ADVANCEMENT COURSES™
A Wiley Brand

Unconventional Math Strategies for the Elementary Classroom

30 Clock Hours
Why should teachers take our courses?

A Focus on Student Success
Fostering student success in both academics and social-emotional growth is the main focus of all of our courses. Our courses are filled with strategies, techniques, and activities that are directly tied to improving student achievement in the classroom.

Classroom Applicable
We believe that professional development should be directly related to the classroom, so our courses are designed to include valuable resources for the classroom, innovative strategies and perspectives, and activities aimed at developing content teachers can use in the classroom immediately.

Authentic Assessments
As every subject and grade range has its own needs, we have designed our courses to include authentic assessments that mirror the type of work teachers do in the classroom. With case studies, active reading exercises, and time for developing student-facing activities, our courses provide consistent opportunities to express learning in an authentic manner.

Reflective Practice
A key component of all of our courses is time dedicated to reflective practice. Each course includes a journaling component, which prompts the teacher to connect the reading to their practice, experiences, student population, and school community.

Connection to Special Populations
While many professional development courses may tack on a section on special populations at the end, we believe that knowledge of special populations is integral to all subjects and grade ranges. The majority of our courses include direct strategies for working with exceptional students (special needs, English Language learners, at-risk students, and gifted and talented students).

Professional Learning Community
A dedicated online community space allows teachers to interact with course instructors and their peers, sharing resources, exploring new ideas, and connecting with other educators from across the country.
Unconventional Math Strategies for the Elementary Classroom

Course Description

Math really is all around us! Math can be fun, imaginative, and extraordinary, and can challenge the ways we think about life. Unfortunately, traditional education methods of drill-and-kill and rote memorization often stifle learning, curtail motivation, and contribute to students’ math anxiety.

In this course, you’ll learn how to excite and inspire your students about math using creative instructional strategies that align with how students actually learn. You’ll see how you can play with math naturally through games, culture, and community to build students’ intuitive and conceptual understanding. You’ll also develop key strategies for designing quality lessons, finding great resources, using questioning techniques, and developing assessments that will ignite critical thinking, persistence in problem-solving, and a growth mindset. Above all, you will inspire a love of mathematics and support students using developmentally appropriate, engaging, and transformative pedagogy.

With the tools and techniques from this course, you’ll be able to dispel your students’ anxiety and foster deep learning, excitement, and passion for mathematics.

Connections to Practice

This course provides the following classroom connections:

- Practical instructional strategies that teachers can use to support effective differentiation for small and large groups in a student-directed framework.
- Solutions to potential issues of math anxiety and limiting beliefs that curtail learning capacities, confidence, and growth.
- Strategies to uncover students’ individual learning needs and readiness levels by using context and connection to support student inquiry.
- Tips for structuring and organizing math lessons and assessments that differentiate instruction based on student readiness, interests, and learning profiles.

Course Outcomes

In this course, participants will:

- Develop practices for building a classroom environment that effectively implements strategies to redefine math education and excite learners while building confidence, ingenuity, and creativity.
- Appraise best practices and strategies for effectively designing math lessons that support 21st-century skills for an innovative, entrepreneurial economy.
• Design strategies to support all learners in the classroom through differentiation and accessibility considerations using high-quality, real-world, nature-based, and technology resources.
• Outline how a professional learning community and other ongoing, authentic assessment methods can help teachers successfully integrate models and strategies of unconventional math education methods.

Charlotte Danielson Framework for Teaching Alignment

Domain 1: Planning and Preparation
1a Demonstrating Knowledge of Content and Pedagogy
1b Demonstrating Knowledge of Students
1e Designing Coherent Instruction

Domain 3: Instruction
3b Using Questioning and Discussion Techniques
3c Engaging Students in Learning
3d Using Assessment in Instruction

Course Engagement and Resources

The activities and engagement options for the course have been designed to align with guidelines and considerations of Universal Design for Learning. This course aims to:

• Provide the learner with multiple means of representation.
• Provide the learner with multiple means of action and expression.
• Provide the learner with multiple means of engagement.

