Title
Differentiating Math Lessons for a Range of Learners

Target Audience
This course is intended for pre-service and in-service teachers of grades K–8.

Prerequisites
To participate and complete the assignments in this course successfully, the learner must:
• Have past experience using the classroom computer.
• Have past experience working with the Internet.
• Be familiar with taking an online course or have completed the PBS “Practice Learning Online with TeacherLine” course.
• Be familiar with elementary or middle grades mathematics content.
• Have access to a classroom or group of students in order to complete an implementation.

Course Description
To meet the needs of a range of learners in the mathematics classroom, teachers are called upon to differentiate instruction. The need for differentiation is stronger than ever, as districts strive to implement the Common Core State Standards and other state standards with rigor and equity to promote the success of all students. Providing instruction that is differentiated and targeted to students’ strengths and needs is a powerful practice for improving student engagement and math learning. Unlike more general offerings on differentiating instruction, this course provides specific suggestions and examples of differentiating mathematics instruction. Teachers will learn about models and approaches to differentiating math instruction by building skills in articulating learning goals, assessing students’ strengths and difficulties, and aligning effective instruction accordingly. They will learn about the role of classroom culture in setting the stage for effective differentiation and identify ways to plan and implement differentiated mathematics lessons. They will take away strategies, planning tools, and resources for applying the ideas in their classroom practice.

Instructor/Facilitator
See instructor/facilitator sheet.

Credits
To be determined by college or university.

Goals
By the end of this course, learners will:
• Deepen their understanding of the meaning and importance of differentiation in mathematics instruction.
• Explore ways to gather information on students’ learning profiles and interests for the purposes of planning differentiated math lessons.
• Explore assessment practices and tools that support differentiation, including diagnostic assessment, formative assessment, and student self-assessment.
• Write learning targets that outline measurable goals for math lessons and clearly communicate them to students.
• Build knowledge of, and skill in, applying models and approaches for differentiating math lessons.
• Build knowledge about the varied mathematics learning needs of, and recommended instructional strategies, for struggling students, English learners, and gifted students.
• Learn about ways to create classroom structures, strategies, and a culture that support differentiation of math lessons.
• Apply ideas by planning and teaching differentiated math lessons with students.

Outline of Content and Assignments

After previewing the documents in the Course Information area, learners will proceed to Course Content to complete the following six sessions, working through each session in order. Throughout the sessions, learners are asked to articulate their ideas in various forms: they are encouraged to reflect on their ideas and experiences in their online journals; the discussions in the discussion forum are designed to allow learners to share ideas and build on other learners’ experiences. As a course project, each learner will create a differentiated math lesson that implements ideas and models from the course. Learners will also be required to complete assignments in which they apply ideas and models of differentiation to their own contexts.

Session 1: Introduction to Differentiating Math Lessons

Differentiated instruction provides a powerful approach to a pressing challenge for teachers in today’s increasingly diverse classrooms: how to provide effective mathematics instruction that addresses students’ varied learning needs, so that all students become successful mathematics learners. This session provides an overview of differentiating instruction in general, and then specifically for mathematics teaching. Learners will explore ways to gather information on students’ learning profiles and interests and discuss ways to use that information to guide differentiation. To start the course, learners will begin by defining your own professional goals and expectations, explaining their prior knowledge on the topic, and introducing themselves to fellow learners.

