Culturally inspired mobile phone games help Chinese children learn language characters

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Mobile phone-based games could provide a new way to teach basic knowledge of Chinese language characters that might be particularly helpful in underdeveloped rural areas of China, say researchers in Carnegie Mellon University's Mobile & Immersive Learning for Literacy in Emerging Economies (MILLEE) Project.

Earlier this year, researchers reported that two mobile learning games, inspired by traditional Chinese games, showed promise during preliminary tests with children in Xin'an, an underdeveloped region in Henan Province, China. The researchers from Carnegie Mellon, the University of California, Berkeley and the Chinese Academy of Sciences reported their findings at CHI 2010, the Association for Computing Machinery's Conference on Human Factors in Computing Systems in Atlanta, Ga. Subsequent studies this summer at a privately run school in Beijing likewise showed that students playing the educational videogames increased their knowledge of Chinese characters.

"We believe that the cooperative learning encouraged by the games contributed to character learning," said CMU's Matthew Kam, assistant professor in the School of Computer Science's Human-Computer Interaction Institute and MILLEE project director. "The results of our studies suggest that further development of these games could make inexpensive mobile phones important learning tools, particularly for children in underdeveloped rural areas."

The Chinese language is the most widely spoken language in the world, with more than 1 billion Mandarin Chinese speakers, but it presents unique challenges to language education. Unlike languages with alphabetic writing systems, the Chinese language uses characters that each correspond to a syllable or sometimes a word. About 6,000 characters are commonly used, but the shape of each character provides few clues to its pronunciation and different dialects have different pronunciations for the same character.

MILLEE researchers analyzed 25 traditional games played by children in China to identify elements, such as cooperation between players, songs and handmade game objects, that could be used to design two educational mobile phone games. In one game, Multimedia Word, children are required to recognize and write a correct Chinese character based on hints provided for pronunciation, a sketch, a photo or other multimedia context. In a second game, Drumming Stroke, children practice writing Chinese characters; participants pass the mobile phone one by one on the rhythm of a drum sound played by the mobile phone, with each player required to write one stroke of a given Chinese character by following the exact stroke order.

Kam and other MILLEE researchers are collaborating with Tian Feng, an associate professor in the Institute of Software, Chinese Academy of Sciences in Beijing, to further explore the potential of mobile phones as a learning resource for Chinese children. Field research on behalf of MILLEE was performed this summer by Ben Rachbach, a student at Swarthmore College, to determine the educational needs of low-income students in three schools in Beijing. The team is receiving curriculum guidance from Sue-mei Wu, associate teaching professor of Chinese at CMU and chair of Chinese learning in the Pittsburgh Science of Learning Center, a joint effort of Carnegie Mellon and the University of Pittsburgh that is supported by the National Science Foundation.

With the support of Nokia, MILLEE has developed mobile phone-based games for teaching English literacy to rural children in India and is commencing a controlled study involving 800 children in 40 villages of Andhra Pradesh, a state in southern India. MILLEE is also working with the University of Nairobi to explore how the games could be adapted to English literacy learning for rural children in Kenya.

Kam, a native of Singapore, said despite their small screens and low computing power by today's standards, mobile phones could become a major educational resource as wireless carriers and mobile phone manufacturers move aggressively to extend mobile phone penetration across the globe. And if the educational benefits of mobile phones can be demonstrated convincingly, he added, consumers will have an additional motivation for getting mobile phone service, which could further spur mobile phone adoption in developing countries.

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