The positive effects of bilingualism on student learning

New research using neuroscience and other methods suggests that learning a second language -- even at a later age than previously thought -- might have additional learning benefits for students. One study found early social interaction with native speakers is critical to language learning and might also have implications for general learning, while another showed students who are multilingual are more flexible problem-solvers.

http://www.edweek.org/ew/articles/2010/10/22/09window_ep.h30.html?tkn=QWMFQ40HYm6QDe1ol7LFckRjXvbnro2SQxu5&cmp=clp-sb-ascd

Science Grows on Acquiring New Language

By Sarah D. Sparks October 22, 2010 Education Week

Recent studies on how language learning occurs are beginning to chip away at some long-held notions about second-language acquisition and point to potential learning benefits for students who speak more than one language.

"We have this national psyche that we're not good at languages," said Marty Abbott, the director of education for the American Council on the Teaching of Foreign Languages in Alexandria, Va. "It's still perceived as something only smart people can do, and it's not true; we all learned our first language and we can learn a second one."

New National Science Foundation-funded collaborations among educators, cognitive and neuroscientists, psychologists, and linguists have started to find the evidence to back that assertion up. For example, researchers long thought the window for learning a new language shrinks rapidly after age 7 and closes almost entirely after puberty. Yet interdisciplinary research conducted over the past five years at the University of Washington, Pennsylvania State University, and other colleges suggest that the time frame may be more flexible than first thought and that students who learn additional languages become more adaptable in other types of learning, too.

"There has been an explosion of research on bilingual-language processing," said Judith F. Kroll, the principal investigator for the Bilingualism, Mind, and Brain project launched this month at Penn State's Center for Language Science in University Park, Pa. The five-year, $2.8 million project is intended to bring together neuroscientists, linguists, and cognitive scientists to compare the brain and mental processes of different types of bilingual people, such as a Chinese-English speaker whose languages include different writing systems or a deaf English speaker whose signed and written languages involve different modes of communication.

Distinguishing Sounds

During the first year of life, a baby starts to specialize in the sounds of his native language and becomes less able to distinguish sounds common only to other languages. University of Washington researchers exposed 9-month-old American babies of native-English-speaking parents to sounds associated with Mandarin either through sessions with a native-Mandarin-speaking tutor or video or audio lessons. At 12 months, babies who had worked with a person recognized Mandarin sounds more accurately than did infants who were exposed to the language through video or audio only.

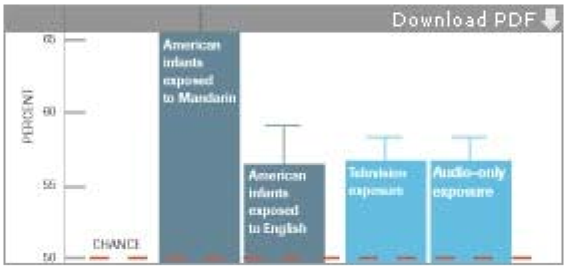

PHOTO & CHART: The University of Washington Institute for Learning and Brain Sciences (I-LABS)

Likewise, the Washington-based American Association for the Advancement of Science has added a symposium on bilingualism to its 2011 annual conference in February, and the University of Washington this summer opened the world's first brain-imaging center adapted to study language and cognition in infants and young children in Seattle.

"Bilingualism provides a lens for researchers to examine aspects of the underlying cognitive architecture that are otherwise obscured by native-language skill," Ms. Kroll said.

New Techniques

The increased use of neuroscience in language-acquisition research has been fueled in part by the development of brain-imaging equipment scaled for tiny brains and squirmy bodies, according to Patricia K. Kuhl, a co-director of the University of Washington's Institute for Learning and Brain Sciences, known as I-LABS. The technology has enabled scientists over the past decade to start to paint a picture of how language learning affects a child's brain,

Among the new techniques is magnetoencephalography, or MEG, which maps brain activity by measuring the magnetic fields produced by the brain's electrical currents. The MEG's sensors use a global positioning system to correct the resulting image for the child's head movements.