Goals

Learners will:
• Define their professional goals and expectations for this course.
• Reflect on prior knowledge and experiences with differentiating instruction in mathematics and other subject areas for students.
• Deepen understanding of the meaning and rationale for differentiating instruction.
• Explore ways to gather information on students’ learning profiles and interests for the purposes of planning differentiated math lessons.
• Discuss the benefits and challenges of differentiating mathematics instruction for students.
Activities

Complete Readings
- "The Underpinnings of Differentiation"
- Choose two: "Differentiation Model", "Principles and Key Features of Differentiated Instruction", "What Differentiation Is and Is Not"
- "Teacher-Initiated Differentiation"
- "Differentiated Instruction in Shared Mathematical Contexts"
- "Multiple Intelligences: What does the Research Say?"
- "Tapping into Multiple Intelligences" (one of a choice of tasks)
- The Foundations of MI Theory (one of a choice of tasks)

View Videos
- "Using Differentiated Instruction to Support All Learners" or "What is Differentiation?" (or choice of key features of differentiation reading above)
- Choose one: "Introduction to DI", "Misconceptions about DI", "The Journey to Differentiation", "Providing Quality Curriculum", "Continuous Assessment"
- "Applied Differentiation: Making it Work in the Classroom"

Complete Online and Paper Surveys/Inventories
- "What’s Your Learning Style?"
- "Multiple Intelligences: Self Assessment"
- "General Interest Survey for Students"
- "Simple Multiple Intelligences Survey" (one of a choice of tasks)
- "Learning Styles –Modality Preference Inventory" (one of a choice of tasks)
- "Index of Learning Styles Questionnaire" (one of a choice of tasks)

Offline Activity:
- Interview a Colleague (one of a choice of tasks)

Write in Online Journal
- Reflect on goals and expectations for the course
- Reflect on prior knowledge about experiences with differentiating mathematics lessons
- Reflect on current practices for gathering information on student profiles and interests and identify ideas from the session to apply in practice

Participate in Online Discussions
- Introduce themselves to other learners
- Discuss key elements, benefits, and challenges of differentiation

Session 2: Using Math Learning Targets to Guide Differentiation

In this session, learners explore the important role that formative assessment plays in implementing differentiated instruction. The session first provides a broad picture of formative assessment as an instructional approach. Then, learners will focus on a key aspect of formative assessment: identifying and using clearly defined math learning goals or learning targets. They will explore the formative assessment approaches of using probes and exit tickets as tools for assessing student understanding of learning targets and using that data to differentiate instruction.
Goals
Learners will:

• Understand the essential role of formative assessment in planning and implementing differentiated lessons.
• Describe the characteristics of strong learning targets and ways to use them effectively with students.
• Write learning targets that outline measurable goals for math lessons and clearly communicate them to students.
• Explore probes and exit tickets as tools for gathering student data to inform the planning of differentiated lessons.
• Discuss the benefits and challenges of writing and using learning targets.

Activities
Complete Readings
• “The Bridge Between Today’s Lesson and Tomorrow’s”
• “Using Formative Assessment to Differentiate: The Role of Learning Targets”
• “Characteristics of Learning Targets and a Process for Writing Them”
• Choose one: “Learning Target Examples: Elementary” or “Learning Target Examples: Middle”
• “Leveling the Playing Field: Sharing Learning Targets and Criteria for Success”
• “Formative Assessment Probes: A Valuable Tool for Differentiating Mathematics Instruction”
• “Overview of Exit Tickets”

Explore Resources
• Mathematics Learning Target Database" (one of two choices)

View Videos
• “Formative Assessments: Using Feedback to Guide Instruction”
• “Approaches to Posting Learning Targets” (one of two choices)
• “Initial Diagnostic Strategies”
• “Exit Ticket (Elementary)”
• Assess and Plan with Exit Tickets

Write in Online Journal
• Reflect on the connection between assessment and differentiation

Participate in Online Discussion
• Discuss writing and using learning targets as part of differentiating instruction

Assignment
• Complete Part 1 of Assignment 1: Write and Use a Learning Target  (Submit Part 1 with Part 2 by the end of Session 3)
Session 3: Models for Differentiating Instruction in Math Class

This session presents several approaches for differentiating math lessons. First, learners will explore the use of tiered tasks to differentiate based on students’ readiness to learn—that is, the mathematical understandings that students demonstrate. Next, they will explore the use of stations and rotations. They will have opportunities to look at examples and get suggestions for implementing these approaches in their classrooms.

