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Offerings and Enrollments In Junior High School Science in Kansas In 1962 - 1963

By

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Offerings and Enrollments in Junior High School Science in Kansas in 1962-1963[1]

John Breukelman and Ralph P. Frazier*

The Kansas Academy of Science has long been interested in problems of science teaching at various levels. Through its Committee on Educational Trends in Science Teaching, the Academy has sponsored a biannual series of statewide conferences on science teacher improvement, begun in 1957 and supported from 1959 to 1963 by grants from the National Science Foundation. The conferences and their areas of discussion were as follows:

ACADEMY CONFERENCES

1957-1959 Preliminary Conferences I to III, Emporia	Certification of high school science teachers
1959-1960 NSF Academy Conferences I, Salina, and II, Manhattan	Curriculum for high school science teachers
1960-1961 NSF Academy Conferences III, Lawrence, and IV, Hays	Curriculum for teachers of science at all levels through senior high school
1961-1962 NSF Academy Conferences V, Emporia, and VI, Dodge City	Curriculum for junior high school science teachers
1962-1963 NSF Academy Conferences VII, Pittsburg, and VIII, McPherson	Science curriculum for teachers in elementary grades

A detailed report[2] of the 1959-1960 conferences, together with a historical résumé of previous activities of the Committee, was published as a supplement to Volume 63 of the *Transactions* of the Kansas Academy of Science (Breukelman, 1960). The report includes the deliberations of the Salina Conference, October 1959, and the Manhattan Conference, April 1960, both of which were devoted to a study of the college curriculum for high school teachers and supervision of science.

The reports[2] of the fall conference held at Lawrence in October, 1960 and the spring conference at Hays in April, 1961 are reported in Volume 64 of the *Transactions* (Breukelman and Frazier, 1961a).

The Emporia, October 1961, and Dodge City, April 1962, conferences (Breukelman and Frazier, 1962) were devoted to a general study of the college curriculum desirable for the preparation of junior high school science teachers. Most of the discussion during the closing

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2. Copies of these reports may be obtained from the committee chairman, John Breukelman, Department of Biology, Kansas State Teachers College, Emporia, Kansas.

general session of the spring meeting at Dodge City was concerned with problems relating to certification requirements of junior high school science teachers. It was unanimously decided that the Academy Committee on Educational Trends should conduct, in the fall of 1963, a conference to study the specific problems of certification in science at the junior high school level. Recommendations growing out of this or subsequent conferences will be transmitted to the Kansas Advisory Council on Education for their consideration.

This study is being presented to provide up-to-date information on offerings and enrollments in science courses in Kansas junior high schools. It is hoped that these data, based on the 1962-1963 school year, may be useful in the deliberations of the conference on junior high school science teacher certification, and of general interest to all concerned with the preparation and certification of junior high school science teachers.

NATURE OF THE SAMPLE

Several studies of offerings and enrollments in secondary school science in Kansas have been made in recent years (Breukelman and Andrews 1953, 1956, and Breukelman and Frazier 1961b), but only in the last of these were the junior high schools treated as separate entities. The decision to report separately on the junior high schools in the 1961

TABLE I. Number and type of separately organized and accredited junior high schools in Kansas, 1951-1963.

School Year	Type of School				
	1 year	2 year	3 year	4 year	Total
1951-1952		17	38	4	59
1952-1953		14	41	2	57
1953-1954		11	42	4	57
1954-1955		9	43	5	57
1955-1956		9	50	5	64
1956-1957		9	55	5	69
1957-1958		10	58	5	73
1958-1959		10	68	3	81
1959-1960		10	72	2	84
1960-1961		13	76	3	92
1961-1962		13	78	2	93
1962-1963	1	14	80	1	96

study was based on the steadily increasing number of separately organized and accredited junior high schools in Kansas, as shown in Table I. In 1951-1952, the year on which the first (1953) study was based, there were only 59 such junior high schools. By 1960 there were 84 schools and this number had increased to 96 schools when the data were obtained in the 1962-1963 school year.

