



TECHNOLOGY FOR TAILORED LEARNING

Research-Based Design and Best Practices In Classworks

In ensuring the effectiveness of instructional technology, indeed any instructional methodology, a review of research and best practices is critical. This background provides a purposeful approach to Classworks instruction, and gives educators confidence that by using a research-based solution students are given the best opportunity to learn.

Classworks is developed and organized to provide a research-based format and structure for delivering instructional software. This is accomplished based on research proven practices in three general areas:

- Organization and Instructional Design
- Content Alignment for Relevant Instruction
- Best Practices in Content and Delivery

The discussion that follows examines all three areas in detail and describes how Classworks utilizes proven methods of instruction so as to provide rich, relevant content designed to maximize student learning.

Organization and Instructional Design

Classworks units are constructed and maintained so they will provide meaningful activities using research-based methods and strategies. The framework for the units includes mini lessons, practice activities, review activities, posttests, and projects. Within this framework Classworks incorporates a significant variety of activities that utilize the proven methods and strategies that the framework can provide.

Each part of the framework contributes important elements to the instructional effectiveness of the unit as a whole. Below are details of the unit components along with examples of how Classworks weaves them all together.

Mini Lessons:

Mini lessons provide three instructionally effective elements to the unit – learn, apply and review. They are designed to provide an anticipatory set or a tutorial, a way to teach the designated objective for the unit. Visual, audio, and textual examples and models are utilized. The ‘learn’ section has the initial delivery of instruction, including all content required to learn the concept. The application section of the lesson is for practice where consistent feedback is given. The third piece of the mini lesson is the review, including all key concepts that will be assessed.

Placement of mini lessons at the beginning of units is an effective way to provide initial instruction, application and review through a springboard activity. It also uses elements of Madeline Hunter's widely used framework on lesson design.

Practice Activities:

Practice activities engage students in numerous ways to practice a skill. By integrating multiple activity types into each unit while focusing in a single skill, students have an opportunity to see different instructional approaches and learning styles. Often, a particular approach will engage a student and learning will take place more quickly, or with a longer retention of knowledge. Ongoing feedback is provided, encouraging greater student attention, interest, and increased understanding. In many cases direct instruction, helpful hints and tips are provided during the lesson.

Many practice activities provide opportunities for developing higher-order thinking skills. The sequential placement of activities within a unit requires students to use increasingly complex thinking as they proceed through the unit. Students are required to use application, analysis, and synthesis skills (Webb's Depths of Knowledge and Bloom's Taxonomy). Lessons require solving puzzles, comparing and contrasting, summarizing, supplying answers from context clues, creating examples, and writing stories. Robert Marzano in What Works in Schools: Translating Research into Action looks at research that shows what activities give greater results. Two areas that rated the highest in his studies for higher order thinking are comparing and contrasting, and summarizing – both frequently represented in Classworks instruction.

Following are some specific examples:

Math Shop Deluxe activities on fractions require students to determine how to divide the cookies up given certain pre-set parameters. Multiple steps, requiring thoughtful consideration, are required to come to a correct answer. In *Reading Gladiator* a student must 'recognize relationships' to match words in rows with corresponding words in columns using different categories. Clues are available throughout the lesson. *JumpStart Phonics' Storybook Cave* is an activity that has the student find the correct word to fill in the blanks based on the context of the rest of the sentence. Hints are available in several spots within the screens of this lesson. Many comprehension activities require understanding of the main idea, the details, or ask for a summary. The *Tom Snyder Graph Club* lessons teach students how to make a graph and then lets students create and explore their own data and graph. The *JumpStart Phonics Beehive Activity* works the student through activities where he or she matches correct short vowel sounds with the correct word. The student can listen to the words and their sounds and compare those sounds with the vowel sound that is given. In addition, many writing (practice) lessons have students complete directed writing activities while others create open ended writing projects.

Another highly rated strategy for achieving results is practice with non-linguistic representation (including instructional software). Classworks is rich in non-linguistic representation of concepts supporting this methodology.

Review Activities:

Optional activities are provided in many of the units for additional practice through more concrete and simplified materials. Students that are not able to understand objectives at

the assigned level can do lessons that are more instructionally appropriate, while still focusing on the same standard or skill as their peers. Built into the Classworks manager is the capability to automatically trigger review activities based on non-mastery, or for teachers to specifically assign this instruction. This mechanism provides tools for stronger accountability and instructional appropriateness.