Goals

Learners will:

• Explore several approaches for differentiating lessons: tiered tasks, stations, and rotations.
• Build knowledge and ability to apply these approaches to math lessons.
• Explore resources, tools, and approaches to planning for differentiation.
• Discuss the benefits and challenges of differentiating math lessons by student readiness.

Complete Readings

• “Constructing Complexity for Differentiated Learning”
• “Why is tiering an effective instructional practice for some learners?”
• “Suggestions for Using Stations”
• “Planning and Teaching Differentiated Math Lessons: Guiding Questions”

View Videos

• “Adapting Curriculum to Learners’ Needs”
• “2nd Grade Differentiated Math Stations”
• “Math Rotations: Planning and Grouping”

Explore Resources

• Explore two or three websites: Youcubed; NRich; Inside Mathematics: Problems of the Month; Math Forum: Elementary Math Problems and Puzzles; Math Forum: Middle School Math Problems and Puzzles; NCTM Illuminations; NCTM: Figure This; Open Middle Problems; Illustrative Mathematics

Interactive:

• Rate and share favorite math resources

Write in Online Journal

• Reflect on experience using tiered tasks, stations, and/or rotations, and plan for implementation
Participate in Online Discussion
• Discuss the benefits and challenges of differentiation models

Assignments
• Submit Assignment 1: Write and Use a Learning Target
• Work on Assignment 2: Design a Differentiated Lesson Activity (Due: Session 4)

Session 4: More Strategies for Differentiating Math Lessons

Session 4 extends the work of Session 3 by providing additional strategies for differentiating mathematics lessons in ways that offer students choices. Learners will learn about using menus for offering selections of math tasks and about problem choice formats in which students select the numbers for math problems. In addition, they will explore ways to create open questions that allow all students to participate and parallel tasks that provide different levels of challenge for the same math topic. For all these approaches, learners will reflect on the benefits and challenges and identify ideas to apply in their own classroom practice.

Goals
Learners will:
• Explore the use of a variety of menu formats for providing students with choices of math activities.
• Build their knowledge of different approaches for creating differentiated mathematics problems.
• Compare and contrast different formats for differentiated activities to identify benefits and challenges of each, as well as implementation suggestions.
• Learn about structures for creating sequences of whole group, small group, pair, and independent work in differentiated math lessons.
• Reflect on their current practices for differentiating math tasks and plan ways to apply ideas to their own teaching practice.

Complete Readings
• “The Power of Problem Choice”
• “Beyond One Right Answer”
• “A Variety of Different Formats for Differentiated Math Lessons”

Read and View:
• Learning Menus: Differentiating for ALL Learners”

View Videos
• “Open-Ended and Parallel-Learning Tasks” (choice)
• “Stop and Jot” and “What Does it Sound Like When We’re Doing This?”

Explore Resources/Try Things
• Explore four websites to learn about Menus, Choice Board, Tic-Tac-Toe Boards; Learning Contracts
• Problem Choice Handout
• Open Question activity
• Favorite Formats Poll
Session 5: Addressing the Math Learning Needs of Special Student Populations

This session focuses on ways to differentiate math lessons to meet the varied needs of struggling math students (with and without identified disabilities), of students who are English learners (ELs), and of gifted students. Since it is not possible to provide an in-depth look at the mathematics learning needs of these student groups within just one session, this session will explore some key ideas and offer additional resources for further study beyond this course.

Goals

Learners will:

• Build knowledge about the varied mathematics learning needs of, and recommended instructional strategies for struggling students, English learners, and gifted students.
• Consider ways to use differentiation strategies to address the particular needs of each student group.
• Gain awareness of resources for further learning about each student group.
• Apply ideas to their differentiated lesson plan for the course project.
• Provide feedback to fellow learners on their “Create a Differentiated Math Activity” assignments.