The present study includes data from the 96 separately organized junior high schools, supplemented by data from the seventh, eighth, and ninth grades of 25 six-year, junior-senior combination schools. The source of the data on these 121 schools was the Junior High School Principal's Organization Reports for 1962-1963 submitted to the State Department of Public Instruction.

For each school, the information abstracted from the organization reports included: total school enrollment, enrollment by grades, enrollment in each section of each science, and the number and kind of courses taught by each science teacher (non-science as well as science courses).

For final tabulation purposes, the schools were divided into population classes corresponding to those used in the study of science teaching in the public schools in the United States (Johnson, 1950) and also in the Breukelman, Andrews (1953, 1956) and the Breukelman, Frazier (1961b) studies.

ENROLLMENTS IN THE JUNIOR HIGH SCHOOLS

The distribution of students by grades enrolled in the various types of junior high schools included in this study is shown in Table II. Of the 61,056 students, 56,821 or approximately 93 per cent were enrolled in the 96 separately organized and accredited junior high schools and 4,235 or about 7 per cent in the first three years of six-year, junior-senior high schools.

At the time of this writing the total state enrollment figures for grades seven, eight, and nine in 1962-1963 were not available. However, they probably did not differ markedly from the 1961-1962 figures, which were as follows: grade seven, about 43,400*; grade eight, about 43,000; grade nine, about 42,200; total about 128,800. The enrollment of 61,056 covered in this study thus comprised somewhat less than half of the "junior high school population" of Kansas.

Of the approximate 67,000 junior high school level students not covered in this study, about 19,000 were enrolled in the ninth grade in four-year high schools, and were taught by about 550 teachers, not more than 20 per cent of whom were full-time science teachers. The remaining 48,000 pupils, enrolled in the seventh and eighth grades of rural and other elementary schools were taught almost entirely by elementary teachers, few of whom had special competence or training in science.

* Exact figures are not given because some of the enrollments reported by non-public schools were not tabulated by individual grades.

TABLE II. Enrollments in the seventh, eighth, and ninth grades in different kinds of Kansas schools.

	Seventh Grade		Eighth Grade		Ninth Grade		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
1-yr. Junior	307	1.47					307	.50
2-yr. Junior	1,377	6.61	1,718	8.46	344	1.72	3,439	5.63
3-yr. Junior	17,619	84.69	16,973	83.64	17,801	89.17	52,393	85.81
4-yr. Junior	208	1.00	232	1.14	242	1.21	682	1.12
6-yr. Jr-Sr	1,292	6.21	1,369	6.74	1,574	7.88	4,235	6.94
Total	20,803	100.00	20,292	100.00	19,961	100.00	61,056	100.00

TABLE III. Number of schools in each size group offering junior high school sciences, by grades.

Size of School	Totals	7th Grade Only	8th Grade Only	9th Grade Only	7th and 8th	7th and 9th	8th and 9th	7th, 8th, and 9th	7th + 8th	7th + 8th, 9th	7th + 8th + 9th
25-49	5		1		1			3			
50-74	2						1	1			
75-99	4	1		1	1		1				
100-199	21	3			7	1	3	5	1	1	
200-299	7			1	1		1	2	1		1
300-499	26	1	2	1	1	1	10	10			
500-999	46			8	2	5	9	21			1
1000-2499	10			2		2		5		1	
Totals	121	5	3	13	13	9	25	47	2	2	2

SCIENCE OFFERINGS IN THE JUNIOR HIGH SCHOOL

Table III shows the schools, grouped by size, offering science in the seventh, eighth, and ninth grades. Note that 82, or nearly 68 per cent of the 121 schools, had enrollments of 300 or more, and 39 or 33 per cent, had enrollments of 500 or more. By contrast, among the senior high schools of Kansas reported in 1960-1961, only 78, or 13 per cent had enrollments greater than 500. While this percentage for the senior high school has increased slightly in the past two years, it remains far below that for the junior high schools. The median junior high school enrollment for 1962-1963 was 460, that of the senior high schools about 85. The separately organized junior high school is still largely a phenomenon of the larger population centers and Kansas still has many small towns and rural schools.