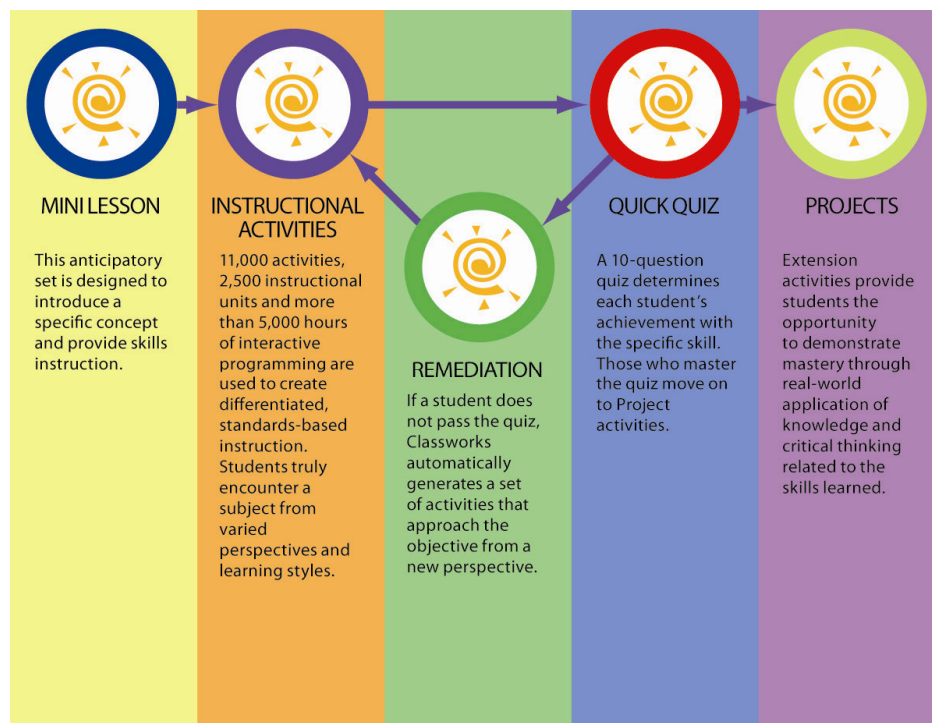
Quizzes:

Quizzes are the assessment piece of Classworks units and give a formative assessment following the mini lessons and practice activities. Results are easily measured and immediate accountability is available to students, teachers, and administrators. Tested concepts come from the unit objectives. Quiz results assist with needed feedback and can help to drive instruction.

Projects:

Projects are the culminating activity of each unit. Performance-based projects provide an opportunity to show real world application and critical thinking related to the skills learned to demonstrate mastery. They are open-ended activities that use one of four software applications (*Writing Blaster, Multi-Media Workshop, HyperStudio, and Cruncher*). These activities provide for student creativity, student writing, and the resources to apply things that were learned in the unit.

Classworks projects are fully integrated into the instructional units. This ensures that they are aligned to state standards and developed around specific skills and concepts – adding depth and breadth to the instructional path instead of existing as a separate piece outside of the student’s regular learning process. Projects readily enable the more highly effective instructional strategies and require complex levels of thinking as well as varied levels of evaluation.



Results/Reports:

Immediate feedback assists in the learning of conscientious learners and teachers. Classworks provides immediate feedback throughout the lessons. On top of that the management system also generates reports. These results can be in summary or detailed formats. Research shows how when timely feedback is given for student activity, learning improvement is measureable. Classworks provides information on what activities the students have worked on, their accompanying scores, engaged time on task, and date of completion. Again, the data is a key resource to direct instruction. Robert Marzano in What Works in Schools: Translating Research into Action (p. 37) talks about the need for ongoing feedback, especially teacher to student feedback. He shows how reinforcing and recognizing is another one of the more highly effective practices for seeing results. Another report showing the importance of results in direct relation to learning is How Full is Your Bucket by Tom Rath and Donald O. Clifton. Classworks reports address the concerns outlined in both of the above works.

The ability to base instructional decisions on data is a critical piece of the puzzle to provide the most relevant, effective instruction to every child. Classworks reports give educators the tools they need to make informed decisions and adjust assignments accordingly.

Content Alignment for Relevant Instruction

Classworks' sequences are organized with sets of units by grade level and content area to the most appropriate local, state and national standards. The fundamental components of instructional sequences are the units. Curriculum Advantage constructs each sequence with the units aligned to the required standards.

National Alignment:

Foundational sequences are developed for each grade level and content area from a national perspective. Instructional strands and objectives are identified and included from state and national resources. These national sequences become the basis from which other more specific alignments are drawn. Our commitment has been and continues to be to maintain comprehensive, robust national sequences.

Standards from the National Council of Teachers of Mathematics, the National Council of Teachers of English, the International Reading Association and the National Assessment of Educational Progress were used in building the scope and sequence and organizing Classworks instruction.

The National Reading Panel's report and summary on Teaching Children to Read: An Evidence-based Assessment of the Scientific Research Literature on Reading and its Implications for Reading Instruction, 2000, was used for both validating and aligning the instructional materials. As the basis for the Reading First essential components of reading, we have gathered a comprehensive set of materials to meet the underlying objectives of phonemic awareness, phonics, fluency, vocabulary, and comprehension.

