Moore Collaborative Committee
Research Framework for Pre-Screened Proposals

Proposal title: Carnegie Learning MATHia software and textbook (grades 6-8); Cognitive Tutor® software and textbook (grade 9)

Vendor/Agency: Carnegie Learning, Inc.

Contact person: Mary Murrin, Vice President, Grants & Proposals

Contact information: 437 Grant Street, Suite 918, Pittsburgh, PA 15219
888-851-7094 X176
mmurrin@carnegielearning.com

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of proposal.</strong> Please use one of the following categories:</td>
<td>2. Product: <strong>Academic Year Math Series Curriculum for Students</strong> in grades 6-8 will enroll in the Carnegie Learning Math Series -- including MATHia software and textbooks -- during the academic year, and grade 9 will work on the Cognitive Tutor® software and textbooks. Students will work on the software and textbooks using a blended model where 40% of instruction occurs in a lab setting working on the software, and 60% occurs in a classroom using the textbooks in a collaborative, student-centered environment.</td>
</tr>
<tr>
<td>1. Professional development activity (i.e., one-time training or workshop);</td>
<td>Strengths in our proposed curriculum are as follows:</td>
</tr>
<tr>
<td>2. Product (i.e., curriculum guide, workbook series or other physical item);</td>
<td>• Superb built-in student assessment system, with extensive student report features to monitor student progress</td>
</tr>
<tr>
<td>3. Service (i.e., curriculum or instruction audit or coaching contract);</td>
<td>• Strong differentiation components in the texts and online, MATHia and Cognitive Tutor provide a tiered approach for students who struggle</td>
</tr>
<tr>
<td>4. Hired professional (i.e., RTI or reading intervention specialist);</td>
<td>• Like many sophisticated online programs, computer adaptable software monitors each student and immediately adjusts the next problems</td>
</tr>
<tr>
<td>5. Other (specify).</td>
<td>• Learning academic vocabulary is fully supported with easy to find glossary and resource tools in texts and online</td>
</tr>
</tbody>
</table>

**Conditions the proposal is intended to address.** (Describe school improvement issues or challenges that this service or product is intended to address or remediate.)

The transition to CCSS requires newly developed curricula written explicitly to the more rigorous standards and supported by teacher professional development for teachers and administrators that makes a commitment to work consistently to ensure that students are succeeding.

Given our experiences working with rural Alaskan schools, Carnegie Learning’s Cognitive Tutor software can be a revolutionary teaching as a result of its powerful, On-Going Formative Assessment. Formative assessment is part of instruction designed to provide crucial feedback for you and your students – to diagnose, not to assign a grade.

Cognitive Tutor® and MATHia® Software’s differentiated instruction and mastery-based approach provides highly individualized, self-paced instruction. Tracking a student’s strengths and weaknesses, the software customizes prompts to focus on areas where the student is struggling, and presents new problems that address specific concepts that have not yet been mastered. This system for individualizing instruction continuously assesses student responses.
**Description of proposal.**

<table>
<thead>
<tr>
<th>Carnegie Learning, Inc. Response.</th>
</tr>
</thead>
<tbody>
<tr>
<td>to create a customized instructional path, ensuring that students spend more time on concepts they don’t know and less time on topics that they have already mastered. Our software differentiates instruction with ongoing formative assessment for mainstream and supplemental implementations. Formative assessments are another way to support teachers that instruct multi-age, multi-grade classes.</td>
</tr>
</tbody>
</table>