The distribution by grades of the junior high school science offerings are also shown in Table III. Commonly, science was offered in at least two of the three grades, but the pattern was quite varied. The number of schools offering science in only one of the three grades was but 21 or 17.3 per cent; of these, 5 offered science in the seventh grade, 3 in the eighth grade, and 13 in the ninth grade. Forty-seven, or 38.8 per cent, provided science two out of the three years and in the largest number of cases, 25, these two years were grades eight and nine. Science was offered in all three grades in 51 or 42.1 per cent of the schools. Note, however, that two of these schools offered science in combined seventh and eighth grade classes, and two others in combined seventh, eighth, and ninth grade classes. It is not possible to tell from the data whether all students in a school are included in a science class each year.

Biology, natural science, and laboratory science are not included in this table, because it was not always made clear in which grade these

TABLE IV. Science enrollments in the junior high school sciences.

Size of School	Seventh Grade	Eighth Grade	Ninth Grade	Biology	Other Science
25-49	50	68	29		
50-74	24	51	68	18	
75-99	66	94	59		
100-199	769	810	273	68	124
200-299	284	427	179	20	
300-499	1595	2533	1140	159	234
500-999	5092	5898	4760	815	22
1000-2499	1770	1337	1964	142	
Total	9650	11218	8472	1222	380

were offered, although biology was shown most often as a ninth grade subject.

The science enrollments in the 121 schools included in this study are indicated in Table IV. The enrollments in biology, natural science, and laboratory science are not included in the figures for the ninth grade, although it is clear that nearly all classes in these sciences are made up of ninth graders. The seventh grade science enrollment of 9,650 was 46.3 per cent of the 20,803 pupils enrolled in this grade; for the eighth grade the corresponding percentage was 55.2. The total of 8,472 in the ninth grade represents only 42.4 per cent of the 19,961 enrolled in this grade. However, if the 1,602 pupils enrolled in the other sciences are added to the 8,472, this total of 10,074 is 50.4 per cent of the 19,961 ninth graders. The 30,942 enrolled in all science in the 121 schools was 50.7 per cent of the 61,056 pupils enrolled.

CONTENT OF COURSES

Table V shows the number of schools offering science at each grade level and the kinds of science courses. For the most part the courses are entitled either seventh grade science, eighth grade science, ninth grade science, or simply *General Science*. The presence of biology as a junior high school science offering is a recent development brought about in part by the influence of the program of the Biological Sciences Curriculum Study. In general, the teaching of biology in the junior high school is an experiment and usually the students are highly selected. Regarding ninth grade biology, the Biological Sciences Curriculum Study found in the 1961-1962 testing program that

> **above-average** ninth grade students in situations with relatively good teacher preparation and good biology laboratories were able to handle BSCS Biology materials. Test data tend to substantiate feedback re-

TABLE V. Kinds of science courses taught and number of junior high schools offering each course.

Size of School	Totals	7th	8th	9th	Biology	Natural Science	Laboratory Science
25-49	5	4	5	3			
50-74	2	1	2	2			
75-99	4	2	2	2			
100-199	21	18	17	10			1
200-299	7	5	6	5	1		
300-499	26	13	23	22	1	1	
500-999	46	29	33	44	9		
1000-2499	10	8	6	10	2		
Totals	121	80	94	98	13	1	1
Percentage		66.1	77.6	80.9	10.7	0.8	0.8

> ports that BSCS Biology would probably not be suitable for the **average** ninth grader. (BSCS 1963)

There is, no doubt, wide variation in the nature of the science taught in the 121 schools covered in this study. The content of the science offerings was beyond the scope of this investigation; however, 22 schools were visited and teachers from eight other schools were interviewed, in an effort to obtain some information. This sample showed as much variability in course content as in grade offerings, with the largest number of courses devoted to that pot pourri "general" science. The growth of biology as a ninth grade subject is reflected in the fact that 13 or 10.7 per cent of the 121 schools were offering this course, whereas as recently as ten years ago, the teaching of biology as an organized course below the tenth grade was almost unheard of in Kansas. The largest number of schools offering biology fell in the 500-999 enrollment group, which is the group with the largest number of junior high schools.