In a series of experiments, Ms. Kuhl and her team studied American infants of English-speaking parents between the ages of 6 and 12 months. During the first year, the team found the auditory and motor regions of the brain start to react more in response to speech, as opposed to other sounds.

“They are mapping the language, so the faster they can map those critical sounds, the faster their language is going to grow,” she said.

“Babies start out as citizens of the world; they can discriminate the sounds of any language,” Ms. Kuhl said.

Yet during about a two-month window from 8- to 10-months-old, the team found babies start to specialize in sounds from their native language. For instance, an English-speaking baby will get better at hearing the difference between the often-used “l” and “r” sounds, while a Japanese baby, whose native language does not differentiate between the sounds, will get worse at hearing the difference.

Since the initial experiments, the researchers have drilled down into exactly what sort of instruction props open that language-learning window.

For example, when babies born to native-English-speaking parents played three times a week during that window with a native-Mandarin-speaking tutor, at 12 months, they had progressed in their ability to recognize both English and Mandarin sounds, rather than starting to retrench in the non-native language. By contrast, children exposed only to audio or video recordings of native speakers showed no change in their language trajectory. Brain-imaging of the same children backed up the results of test-based measures of language specialization.

The research may not immediately translate into a new language arts curriculum, but it has already deepened the evidence for something most educators believe instinctively: Social engagement, particularly with speakers of multiple languages, is critical to language learning. Social and emotional areas of the brain mediate language areas, but only now—with an MEG that can correct for the child’s head movement—are researchers starting to measure those neural connections. “When we can connect language regions with social-emotional regions with executive functions, we’ll have a picture of the whole system,” said Gina C. Lebedeva, the translation outreach and education director for I-LABS.

“The key to that series of studies is exposure and live interactions with native speakers,” Ms. Lebedeva said. “The interactions need to be naturalistic: eye contact, gestures, exaggerated phonemes.”

“Human brains are wired to learn best in social interactions, whether that learning is about language or problem-solving or emotion,” Ms. Lebedeva said, “but language is such a ubiquitous human behavior that studying it gives us an example of how more general learning takes place.”

With the opening this summer of I-LABS' $7 million MEG Brain Imaging Center— the first such facility adapted to study babies and young children—Ms. Kuhl and lab co-director Andrew Meltzoff will launch a new phase of research. The Developing Mind Project is studying how people's brain and cognitive processes change during key transition periods: infancy and early childhood, puberty, and old age.

Ms. Abbott said she hopes such research will help persuade education officials to provide more second-language instruction for all students in early grades, as opposed to the traditional secondary school courses.

“Just around the time when most students in this country, if they study a language, are starting that process, they're becoming less likely to be able to make those native-like sounds in another language,” Ms. Abbott said.

Ms. Kuhl and Ms. Lebedeva agreed. “I think we may be able to draw a new [language learning] curve that's not so age-dependent,” Ms. Kuhl said. “We think we can push that curve around. Learning itself in early development is so profound, and the neural architecture stays with you throughout your life.”

Other studies also suggest that learning multiple languages from early childhood on may provide broader academic benefits, too.

For example, at the science-oriented Ultimate Block Party held in New York City this month, children of different backgrounds played games in which they were required to sort toys either by shape or color, based on a rule indicated by changing flashcards. A child sorting blue and yellow ducks and trucks by shape, say, might suddenly have to switch to sorting them by color. The field games exemplified research findings that bilingual children have greater cognitive flexibility than monolingual children. That is, they can adapt better than monolingual children to changes in rules—What criteria do I use to sort?—and close out mental distractions—It doesn't matter that some blue items are ducks and some are trucks.

Ms. Abbot, who has supervised foreign-language programs for early-elementary students in Fairfax County, Va., said she saw exactly that sort of flexibility in problem-solving among the young students in the district's partial-immersion program, in which both English-speaking students and speakers of other languages spend part of the school day learning in a second language.

“A bilingualist,” Ms. Kroll said, “is a mental juggler.”