Your course facilitator will be available to you to answer questions and provide written feedback on your submitted Checkpoint assignment and Final Project. Additionally, within the Moodle LMS, you will have access to a collection of community resources through which you will be able to further explore course concepts through collaboration with facilitators and peers.

Materials

Online reading, viewing, and listening resources will be provided in each module.

Method of Evaluating Student’s Performance

<table>
<thead>
<tr>
<th>Assignment Category</th>
<th>Total Point Value</th>
<th>Percentage of total possible points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Checkpoint</td>
<td>10 points</td>
<td>30%</td>
</tr>
<tr>
<td>Assignment Category</td>
<td>Total Point Value</td>
<td>Percentage of total possible points</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------</td>
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<td>-------------------------------------</td>
</tr>
<tr>
<td>Participation</td>
<td>10 points</td>
<td>30%</td>
</tr>
<tr>
<td>Assignments: Self-reflection and goal setting, concept practice questions, discussion and reflection forums, and the Module 4 checkpoint activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Project</td>
<td>15 points</td>
<td>40%</td>
</tr>
</tbody>
</table>

*Please note that you must receive a percentage of 80% or higher for successful completion of this course. Completion of all activities is required to receive credit.

**Assessments**

**Self-Reflection and Goal Setting**

This course will include a self-reflection and goal setting assignment in the first module, in which each learner will articulate what they hope to learn and achieve because of the course. Learners will be guided to reflect briefly upon their intentions for the course and to set one to two specific (SMART) goals for their learning.

**Concept Practice**

These automatically scored questions will appear in each module and will cover concepts discussed in the module. Immediate feedback will be provided for each question.

**Discussions**

Discussions will appear in each module and include questions about concepts that appear in the module. Learners will be expected to post one original response to the prompt and respond to two peers.

Discussions will be evaluated on a pass–fail basis, per the following guidelines for completion:

- Participant satisfactorily shares thoughtful reflections and responds to colleagues in a respectful and engaging way.
- Participant provides an adequate level of detail in entries.
- Examples are satisfactorily helpful and informative and foster discussions or demonstrate substantial reflection.
- Participant’s responses are clear and well written and employ proper APA citation.
Project Checkpoint

Each course will include one project checkpoint activity for submission in Module 2. The checkpoint serves as a framework that supports learners in planning for and managing the development of the final project. Thus, the checkpoint allows learners to create artifacts or components that will later serve in completing the final project.

Learners will receive feedback from the course facilitator on the checkpoint assignment in Module 2.

The checkpoint assignment in Module 2 will be evaluated using the following rubric:

<table>
<thead>
<tr>
<th>Focus Areas</th>
<th>Does Not Meet Expectations (1 point)</th>
<th>Partially Meets Expectations (3 points)</th>
<th>Meets Expectations (4 points)</th>
<th>Exceeds Expectations (5 points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of Course Content</td>
<td>Checkpoint relates incomplete or incorrect information about course concepts. The learner provides an unclear reflection upon how he or she will evaluate personal progress toward established course goals.</td>
<td>Checkpoint relates superficial information about course concepts. The learner provides a superficial reflection upon how he or she will evaluate personal progress toward established course goals.</td>
<td>Checkpoint relates clear information about course concepts. The learner provides a satisfactory reflection upon how he or she will evaluate personal progress toward established course goals.</td>
<td>Checkpoint relates detailed and thorough information about course concepts. The learner provides a detailed reflection upon how he or she will evaluate personal progress toward established course goals.</td>
</tr>
<tr>
<td>Alignment of Student Outcomes</td>
<td>Checkpoint activity’s alignment to course learning outcomes is unclear or absent.</td>
<td>Checkpoint activity aligns with 1–2 course learning outcomes.</td>
<td>Checkpoint activity aligns with 2–3 course learning outcomes.</td>
<td>Checkpoint activity aligns with 3–5 course learning outcomes.</td>
</tr>
</tbody>
</table>

Final Project

The final project for each course will appear in the final module and will include a prompt that aligns with each category (including the “evaluate” and “create” categories) of Bloom’s taxonomy, building on the concepts from each module.