FULL AND PART TIME TEACHERS

For purposes of this study, junior high school science teachers were designated as full time science teachers if they taught four or more science classes; and part time teachers if they taught three or fewer science classes. As would be expected, there were many more full time science teachers in the larger schools than in the smaller, as shown in Table VI.

TABLE VI. The number of full time and part time science teachers and the average numbers of pupils taught by each.

Size of School	Full Time Teachers		Part Time Teachers		Average Number of Science Pupils per Science Teachers	
	No.	Per Cent	No.	Per Cent	F.T.*	P.T.*
25-49	0	....	7	100.0	....	21
50-74	1	25.0	3	75.0	71	24
75-99	0	....	6	100.0	....	36
100-199	7	21.2	26	78.8	102	49
200-299	5	35.7	9	64.3	129	30
300-499	37	68.5	17	31.5	119	42
500-999	104	70.3	44	29.7	141	60
1000-2499	38	84.4	7	15.6	133	61
Totals	192	61.7	119	38.3		

*Full Time — Part Time

The ratio of full time to part time science teachers in the schools studied was 61.7 to 38.3. But the numbers of students taught by the full time teacher contrasts rather sharply with the numbers taught by the part time teacher, not only in terms of average number per teacher

TABLE VII. Classification of all full time junior high school science teachers.

Size of School	7th Grade Only	8th Grade Only	9th Grade Only	7th and 8th	7th and 9th	8th and 9th	7th, 8th and 9th	Biology Only	Biology Plus Other Sciences	Total
25-49										0
50-74							1			1
75-99										0
100-199	1			4			2			7
200-299		1		1		2	1			5
300-499	6	6	4	4	3	12	2			37
500-999	14	14	15	20	9	22	1	2	7	104
1000-2499	8	4	10	6	2	3	3		2	38
Totals	29	25	29	35	14	39	10	2	9	192

but in total numbers. The 192 full time teachers had more than 25,500 students or an average of about 133 each. The 119 part time science teachers taught 5,763 science students, or an average of only 48 each. Thus more than 80 per cent of the students in the 121 schools were taught science by full time science teachers.

TABLE VIII. Non-science courses taught by junior high school science teachers.

Size of School	None	Mathematics	Industrial Arts	Health, Physical Ed.	Athletics	Social Science	Vocational Agriculture	Home Economics	Journalism, Speech, English	Driver Training	Art	Typing
25-49	1	2		2		2		1	2	1	1	
50-74	1	2	1	1		2						
75-99	4		1	3		1						
100-199	18	5	1	10		3					1	1
200-299	8	3	1	3								
300-499	39	11		3		2			2		1	
500-999	96	25	1	7	1	7	2	4	2			
1000-2499	34	5	1					1	1			
Totals	201	53	6	29	1	17	2	6	7	1	3	1

In the 82 schools with 300 or more students enrolled, 179 of the 247 science teachers taught science full time. In the 56 schools with 500 or more enrolled, there were 142 full time science teachers, and this number comprised 77 per cent of all those teaching junior high school science.

The comparable 1962-1963 figures for senior high schools were not available; but the percentages were probably not greatly different from those for 1960-1961, when 350, or 31 per cent of the 1,136 senior high school science teachers were full time, and 786, or 69 per cent were part time science teachers.

Not all of the full time junior high school science teachers have comparable teaching assignments. For example, two were teaching only biology, as noted in Table VII, 83 were teaching in one grade, seventh, eighth or ninth, while 88 were teaching in two grades and 10 were teaching in all three grades. Nine science teachers were teaching biology and at least one other science course.