The recent findings of the National Math Panel, Foundations for Success, 2008 are reinforced with Classworks instruction. The purpose of this panel was to lay out a framework for effective mathematics instruction, with a particular focus on preparation for success in Algebra.

Some of their relevant findings included:

- K-8 content must be streamlined with more depth on fewer key topics
- The foundation skills for algebra are whole numbers, fractions, geometry concepts and measurement
- A much greater emphasis must be placed on fractions in American schools
- Early exposure (Pre-K through 2) to math is critical and has a lasting impact

Classworks has extensive instruction in the four foundation skills, and is particularly strong in the area of fractions, which was found to be the greatest weakness in current learning.

Classworks also takes into account NCTM's Curriculum Focal Points which derive from some of the same concerns that appeared in the NMP Report. The Focal Points are three identified targets at each grade level that are recommended for in-depth content emphasis. This means that the vast majority of teaching and learning at each grade level would center on the focal points – with the goal of real learning that is retained and provides a solid mathematical foundation for future success.

State Alignments:

Curriculum Advantage creates state-aligned sequences to keep content relevant to local and state needs and to help in meeting state accountability requirements. From the national sequences we draw the specific units together that a state requires through their standards and assessments.

Classworks state editions are directly aligned to:

- Specific state developed standards
- State test objectives

This allows individual learning paths to be created based on those standards and/or objectives so that each student can work on their state-determined areas of need. Student progress against the standards is measured and reported through Classworks Manager.

When working with the standard alignments, students may be assigned on grade level Classworks content for standard mastery. When working with state high-stakes test objectives or assessment result imports, learning paths have content for remediation, on grade level, or enrichment, according to individual areas of need.

Each year Curriculum Advantage reviews the changes in standards and assessments in order to update any state's aligned material, helping to maintain consistency when a state is transitioning to new standards and state tests. This can be critical in supporting educators, especially when textbook adoptions lag behind state changes and new materials are required.

Import and Benchmark Features:

Two of the Classworks features, imports and benchmark assessments, deliver individualized, prescriptive assignments for students. Student assignments are customized to the individual student's needs based on results. If a student did not do well in measurement, the lessons for that specific area are assigned. The next student could be assigned something very different depending on the specific needs.

Import assignments are generated from outside testing data that can be imported into the Classworks manager, generating a unique assignment for each student. This data comes from the results of a state's criterion-reference high-stakes test, or from a local or third-party assessment. The ability to import assessments used by the district offers two advantages: 1) Student assignments are derived from state assessments which are more meaningful in terms of accountability to state standards, and 2) Student assignments are derived from assessments already being used so that additional time does not have to be spent on assessments, but can be devoted to instruction and learning.

The Classworks Benchmark Assessment is designed to measure student concept and skill mastery, and automatically prescribes an individual learning path of Classworks instruction based on the results. Test items are valid and reliable nationally normed items, covering grades 3-10. The items are organized into strands and skills that have been aligned to Classworks units that provide instruction to help students master the concepts. Benchmark assessments are created to match curriculum maps or pacing guides, and to let the teacher assess for the objectives he/she chooses at the appropriate time. Students take the test on those objectives and the results determine the lessons that will be assigned to each student based on results. These features allow teachers to assign instruction based on each student's individual needs.

Best Practices in Content and Delivery

While there are tens of thousands of writings on pedagogy and instructional methodologies, clearly some effective practices have been noted by both the experts and practitioners alike. This core group of recognized "best practices" has been proven effective in both teaching and learning, and in having an impact on student achievement.

Classworks can be viewed through the lens of "best practices" as a way of helping educators use the flexibility of the management system and depth and breadth of the instruction to maximize student learning.

Following are some of the most common and proven practices, evidenced by research, that are integrated into Classworks Instructional Delivery:

Effective Instructional Design

The framework design of Classworks' units incorporates a sound instructional process. The Classworks' framework, similar to Madeline Hunter's Elements of Lesson Design, maintains the integrity of the objective and the level and flows from the introduction, to the tutoring, then the practicing, the assessing, and extending.

Beyond the unit framework there is a significant variety of activity types. One recognized strategy for helping students to learn an objective well is to teach it to them in a variety of ways. With Classworks that technique can be easily practiced.

Differentiation Capabilities

Classworks differentiates in a variety of ways. Within the instruction, each unit provides differentiation by presenting students with multiple instructional approaches to the skill or concept. On a broader scale, each student's instructional learning path is differentiated from every other's, targeting instruction that is relevant to their needs. Finally, the Classworks import, benchmark, and management tools enable the teacher to assign individualized, instructionally appropriate activities. With a balanced, teacher-directed use of these tools this technology can be very helpful, very powerful, and the results measurable. Researchers and authors like Fullan, Schmocker, Marzano and others emphasize that the key to these types of assignments is that they be teacher directed.

