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ABSTRACT

This paper reports on a nationwide, random telephone survey conducted with elementary school principals and human resources directors to measure the levels of competency and preparedness of students today and in the future for entry-level jobs; attitudes toward the importance of science skills in relation to entry-level employment; assessments of the current and future status of science education; level of support for increasing the emphasis of science education at the elementary school level; and the use and effectiveness of hands-on science activities and teaching methods. Significant findings include: (1) about 60% of human resource directors surveyed do not feel that today's young adults are adequately prepared for current entry-level jobs, especially in the areas of reading and writing, mathematics, and science; (2) human resource directors are even less optimistic about the level of student preparedness for entry-level jobs in the future if no changes are made in teaching; (3) the majority respondents believe that science literacy will be a requirement for entry-level jobs in the future; and (4) overall there is a strong belief that hands-on science will not only be effective in teaching science but it will also be successful in teaching students the necessary skills of the workplace such as critical thinking, problem-solving, and team work. (JRH)

THE BAYER FACTS OF SCIENCE EDUCATION II:

TODAY'S STUDENTS AND TOMORROW'S WORKPLACE: AN ASSESSMENT OF WHAT BUSINESSES WILL NEED AND WHAT SCHOOLS CAN PROVIDE

Executive Summary

APRIL 1996

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THE BAYER FACTS OF SCIENCE EDUCATION II:

TODAY'S STUDENTS AND TOMORROW'S WORKPLACE: AN ASSESSMENT OF WHAT BUSINESSES WILL NEED AND WHAT SCHOOLS CAN PROVIDE

Goals of the Research

A nationwide, random telephone survey was conducted with elementary school principals and human resource directors to measure:

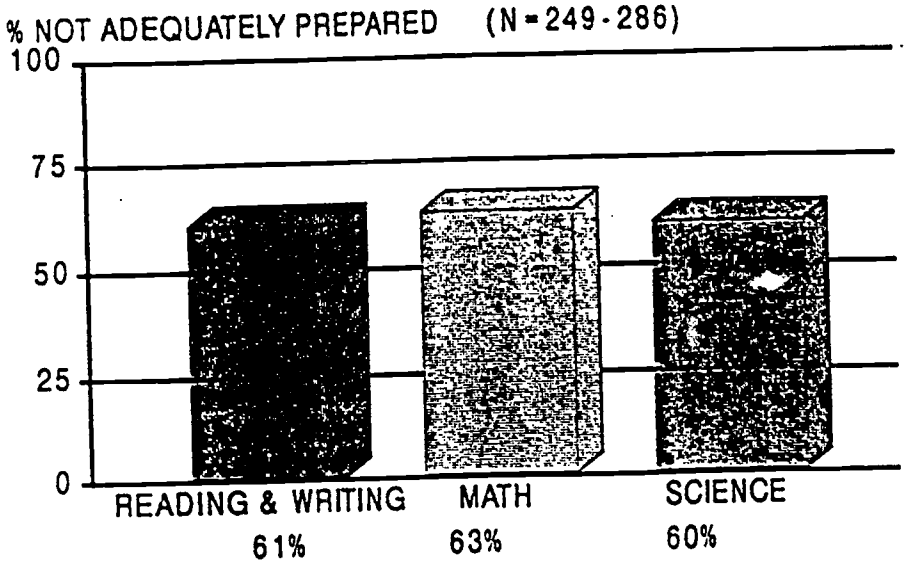
1. the levels of competency and preparedness of students today and in the future for entry-level jobs;
2. attitudes toward the importance of science skills in relation to entry-level employment;
3. overall assessments of the current and future status of science education;
4. the level of support for increasing the emphasis of science education at the elementary school level; and
5. the use and effectiveness of hands-on science activities and teaching methods.