**Intended outcomes of program.**

*How will the program impact the conditions mentioned above? Include intermediate outcomes that lead to overall impact. Where possible, note qualitative and quantitative outcomes.)*

| Our program is expected to improve student achievement in middle school and high school mathematics by solidifying basic understandings and better prepare them for higher-level mathematics. The CCSS are informed by other top-performing countries so that all students are prepared to succeed in high school and improve the opportunity to access to college. Because the CCSS are aligned with the expectation that students will attend college or leave high school career-ready, Carnegie Learning’s program is designed to transition Alaska’s middle school and high school students to the more rigorous standards. As part of the Smarter Balance Assessment Consortium, CCSS assessments will be implemented starting in the 2012-2013 school year. Over the course of each academic year, Carnegie Learning will work with the districts to collect roster data, course grades, and assessment scores from each school and usage data from Carnegie Learning’s math software. This data will be combined to generate reports to track growth over time and provide evidence of the effectiveness and fidelity measured by outcomes. An aggregation of several well-designed third party studies indicates that, when using Carnegie Learning programs: |
| • Students performed 30% better on questions from the TIMSS assessment |
| • Students demonstrated an 85% better performance on assessments of complex mathematical problem solving and thinking |
| • Students completing Cognitive Tutor® Algebra I had a 70% greater likelihood of completing subsequent (non-Cognitive Tutor) Geometry and Algebra II courses, as compared to students completing a traditional Algebra I course |
| • Students in Cognitive Tutor® Algebra I achieved 15-25% better scores on the SAT and Iowa Algebra Aptitude Test, as compared to students using a traditional curriculum |
| • Results have been nearly equivalent for both minority and non-minority students |

**How outcomes are measured.**

*Provide measures for the overall impact on conditions mentioned above in addition to program performance measures used to evaluate quantity of service delivered, quality of program delivery, and implementation, and direct program outcomes. Measures should include a quantitative or otherwise replicable component appropriate for grant evaluation and Carnegie Learning® Math programs deliver innovative, research-based curricula for middle school and high school students in preparation for graduation, college, and the 21st Century workforce and aligned to the Alaska assessments, and to the five content strands of the standards set by the NCTM. The programs are rooted in more than two decades of cognitive science research at Carnegie Mellon University, and the result is a unique modeling technology that teaches students to think mathematically. The primary theoretical basis for the Cognitive Tutor approach comes from John Anderson’s ACT-R model of learning and performance (see http://act-r.psy.cmu.edu/ and Anderson, 1993; Anderson and Lebiere, 1998; Anderson, 2007).*
### Description of proposal.

- **Validation.**
  - The Franklin Institute in Philadelphia recently presented co-founder Dr. John Anderson with the 2011 Benjamin Franklin Medal in Computer and Cognitive Science for his ACT theory that is the foundation of the Cognitive Tutor® software.

### Carnegie Learning, Inc. Response.

#### Pre and Post Testing

Carnegie Learning delivers pre and post assessment allowing teachers to create a custom test that is both prescriptive and diagnostic. Tied to custom-sequenced curricula, the results are used to set pacing for students in the instructional software. These constitute criterion-referenced exams, correlated with state standards and benchmarks and which assess all material to that point in the course. These exams can be used to produce a growth scale that can be aggregated for state review.

#### Assessment Reports

- Data is an important tool for personalizing instruction and ensuring that students are progressing at an appropriate pace to master concepts and skills. Teachers can now access four reports that illustrate performance on pre- and post-tests, including:
  1. **Student Report By Problem** – View how a student performed on each problem in the assessment. Plus see the scored response, correct answer, and the student's answer.
  2. **Class Report By Problem** – Shows a class summary for each core problem in the assessment.
  3. **Student Report by Topic** – See a summary of a student’s strengths and weaknesses by mathematical topic.
  4. **Class Report by Topic** – See a class summary of students’ strengths and weaknesses by math topic.

#### Cost.

- **(Provide cost on a unit basis, per-student basis, or per-teacher basis, as appropriate, to allow districts to accurately calculate their actual potential cost. Address any cost sharing opportunities offered by the vendor or agency.)**

- **For schools and/or districts interested in implementing Carnegie Learning’s Middle School Math Series or High School materials, a 3 year pricing model has been established for software and textbooks for core and intervention needs.**

  - **The Middle School Series 3 year total cost per student is $180, plus shipping charges.** Per student bundle provides a complete student textbook (in-classroom text, assignment and skills practice) annually along with access to Mathia Software for Courses 1-3. Teacher textbooks are sold $110 per course level.