Final projects will be designed for the learner to create an artifact that demonstrates application and understanding of concepts and skills learned through each module of the course.

The final project will be evaluated using the following rubric:
<table>
<thead>
<tr>
<th>Focus Areas</th>
<th>Does Not Meet Expectations (1 point)</th>
<th>Partially Meets Expectations (3 points)</th>
<th>Meets Expectations (4 points)</th>
<th>Exceeds Expectations (5 points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of Course Content</td>
<td>Project relates incomplete or incorrect information about course concepts. The learner provides an unclear reflection upon how they will evaluate personal progress toward established course goals.</td>
<td>Project relates superficial information about course concepts. The learner provides a superficial reflection upon how they will evaluate personal progress toward established course goals.</td>
<td>Project relates clear information about course concepts. The learner provides a satisfactory reflection upon how they will evaluate personal progress toward established course goals.</td>
<td>Project relates detailed and thorough information about course concepts. The learner provides a detailed reflection upon how they will evaluate personal progress toward established course goals.</td>
</tr>
<tr>
<td>Application of Course Content</td>
<td>The project is not clearly aligned with the chosen audience; learner demonstrates no or faulty awareness of the audience’s needs.</td>
<td>Learner makes choices regarding content and methods of presentation that may be unclear or inappropriate in some ways; learner demonstrates some awareness of the chosen audience’s needs.</td>
<td>Learner makes appropriate choices regarding content and methods of presentation; learner demonstrates a clear awareness of the chosen audience’s needs.</td>
<td>Learner chooses and adapts project content and presentation in multiple ways to ensure complete appropriateness for the chosen audience; learner demonstrates exceptional awareness of the audience’s needs.</td>
</tr>
<tr>
<td>Alignment of Student Outcomes</td>
<td>Project’s alignment to course learning outcomes is unclear or absent.</td>
<td>Project aligns with 1–2 course learning outcomes.</td>
<td>Project aligns with 2–3 course learning outcomes.</td>
<td>Project aligns with 3–5 course learning outcomes.</td>
</tr>
</tbody>
</table>

**Course Outline**

**Module 1**

Mathematics is biologically hardwired into human evolution because it helps us make sense of our world, bringing to our experience logic, reason, order, and so much more. This math state of mind aligns with a child’s natural and innate ability to think differently, solve problems, experiment, and imagine. Take, for example, children who tinker with their toys or everyday objects in their environments, such as a fork and spoon. Through their imaginations and pretend play, they experiment with the toys in new or radical ways, learning about shape, size, quantity, and arrangement; they imagine objects being used in ways totally different than expected; and they persist through problems with acute focus and careful precision. They are doing math.
Humans are born knowing intuitively how to recognize patterns, make predictions, solve problems, and play with logic. We are born mathematicians. Yet, the traditional, procedural, rote approach to math instruction often leaves us feeling anxious and disempowered, as if math is just not our thing. As a result, adults hold onto strong limiting beliefs about their math capacities that impair their relationship with even the word “math.”

Fortunately, we can change this script. In this lesson, you will learn what math is and how to identify and dispel the myths, misconceptions, and limiting beliefs that hold you and your students back. You will examine thoughts, beliefs, and ideas around mathematics education and reveal how they run counter to what math really is. In addition, you will learn why schools need to change their approach to mathematics instruction and how to inspire students to tap into their natural mathematical minds, using nature as a way to transform mathematics education.

**Learning Outcomes**

By the conclusion of this module, you will be able to do the following:

- Examine myths, misconceptions, and limiting beliefs that create barriers to building mathematical understanding, reasoning, and appreciation.
- Evaluate the principles of math education that guide the unconventional, natural approach.
- Invent rich, multisensory, highly complex, and deeply mathematical experiences, activities, and invitations for deeper inquiry.

