents that will influence future trends.

Textbooks and Other Readings

Required:

Jones, P. S. (Ed.). (1970). *A History of Mathematics Education in the United States and Canada*. (32nd Yearbook). Reston, VA: National Council of Teachers of Mathematics.

Stanic, G. & Kilpatrick, J. (Eds.) (2003*). A History of School Mathematics*. Reston, VA: National Council of Teachers of Mathematics.

Optional:

Grouws, D. A. (Ed.) (1992). *Handbook of Research on Mathematics Teaching and Learning*. Reston, VA: National Council of Teachers of Mathematics. (Chapter 1)

Dow, P. B. (1991). *Schoolhouse Politics: Lessons from the Sputnik Era*. Cambridge, MA: Harvard University Press, Chapter 1.

Hirsch, C. R. (Ed.). (1985). *The Secondary School Mathematics Curriculum*. Reston, VA: National Council of Teachers of Mathematics.

Trafton, P. R. (Ed.). (1989). *New Directions for Elementary School Mathematics*. Reston, VA: National Council of Teachers of Mathematics.

Course Assignments

1. *Reading Assignments*- Specific readings will be assigned for each meeting. Class discussion will center upon the assigned readings.

2. *Reports on major committees, commissions or task forces.* These reports should:

   a) be based on an examination of the group's publication(s).

   b) provide a brief written report that will provide a summary document useful to anyone interested in learning about its contents. It should include major headings detailing, What were the specific events that precipitated the formulation of the group? Why was the group appointed? What was their charge? Who comprised the group? What was produced? Significance, i.e., fallout (if any) from the group that influenced curriculum change? Probably 4 to 6 pages in length.

   c) provide a PP presentation that highlights the report.

   d) identify specific pages/articles that provide in-depth information for the reader. When these documents are old or difficult to obtain, the pages should be scanned to make them available to a broader audience.

   e) formulate three significant questions related to this report that stimulate reflection and thinking related to the report.

3. *Role as expert in residence* - An expert will be identified for selected "new mathematics" curriculum projects. Your responsibilities include:

   a) highlighting the nature, goals, audience, etc. for the curriculum project.

   b) locating sufficient copies of materials (or duplicating some representative pages) and distributing them to the seminar members prior to actual discussion.

   c) providing advance organizers or questions related to this project to help focus attention and discussion.

   d) presenting sufficient examples so that the spirit and intent of the project is properly conveyed.

   e) identifying (at least as you see them) strengths and weaknesses of the project.

   f) identifying articles/references that were useful in learning about this project.

   g) preparing three significant questions related to this project to help focus attention and discussion.

Evaluation

Course grades will be based on individual written assignments, projects, and class participation. The components will be weighted as follows:

20% Class discussion related to readings
25% Major Committee Report
25% Expert in residence role
30% Final Examination

Schedule

Week	Topic
1	Introduction to Course on Mathematics Curriculum • Pretest • Course orientation to history of the evolution of mathematics curriculum • Why a historical look? o "Those who do not remember the past are condemned to repeat it" o George Santayana) o "Experience is recognizing a mistake when it is made again." o "Those who do not study the past will repeat its errors, while those who do will find other ways to err." (Charles Wolfe) o "History is the past seen through the eyes of others." (Peter Dow) • What is mathematics curriculum? • Different perspectives of the mathematics curriculum (CSMC handout) What should be taught? Ideal or envisioned curriculum What is in textbooks? Intended, constructed or developed curriculum What is taught? Enacted, experienced or implemented curriculum What is tested? Assessed curriculum What is learned Achieved curriculum *Assignment:* 1. Read—pages 93-106 and 155-167 from *A History of Mathematics Education in the United States and Canada.* Did you find these questions to provide an organizational structure helpful? i.e., Why teach mathematics? What mathematics should be taught? How should it be organized? How should it be taught? Are these same questions relevant today? 2. Read Chapter 2—Numeracy in Nineteenth-century America—pages 43-76 in *A History of School Mathematics*. How would you characterize the use of the term "mental" or "oral" exercises that appeared in mathematics textbooks? How would you describe Warren Coburn's approach to mathematics teaching/learning? What is something "new" that you learned in reading this Chapter? 3. Review an "old" textbook. Your review should be based on old textbooks (earlier than 1890). You may use books in our mathematics education library or old mathematics books from your own professional library. Be prepared to: ➢ Find an example of the "Rule of Three". Be prepared to describe/explain the "Rule of Three". ➢ Was gender equity reflected in mathematics textbooks during this era? Find evidence to support your answer. ➢ Find a mathematical term or skill that was used in a textbook that was "new" to you. Be prepared to describe/explain it. For the textbook you reviewed, please do the following: ➢ Identify the author, title, copyright and publisher. ➢ Identify the intended audience, including grade level(s). ➢ Describe the scope of content that was addressed. You should have a copy of the book handy for our discussion on August 30. You might