The non-science courses taught by the junior high school science teachers are delineated in Table VIII, which indicates the wide range of these courses. It will be noted that mathematics occurred more often than any other subject, with health and physical education second.

There are some apparent discrepancies between Tables VII and VIII. Table VIII shows 201 teachers who taught no non-science courses, while table VII shows only 192 full time science teachers. Several persons who taught fewer than four science classes per day, and were therefore counted among the 119 part time science teachers, were principals or guidance officers who taught one to three science classes, but no other classes. Others, who taught four or more science classes, and were counted as full time science teachers, taught a non-science class in addition. A few taught in more than one non-science field and so appear more than once in the table.

CERTIFICATION

It is the belief of many of those who have studied the persistent problems of junior high school science teaching and certification that serious attention must be given to a definition of a junior high school student and of a junior high school teacher. Is an eighth grader in a one room rural high school a junior high school student? A seventh-grader in a four room elementary school in which the seventh and eighth grades are together with one teacher? A ninth grader in a four year high school with an enrollment of 36? Is anyone who meets seventh or eighth grade classes a junior high school teacher, even though he teaches in a rural school and has only a single pupil in one or each of these grades?

It is commonly thought that all junior high school pupils not enrolled in rural schools or elementary schools with seventh and eighth grades are taught by teachers with secondary school certificates, but such is not the case. The following is quoted from the 1963 Certificate Handbook of the Kansas State Department of Public Instruction:

Elementary Certificates

A. Degree Three-Year Elementary. (Code: 103) The Degree Elementary Certificate is a three-year certificate, renewable for five years, valid in any kindergarten, elementary school, junior high school, and grades seven, eight, and nine in a six-year high school. It may be issued to a qualified applicant who holds a baccalaureate degree, provided an official transcript of college record shows general and professional education credit as follows:

1. Fifty semester hours of general education including:
   a. Oral and written communication 6
   b. Physical and biological science (must include both; may include mathematics) 10
   c. Social science 10
   d. Literature or language 6
   e. Physical and Mental Health, Human Behavior, General Religion, Philosophy 3
   f. Electives in music, art, or any of the above areas, ten semester hours with a total of 15
   Provided: For purposes of distributing electives, mathematics may be considered as a separate area.
   Total 50

   Applicants who have held a standard teaching certificate based on a degree from an institution accredited by the State Superintendent may be allowed a five semester hour deviation in the distribution of the 50 semester hours credit.

2. Twenty-four semester hours of professional education including:
   a. Six semester hours directed toward understanding the individual in the area of pupil development and learning.
   b. Six semester hours directed toward understanding the school as a social institution and devoted to developing a professional attitude regarding the role of education in the "American way of life."
   c. Eight semester hours directed toward attaining competence in instruction at the elementary level which must include at least five semester hours in directed teaching.
   d. Four semester hours elective in professional education courses.

3. Fifteen semester hours of specialized courses designed to deal with content and method of the elementary school exclusive of courses used in this section in item 1.

For accredited secondary schools, the following subject and field requirements are in force:

1. In the Six-Six Organization Plan: All teachers shall meet such subject and field requirements as are required of teachers in the four-year high school, except as otherwise provided (see section 91-1-5A).
2. In the Junior High School: Junior high school teachers shall have obtained a minimum of fifteen semester hours of credit in each field or subject taught.

A complete study of the highest degree and type of certificate held by the junior high school teachers was not included in this study, but these were tabulated for teachers scattered over a variety of sizes of junior high schools covered in this study. The data are shown in table IX.

TABLE IX. Highest degrees and types of certificates held by Kansas junior high school science teachers.