**Agenda**

Review the reading, viewing, and listening resources provided in Module 1, and complete the:

- **Self-Reflection and Goal Setting Activity**: in this discussion forum, you will articulate what you hope to learn/achieve because of the course. Please reflect briefly upon their intentions for the course and to set 1-2 specific (SMART) goals for your learning.
- **Introductory Forum**: in this discussion forum, you will have an opportunity to introduce yourself and meet other learners in the course.
- **Module 1 Content Lesson**: The content lesson serves to introduce and explain the topics and concepts for the module, and their applications in the classroom setting.
- **Module 1 Discussion Forum**: in this discussion forum, you will provide an original response to a question posed about topics in the Module 1 Content Lesson and respond to the original postings of your peers.

**Module 2**

Games and play-based learning prime the brain for real, lasting acquisition of knowledge and skills while creating ample opportunities to engage in deep conceptual thinking, creativity, and problem-solving. In play, students can best focus their attention on practicing key cognitive, social, and emotional skills because their brains are in what cognitive psychologists and neurologists call the “flow state” (Berlin, 2020). Our brain detects this flow state and our bodies feel it as full-on engagement and mental acuity, which occur when experiences are meaningful,
contextualized, and relevant to our unique life experiences and learning preferences. This is play.

This module will explore the ways in which play is the language of children. This information can empower you to transform mathematics education to reflect core principles of math such as curiosity, playfulness, and imagination. You will examine how children are born mathematicians, with capacities to question, test, and find solutions through play that are greater than those of any certified mathematician. Using this knowledge, you will explore practices, tools, strategies, and unique games for building robust lessons that prioritize play and meet the needs of all learners. In the end, you should be prepared to shift away from rote memorization, overtesting, and procedural knowledge toward game- and play-based math practices that will deeply enrich, engage, and inspire your students and be in full alignment with the core math principles.

**Learning Outcomes**

By the conclusion of this module, you will be able to do the following:

- Formulate a succinct definition of game- and play-based learning as it relates to optimal growth and education.
- Utilize brain science as it relates to learning and math education to increase student engagement and real-world application of skills.
- Evaluate the usefulness of rich math experiences with everyday objects, toys, art, and books.
- Research games that will best support academic standards and students’ specific needs, styles, and preferences.
- Generate tools, resources, and assessment strategies to create a play-based math lesson or unit plan that incorporates play, art, and rich literature.

**Agenda**

Review the reading, viewing, and listening resources provided in Module 2, and complete the:

- **Module 2 Content Lesson**: The content lesson serves to introduce and explain the topics and concepts for the module, and their applications in the classroom setting.
- **Module 2 Discussion Forum**: In this discussion forum, you will provide an original response to a question posed about topics in the Module 2 Content Lesson and respond to the original postings of your peers.
- **Module 2 Project Checkpoint**: This checkpoint serves to help you generate ideas for assessing not only learners’ understanding of the course content (after interacting with your artifact) but also the effectiveness and suitability of your final artifact. For this checkpoint assignment, outline an evaluation plan and design at least one formative or summative assessment.

**Module 3**

Mathematics in the real world does not equate to endless worksheets, timed tests, or flashcards. What is most important in mathematics education is that students have exposure to and practice with relevant, authentic concepts and that they see the utility and beauty of math in ways that bring them purpose, direction, and joy.
In a student-directed classroom, students are motivated to learn because they see the relevance of what they are learning. Self-initiative and innate desire come from natural human curiosities and a need to learn skills that enable individuals to be functioning, contributing members of their communities. Those curiosities and desires lead to the development of skills and competencies that have a clear purpose, which is to live a healthy, productive life. Seeing connections between concepts and applying math in the natural world through life experiences allows classrooms to cultivate deep learning, rather than surface-level understanding.