Methodology

In the Spring of 1996, a telephone survey was conducted with 301 elementary school principals and 300 human resource directors. Elementary school principals were surveyed because it has been reported that many students become disenchanted with science by the third grade, and principals at the elementary level are most likely to influence students' early appreciation of science.

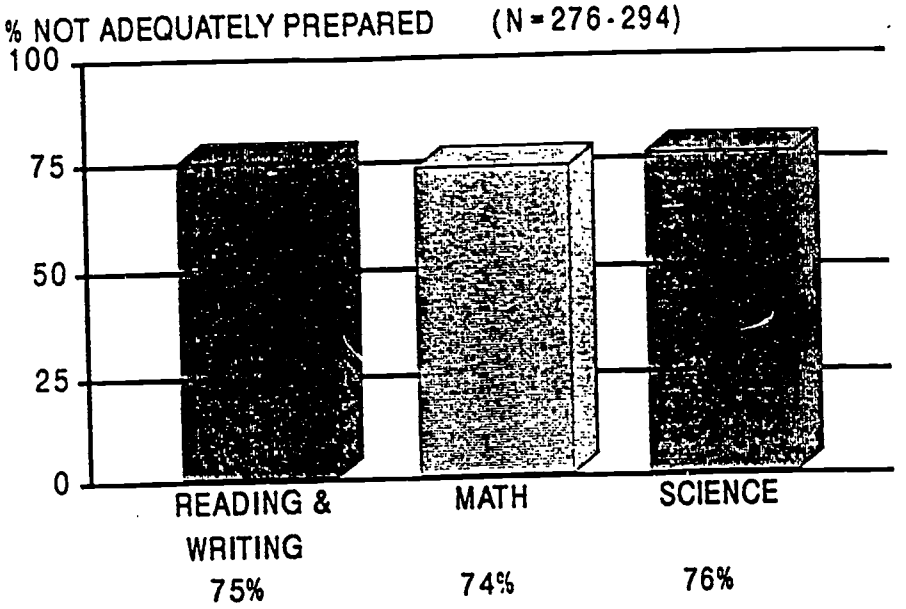
The calls were nationwide and were completely random. Each survey took approximately 15 minutes to complete, and all calls were supervised and monitored. Principals and human resource directors responded to quantitative items designed to measure their attitudes toward science and science education. All responses were processed using the statistical package SPSS for Windows. This Executive Summary presents the highlights of the research findings.

HUMAN RESOURCE DIRECTORS' VIEW OF STUDENT PREPAREDNESS



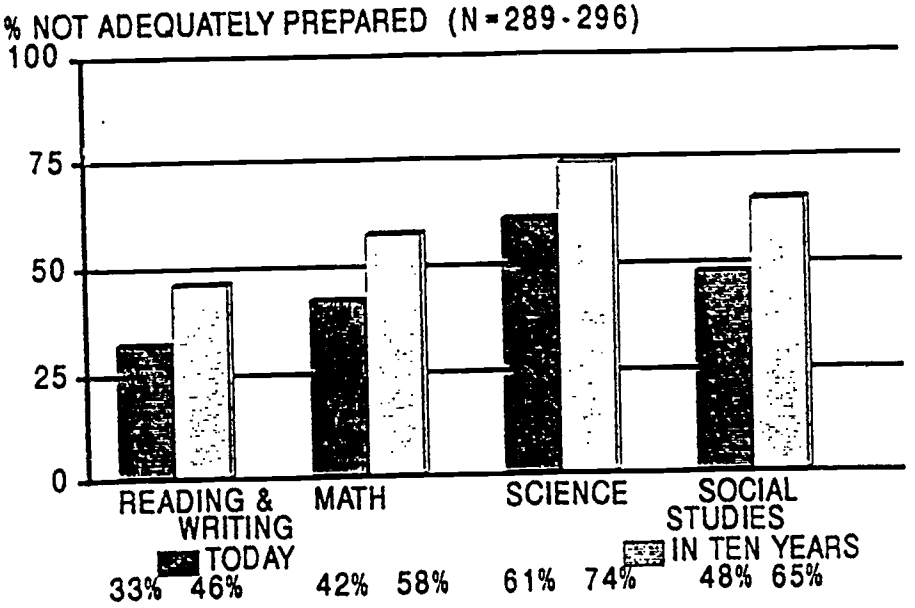
* About 60% of the human resource directors surveyed said that today's young adults are **not adequately prepared** in the areas of reading and writing, mathematics, and science for current entry-level jobs.