	Degree		Certificate		
Size of School	B.A., B.S. Bachelor	M.A., M.S. Master	Elem.*	Sec.*	Both
25-49	6	1		4	2
50-74	4			2	2
75-99	4	2		3	3
100-199	17	5		18	4
200-299	10	3		9	4
300-499	26	13	3	21	15
500-999	77	33		76	34
1000-2499	16	5		12	10
Totals	160	62	3	145	74
Per Cent	72.07	27.93	1.35	65.32	33.33

*Elementary – Secondary

Most of those who teach seventh and eighth grades in elementary schools hold elementary certificates. Those who teach ninth grade general science in four-year high schools hold secondary certificates and meet the following requirements:

General Science:

Standard – Twenty-four semester hours in the field of science. It is strongly recommended that the preparation of teachers of general science include one laboratory course in each of the sciences (biology, chemistry, and physics) and include full qualification to teach in one of the sciences (biology, chemistry, and physics).

Minimum – Eighteen semester hours in the field of science. It is strongly recommended that the preparation of teachers of general science include one laboratory course in each of the sciences (biology, chemistry, and physics), and include full qualification to teach in one of the sciences (biology, chemistry, and physics).

In many cases the Principal's Organization Report omitted either the teacher's highest degree or his certificate, or stated the certificate in such a way that it could not be identified exactly, i.e., "Life" or "Provisional." The data concerning degrees and certificates, tabulated for the 222 teachers for whom there could be no doubt, are shown in Table IX. It is encouraging to note that approximately 28 per cent of the science teachers in the accredited junior high schools had earned the Master's Degree. It is also notable that almost 98 per cent of the teachers had either a secondary certificate or both a secondary and elementary certificate. This has meaning in that these individuals would have some concentration in the area of science to have been so certified.

SUMMARY

1. The Junior High School Principal's Organization Reports for 1962-1963 were the source of the data concerning the teaching of science in the 96 separately organized and accredited junior high schools, supplemented by data from the seventh, eighth, and ninth grades of 25 six-year, junior-senior combination schools.
2. There were 61,056 students enrolled in these 121 schools. Of this number, 56,821 or approximately 93 per cent, were enrolled in the 96 separately organized junior high schools and 4,235 or about 7 per cent, in the first three years of six-year, junior-senior high schools.
3. Students enrolled in rural and other elementary schools that included grades seven and eight, in the ninth grade of four-year high schools, and in non-accredited schools, were not included in the study. The total enrollment in 1961-1962 in grades seven, eight, and nine was about 128,000.
4. The median junior high school enrollment for 1962-1963 was 460 pupils. There were enrollments of 300 or more in 82 (nearly 68 per cent) of the 121 schools, and 39 or 33 per cent had enrollments of 500 or more.
5. Science was offered in all three grades in 51 schools, in two grades in 49 schools, and in one grade only in 21 schools.
6. Eighty schools offered science in the seventh grade, 94 in the eighth grade, and 98 in the ninth grade. In addition, 13 schools were providing classes in biology, usually at the ninth grade level, and one school gave a course entitled natural science and one a course called laboratory science.
7. A limited sample, made by visiting schools and interviewing teachers, indicated a wide variation in the content of the courses taught at each grade level.
8. The 30,942 pupils enrolled in all junior high school science represented 50.7 per cent of the 61,056 pupils in the 121 schools studied.
9. There were 192 (61.7 per cent) full-time teachers of science and 119 (39.3 per cent) part-time teachers. The 192 full-time teachers taught more than 25,500 students, or an average of about 133 each, whereas the 199 part-time teachers taught 5,763 students, or an average of only 48 each.
10. Two teachers were teaching only biology; 83 were teaching in one grade, seventh, eighth, or ninth; 88 were teaching in two grades; and 10 were teaching in all three grades.
11. A number of science teachers teach areas other than science or have other duties. In addition to administration and guidance, mathematics and physical education are the most common areas of responsibility.
12. Of the 222 teachers about whom it was possible to get information, 72 per cent had a baccalaureate degree and 28 per cent a master's degree. In this same group, 65 per cent had a secondary certificate, 33 per cent were certified at both elementary and secondary levels, and less than 2 per cent had only an elementary certificate.

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