Abstract: The Online Initiative to Support Content Development in the Middle Schools is a collaborative partnership among the Northwestern State University College of Education, the NSU Space Science Group, and the Louisiana Middle School Association which provides 45 hours of Continual Learning Unit training for middle school educators delivered electronically in each of the areas of science and math, along with a facilitator’s guide for all training. The primary goal of this initiative is to collaboratively develop, implement, and continue the online delivery of math and science content-based professional development material to Louisiana middle school teachers.

This online initiative to support content development for middle school educators is a collaborative effort to develop and disseminate math and science content modules aligned with No Child Left Behind requirements and National Staff Development Council criteria (NSDC, 2003) that is being required of middle school teachers. No Child Left Behind (NCLB) outlines the minimum qualifications needed by teachers and paraprofessionals who work on any facet of classroom instruction. It requires that states develop plans to achieve the goal that all teachers of core academic subjects be highly qualified by the end of the 2005–06 school year. No Child Left Behind gives states and districts the flexibility to find innovative ways to improve teacher quality, including alternative certification, merit pay for master teachers and bonuses for people who teach in high-need schools and subject areas like math and science (U.S. Department of Education, 2003).

The Louisiana State Department of Education (LDOE) has addressed preparing, training, and recruiting high-quality teachers by saying “In order to ensure that all teachers meet the definition of ‘Highly Qualified’ under Section 9101 of NCLB, the State, local education agencies (LEAs), and institutions of higher education (IHEs) have the opportunity to join forces to develop alternative routes to certification to increase the number of highly qualified teachers, principals, and assistant principals” (LDOE, 2003 par. 2).

The project included three phases: Phase One - collaboration, networking, and development; Phase Two - review, pilot implementation, and evaluation; and Phase Three - delivery and expansion. The program objectives designed to support the content training of middle school teachers follow:
1. Developing 45-hours of math modules and 45-hours of science modules based on middle school standards.
2. Training middle school teachers, new to electronic professional development, in the implementation and completion of online instruction.
3. Providing effective, content-based math and science Continuing Learning Units modules (CLUs) to middle school teachers throughout the State.
4. Developing a Facilitator’s Guide and Web site that contain these math and science professional development modules for middle school teachers.

Phase One: Initial planning with the grant PI’s, Space Science Group (SSG) staff and Louisiana Middle School Association (LMSA) partners identified the content structure of the two 45 hour sets of professional development modules. Next, the collaborative module development teams composed of highly qualified middle school teachers, Science Out of this World staff, and College of Education Faculty built the modules and facilitation support materials. The modules are content-focused, center on the content for state math and science standards for 6th, 7th, and 8th grades, and are flexible enough to suit a wide middle school audience. Each module contains content-based material, field experiences and hands-on activities. Additionally, the SSG staff provided instructional design and Web support.

Phase Two: Once the development of the modules was completed, the COE and NSU Middle Lab School faculty provided an initial review of the modules to check linkage with Louisiana Content Standards and Louisiana Department of Education CLU guidelines. Following the review, the SSG staff published the pilot modules on the Louisiana Middle School Association Web site at http://www.lmsaonline.org/clu. Next, feedback teams composed of six highly qualified middle school math and science teachers worked through the modules with facilitation support provided by SSG staff. Feedback from this evaluation was then incorporated into the final version scheduled for November, 2004, delivery.

Phase Three: Announcements of the CLU offerings will be made jointly by the NSU Space Science Group (SSG) and the Louisiana Middle School Association (LMSA). Both organizations will contract with participants, facilitate the online modules, and award certification in the form of Continual Learning Units (CLU) for completion of these modules following the guidelines of the Louisiana Department of Education. Additionally, Louisiana school districts can coordinate with NSU and LMSA in awarding the CLUs to teachers in their districts.

Math modules are entitled Numbers and Number Relations, Algebra and Functions, Measurement and Geometry, and Data Analysis and Probability. Science modules are Physical Science, Life Science, and Earth Science in the Middle School. Each of the modules include an Introduction, Online Workshop Objectives, Workshop Duration, Grade Level Expectations (GLEs), Conclusion, and Additional Resource List.

