Background and Objectives

The Illinois State Board of Education (ISBE) contracted with Northern Illinois University (NIU) to measure awareness and knowledge among middle and high school teachers of science and mathematics regarding concepts related to five categories of emerging and critical technologies.

- Biosciences
- Environmental and Energy Technologies
- Human Health and Development
- Information Technology and Communications
- Materials Science and Advanced Manufacturing

The objectives of the study were focused on determining the following:

- Awareness levels for each concept
- Familiarity, or lack thereof, with each concept
- Comfort level with integrating the concepts into the classroom
- Current or future plans for teaching these concepts to students
- Interest in learning more
- Barriers to integrating concepts into the classroom
- Profile of teachers by grade level taught and experience

Working from a list of critical technologies developed in Kentucky, the Illinois Mathematics and Science Academy identified the 26 concepts in consultation with researchers, educators, engineers, and business representatives. Between April and December 2005, NIU’s Public Opinion Laboratory conducted an online survey of teachers.

Questionnaire Design

NIU Outreach and the Public Opinion Lab worked with ISBE to adapt a similar survey leased from the Kentucky Science and Engineering Foundation. For Illinois purposes, the Public Opinion Lab programmed the survey items for online administration. Participants took an average of 12 minutes to answer the survey items. As an incentive, ISBE offered professional development credits to teachers who filled out a form on completion of the survey. To protect the privacy and confidentiality of survey participants, NIU hosted the survey on a secure server.
Sample Design

Three methods were used to acquire a representative sample of the 16,000 teachers of science and mathematics in Illinois. In the end, the sample consisted of 2881 unique email addresses and 1241 responses. Three methods were used to engage participants.

1) State Superintendent Randy Dunn sent a request to principals in 898 randomly selected schools and middle schools which represented eight geographical areas, various school sizes and income levels for both high schools and middle schools. Follow-up emails and phone calls solicited email addresses for teachers of science and mathematics. This method yielded a 33% response rate from principals, for a total of 625 schools. Unfortunately, between faulty email addresses, aggressive spam filters, and reluctance to participate in yet another survey, the number of actual respondents was not sufficient.

2) Organizations of science and mathematics teachers advertised a sign-up Web address where their members could register for access to the survey. About 85% of teachers who entered their email and county information completed the survey, a total of 290 participants.

3) A sign-up page was added to the end of the Math and Science Professional Development Survey that ran from September to December 2005. About 51% of teachers who signed up at this location completed the Critical Technologies Survey, a total of 326.

### Sample Selection By Method

<table>
<thead>
<tr>
<th>Method</th>
<th>Number in Sample</th>
<th>Number Completed</th>
<th>Raw Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly Selected Schools</td>
<td>1897</td>
<td>625</td>
<td>33%</td>
</tr>
<tr>
<td>Web Sign-up</td>
<td>343</td>
<td>290</td>
<td>85%</td>
</tr>
<tr>
<td>Survey Sign-up</td>
<td>641</td>
<td>326</td>
<td>51%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>2881</strong></td>
<td><strong>1241</strong></td>
<td><strong>43%</strong></td>
</tr>
</tbody>
</table>

### Percentage in Sample

- Randomly Selected Schools: 66%
- Web Sign-up: 12%
- Survey Sign-up: 22%

### Percentage Completed

- Randomly Selected Schools: 51%
- Web Sign-up: 23%
- Survey Sign-up: 26%
To help with recruiting, ISBE, the Illinois Principals Association, regional offices of education, and other groups encouraged teachers to participate, especially in under-represented counties. One initial email and two reminders were sent to each of the email addresses supplied to the Public Opinion Lab. Tracking software ensured that participants could return to an unfinished survey and would receive no further reminders after completion.

The total of 1241 science and mathematics teachers represented all eight areas of the state. Chicago schools are under-represented, especially in high schools. Through random selection in the first sampling method and the distribution by areas representing the state, we believe that both school size and family income levels reflect the state profile.

The respondents’ profile reflects state averages for gender, percentages of teachers of science and mathematics, length of service, and geographic distribution.

Once the sample was complete, the Public Opinion Lab and NIU Outreach staff analyzed the data and prepared this report.