upon the child's "persistence of vision" to present the illusion of moving images.

The processes described above occur regardless of the content that is transmitted. From the cathode ray tube, electrons—fragments of matter—stream, at high velocity, toward the child, while from the child form-giving forces that restore the fragments into the semblance of wholeness stream toward the television.

From one side, the child is bombarded, while from the other, he or she is drained. We could say that the child's own etheric forces cohere the pixels into a "form," while the child's astral forces animate the form into "movement." Forces of life and soul that should be serving the child are instead drawn out to serve the image on the television screen. The speeding electrons are like an attack of inchoate will forces, while the faculties the screen draws from the child drain the child's life of feeling. It should be no surprise that EEGs reveal that a television viewer resembles someone in a state of deep sleep.

The "passive-aggressive" nature of television described above may help us to understand why it is an inherently unbalanced medium. We need only contrast this with the enlivened forces of feeling that awaken when a child's own will is engaged in artistic activity. Perhaps William Crookes' suspicion that the cathode ray tube was a medium in which deadening forces flourished is not so far-fetched after all. By its very nature, television undermines the healthy interplay of feeling and willing that arises as a child's faculty of imagination. Perhaps future studies of the effects of television will take into consideration, in one form or another, its impact on the threefold nature of a human being.

International Student Assessment and Computer Use

What Do Recent PISA Surveys Show?

Jon McAlice

The Program for International Student Assessment (PISA) is a multi-national survey made every three years (2000, 2003, 2006…) of 15-year-olds in the principal industrialized countries coordinated by the Organization for Economic Cooperation and Development (OECD).

The survey was conducted in 43 countries, including the United States, in the first assessment in 2000 and in 41 countries in the second assessment in 2003. At least 58 countries will participate in the third assessment in 2006.

Tests are typically administered to between 4,500 and 10,000 students in each nation to assess how well students near the end of compulsory education have acquired some of the knowledge and skills that are deemed essential for full participation in society.

PISA studies raise questions. Research based on data from the 2000 PISA tests, for example, raised serious questions about computer use and student learning. Thomas Fuchs and Ludger Woessmann of the CESifo economic research organization in Munich cross-referenced student responses concerning computer availability and use with corresponding test scores to create a multivariate picture of the relationship between computers and stu-

dent learning. Although descriptive and largely anecdotal, the report shows that the sweeping claims of many educational policy makers and software company representatives may well not be valid. Neither the availability of computers nor their frequent use seems to have any positive impact on student learning.

Neither Fuchs nor Woessmann is a teacher. Their interest in education springs from their concern for national productivity. Economic growth in OECD countries revolves around human capital. Are schools providing an environment that supports the development of marketable skills? A number of papers in recent years point out that computer skills are less marketable than are math and reading skills and that increased focus on computer literacy in schools throughout the world has had a negative effect on the attainment of the higher-level thinking skills most sought after in the global market.

In their study of computers and student learning, Fuchs and Woessmann looked at the availability and the use of computers in school and at home. Statistical analysis of student responses to questionnaires in relation to their test scores led the researchers to support a growing body of research questioning the efficacy of the computer as a tool for learning. The mere availability of computers, whether at home or in the classroom, seems to have no significant effect on students' performance on the PISA tests.

The way computers are used and the frequency of use, however, did. Students who use home computers primarily to play games or for instant messaging had generally lower scores than those who used them to write e-mails, visit web-pages, or do research. This is not surprising, but results concerning the frequency of in-school computer use are somewhat more so. Students who report never using the computer in school have relatively low test scores. Those who report using the computer often, "several times a week," had even lower scores. Those with the highest scores report using the computer "a couple of times a month to a couple of times a year."

Does the frequent use of computers help youngsters prepare themselves for a working world in which computer technology is ubiquitous? Fuchs and Woessmann say no. Based on data provided by the PISA tests—tests designed to assess student preparedness for the challenges they will meet in the world—the more students use computers, the less prepared they seem to be. The intentional use of computers by students who have a goal, however, does allow them to access data that might otherwise be unavailable.

OECD reports based on data from the most recent PISA tests (2003), in which over a quarter of a million 15-year-olds in 41 separate countries participated, highlight other aspects of how schools can make a difference in preparing students for the challenges of today's world. School autonomy is close to the top of the list. Schools that manage their own budgets and have a say in hiring teachers and developing their own curricula seem to be more effective at creating a healthy learning atmosphere. Schools in which teachers use their own tests show a positive effect on student performance. A large percentage of students said that their success was due in part to the willingness of teachers to take the time to answer their questions.

The third round of the PISA tests will take place during this coming school year and will focus particularly on science literacy.