**ED 524 Trends in Mathematics**

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| Mississippi Valley State Univ. seal.png | **Dr. Teresa Banks, Course Instructor****Office: 230P.O. Lowe****Phone: 66-254-3698****Email:** **Teresa.banks@mvsu.edu****Office hours: 9:00- 1:30 Tuesday and Thursday** |

**Course Overview**

This course is designed to help you develop a solid understanding of the school mathematics curriculum from a historical perspective. Assigned readings, class discussion, projects, and individual research will enable you to become familiar with the key issues and forces that have influenced curriculum change from about 1890 to 1990 and to become knowledgeable of the major reports, conferences, and curriculum development efforts that have provided direction for, and trends in, school mathematics.

 **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.

**Course Text:**

*Helping Children Learn Mathematics*. Reys-Linquist (2004). 7th edition. Wiley/Jossey-Bass Education.

**Additional Resources:**

* *NCTM Principles and Standards for School Mathematics*
* *NCTM Math Focal Points*
* *Mississippi Department of Education College and Career Readiness Standards for Mathematics*
* *Mississippi Department of Education Math Scaffolding Documents*
* *Standards for Mathematical Practices*

**Methods of Instruction:** on-line Blackboard

**Mathematics in this Course**

This is not a mathematics content course, nor is this a course on general teaching methods. This is a course focused on the teaching of mathematics. To become a teacher who effectively supports her or his students’ development of mathematical proficiency it is not enough to be really good at mathematics. It is important 3 that you understand and be able to do mathematics; but your main objective is to teach your students these capabilities. Knowing mathematics is different from knowing how to support others in learning mathematics. At the same time, this is not a course for learning general instructional practices for any subject areas. Promoting students’ proficiency in mathematics requires instructional supports different than those needed to promote proficiency in other subject areas, in part because what it means to be proficient varies by subject.

This course draws on the definition for mathematical proficiency provided by the National Research Council’s (NRC) Mathematics Learning Study Committee in their publication Adding It Up: Helping Children Learn Mathematics (2001). The NRC committee defines mathematical proficiency as being composed of five different, but inter-related, strands of proficiency – conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition. This multi-faceted portrait of mathematical proficiency informs the practices and principles of mathematics teaching that we study in this course. In terms of content areas, we will focus primarily on algebra, geometry, statistics, and probability.

**Objectives:**

1. Through classroom discussion and clinical experiences, students will observe and begin to apply effective teaching, lesson planning, and classroom management practices, in a K-6 classroom relative to math.
2. Through classroom discussion and clinical experiences, students will observe and begin to apply fair and effective assessment practices relative to math.
3. Students will complete assignments designed to enhance their understanding of children and their learning, effective classroom practices, and communication.

**Major Topics:** In order to address current mathematics reform efforts and cover topics in depth, the following mathematics topics will be studied: **Number Sense, Geometry, Rational Numbers, and Algebraic Thinking.** To facilitate this learning, all chapters of the course textbook will be covered. We will look specifically at:

1. Instructional approaches to teaching mathematics
2. Applications of current mathematics education research
3. Modeling use of *Constructivism* in teaching mathematics
4. Major content strands of mathematics (emphasis on Number Sense, Geometry, and Fractions)
5. Review of instructional materials, resources, media, and technology for teaching mathematics
6. Assessment and evaluation of student achievement
7. Basic teaching mathematics manipulatives - description(s) and purpose(s).
8. Applications of current research
9. Professional organizations

**Written Assignments and Academic Misconduct:** All written work submitted must be the student’s original work and conform to the guidelines of the *American Psychological Association* (APA) available online and via their publications. This means that any substantive ideas, phrases, sentences, and/or any published ideas must be properly referenced to avoid even the appearance of plagiarism. Plagiarism includes, but is not limited to, the use, by paraphrase or direct quotation, of the published or unpublished work of another person without full or clear acknowledgment. It also includes the unacknowledged use of materials prepared by another person or agency in the selling of term papers of other academic materials. It is the student’s responsibility to know all relevant university policies concerning plagiarism.

