The Real Source of Success in Japanese Education

By Daniel M. Stamm

In 2005 I retired from a 30 year career teaching high school physics. Before going into science education, I received a bachelor's degree in psychology, which I thought had given me a good grounding in the principles of teaching. I tried to apply as many of them as I could in my work, but it wasn't till after I had retired that I found what good teaching really was. Ironically, it was in the area of elementary mathematics education that I saw better teaching than I had ever done.

Towards the end of my career, I came across accounts of the instructional techniques of Asian teachers, who were using some simple but very effective methods of fostering an understanding of mathematical concepts in their students. After retiring I continued studying the subject and encountered further examples in some translations of Japanese elementary math texts. They ranged from lessons on weight (Gill & McPike 1995) and area (Lee 2000) to a complete first-grade math textbook (Hironaka & Sugiyama 2000). Even after a career teaching at the high school level, it was a pleasure to read these, because they were such beautiful applications of the teaching principles I had tried to use with my own students. After seeing them, it was very clear how the Japanese could have achieved such outstanding results on international math tests, with their fourth graders ranking 3rd in the world both in 1995 and 2003. Of the possible factors that had been suggested, I thought none could account better for this performance than such high quality early math instruction.

As I continued my reading I found that such instruction was due to work by Japanese classroom teachers. A process called "lesson study" is their primary method of research in education, and also their basic means of staff development. It consists of thoroughly testing in the classroom techniques for improving instruction.

An experimental lesson is developed by a group of teachers over the course of the school year and then taught by one of the group members. The new features of the lesson are often based on teachers' observations of things that students typically have difficulty understanding. The lesson is carefully observed by the other members of the group, who make notes about how students respond to it and who also make video recordings. After it is taught to the class, the teachers spend several hours discussing in detail the results of the lesson (Lewis & Tsuchida 1998).

Depending on its success, the lesson may be redesigned and retaught, but whatever the eventual outcome, it is written up and published, either for local or wider consumption. In fact, "journal articles by teachers about their educational research outnumber by a third those of university educational researchers in Japan." (Sato & McGlaughlin 1992, p. 362). The latter group may advise teachers, make suggestions for them to research, or help disseminate new discoveries throughout the educational community, but they are not considered the major source of improvement in instructional technique; teachers are.

In this way, effective techniques have been gradually created and collected to form a solid knowledge base for Japanese teaching. Over decades, Japanese teachers have produced very effective lessons relating to all aspects of mathematics instruction. A given topic is always taught based on skills and information mastered previously, and keeping in mind topics that will be taught in later grades. In other words, the curriculum is a series of interrelated units, whose optimum sequence, as well as individual effectiveness, have been tested.

An example of a connection between grades is the handling of the concept of area, the amount of space on a surface. This topic is first taught formally in the fourth grade, but even in the first-grade teachers are laying the groundwork for understanding the concept. One activity is simply

comparing the size of two figures, one set on top of the other, using three different examples, picnic blankets, origami papers and leaves. Another is a clever game for two students involving a rectangular grid on a sheet of paper. Each child has a different color crayon, and they play rock-paper-scissors. For each win, a student fills in a square with his or her color. They repeat the process until all the squares are filled in, and each counts his or her squares to see who has the greater number. No mention is ever made of area per se, but they are exposed to the concept and its measurement as they play the game. (Hironaka & Sugiyama 2000, p. 80)

These and numerous other techniques have been tried out in lesson study. Because everything is tested, from the sequence of the topics to the methods of teaching them, the knowledge base that is developed ends up affecting the curriculum itself. (Watanabe 2007, p.6) Also, because the time required for every topic and its activities is well-known, the number of topics is limited to a more reasonable figure than has been the case in American curricula.

Decades of classroom-based research in Japan have thus led to an ideal curriculum, which forms the basis of the Course of Study, the Japanese national curriculum. It would seem obvious for American schools to simply adopt outright the Japanese elementary math curriculum. Apart from the proven effectiveness of their materials, there is another reason that this idea is plausible.

In elementary school the Japanese do not track students by ability (Stevenson 2002, p. 104). Since they have tested the lessons in those classes, their curriculum will work for any class, regardless of what track it is. Faster groups would just finish it more quickly or learn it more solidly.

Most Americans, including authorities on lesson study, would object to the wholesale adoption of the Japanese math curriculum. They advocate having American teachers learn to do research lessons themselves. The problem with this idea is that since the U.S. ranked 12th in the world both of the years Japan was 3rd (TIMSS 1995 p.2; TIMSS 2003 p.4), we simply don't have time to reinvent what they have already developed. Japanese teachers are experts in performing classroom-based research, because they have been doing it for more than 50 years. It would be a tremendous loss not to use what they have already achieved.

There has always been a need for content-based staff development for American teachers, and this is an ideal opportunity to give it to them. Simply teach them to use the Japanese texts and teachers' manuals as sources of exemplary methods for their own teaching and as clear explanations of the content. It would be worth far more than anything they are being given now, and it is something that our children both need and deserve.

The practice of carrying out research lessons—the straightforward, empirical development of a technology of teaching—is central to the professional life of Japanese teachers, and, along with their commitment to giving all students a good education, accounts more than anything else for the quality of the foundation provided by Japanese elementary education.

References

Gill, A. & McPike, L. (1995, Spring). What We Can Learn from Japanese Teachers' Manuals.. *American Educator*, pp.14-24

Hironaka, H. & Sugiyama, Y. (Eds.) (2000). *Mathematics 1 for Elementary School*. Tokyo: Tokyo Shoseki Co., Ltd. Translation: Yoshida, M. (2006) Madison, N.J.: Global Education Resources

Lee, S.Y. (2000) Translation of 4th grade chapter on area from Kyôiku Shuppan (publisher); personal communication

Lewis, C. & Tsuchida, I. (1998, Winter). A Lesson is Like a Swiftly Flowing River. *American Educator*, pp.12-17

Sato, N. & McLaughlin, M. (1992). Context Matters: Teaching in Japan and in the United States. *Phi Delta Kappan,* 73 (5),359-366

Stevenson. H. W. (2002). Individual Differences and Japan's Course of Study. In DeCoker, Gary (Ed.) *National Standards and School Reform in Japan and the United States*. New York: Teachers' College Press.

TIMSS 1995 http://timss.bc.edu/timss1995i/TIMSSPDF/P1HiLite.pdf

TIMSS 2003 http://nces.ed.gov/pubs2005/2005005.pdf

Watanabe, T. (2007). In Pursuit of a Focused and Coherent School Mathematics Curriculum. *The Mathematics Educator*, **17(**1**),** 2-6.

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