Complete Readings:

• "Strategies to Help Students with Learning Disabilities Tackle Multi-Step Problems"
• Choice: “Goldilocks Discourse: Math Scaffolding That’s Just Right” or “Adapting the Curriculum to Meet the Needs of Diverse Learners”
• “Designing Mathematics Lessons for English Learners”
• “Supporting English Learners: Lessons from Research”
• “The Gifted Student”
• Choose one: “Mathematically Gifted Students: How Can We Meet Their Needs?”
• “Serving Gifted Students in General Ed. Classrooms,” OR “Debunking Myths About Gifted Students”
• Choose one: "Two Paths to Knowledge", “Overview of Math Centers,” OR “Curriculum Compacting: A Research-Based Differentiation Strategy for Culturally Diverse Talented Students”

View Video

• Scaffolding for Student Success (choice)
• Choose one: “Moises in Math Class,” “We Are All Teachers of English Language Learners,” OR “Math, Common Core and ELLs”

Explore Resources

• Basics of Mathematics (web page)
• Difficulties with Mathematics (web page)
• Responses (web page)
• PowerUp What Works (website)
• Choose one from Dare to Differentiate Wiki; “Curriculum Compacting” or “Learning Centers”

Write in Online Journal
• Reflect on session content and connect to teaching struggling math learners, ELLs or gifted students

Participate in Online Discussion
• Discuss differentiating math instruction for struggling learners

Complete Assignment
• Peer review of Assignment 2: “Create a Differentiated Lesson Activity” assignment due this session

Session 6: Building Supportive Classroom Cultures and Structures for Implementing Differentiation

In this session, learners explore considerations for creating a classroom environment and culture that supports differentiation. Structures and routines will not only help teachers manage differentiated activities, but can also help students understand their role in a differentiated lesson and build their independence as learners. Learners will discuss ways to build a culture of respect for learner differences and establish the expectation that students will not all do the same things at the same time. For the course project, learners will have an opportunity to integrate the peer feedback they have received to make revisions to their projects before submitting them. As a closing activity for the course, learners will reflect on their experiences and learning over the six sessions.

Goals
Learners will:
• Explore ways to create classroom structures, strategies, and a culture that support differentiation of math lessons.
• Use feedback from a peer to revise their differentiated activity as part of finalizing and submitting a completed course project.
• Assess their learning in the course by comparing your prior understandings to current understandings.
• Evaluate the learning experiences in this course by revisiting their professional goals and expectations.

Complete Readings
• “Strategies for Managing a Differentiated Classroom”
• “How Do Teachers Make it All Work?”

View Videos
• Choice of 2: “Teacher Toolkit: Card Sort; Find Someone Who; Frayer Model; Quiz, Quiz, Trade; Total Physical Response: Walk, Talk, Decide.”
• “Nonnegotiables of Differentiated Instruction: Respectful Tasks”
• “Closing Thoughts on Focusing on Students”
Write in Online Journal
  • Reflect on your acquired knowledge
  • Reflect on professional goals and course expectations

Participate in Online Discussion
  • Post and discuss photos showing aspects of classroom culture and environment that support differentiation

Complete Assignments and Activity
  • Submit Course Project

Schedule

This course is scheduled to take approximately 30 hours. The number of hours identified for each course reflects time spent online, but does not reflect the total time spent completing offline coursework and assignments. All learners are different and completion time for all coursework is expected to vary depending on learning styles and work habits.

Requirements

Learners are expected to:
  • Complete all assignments.
  • Maintain an online journal.
  • Participate and actively engage in discussions with fellow learners, while contributing to the social construction of knowledge.
  • Be self-directed and self-motivated.
  • Ask for assistance when they need it.

Materials (hardware, software, plug-ins)

  • Word processor
  • Internet access
  • E-mail

Academic Dishonesty Policy

To be inserted by university institution only

Evaluation

This course is evaluated on a letter grade basis and may be available for graduate credit. See graduate credit details pertaining to specific graduate credit institutions.

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