**Assignments**

**Date: August 30**

**Assignment Part I: Math Autobiography Points: 50**

**Autobiography**

Please provide me with a “mathematics autobiography.” Include (but do not limit yourself) to answering the following questions: **Please answer in essay form, hand in a copy, and email a copy as a Word® attachment to apowell3@memphis.edu** ( items do not have to be order as questions are written) **GO INTO DETAILS!!!!!!!**

* Tell me about your family (please include spouses, children, parents, siblings)
* Why you chose education as your major and Mississippi Valley State University as your school?
* Are you “good” at mathematics?
* Tell me about your educational triumphs or disasters. Highlight your mathematics education.
* Do you like or dislike mathematics? Why?
* What do you like about learning math? What do you not like?
* What is your first or strongest memory of learning or doing math?
* Have you ever been embarrassed, humiliated or especially proud of your mathematics ability?
* Do you like/dislike all areas of mathematics equally? If not, which ones do you like/dislike the most? Why?
* Who or what influenced (either positively or negatively) your feelings about mathematics?
* How do you feel about teaching mathematics?
* How do you think your attitude about math will affect your teaching of math?
* Describe a typical day in your future math class.

Please list the math courses that you have successfully completed and whether you took them in high school or college. A partial list is here to jog your memory. Discuss these in your writing.

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| **Subject** | **H.S.** | **College** | **Both** |
| Algebra I |  |  |  |
| Geometry |  |  |  |
| Algebra II |  |  |  |
| Tech Prep |  |  |  |
| Pre Calculus |  |  |  |
| MA 111 College Algebra  |  |  |  |

**Date: September 13**

**College and Career Readiness Standards and Standards for Mathematical Practices Points: 40**

You will go to the Mississippi Department of Education, under the Elementary Education and Reading tab, retrieve the scaffolding document and CCR math documents to review. In addition, be sure to read the attached documents in Blackboard to assist you with completing this activity using the Standards for mathematical Practices.

**Date: September 27 (article 1) & November 1 (article 2)**

**Critique of Journal Articles Points: 60each**

You will select a math related articles( within the last 5 years) to give a summary of the content, a reflection of your thoughts, questions, etc. on the article, and describe any applications to your future math teaching. The self-chosen article can be taken from **refereed journals only** such as SAGE, The Math Teacher, Mathematics in the Middle School, American Educator, etc.

***NOTE: DO NOT INCLUDE NUMBERS WHEN WRITING YOUR CRITIQUE***

Answer the following questions in essay format:

1. THE MAIN PURPOSE OF THIS ARTICLE IS \_\_\_\_\_\_\_\_\_\_\_\_\_.
2. The key question that the author is addressing is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. (Figure out the key question I the mind of the author when s/he wrote the article.)
3. The most important information in this article is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. (Figure out the facts, experiences, data the author(s) is using to support his/her conclusion.)
4. The main inferences/conclusion in this article are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. (Identify the key conclusions the author come to and the presents in this article.)
5. The key concept(s) we need to understand in this article is(are)
6. The main assumption9s) underlying the author’s thinking is (are) \_\_\_\_\_\_\_\_\_\_\_\_. (Figure out what the author is taking for granted (that might be questions).
7. If we take this line of reasoning seriously, the implications are\_\_\_\_\_\_\_\_\_\_.
8. If we fail to take this line of reasoning seriously, the implications are \_\_\_\_\_\_\_\_\_\_. (What consequences are likely to follow if people ignore the author’s reasoning?)
9. The main point(s) of view presented in this article is (are) \_\_\_\_\_\_\_\_\_\_\_. What is the author looking at, and how is s/he seeing it? Discuss your reaction. Did you enjoy reading the article? Is the information contained in the article feasible, believable and beneficial? Did it make you think differently about the issue? The journal from which you take the article cannot be over seven years old. Please include a copy of the article site and reference page in APA format.

**Date: October 4**

**Assignment: Students and Parents interviews points: 200**

You will interview three (3) students and three (3) parents for this assignment. With the students, you will choose a math problem appropriate for the child’s grade. Allow the child to complete the problem in front of you. After the child, finish use the interview questions provided. Assess the student’s responses analyzing the algorithm and solution. What commonality/(ies) were identified among the group? What differences? Do the same with the interview questions. Additionally, discuss trends and issues identified from this group. How do the results of the parent interviews support your rational?