	consider copying a page or two if that would facilitate discussions.
2	Early Mathematics Curriculum—Prior to 1894 • Discuss readings • Share findings from textbook reviews • Presentation on the Committee of Ten (1894)—See Resources at www.mathcurriculumcenter.org *Assignment:* 1. Read Chapter 3 pp. 77-109 from *A History of School Mathematics*. How would you describe Warren Coburn's approach to mathematics teaching/learning? Is the inductive method offered by Warren Coburn a forerunner of children constructing their own knowledge? Explain. Cite evidence of how progressive versus the conservatives surfaced in how children learn mathematics during the 19th century. If your student number ends in an odd digit, find a textbook that illustrates a progressive position for that era; even digit, find a textbook that illustrates a conservative position. 2. Read—pages 107-117 and 155-196 from *A History of Mathematics Education in the United States and Canada*. How would you compare the secondary issues identified in Chapter 12 (pp 155-196) with the elementary issues identified in Chapters 8 & 9? Did you learn anything new from this secondary perspective that you was not discussed from the previous focus on elementary? Please explain. 3. Examine the chronology of events from *History of Mathematics Education in the United States and Canada*. pp. 23; 34-35; 65-66; 88-89. How does this thumbnail sketch help provide a context for events? 4. *Saber-tooth Curriculum.* If you have read the book, be prepared to reflect on the moral of the story. If not, you can access an adapted version at http://www.grand-blanc.k12.mi.us/qip/saber-tooth%20curriculum.htm Please read this shortened version and be prepared to reflect on the moral of the story.

3	Early Mathematics Curriculum—1894-1911 • Discuss readings • Share findings from textbook reviews • Presentations on the ▪ Committee on College Entrance Requirements (1899) ▪ National Committee of Fifteen on the Geometry Syllabus— ▪ See Resources at www.mathcurriculumcenter.org • Highlight contributions from learning theory and implications for curriculum: o Johann Pestalozzi (1746-1827) G. Stanley Hall (1844-1924 John Dewey (1859-1952)— *Assignment:* 1. Read Chapter 5 pp. 159-193 from *A History of School Mathematics*. • Identify one of the leaders cited in this chapter and be prepared to describe some of their contributions to mathematics education • Order these journals from "oldest" to "youngest": *American Mathematical Monthly, Mathematics Teacher, School Science and Mathematics* 2. Read pages 197 - 208 from *A History of Mathematics Education in the United States and Canada*. The 1923 Report received more attention in this YB than any other single committee report. Based on what you read, identify three significant issues that were addressed. Why did you think they were significant? Tell some ways in which the message of the 1923 Report differed from the Committee of Ten? 3. Review an old textbook (either arithmetic or algebra)—prior to 1920 and be prepared to provide your perspective on the following: a. Identify the title of the book, author, publisher and copyright b. What as the educational psychology and/or philosophical underpinnings for the book. (Be sure to read the preface.) c. Did the book provide notes to the teacher? If so, what ideas/suggestions were offered? d. Would you characterize the presentations as skill or concept oriented? Theoretical or applied (vocational) mathematics? e. Did it have pictures? Graphs? Tables? Manipulatives? f. Which came first—rules or practice? Give an example. g. Describe how it is similar/different from mathematics textbooks you are familiar with h. Identify any mathematics that was NEW to you? Be prepared to give an example and explain. i. Identify any mathematics that was familiar to you but presented in a novel or creative way.

4	Mathematics Curriculum—1911-1923
	
	• Discuss readings
	• Share findings from textbook reviews
	• Presentation on the
	• National Committee on Mathematical Requirements—1923 Report
	• See Resources at www.mathcurriculumcenter.org
	• Highlight contributions from learning theory and implications for curriculum:
	  ▪ Edward Thorndike (1874-1949)
	  ▪ John Dewey (1859-1952)
	
	Assignment:
	1. Read Chapter 10 (pp. 118-131) & Chapter 13 (pp. 197-234) from *A History of Mathematics Education in the United States and Canada*.
	