  - **Carnegie Learning’s High School 3 year total per student is $194.49 per product, plus appropriate shipping charges.** Per Student bundle provides a complete student edition of chosen curriculum (Student Text and Assignment) annually along with access to the Cognitive Tutor software. Each High School per student software license is provided access to Bridge to Algebra, Algebra 1, Geometry, and Algebra 2. Within the 3 year agreement period, the annual textbook composition can be changed annually by purchasing school and/or district with prior notification (minimum of 30 day notice). Teacher textbooks are $89.25 for Bridge to Algebra, Algebra 1, Geometry and Algebra 2, and $110 for CCSS Aligned editions.

  - **Online Professional Development. $200 per teacher** access is designed to support you with on-demand, just-in-time learning. Available via the Carnegie Learning Resource Center, our Online
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PD modules include both interactive and video content, developed to make instructors more successful and confident using Carnegie Learning curricula</td>
<td></td>
</tr>
</tbody>
</table>

**Webcast Training $375** for up to 5 participants.

**Requirements for implementation.**  
(Capacity, staff, technology, facilities, financial resources, other conditions or resources.)

- Adequate technical infrastructure and technical training  
- A strong understanding of online technology capabilities state-wide  
- Wireless access  
- Video capability – Elluminate


**Implementation.** The three-year implementation will be customized based on teacher availability and needs assessment.

**Timeline for Launch**  
To ensure a smooth implementation, Carnegie Learning has developed a comprehensive checklist for planning and getting started with Carnegie Learning curricula.

- 4 weeks prior to the start of the implementation:
  - Determine the number of schools, teachers, and students
  - Work with each school to determine the implementation model and ensure appropriate scheduling
  - Confirm technology readiness
  - Select Carnegie Learning teachers and students
  - Schedule a meeting to define the Professional Learning Plan for the year
  - Coordinate a leadership planning meeting to define a theory of action, set performance benchmarks, and establish an accountability plan
  - Order curriculum materials

**Best practices for implementation.**  
(Processes or changes schools should adopt to make best use of this proposal.)

The Carnegie Learning Math Improvement project provides:

- Research-based approach to learning. MATHia and Cognitive Tutor software and textbooks that motivate all students and improve reasoning and sense-making skills.
- Aligned curricula. A set of vertically aligned mathematics courses with content transparently in sync with Common Core, State of Alaska, and NCTM standards.
- Assessment. An “at-your-fingertips” formative assessment and Teacher’s Toolkit reporting system that tracks progress and fosters continuous improvement. Include training, leadership training, status meetings, and IT support.
- Implementation Fidelity Rubric – We support high-quality implementations that sustain mathematics improvement—a critical first phase and work side by side with teachers and leaders in their buildings, modeling, co-teaching, co-planning, and building best practices for Carnegie Learning® instruction.

**Evidence of success in similar environments.**  
(List past or current)

In Alaska, Kuspuk School District has been using Carnegie Learning curricula for high school math students since 2000, and recently...
examples or incidences of successful implementations in Alaska. Provide references where possible.)

adopted middle school and high school programs for students for an additional 6 years. In 2000, Cognitive Tutor® software was implemented for the distance learning environment necessary in rural Kuspuk. Carnegie Learning’s solutions for its Algebra I, Geometry, and Algebra II classes were unique in that they supported the District’s use of video teleconferencing, white boards, and online resources to create an interactive classroom that simultaneously reached students in 5 remote villages, across 80 miles, in real time. The implementation is described below.

Each student has a laptop with wireless internet, a headset, and chat and video capabilities with which they access the software and collaborate with instructors and students in other classrooms and remote villages. Students communicate with one another through video, chat and audio and work in groups to solve problems.

Whiteboard technology allows instructors to assist students across these multiple locations. Students submit homework and take all assessments entirely online.