More detail directions is below.

Have the child record all written work on paper and attach it to the interview. If the child writes his/her name on the paper, you should block it out before turning in the assignment. Using a clean sheet for each new task will make interpretation of your results easier. You should try to take notes during the interview so that you can recall later exactly what the student did and the questions you asked or modifications you made. However, make sure that your note-taking does not distract the child.

Remember the purpose of this interview is to assess what the child knows and can do rather than report what he/she cannot do. Focus on the process rather than the answer. Ask questions to help you understand the child’s thinking. For example, “How would you explain what you did to other students (or to younger children)?” You will need to probe and ask why. *Your job is to assess and accurately record the child’s responses and thinking, not to teach the child or correct his/her responses*. Be flexible. If the question asked is too difficult, make it easier. Also, if the child is not challenged by the question, pose a more difficult one. Be sure to note any adaptations that you make. The interview does not have to be conducted all at one time. If you are losing the child’s interest or attention, or if the class schedule is limited, break the interview into smaller parts.

Offer to share your results with the child’s teacher if he/she is interested. Remember to respect the dignity of the child and protect the confidentiality of the classroom. Results should be discussed only with the teacher or your instructor in your methods class. The use of pseudonyms for your written report would be appropriate.

You might consider using a recorder to record your interview.

**Choosing Interview Questions( you can use questions attached in Blackboard under this assignment):**

The intent of the interview is to take what you have learned through teaching and/or in the methods course and to apply that to the assessment of student thinking. You should ask questions that require students to solve problems and explain their strategies to you. This is NOT an interview about the child’s feelings or beliefs about mathematics. (Although that is important information, it is not what this interview is about).

First, you need to select a topic on which to focus your interview. The concept that you choose will depend on the grade level of the students with whom you are working. For example, counting is an appropriate interview topic for a kindergarten student, but is probably not appropriate for a third grader. Once you have selected your topic, think about what you have learned about this topic. What are some of the misconceptions or benchmarks of understanding that students demonstrate in learning your topic? How can you design (or adapt) an interview that you could use to assess students’ understanding of your content area? For example, an interview on counting would look for evidence that the student has mastered one-to-one correspondence. You must be familiar with the topic of your interview in order to design appropriate questions. Do not attempt to conduct an interview without AT LEAST reading the relevant chapter from your selected textbook.

Keep in mind that the point of this interview is to learn something about the student’s thinking and about what he/she understands, not simply to identify his/her level of proficiency at performing a skill. The purpose is not to simply figure out WHETHER a child can solve a particular type of problem, but to identify HOW they approach and think about the solving of that problem. For example, do they use manipulatives? If so, how? and for what purpose? Do they use an alternative algorithm? If they use the standard algorithm, do they seem to understand why it works or are they just following the procedure that they were taught? Again, you are trying to learn something about the student’s THINKING.

While some very straightforward problems may provide this insight, you will need to think carefully about the purpose of the problems/questions that you choose and what they might tell you about the child’s thinking. If you make the problems very complex, you may have trouble pinpointing patterns in the student’s thinking. On the other hand, if you make the problems too simplistic, you are equally unlikely to learn anything. This is where your knowledge of the content topic and the students will come into play.

You must also think carefully about the number of questions. The goal is to ask enough questions to give you a good sense of the student’s thinking, while not asking so many that the student becomes overwhelmed or bored. You should be strategic about the questions and about the information that they are likely to provide. You do not want to conduct the interview and then find that you do not have enough data about the student’s thinking. This can happen when you h have too few question or if your questions are not sufficiently focused.

You will turn in a written report of the results of your interview. Your report should include the following elements:

***A list of the questions asked during the interview***.

This list should include two different types of questions:

The questions on the interview protocol: What did you plan to ask?

The questions asked that were not on the protocol: These are the questions (not included on the protocol) that you ask during the interview to probe the student’s thinking. For example, “Why did you do that?” These would also include questions that you add if the original questions are too easy or too difficult.