In this lesson, you will gain tools and strategies to facilitate self-directed learning experiences that go beyond basic computation to build a positive culture and belief system around mathematical thinking. When educators recognize the utility of mathematics and understand how it helps us make sense of the world, persist through challenges, and tap into creative solutions, students gain confidence and drive to understand and use math. You will analyze the role that visual mathematics plays in math education and develop strategies to facilitate high order thinking, flexibility, and creative problem-solving while meeting the unique needs of your students. In addition, you will unpack tools and scaffolding techniques for students to progress in ways that are developmentally appropriate for their unique preferences, styles, and needs. You will also learn how to create opportunities to deepen self-awareness and to integrate math talk, understanding, and skills into culturally relevant and contextualized scenarios. In learning to attune to the unique variability of human development, the entire school community can support learners in both their academics and their social and emotional learning, building a stronger foundation for overall health and well-being.

**Learning Outcomes**

By the conclusion of this module, you will be able to do the following:

- Incorporate self-directed math education techniques into instruction to inspire lifelong learning and promote problem-solving skills.
- Formulate a plan for using tools and strategies that allow students to take initiative and embrace the power of seeing math visually in problem-solving and critical thinking.
- Generate lesson design techniques and assessment strategies that attune to the natural variability and multiple intelligences of human cognition.

**Agenda**

Review the reading, viewing, and listening resources provided in Module 3, and complete the:

- **Module 3 Content Lesson**: The content lesson serves to introduce and explain the topics and concepts for the module, and their applications in the classroom setting.
- **Module 3 Discussion Forum**: in this discussion forum, you will provide an original response to a question posed about topics in the Module 3 Content Lesson and respond to the original postings of your peers.
- **Final Project**: For your final project, you will create an artifact that would support you in teaching the concepts you have learned in this course to an audience of your choosing. The artifact and audience that you choose should be designed to suit your professional role.
- **Course Evaluation Survey**
Technology Requirements

Please review the System Requirements for Moodle.

Netiquette Policy

Anyone enrolled in online courses has the right to learn in an environment where all individuals are treated equitably and with respect. Behaviors in the course that interfere with the learning experience are not permitted. Disruptive or disrespectful behaviors may result in dismissal from the course.

To maintain a positive, professional, and supportive online environment for this class, learners should adhere to the following standard guidelines. Everyone is expected to:

- Show respect for the facilitator and for other learners in the class, including use of polite, professional tone, respecting and valuing the privacy of other learners, and expressing differences of opinion in a polite and rational way.
- Maintain an environment of constructive criticism when commenting on the work of other learners by offering feedback that is supportive and helpful in nature.
- Contribute relevant topics and ideas when involved in group discussions or other collaborative activities.
- Use appropriate grammar and structure in online communication and refrain from use of all capital letters, as this equates to and can be interpreted as shouting in the online environment.

Compliance With the Americans with Disabilities Act

In compliance with Section 504 of the Rehabilitation Act and the Americans With Disabilities Act, participants who have any condition, either permanent or temporary, which might affect their ability to complete this course, are encouraged to reach out to support@advancementcourses.com at the beginning of the course. We will make reasonable academic and accessibility accommodations to the course.

Academic Integrity

Honesty is an essential aspect of academic integrity. Individual students are responsible for doing their own work and submitting original assignments as per the course directions. Plagiarism and cheating of any kind will not be tolerated.

Plagiarize: “To steal and pass off (the ideas or words of another) as one’s own without crediting the source; presenting as new and original an idea or product derived from an existing source” (Webster’s new collegiate dictionary, 1973, p. 870). This includes using information from the Internet without citing the website. Avoid plagiarism by appropriately acknowledging the source of the author’s words and ideas.

Cheating: Submitting or presenting an assignment as your own when it was written or created by someone else is not permissible in this class.
References


Edutopia. (2021). *How to foster metacognitive skills for independent learning* [Video].


Wabisabi Learning. (n.d.). *The best online math games for students that hate math*.


Student achievement is at the core of everything we do.

Since 1988, Advancement Courses has been a leader in professional development, providing expertly-crafted, classroom-applicable courses to thousands of teachers across the country. Our extensive online curriculum includes over 280 graduate-level, self-paced courses in 20 different subject areas covering both foundational topics and emerging trends in K-12 education.

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<td>District/School Improvement Plans</td>
<td>Core &amp; Specialized Content Areas</td>
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