

Science Teaching Around the World: Lessons for U.S. Classrooms

- Part I in a series of three articles
- Part II runs October 10
- Part III runs October 24

INTRODUCTION & PART I – CORE PATTERNS OF SCIENCE TEACHING

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Wouldn't it be nice to step inside classrooms around the world to see first-hand what science teaching looks like in other countries? How does it differ from country to country? What can we learn to improve science teaching and, in turn, student learning in U.S. classrooms?

In this three-part series, we will answer these questions and more as we examine key findings from the Trends in International Mathematics and Science Study (TIMSS) 1999 Video Study—the first international study to provide a detailed picture of science teaching practices.

The TIMSS Video Study of Science

The TIMSS Video Study examined science teaching practices in the United States and four countries that outperformed the United States in science achievement on the 1995 and 1999 TIMSS assessment: the Czech Republic, Japan, Australia, and the Netherlands. A random sample of 100 eighth grade science lessons in each country was videotaped during one school year. This process captured a range of science content and illustrated typical science teaching practices in each country.

Although many teaching strategies were common to all five countries, the video study revealed two major differences between the United States and the other countries:

Finding #1 - Each of the higher-achieving countries had a distinct core pattern of science teaching. In contrast, the U.S. lessons were characterized by variety.

Finding #2 - Although each country had its own approach, the higher-achieving countries had strategies to engage students with core science ideas. Their science lessons focused on content. In U.S. lessons, content played a less central role and sometimes no role at all; instead, lessons were typically built around engaging students in a variety of activities.

Introduction to Parts I, II and III

Part I of this series explores *Finding #1* (above) and describes core science teaching patterns in each country.

Part II will examine *Finding #2* (above), and investigate science content's role in lessons and common features of science teaching in higher-achieving countries.

Part III will describe what U.S. schools can learn from higher-achieving countries.

Part I - Core Patterns of Teaching

Summarizing Science Teaching Patterns

■ Czech Republic	Talking to learn
■ Australia and Japan	Using practical activities and evidence to develop ideas
■ Netherlands	Learning independently
■ United States	Doing a variety of activities

The Czech Republic

The Czech science teaching pattern emphasizes demonstrating knowledge publicly. Teachers exposed students to challenging, often theoretical science knowledge and ideas. They held students accountable for understanding the material through scientifically technical and challenging public discussions.

Australia and Japan

The Australian and Japanese patterns focused on engaging students in inquiry and using evidence to develop concepts. A typical lesson used an inquiry-oriented approach, focusing on one or two main ideas developed in depth and supported with scientific evidence. Students deepened their understanding of concepts by working independently on tasks closely connected to the lesson's main ideas.

The Netherlands

Dutch students were expected to assume responsibility for their own learning and usually worked independently. The textbook and homework assignments largely defined science lessons' content and organization, and class discussions supplemented the text. During lessons, students were continually engaged with science content ideas.

The United States

In contrast, the U.S. lacked a core pattern of science teaching. Instead, teaching was characterized by variety. Students worked on many activities, with almost equal emphasis

on hands-on activities, independent seatwork, and whole-class discussions. High-interest activities were prominent, as was exposure to real-life issues. However, U.S. teachers did not typically connect these activities to the development of content ideas. Science content was more commonly organized as a collection of discrete facts, definitions, and algorithms

rather than a connected set of ideas.

Conclusions

What can U.S. classrooms learn from these findings? While the higher-achieving countries teach science differently, each has a consistent science teaching pattern. Thus, while there is no one best way to teach, having a consistent pattern supports student achievement.

Coming Up in Part II

Despite the differences in approach, did the higher-achieving countries have common science teaching features that contrast with those in the United States? This will be addressed in Part II of this series, scheduled to run in the Oct. 10 issue of *Education Week*. Part II will also describe how teachers can benefit from a new professional development program, *Enhancing Instruction in Science*, created by Pearson (www.PearsonAchievement.com) based on the findings from the TIMSS 1999 Video Study.

Additional Resources

A five-CD set with five full lesson videos from each country, along with commentaries by the teachers and researchers, is available for purchase at the online store at www.PearsonAchievement.com. Select "TIMSS" from the drop-down menu bar.

The full TIMSS Video Study science report and a highlights report are available at <http://nces.ed.gov/timss>.

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Variety of Activities