As an example, the Measurement and Geometry module covers Perimeter, Pythagorean Theorem, Area of Polygons, Circles – Circumference and Area, Surface Area, Volume, and Angles. One particular part of the module looks like this:

Pythagorean Theorem
Right triangles, triangles with a right angle, have a special relationship among their sides. The Pythagorean Theorem explains this relationship. It states that if a square is made on each side of a right triangle, the sum of the areas of the two smaller squares will be equal to the area of the largest square. This concept is illustrated below.
The area of the square made on the longest side, the hypotenuse, would be 25m². The square made on the shortest side would have an area of 9m². The square on the other side has an area of 16m². The formula for the Pythagorean theorem \((a^2 + b^2 = c^2)\) where \(c\) is the hypotenuse and \(a\) and \(b\) are the other sides) is proven by this demonstration. \(3^2 + 4^2 = 5^2\) or \(9 + 16 = 25\). In the following example we will find the length of the hypotenuse by using the Pythagorean theorem.

\[
\begin{align*}
a^2 + b^2 &= c^2 \\
7^2 + 10^2 &= c^2 \\
49 + 100 &= c^2 \\
149 &= c^2
\end{align*}
\]

The problem remains unsolved at this point because the length of the hypotenuse, \(c\), is still squared. We will need to find the square root of 149 and \(c^2\) to find the length of the hypotenuse. The square root of 149 is 12.2 and the square root of \(c^2\) is \(c\). The next steps of the problems will look like this:

\[
\sqrt{149} = \sqrt{c^2}
\]

\[
12.2 = c \quad \text{The length of the hypotenuse is } 12.2 \text{ cm}. \quad \text{Let’s look at another example.}
\]

\[
\begin{align*}
a^2 + b^2 &= c^2 \\
6^2 + 8^2 &= c^2 \\
36 + 64 &= c^2 \\
100 &= c^2
\end{align*}
\]

\[
\begin{align*}
\sqrt{100} &= \sqrt{c^2} \\
10 &= c
\end{align*}
\]

\[
\text{The length of the hypotenuse is } 10 \text{ cm.}
\]
\[6.3^2 + 6^2 = c^2\]
\[39.69 + 36 = c^2\]
\[75.69 = c^2\]
\[\sqrt{75.69} = \sqrt{c^2}\]
\[8.7 = c\]

Occasionally, the Pythagorean Theorem is used to find the length of one of the sides when the hypotenuse and the other side measures are given. Here is an example of that process:

\[a^2 + b^2 = c^2\]
\[16^2 + b^2 = 33^2\]
\[256 + b^2 = 1089\]
\[256 + b^2 - 256 = 1089 - 256\]
\[b^2 = 833\]
\[\sqrt{b^2} = \sqrt{833}\]
\[b = 28.9 \text{ ft.}\]


For the CLU Activity, locate, summarize, and critique another site explaining uses of the Pythagorean Theorem. Forward the critique to the facilitator.

Performance criteria for evaluating effectiveness of the project include number and evaluated quality of the modules, record of participation in online professional development modules, monitoring of modules in Fall 04, student evaluations and feedback, and report of evaluator on Program Goals and Objectives. A formative evaluation is taking place throughout the development of the project. Numbers of individuals who use the online materials and students who receive CLUs will be tracked. Survey data will be collected from course participants in order to gather data on the efficacy of the courses.

Project information and links will be placed on the Middle School Online (NSU, 1999), NSU College of Education (NSU, 1998), and NSU Space Science Group (NSU, 1997) Web sites. All Louisiana middle school teachers will be notified of the availability of the modules through information dissemination and conference handouts and workshops through the Louisiana Middle School Association, math and science educators' associations, and Science Out of This World participants. Publications and presentations (state, regional, national, and international) describing planning, data gathering, and analytical evaluation of instructional, institutional, and student services elements of the program will be conducted.

As a follow-up initiative to this original math and science content project, an online initiative to support language arts and social studies content development in the middle schools has been planned and submitted as part of the Louisiana Board of Regents’ Supporting Electronic Learning and Essential Campus Transitions
(SELECT) program. Similarly structured to the math/science initiative, the language arts/social studies partnership is among the Northwestern State University Colleges of Education and Liberal Arts, the Louisiana Middle School Association, and the Vernon Parish (LA) School System. Its primary goal is to collaboratively develop, implement, and continue the online delivery of language arts and social studies content-based professional development material to Louisiana middle school teachers.

References


