

science: an educational MELTDOWN

Michigan reflects national malaise

Michigan has little reason to think its schools or students are significantly different than the rest of the country, according to statistics compiled by the American Institute of Physics.

Michigan was at, near or below national norms, the institute found in a 1985-87 nationwide survey of secondary school physics teachers, according to Michael Neuschatz, one of the study's organizers.

The institute sent questionnaires to 80 physics teachers in Michigan, Neuschatz said.

Some of the institute's findings, and how Michigan compared, include:

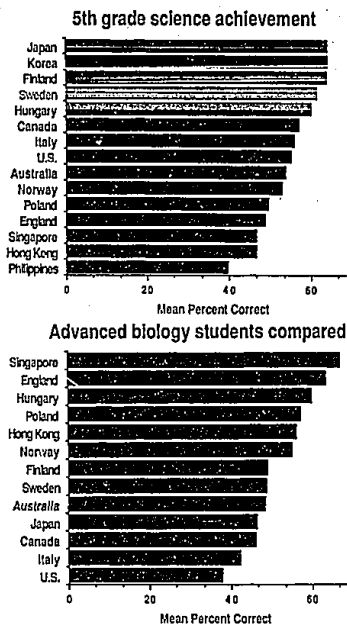
- About 20 percent, or more than 600,000, of all U.S. students enroll in high school physics courses. In Michigan, 18 percent of the students take physics.
- About 23 percent of physics teachers nationally are women. In Michigan women constitute 10 percent.
- About 25 percent of the nation's

high schools require three or more years of science for graduation. Eight percent of Michigan schools require three years or more.

About 19 percent of the nation's high schools require one year of science as a minimum graduation requirement. In Michigan, 31 percent of the schools require a minimum of one year.

Although the institute did not release any data on Michigan, its survey had this observation about private schools:

"In spite of their generally smaller size, non-religious private schools, Catholic schools, and schools affiliated with 'mainstream' Protestant denominations seem to put as much or more stress on physics instruction than public schools do. Schools affiliated with fundamentalist Christian and orthodox Jewish groups, on the other hand, are much less likely to include physics in their curricula, and, where they do teach it, offer only the basic first-year course."



Foreign students outshine U.S. kids

By Pat Murphy
staff writer

The "average" American student might not fare well on standardized science tests when compared with their foreign counterparts, but some from Oakland and Wayne counties do score highly and go on to demanding careers, according to area educators.

"Our students are routinely accepted at Stanford, MIT and other selective universities," said Leonard E. Klein, head of the science department at Groves High School in Birmingham. "The district requires two years of science to graduate, but our average student probably takes three years. Some take as many as six science courses."

The science coordinator for Livonia schools, Richard B. Braun, was equally proud of achievers in his district. "One of our students wrote perfect scores on five advanced placement science tests," he said. "Another took advanced calculus as a junior and was a gold medalist in state mathematics competition."

But while every district produces exceptional students, the average U.S. student trails counterparts in foreign countries, according to an international science report card prepared by the National Science Teachers Association.

That conclusion was based on data from 1986, or about the same time the national science report card was compiled and Michigan was giving MEAP science tests on an all-grades basis in those grades tested.

The international study showed American fifth graders doing relatively well compared to foreign students, ranking eighth out of 17

countries. Scores for science achievement tests for the average U.S. student were less than 10 points behind the scores of students from Japan.

BUT BY THE NINTH grade, test performance by U.S. students deteriorated, according to the study. American students ranked 15th out of 17 countries tested. The average U.S. score was almost 20 points below the average score of students in the top-ranking country, Hungary.

At the 12th-grade level, U.S. students finished dead last among the 14 countries tested in biology, almost 30 points behind top-ranked Singapore. U.S. students did almost as poorly in chemistry and physics, ranking 12th and 10th, respectively.

The comparison between foreign and U.S. students is important, said Gerald J. Fine, dean of the school of human and educational services at Oakland University.

With foreign students doing that much better in science, industrial and military leaders are concerned that the U.S. is slipping behind, said Fine. "There's a concern that we are becoming a second-class power," he said.

As astrophysicist Carl Sagan put it: "U.S. patent applications are steeply down. Japan, with half the population of the United States produces twice as many scientists and engineers with advanced degrees every year. Many new jobs in America require much less technical education than those they replace because of movement to a service economy."

"The American industrial base is decaying, and American leadership in new industries and new technologies is in decline."

