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CHANGES IN SCIENCE ENROLLMENTS AND GRADUATION REQUIREMENTS IN IOWA PUBLIC HIGH SCHOOLS, 1973-1983

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In recent years, public education has received stringent criticism for its performance in producing students who have a very low level of competency in some subjects (National Commission on Excellence in Education, 1983). The media and various professional organizations have conceded that students in the United States have, in recent years, performed poorly in science when compared with students from other developed nations (Jacobson and Doran, 1985). Alleged reasons for poor performance on the part of U.S. students include shortage of qualified teachers, apathetic or negative public attitude toward schools, changing sociological and educational roles of the parent and family, excessive governmental control, increasing litigation to solve educational problems, economic depression, lack of enforced state and local board educational standards, and decreasing student enrollments in high school science courses (Excellence in Education Task Force, 1984).

The purpose of this paper is not to add criticism of public education, but rather to assess whether changes have been made to reverse certain of the above negative trends. More specifically, this report will examine school board influence and resulting enrollment changes in science courses of Iowa public high schools.

The data for this paper came from the Basic Education Data Survey (BEDS) compiled annually by the Iowa Department of Public Instruction (DPI). Principals are required annually to supply to the DPI information about curriculum, staff and student enrollment in grades 9-12. Such data are then available for use by the State Board of Public Instruction, State Superintendent, legislature, DPI staff and the general public. Due to changes in course titles, survey forms and the specificity of data collected, consistent information for longitudinal studies can be provided back to only about 1974.

Table I provides a comparison of science enrollments in public high schools (grades 9-12) for the years 1973-74, 1978-79, and 1983-84. A number of general patterns are evident. The number of school districts has declined from 451 in 1973 to 439 in 1983. This is due to enrollment declines and resultant reorganization of smaller school districts into larger ones. Total enrollment for public high schools in the state declined by 20 percent from 193,981 students in 1973 to 155,675 in 1983. During this same time period, total science enrollments decreased by only five percent from 119,640 students to 104,200.

Specific content areas such as chemistry, physics, earth science and environmental science evidenced increases in enrollment percentage over the 11 year period, while biology, physical science and general science generally held steady.

Such student enrollment enhancements may have been due to positive reactions by students to media exposes, professional organization reports, or

financial incentives (H.F. 532) provided by the legislature to schools for increasing enrollments in physical science (chemistry, physics) courses and to students for enrolling in advanced science courses. Some legislative incentives have been reduced, or eliminated for 1985-86, and it may not be possible to determine the effect of financial incentives. The exact reasons for enrollment increases in public high school science classes may never be known completely; however, the fact remains that raw numbers are increasing and percentages for chemistry, physics, earth science and environmental science are at a ten-year high.

Table II provides data concerning public high school (grades 9-12) graduation requirements established by local school boards for 1975-76, 1978-79, and 1983-84. Due to problems in the Basic Education Data Survey system discussed earlier, the best possible comparisons cover an eleven year period in Table I and a nine year period in Table II. The units of credit range from zero to four. The *School Rules of Iowa* defines a unit as instruction for 100 minutes per week for 36 weeks or the equivalent of 120 hours per year (State of Iowa, 1976).

Table I
Science Enrollments in Iowa Public High Schools
(Grades 9-12) 1973-4 to 1983-4*

	1973-4	1978-9	1983-4	
Biology	46,303 23.9%	47,362 24.4%	37,034 23.8%	No. students % total enrollment (9-12)
Chemistry	14,989 7.7%	15,050 7.8%	16,278 10.5%	No. students % total enrollment (9-12)
Physics	6,638 3.4%	6,430 3.3%	7,357 4.7%	No. students % total enrollment (9-12)
Physical Science	20,769 10.7%	17,307 9.0%	14,396 9.3%	No. students % total enrollment (9-12)
Earth Science	12,758 6.6%	11,290 5.9%	11,639 7.5%	No. students % total enrollment (9-12)
General Science	15,660 8.1%	20,873 10.8%	13,454 8.6%	No. students % total enrollment (9-12)
Environmental Science	2,523 1.3%	2,585 1.3%	4,042 2.6%	No. students % total enrollment (9-12)
Total Science Enrollment	119,640	120,897	104,200	
Public High Schools (9-12)	61.7%	62.6%	67.0%	
Total Public High School Enrollment (9-12)	193,981	193,092	155,675	
No. Public School Districts	451	447	439	

*Data from the Department of Public Instruction, Basic Education Data Survey (BEDS), Grimes Building, Des Moines, Iowa 50319

Table II
Science Graduation Requirements in Iowa Public
High Schools (Grades 9-12) 1975-6 to 1983-4*

Science Units Required For Graduation	1975-6		1978-9		1983-4	
	Number of Districts	% of Total	Number of Districts	% of Total	Number of Districts	% of Total
0	11	2.4%	1	0.2%	0	0%
0.5	1	0.2%	3	0.7%	1	0.2%
1.0	165	36.6%	154	34.5%	104	23.7%
1.5	6	1.3%	9	2.0%	15	3.4%
2.0	259	57.4%	272	61.0%	305	69.5%
2.5	1	0.2%	0	0%	5	1.1%
3.0	6	1.3%	7	1.6%	8	1.8%
3.5	0	0%	0	0%	0	0%
4.0	1	0.2%	1	0.2%	1	0.2%
No. Public School Districts	451	100%	447	100%	439	100%

*Data from the Iowa Department of Public Instruction, Basic Education Data Survey (BEDS), Grimes Building, Des Moines, Iowa 50319

There have been significant changes in the graduation requirements in science from 1975 to 1983, most notably, an increase in the number of districts requiring two or more units. In 1975, 59 percent (267) of Iowa's school districts required two units or more for student graduation. By 1978 this local mandate had increased to 63 percent (280), and by 1983 to 63 percent (319). In addition, in 1975, 12 districts required less than one unit of science; however, by 1983 this number had decreased to one. On the high side of this continuum, the number of districts demanding more than two units had increased from eight in 1975 to 14 by 1983. It is also evident that, for the nine-year period, the majority of Iowa public high schools have always required two units of science for graduation. In 1975, 57 percent (259) districts required two units, by 1978 the number had increased to 61 percent (272) and by 1983 to nearly 70 percent (305).

Based on the data presented, it may be concluded that higher percentages of students are enrolling in science courses and that school boards are in agreement with, and helping cause, such change.

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