	One chapter has *progressive education* and the other has *mathematics education on the defensive* in the title. Are these two terms in conflict? What are some of the issues that placed mathematics on the defensive?
	
	2. Read Chapter 9 "The Ascendance of Practical and Vocational Mathematics, 1893-1945: Academic Mathematics under Siege" pp. 399-440 from *A History of School Mathematics*.
	
	How did the changing structure and social values influence the mathematics curriculum?
	
	3. From Chapter 10 "Mathematics Enrollments and the Development of the High School in the United States, 1910-1994" pp. 441-493 from *A History of School Mathematics*.
	
	How do these data reflect a changing student population? How did this impact mathematics curriculum?
	
	4. Review an old textbook (either arithmetic or algebra)—published between 1925-1940 and be prepared to provide your perspective on the following:
	
	a. Identify the title of the book, author, publisher and copyright
	b. What as the educational psychology and/or philosophical underpinnings for the book. (Be sure to read the preface.)
	c. Did the book provide notes to the teacher? If so, what ideas/suggestions were offered?
	d. Would you characterize the presentations as skill or concept oriented? Theoretical or applied (vocational) mathematics
	e. Did it have pictures? Graphs? Tables? Manipulatives?
	f. Which came first—rules or practice? Give an example.
	g. Describe how it is similar/different from mathematics textbooks you are familiar with
	h. Identify any mathematics that was NEW to you? Be prepared to give an example and explain.
	i. Identify any mathematics that was familiar to you but presented in a novel or a creative way.
	j. Was any reference made to the 1923 Report?

5	Mathematics Curriculum—1923-1940 • Discuss readings • Share findings from textbook reviews • Presentations on the *The Place of Mathematics in Secondary Education*, *Mathematics in General Education* (1940) • See Resources at www.mathcurriculumcenter.org • Highlight contributions from learning theory and implications for curriculum: William Brownell (1895-1977) *Assignment:* 1. Read Chapter 14 (pp. 235-246) from *A History of Mathematics Education in the United States and Canada*. What are some of the landmark events mentioned in the first paragraph on page 235? What was the Steelman Report about? How old is NSF? What was the first of the "new mathematics" curricula? 2. Read Chapter 11 "A time of uncertainty and change: School mathematics from World War II until the new math" pp. 493-520 from *A History of School Mathematics*. How did the war focus attention on mathematics? How did it impact mathematics curriculum? How did it help set the stage for change?
6	Mathematics Curriculum—1940-1952 • Discuss readings • Discuss letter from Admial Nimitz in the *Mathematics Teacher* in 1942 How would you react as a teacher (parent, politically elected official) to this letter? How did the war impact mathematics curriculum? How did it help set the stage for change? • Presentations on the *Pre-Induction Courses: Essential Mathematics for Minimum Army Needs*, Commission on Post War Plans-- First Report May 1944 & Second Report May 1945--Guidance Report November 1947 See Resources at www.mathcurriculumcenter.org • Highlight contributions from learning theory and implications for curriculum: Burrhus F. Skinner (1904-1990) *Assignment:* 1. Read Chapter 14 (pp. 246-290) from *A History of Mathematics Education in the United States and Canada*. What were some of the projects and related issues that began to surface during this era? 2. Review an old textbook between 1945 and 1955. Then, a. Identify the title of the book, author, publisher and copyright b. What were the educational psychology and/or philosophical underpinnings for the book? (Be sure to read the preface.) c. What educational philosophy would you say influenced this book? Explain. **d.** Any mathematics that was NEW to you? Be prepared to give an example and explain.

7	Mathematics Curriculum—1952-1962 • Discuss readings • Share findings from textbook reviews • Presentation on the Commission on Mathematics, College Entrance Examination Board See Resources at www.mathcurriculumcenter.org • Presentation on 'new' mathematics University of Illinois Committee on School Mathematics (UICSM) • Highlight contributions from learning theory and implications for curriculum: Jerome Bruner (1915-) *Assignment:* 1. Read Chapter 14 (pp. 291-297) from *A History of Mathematics Education in the United States and Canada*. What major themes were discussed? 2. Discuss the reading Chapter 15 (pp. 623-646) by Bob Davis in *A History of Mathematics Education*. What were some of the "truths" or myths of new mathematics? What would you say characterized the Madison Project? Did you agree with his characterization of discovery learning? Davis says in the Madison Project "pedagogy and curriculum were developed within classrooms, in direct work with children." What are some of the advantages of this approach to curriculum development? Does it have any downside? Did you recognize some of the folks that Bob Davis worked with? If so, be prepared to name one or more of them.