Society needs to get involved

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problem, according to Don A. Griffin, consultant in education for the Wayne County Intermediate School District.

"Our science illiteracy may actually be much worse," said Griffin. "There are some studies currently being done by the National Science Foundation and the National Geographic Society that I believe will show that things are worse yet."

But the report card's findings caused educators to roll up their sleeves for critical self-evaluation, according to Griffin, Motz and others.

In the Plymouth-Canton Community Schools, for example, science coordinator Barbara Church helped organize the Elementary Science Committee to evaluate and upgrade the science curricula in the early grades. The committee has started to implement a hands-on approach to science beginning at the first grade.

Rather than reading about science, or hearing lectures about it, youngsters should get their hands dirty, at least figuratively, in experiments that help them understand concepts, the committee said.

The operating principle advocated by the Plymouth-Canton committee is based on a Chinese proverb: "I hear, and I forget. I see, and I remember. I do, and I understand."

But the problem is complicated, and change won't be easy. "There are many parts," said Bill Aldridge, executive director of the National Science Teachers Association. "Parents and the students themselves are part of the problem... even society."

WITH RARE exception, educators agree. Society as a whole does not promote critical thinking or anything close to a scientific approach.

Is it any wonder, they ask, that the country has a Fred Flintstone view of the world?

Nor does it help when parents do not insist on appropriate study habits and good attendance. "Some parents encourage students to take time off for deer season or for a Florida vacation," said Mary Buda, a calculus and advanced geometry teacher at Churchill High School in Livonia. "That's discouraging."

But teachers and administrators insist they cannot sit back or duck their professional responsibility merely because parents or youngsters aren't supportive.

Rather than point fingers, educators try to involve parents while they strive to improve course content and teacher performance. Furthermore, they believe good science taught in an interesting manner will go a long way toward overcoming indifferent parents or unmotivated students.

Science teacher Kenneth Vollick, for example, recently challenged his biology students at Redford Union High School to become activists on the issue of using animals for experiments.

"Some of the kids wrote to the veterinary school at MSU and others had telephone conversations with the humane society," he said. "Then we had a pretty heated discussion, with the kids taking different positions. We even video-taped it. Every topic can be made more interesting."

are several physics principles involved," he said. "And students learn by doing."

Kenneth L. Johnson, director of instruction for South Redford Schools, recalls last August when the Redford Union Science Consortium offered a two-week Summer Science Institute in conjunction with Eastern Michigan University.

"We had teachers from Livonia, Wayne-Westland, Northville, Garden City, Plymouth-Canton and every other district," said Johnson. "They learned the kind of hands-on experiments that enhance their knowledge and turn the kids on."

Early this year, the consortium plans another program — aimed at elementary grade youngsters, parents and teachers — on the opportunities in science for women, he said.

Oakland schools have a variety of programs to upgrade teachers and curricula, according to Motz. "We go to great lengths to help teachers become more effective. We encourage them to promote critical thinking and problem-solving. We encourage them to make science interesting, make it fun."

In this school year, he said, teachers have the option of attending a variety of seminars or workshops on topics ranging from aerospace to human sexuality.

Al Gibson, a physics teacher at Adams High School in Rochester, says conferences and seminars are essential to the teachers.

"Teachers recharge their batteries by talking with other teachers," said Gibson, who this fall received a Presidential Award for Excellence in Science and Mathematics Teaching.

AS THE DEFICIENCY in science becomes more apparent, districts have responded by raising the minimum graduation requirements. In 1985, for example, Redford Union increased the minimum number of science credits needed for graduation from one-half to two. Most area districts currently require a minimum two years of science.

School districts sometimes compound weak curricula by assigning unprepared teachers to teach science, according to some sources.

Administrators in one Wayne County district had a bad-news/good-news situation recently when officials learned about a sixth-grade math teacher who could not divide fractions. They learned about him at an in-service program to improve math.

"That kind of thing happens in every district," said the administrator who asked that neither he nor his district be identified. "Every district has a skeleton or two in the closet that officials aren't very happy about."

Michigan tries to address this problem of unqualified instructors by requiring teachers to be certified in a particular subject area. The state requires teachers to have taken a minimum number of courses in college in order to teach that subject.

But being certified is not necessarily the same as being qualified, said Don Griffin, consultant to Wayne County schools.

"And districts find ways to skirt around certification requirements," he said. "Especially when districts are forced to pink slip teachers and seniority provisions of labor contracts come into play."

"Administrators don't like it. But what else are they to do given limited budgets?"

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