Cognitive Tutor software has provided teachers at Kuspuk with the resources to educate effectively many remote students. After using the solution for two years, instructors believe that the technology component motivates students who work three days a week on problem-solving and two days a week on the software. Students are progressing through Alaska State Standards and are passing their High School Qualifying Exam as part of a larger, distributed community of learners.

Carnegie Learning programs in Alaska

Partnership with the University of Alaska Southeast's (UAS) School of Education, and seven school districts (Alaska Gateway, Bering Strait, Kuspuk, Lower Yukon, Northwest Arctic, Borough, Southwest Region, and Yupiit):

In 2007, Carnegie Learning implemented Bridge to Algebra software as the core instructional curricula for the statewide training of middle school and secondary math teachers in the State of Alaska. The program was a partnership among Carnegie Learning, the University of Alaska Southeast's (UAS) School of Education, and seven school districts across Alaska.

The UAS/Carnegie Rural Alaska Math Teacher Development Program is funded from No Child Left Behind legislation that authorizes financing of higher education partnerships in each state to support Professional Development through K-16 partnerships. The program requires using practices grounded in scientifically based research so that students benefit from methods and practices that are known to work. Carnegie Learning is one of the only companies with mathematics curricula recognized as effective by the US Department of Education.

Evidence of success in any environment. (List successful implementations and/or research findings or literature review)

Carnegie Learning, Inc. Response.

Greene County Middle and High School

Background Information:
Greene County Middle and High School, located in Snow Hill, North Carolina, serves approximately 1,800 students in grades 6-12.
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>validating your approach.) Under the federal guidance of the Transformation Model, Greene County partnered with Carnegie Learning to ensure instructional strategies in mathematics were grounded in scientifically based research, data-driven decision making, ongoing professional development for teachers and administrators, and extended learning time for students.</td>
<td></td>
</tr>
</tbody>
</table>

**Implementation Plan Overview:**

Both the high school and middle school students utilized Carnegie Learning blended curriculum through the School Improvement and Innovation Model, where students spent 60% of their time in the textbook, in a collaborative, student-centered classroom. The other 40% of the time, the students worked in Carnegie Learning software, with high school students utilizing the Carnegie Learning Cognitive Tutor program in Algebra I, Geometry and Algebra II, and middle school students utilizing MATHia software, which is differentiated for each student, based on their readiness level in math. Greene County Middle and High School received the following Professional Services as part of their implementation plan during the 2011-2012 school year:

**Results:**

<table>
<thead>
<tr>
<th>High School Results:</th>
<th>Algebra 1 End of Course Test</th>
<th>Graduation Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010 36.00%</td>
<td>62.9</td>
</tr>
<tr>
<td></td>
<td>2011 46.50%</td>
<td>73.9</td>
</tr>
<tr>
<td></td>
<td>2012 70.72%</td>
<td>84%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Middle School Results:</th>
<th>Math Proficiency Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>60.38%</td>
</tr>
<tr>
<td>2011</td>
<td>68.75%</td>
</tr>
<tr>
<td>2012</td>
<td>73.67%</td>
</tr>
</tbody>
</table>

**Ability to transfer to different environments.** (List and address strengths and potential challenges of transferring this concept to low performing Alaska village schools. Explain how the identified product, service, or approach will meet or overcome challenges of transferring to this setting.)

Carnegie Learning is an approved SIG vendor in the states of West Virginia, Michigan, Hawaii, and Massachusetts. In addition, School Improvement implementations span across rural concentrated areas, such as Montana (Lame Deer, Frazer, and Pryor) and Eastern Washington (Yakima). Our school improvement model can transfer from different demographics (rural and urban).

**Potential obstacles to implementation.** (Review obstacles, especially issues encountered in previous implementations, and describe planned support or solutions to address these challenges.)

Ensuring the adequacy of the technical infrastructure and technical training, Carnegie Learning employs a technical and customer service staff available to assist implementations across multiple time zones.

We understand that students learn at different paces. Carnegie Learning Math Series employs self-paced, individualized learning; therefore it automatically creates an Individualized Learning program. In addition, teachers can create a customize course in the software to meet the needs of advanced students.