***A description of what the child did and said***.

This should include information about the child’s actions with manipulatives, written strategies, explanations, or anything else that might shed light on his/her understanding of the concept. This description should include as many details about what happened during the interview as you can record and recall. I should be able to read your description and have a good sense of what took place during the interview. This description provides the basis and supporting evidence for your analysis.

***An analysis of what the interview revealed about the child’s understanding of the concept(s).***

What did you learn about the student’s understanding? What did you learn about how he/she thinks about the concept involved in the interview? As much as possible, try to frame your discussion in terms of the child’s strengths rather than weaknesses. Reflect on the concepts, skills, or facts the child appears to understand and his/her present level of development on a concept. Avoid general phrases such as “Jackie is average in mathematics.” Be as specific as possible and provide supporting evidence, i.e., examples from the interview, to justify your conclusions.

**Relate what you saw in the interview to what you have learned about this topic from (1) your methods textbook; (2) the content of the methods course; or (3) the *Principles and Standards for School Mathematics (PSSM)***. For example, did the student do or say things that were consistent with what you have read in the literature on your topic? Did he/she demonstrate any common misconceptions related to this concept?

***Recommendations for future instruction***.

Based on the conclusions that you draw about the child’s understanding, describe an instructional plan you would suggest for this student. What immediate mathematical goals would you have for this student? What next steps would you take with him/her? What types of problems would be useful for this student and why? Be specific in your recommendations, tie your suggestions to your assessment of the student’s current level of development, and support your recommendations with connections to information from the textbook, course, MDE, or PSSM.

***Assessment of the interview***. How well did your interview work? Did it provide you with enough information about the student’s understanding? If you were to do this interview again, what would you change? What would you keep the same? Why?

**Date: October 18**

**High Quality Math Instructions points: 100**

You will complete the High Quality Math Instructions module. Be sure to go through each tab. At the end of the module complete the five (5) questions in the assessment. You can copy and paste the link below into your browser.

<https://iris.peabody.vanderbilt.edu/module/math/cresource>

Be sure to answer each question completely using the information you read about from the module.

**Date: November 15**

**Assignment: Math Videos points: 120**

You will go to [www.learner.org](http://www.learner.org) click under the blue tab math grades 3-5 scroll down to ***Mathematics: What’s the Big Idea***. You will watch three of the eight video of your choice. Discuss the level of thinking identified in the videos, discuss how the information present is beneficial in today’s classroom. Discuss trends in teaching then with present day. Address the standard and objectives covered in the video. The degree to the teacher’s teaching effectiveness. Discuss the depth of the content presented. Does the presenter/teacher lesson reach all learners? What questioning and scaffolding evidence? To what degree? Pros and cons of the video. Compare each video, what commonalities and differences was observed among the three.

**Date: December 6**

**Math Textbook Investigation points: 200**

For this assignment, you will review the attached math text along with an additional basal textbook, the CCRS and math scaffolding documents. You will review the attached textbook chapter to determine if the information is properly aligned to the MDE documents (CCRS, SMP and Scaffolding) , is the information grade appropriate, does the chapter content address all learners ( above average, average, below average and students with learning disabilities), are the activities and problems grade level appropriate? What Depth of Knowledge (DOK) level are the problems mainly on? Do you find this document to be a good fit for students of this grade? Discuss any new information you discovered regarding the standard and objectives.

**Part II:** Using the lesson plan template provided, develop a lesson plan for the grade and standard provided in the attached text chapter.

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| **Assignment** | **Due Date** | **Points** | **Minutes** |
| Pre-Test | August 27 | 20 | 30 |
| Math Autobiography | August 30 | 50 | 180 |
| CCRS-SMP math activity | September 13 | 40 | 180 |
| Journal Article 1 | September 27 | 60 | 180 |
| Student and Parent Interviews | October 4 | 200 | 660 |
| High Quality math instruction module | October 18 | 100 | 240 |
| Journal Article 2 | November 1 | 60 | 180 |
| Math videos | November 15 | 120 | 250 |
| Math Textbook Investigation | December 6 | 200 | 600 |
|  **Total** |  | **850 points** | **2500 minutes** |