HUMAN RESOURCE DIRECTORS' VIEW OF STUDENT PREPAREDNESS LOOKING AHEAD TEN YEARS



* About 75% of the human resource directors surveyed believe that students are not going to be adequately prepared with the skills of reading and writing, mathematics, and science ten years from now with no changes made in teaching methods.

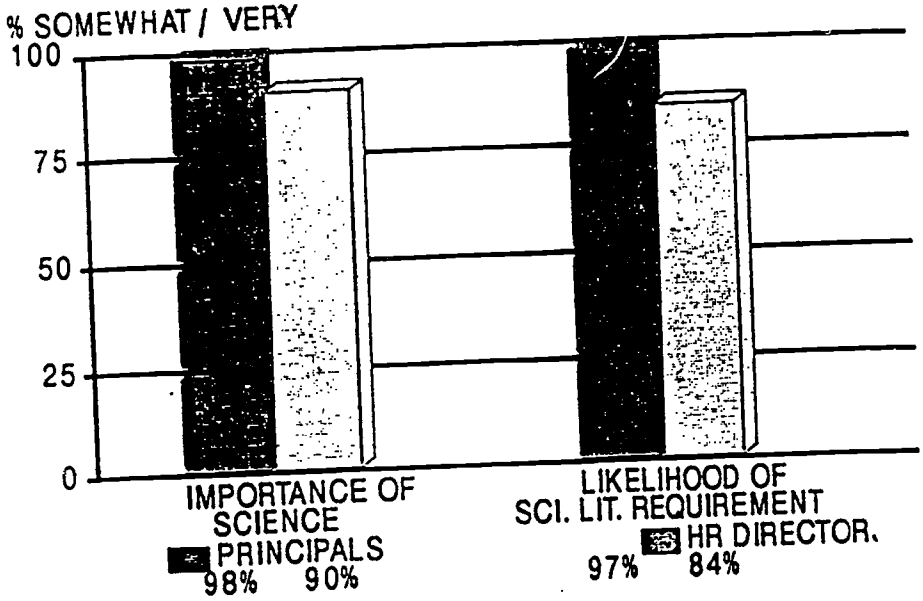
PRINCIPALS' VIEW OF STUDENT PREPAREDNESS



- As shown in the above graph, many principals believe that students are not prepared for today's workplace in important subject areas, nor will they be ten years from now without any changes made in teaching.
  - 33% of principals don't think students are adequately prepared in reading and writing today, and 46% don't think they will be ten years from now.
  - 42% of principals don't think students are adequately prepared in math today, and 58% say they won't be in ten years.
  - 61% of principals feel students aren't adequately prepared in the area of science now, and 74% say they won't be ten years from now.
  - 48% of principals don't think today's students are adequately prepared in the area of social studies, and that number increases to 65% when principals are asked to look ahead ten years.