8	Mathematics Curriculum—1962-1969—Part I • Discuss readings • Share findings from textbook reviews • Presentation on the Cambridge Conference on School Mathematics, *Goals for School Mathematics (1963)* See Resources at www.mathcurriculumcenter.org • Presentations on 'new' mathematics University of Maryland Mathematics Project (UMMaP) School Mathematics Study Group (SMSG) Madison Project • Highlight contributions from learning theory and implications for curriculum: Zoltan Dienes (1916-) *Assignment:* 1. Read Chapter 13 (pp. 559-598) by Joe Payne in *A History of Mathematics Education*. What curriculum project dominated this chapter? How did Joe Payne become involved? What were some of the key people cited? What did the phrase "NSF nixes curriculum projects" mean? Would it still be appropriate? 2. Many different articles—pro and con were written during the 1960s about 'new mathematics'. During the next meeting we will focus on the 1960s. Read any 3 of the following articles and be prepared to highlight some of the issues. Adler, I. (1962). The changes taking place in mathematics, *Mathematics Teacher*, 55: 441-451, October. Begle, E. (1962). Some remarks on "On the mathematics curriculum of the high school, *Mathematics Teacher*. 55: 195-196, March. Fehr, H. (1966). Sense and nonsense in a modern school mathematics program, *Arithmetic Teacher*, 13: 83-91, February. Mueller, F. (1966). The public image of 'new mathematics', *Mathematics Teacher*, 59: 618-623, November. Read, C. (1961). New wine in old bottles, *School Science and Mathematics*, 61: 163-174, March. Schaaf, W. (1964). How modern is modern mathematics? *Mathematics Teacher*, 57: 89-97, February. Stone, M. (1961). The revolution in mathematics, *American Mathematical Monthly*, 68: 715-734, October 1961. Stubblefield, B. (1964). The high school mathematics curriculum, 1856-1964, *Chicago School Journal*, 46: 104-110, December.

9	Mathematics Curriculum—1962-1969—Part II • Discuss readings • Presentation on the Cambridge Conference on School Mathematics, *Goals for School Mathematics (1963)* See Resources at www.mathcurriculumcenter.org • Presentations on 'new' mathematics Comprehensive School Mathematics Project (CSMP) Computer Assisted Mathematics Program Nuffield Mathematics Project & School Mathematics Project • Highlight contributions from learning theory and implications for curriculum: Robert Gagne (1916-) *Assignment:* 1. Read pp. 10-32 from *Schoolhouse Politics: Lessons from the Sputnik Era*. What were some of the issues that impacted curriculum change? Who were some of the prominent people cited—either as stimulating change or the target for change? 2. Read these two articles about the Cambridge Conference: Adler, I. (1966). The Cambridge Report: Blueprint or Fantasy? *Mathematics Teacher*, 59, 210-217, March. Stone, M. (1965). Review of Goals for School Mathematics, *Mathematics Teacher*, 58, 353-360, April. 3. Many different articles—pro and con were written during the 1960s and 1970s about 'new mathematics'. Read any 2 of the following articles and be prepared to highlight some of the issues that were addressed. Bidwell, J. (1968). A new look at old committee reports, *Mathematics Teacher*, 71: 383-387, April. Davis, B. (1974). New Math: Success or failure, *Instructor*, 83: 53-55, February. Glennon, V. (1973). Current status of the New Math, *Educational Leadership*, 30: 604-608, April. Gray, J. (1974). New Math: A moderate view, *National Elementary School Principal*, 53: 36-40, January. Rappaport, D. (1976). The New Math and its aftermath, *School Science and Mathematics*, 76: 563-70, November.