Cognitive Complexity

Higher-order thinking by students involves the transformation of information and ideas. Development of higher order thinking begins with the ability to understand concepts and ideas, and moving to increasingly complex thinking wherein students apply what is learned in new and unusual ways.

There is voluminous research and a variety of instructional models that describe complex thinking. These include the Rigor and Relevance Framework by the International Center for Leadership in Education, Benjamin Bloom's Bloom's Taxonomy as well as Bloom's Revised Taxonomy, and Norman Webb's Depth of Knowledge. These models provides educators with a structure which can be used to build curriculum materials that take learners more deeply into any area of study and ensure a more complete understanding of a concept.

Classworks supports higher order thinking skills in a number of ways. The organization of the instructional unit itself is designed to go from simple knowledge of a skill or concept to a more complex understanding. The use of multiple, third-party titles also ensure that students will be asked to demonstrate understanding in a number of ways – touching on all levels of thinking. In addition to the higher order thinking skills instruction integrated throughout the Classworks activities, Classworks provides performance-based projects, specifically designed to demonstrate complex levels of cognitive thinking. These are standards-based projects – integrated into the instructional unit and focused on each specific skill or concept - designed to demonstrate mastery and real world relevance.

High Curricular Standards

State sequences are aligned to meet the highest instructional requirements of that state. In addition to these state standards, Curriculum Advantage researches and utilizes guidelines and recommendations from national sources. Some of these resources include: the report by the National Reading Panel on *Teaching Children to Read*, the *Put Reading First: The Research Building Blocks for Teaching Children to Read* document, the National Mathematics Advisory Panel's *Foundations for Success* Report, the *Reading First* guidelines, and policy items from the Center for Education Policy. Some other sources reviewed and considered are the standards outlined by the National Assessment

of Educational Progress and the National Council of Teachers of Mathematics, the National Council of Teachers of English, and the International Reading Association.

Use of Technology

Summarizing the reviews of research on computers and education, Fouts indicates that the vast majority reach positive conclusions about their efficacy. He reports general concurrence that:

- When combined with traditional instruction, the use of computers can increase student learning in the traditional curriculum and basic skills areas.
- The integration of computers with traditional instruction produces higher academic achievement in a variety of subject areas than does traditional instruction alone.
- Students learn more quickly and with greater retention when learning with the aid of computers.
- Students like learning with computers and their attitudes toward learning and school are positively affected by computer use. The use of computers appears most promising for low achieving and at-risk students.
- Effective and adequate teacher training is an integral element of successful learning programs based on or assisted by technology.

The National Math Panel reports that high quality computer-assisted instruction does “improve students’ performance compared to conventional instruction.”

Some key elements in Classworks that are critical to effective computer-assisted instruction include:

- Plenty of opportunities for practice of skills and concepts
- Use of well-designed tutorials are used to introduce content
- Targeted instruction to develop specific concepts

Frequent Reporting and Monitoring

Data that is gathered as students work provides relevant feedback. A teacher’s timely management of these results allows for the ‘dollops of feedback’, that researcher Robert Marzano encourages. From the student perspective, they receive feedback after every activity for encouragement during their self-paced learning. In addition, students have access to view their results at any time for individual feedback. Research shows that meaningful feedback generates improved results.

Sound Implementation Strategies

Effective implementation of instructional software is just as important as the quality of the content, the structure of lessons, or the comprehensiveness of the coverage. Implementation includes training, support, goals and planning, how much time is dedicated, and what strategies are utilized. Each of these components contributes to the success of the software. When teachers are trained well, given ongoing support, and implement their plans and goals with fidelity, the implementation is more successful. Adequate instructional time, focus on relevant standards, and a commitment to meaningful feedback are other critical factors.

Some instructional strategies are more effective than others. Robert Marzano’s, What Works in Schools: Translating Research into Action highlights a number of these techniques and what kinds of results they can generate. Some of the strategies he

recommends are identifying similarities and difference, using summarizing, reinforcing efforts and success, assigning homework and practice lessons, giving feedback, and using non-linguistic resources. The strategies he identifies are in use throughout the Classworks software.

Classworks has also been integrated into specific implementation models where it can be a critical component of a larger school reform effort. Some of these models include Response to Intervention, Value-Added Accountability Models, 21st Century After School Programs, and the Continuous Improvement Model.

Conclusion

Classworks recognizes the importance of making informed instructional decisions to give students the best opportunity to learn. By creating instruction that is based on proven best practices and sound instructional design, educators can be confident that they are providing quality, research-based computer assisted instruction that will impact student achievement.

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