IMPORTANCE OF SCIENCE LITERACY

(N = 297-301)

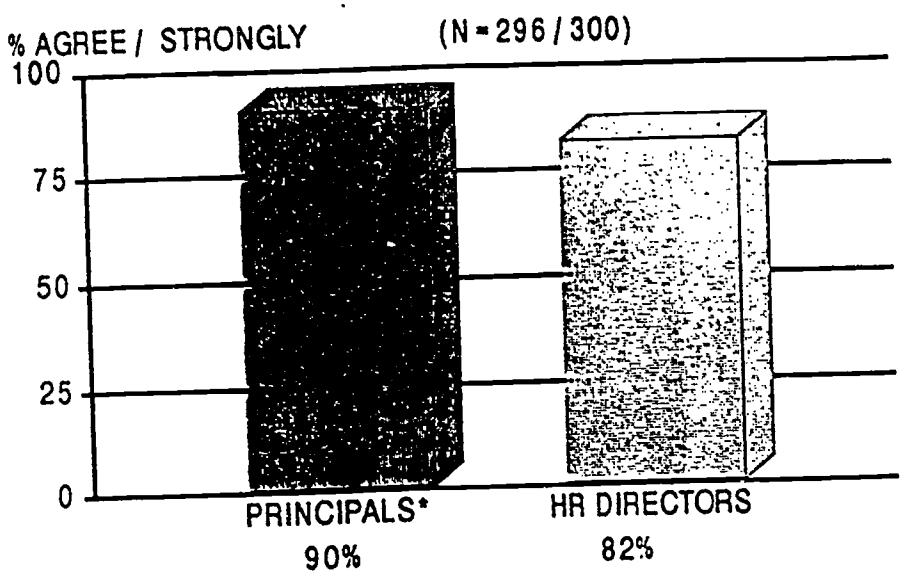


* Science literacy is indeed going to be increasingly important in years to come.

* As shown in the above graph, nearly every principal and 90% of human resource directors feel that science is either somewhat or very important in providing today's young adults with a strong preparation for today's entry-level jobs.

* Similarly, nearly every principal and 84% of human resource directors believe that it is either somewhat or very likely that science literacy will be a requirement for entry-level jobs in the future.

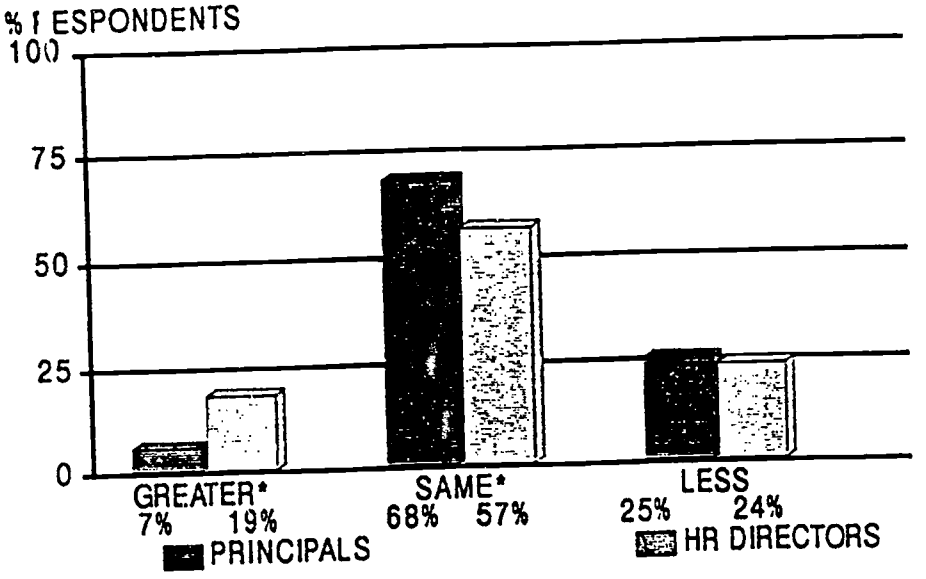
SCIENCE SHOULD BE TAUGHT AS A FUNDAMENTAL SUBJECT



* Most principals (90%) and 82% of human resource directors agree with the statement: *"Science should be taught as a fundamental subject beginning at the earliest elementary grades."*