10	Mathematics Curriculum 1970-75 • Discuss readings • Presentation on the Euclid Conference on Basic Skills See Resources at www.mathcurriculumcenter.org • Presentations on 'new' mathematics Developing Mathematical Processes (DMP) Secondary School Mathematics Curriculum Improvement Study (SSMCIS) *Assignment:* 1. Read Chapter 25 (pp. 989-1036) "A history of non-textbook materials" by Dale Seymour a Pat Davidson in A History of Mathematics Education. Had you heard of either of these pe Why do you think the Elementary Science Study mentioned? Identify some of the ancillary publishers that were mentioned. Were you familiar with any of them? What early product launched the Dale Seymour Publications? How does the Technical Education Research Ce (TERC) and Connected Mathematics Project fit into this picture? 2. Read the "Position paper on basic mathematical skills" prepared by the National Council o Supervisors of Mathematics, January 1977.

11	Mathematics Curriculum 1975-80 • Discuss readings • Presentation on the National Advisory Committee on Mathematical Education (NACOME), *Overview and Analysis of School Mathematics K-12* See Resources at www.mathcurriculumcenter.org • Highlight contributions from learning theory and implications for curriculum: Richard Skemp (1919-1995) *Assignment:* 1. Read Chapter 12 (pp. 521-558) "From the New Math to the Agenda for Action by Jim Fey and Anna Graeber in *A History of Mathematics Education*. What were some of the projects/committees that we have discussed that were reviewed in this article? What was meant by a "second generation project"? What were some of their perceptions on the NACOME Report? On PRISM? On the *Agenda for Action?* 2. Read Chapter 17 (pp. 673-736) "A personal history of the UCSMP Secondary School Curriculum, 1960-1999" in *A History of Mathematics Education*. Uskisin identifies a number of factors that influenced UCSMP. Name them—and how they influenced UCSMP. What was his "new idea" for first year algebra? What familiar source does Usiskin cite as working against curriculum development? What perceptions does he share about commercial publishers and authors? Projects? What arguments were provided for a 6-year secondary mathematics curriculum? How did research/piloting influence their work? Did you learn something about the development of UCSMP that was new to you? 3. Read the *Agenda for Action* sent electronically as a PDF. Did it provide a vision? If so, what are some elements of the vision? If not, what was the purpose of the *Agenda for Action*? What implications did the Agenda have for mathematics curriculum? What other implications were suggested? 4. Sobel, Max. (1981). "Implementing the *Agenda for Action*" *Changing School Mathematics: A Responsive Process*, Reston, VA: NCTM. What are some of the areas addressed in his suggestions for implementation? Are any of the areas new? Were any of the suggestions for implementation look promising? 5. Hill, Shirley H. (1983). " AN *Agenda for Action* Status and Impact" *The Agenda in Action* (1983 Yearbook), Reston, VA: NCTM. What specific categories of implementation were cited? What was her assessment of the state of the *Agenda*?

12	Mathematics Curriculum 1980[+] • Discuss readings • Presentation on the *Priories in School Mathematics* (PRISM) *Agenda for Action* See Resources at www.mathcurriculumcenter.org • Presentation on University of Chicago School Mathematics Project *Assignment:* 1. Read Chapter 24 (pp. 957-988) "Mathematics textbook adoption in the United States" in *A History of Mathematics Education*. What is a 'textbook proclamation'? How does it influence publishers? What are the 'big dogs' that influence publisher? About how many states are open territory? What is the 'mixed soup' effect? What is 'the most innovative materials may never see the light of day' effect? How is textbook adoption in the US different than other countries—such as Japan? Taiwan? 2. Read the chapter from book by Harriet Tyson Bernstein, *A conspiracy of good intentions: America's Textbook Fiasco* entitled "The making of a textbook: A fictionalized account". Do you have any real life experiences to support or refute some of the examples cited? Please be specific. 3. Read article by Barbara & Robert Reys (2006). The development and publication of elementary mathematics textbooks: Let the buyer beware!, *Phi Delta Kappan*, January. What myths about textbook publishing are addressed? Was any of this advice helpful to you? Tell why.
13	Textbook adoption—Good, bad & the ugly • Discuss readings *Assignment:* 1. Create a test question that you think would be appropriate to use on our final exam. Also provide a rubric for answering the question. This should be submitted to me by November 19. If your question is used—you will receive full credit for the question AND receive 5 bonus points.

14	Course Wrap-Up • Reflect on Forces that impacted mathematics curriculum—including Committees Conferences Government—federal/state action Social issues Learning theory Mathematicians Assessment Professional organizations Research Technology • Discuss examples of how these individually or collectively have helped change/shape the mathematics curriculum. • Share questions prepared by students