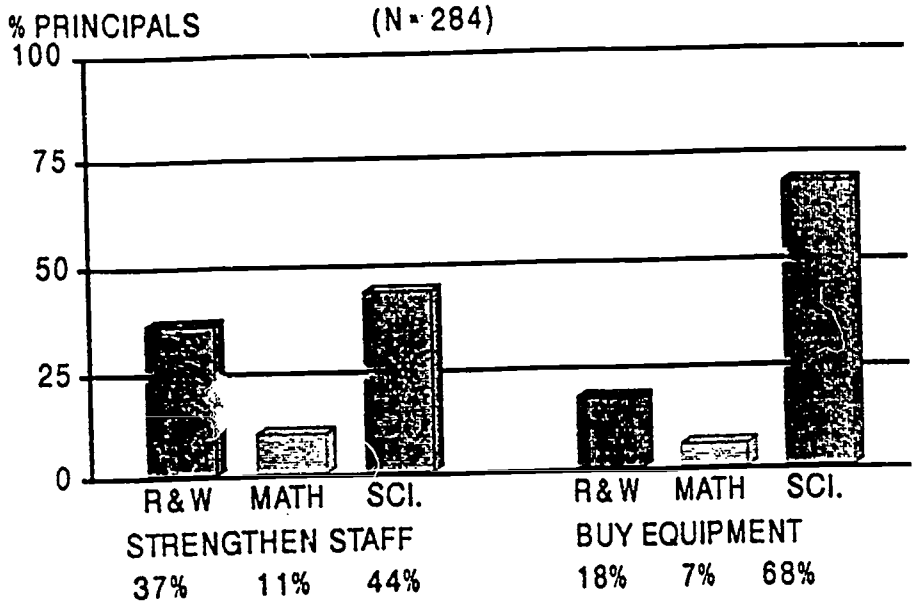
PRIORITY OF SCIENCE EDUCATION

(N = 287 / 297)



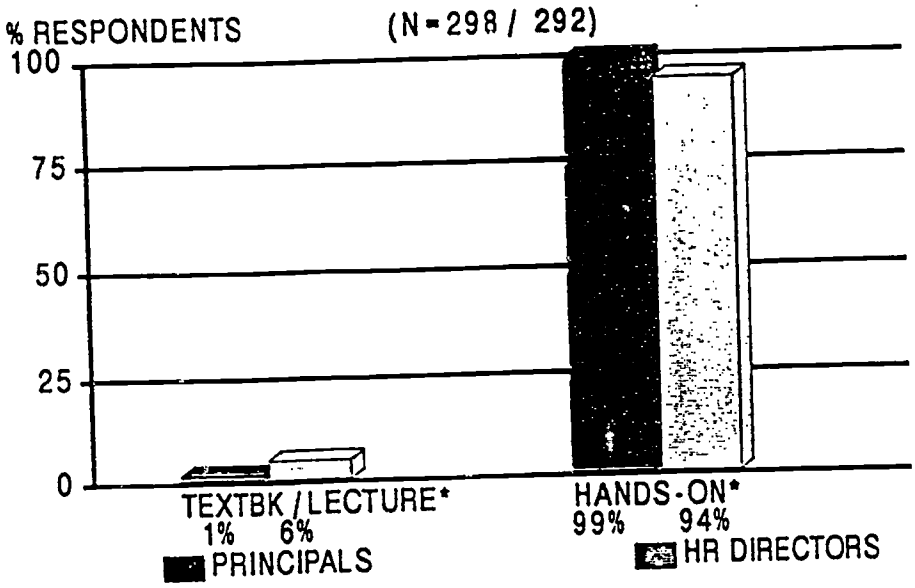
- About 75% of both principals and human resource directors believe that the priority given to science education in elementary school should be the same or greater than that of reading, writing, and math.
- These findings support the idea that science should become the fourth "R" in conjunction with reading, writing, and arithmetic. In other words, science is perceived as an important part of schools' core curricula by both principals and human resource directors.

ADDITIONAL FUNDING TOWARD SCIENCE EDUCATION



- Principals have become such advocates of improved science education at the elementary level that a majority say they would rather put additional funding toward science education than toward their English or math programs.
- Nearly half (44%) said they would spend additional funds for strengthening their school's science teaching staff. This corresponds to the fact that principals feel that their staff is not as qualified to teach science as they are to teach reading and writing and math.
- Sixty-eight percent of principals said they would spend additional funds for equipment and materials to improve the school in the area of science.

BEST SCIENCE TEACHING METHOD

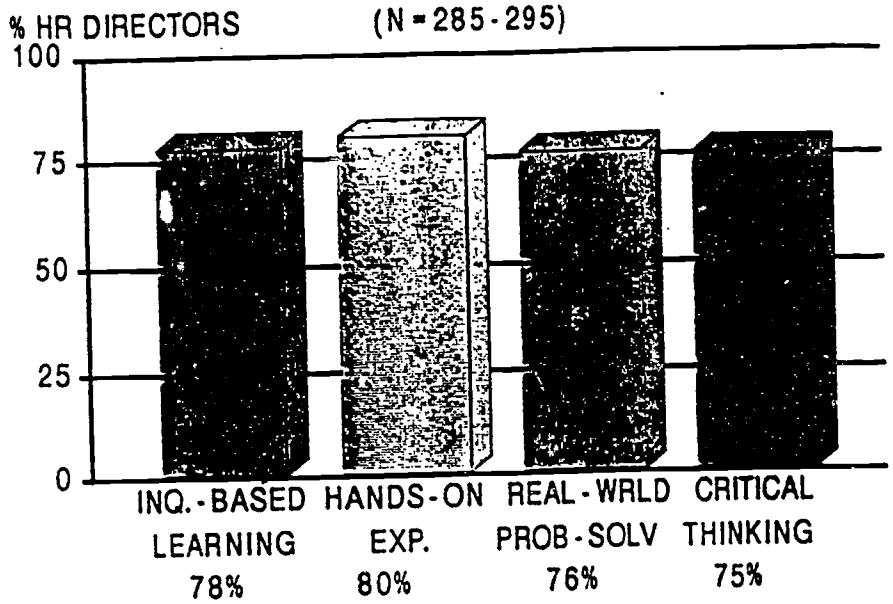


Students have often been taught science in school by having them read textbooks, listen to lectures, and memorize scientific information. Some students today are taught science by having them do experiments, form opinions, and discuss and defend their conclusions with others."

* Principals and human resource directors were read the above description and asked which method of teaching science will best prepare students for the entry-level jobs of the future: textbook and lecture, or hands-on experiments and discussion.

- Nearly all principals and directors surveyed thought the hands-on style of teaching science will best prepare students for entry-level jobs of the future.

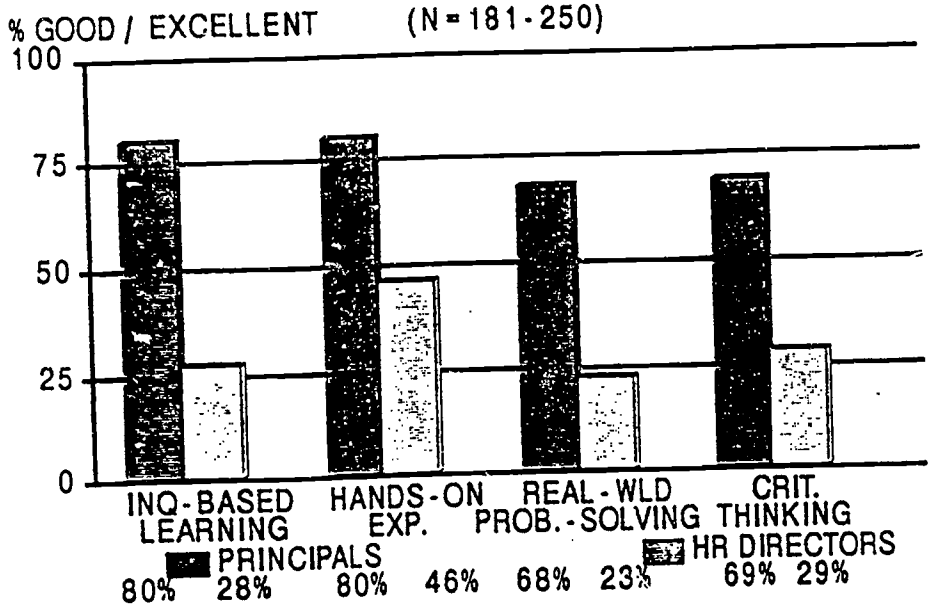
EXPERIENCES THAT WILL BEST SERVE FUTURE EMPLOYEES



* The hands-on, inquiry-based method of teaching science is not only thought to be the best way to teach science, but also elements of hands-on learning are considered by business leaders to be skills necessary for the workplace.

  - Over 75% of human resource directors report that active learning, hands-on experimentation, real-world problem-solving, and critical thinking are skills which will best serve future entry-level employees.

EFFECTIVENESS OF SCHOOLS IN TEACHING SCIENCE SKILLS



- Both elementary school principals and human resource directors were asked to rate the effectiveness of schools in four areas: inquiry-based learning, hands-on experimentation, real-world problem-solving, and encouraging critical thinking.
- Roughly 75% of both groups judge these skills to be increasingly important for future entry-level employees' success in the workplace.
- However both groups, as shown in the graph above, vary widely and significantly in their views on how effective today's schools are in teaching students the skills necessary for success in the workplace.
  - Roughly 70% or more elementary school principals rated the effectiveness of their **own school** in providing students with the above experiences as "good" or "excellent."
  - In contrast, only an average of 32% of human resource directors rated the effectiveness of **schools today** as "good" or "excellent" in giving students the same experiences.

CONCLUSIONS

1. In general, about 60% of human resource directors surveyed do not feel that today's young adults are adequately prepared for current entry-level jobs, especially in the areas of reading and writing, mathematics, and science.

2. Human resource directors are even less optimistic about the level of student preparedness for entry-level jobs in the future if no changes are made in teaching. Looking ahead ten years, roughly 75% said they don't believe young adults will be adequately prepared in the areas of reading and writing, mathematics, and science.

3. Science literacy is needed more than ever before. Not only does a resounding majority of both principals and human resource directors (90% or more) feel that science is important in providing today's young adults with a strong preparation for current entry-level jobs, but also 84% or more believe that science literacy will be a requirement of entry-level jobs in the future.

4. Some ways to increase students' level of science literacy are highlighted by this research. A majority of principals say that they would rather put additional funding toward strengthening their science teaching staff and buying science equipment than toward their English or math programs. Furthermore, about 75% of both principals and human resource directors report that either the same or greater priority should be given to science education as is being given to reading and writing or to mathematics in elementary school.

5. Elementary school principals are in agreement with the human resource directors that it will be much more important for students to able to perform certain key skills in entry-level positions, such as solving problems on the job, adapting to changes in the work environment, and working in teams. Both groups also agree that specific school experiences, such as active learning, hands-on science experimentation, real-world problem-solving, and critical thinking, will best serve entry-level employees in the future.

6. However, both groups differ significantly in their assessment of schools' effectiveness in teaching students the skills necessary for today's workplace. While principals rate the effectiveness of their own school as "good," human resource directors rate the effectiveness of schools today as only "fair." This difference may be due to the fact that students who have experienced hands-on teaching have not entered the workforce yet.

7. Overall, there is a strong belief among both principals and human resource directors that hands-on science will not only be effective at teaching science, but also it will be successful in teaching students other necessary skills of the workplace, such as critical thinking, problem-solving, and team work.