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# Educational Qualifications of Kentucky Science Teachers

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# EDUCATIONAL QUALIFICATIONS OF KENTUCKY SCIENCE TEACHERS

BY

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CONTENTS

TABLES

# CHAPTER I

## INTRODUCTION

The present state of development of the physical and the biological sciences is the result of man's efforts to understand the nature of his environment and its multitude of complex changes. Rapid progress in these specialized fields of knowledge constitutes the single most important factor contributing to the increasing complexity of modern society. The teachers of science in our public schools will necessarily have to supply much of the information and instruction. In order to teach the sciences successfully, the science teacher must be well-qualified in general knowledge of the science field.

Much of the material in this investigation was used in a report on "The Qualifications of Kentucky Science Teachers" to the Kentucky Academy of Science, April 25, 1947, in Bowling Green, Kentucky.

Reason for the study.- Science teachers of our schools should be the leaders in developing an interest and knowledge in a scientific age. Very little investigation has been made of the status of our science teachers.

The purpose of this investigation is to call attention to the need for better qualified science teachers in our schools. One need but consider the facts as presented in tabular form in this study to realize the problems facing our schools in providing adequate science instruction.

Statement of problem.- This study presents the status of the educational qualifications of Kentucky science teachers with the following correlated aims:

1. To determine the number of science teachers in the state and the number of schools offering the different sciences.

2. To reveal the salaries of Kentucky science teachers.

3. To present in tabular form the number of science teachers and their actual educational qualifications for the teaching of such sciences as biology, chemistry, physics, and general science.

Scope of the study.- This study includes an investigation of the 787 science teachers in the 597 high schools of the state. The study deals in the main with the educational qualifications and salaries of the teachers and with the number of schools offering science instruction. The investigation presents the status of the Kentucky science teachers for the school year 1946-47. It is correct so far as the material included in the superintendents' reports to the Kentucky State Department of Education is correct.

Source of data.- The data for this study were secured from the reports of superintendents to the Division of Supervision, Kentucky State Department of Education for the year 1946-47. In case the reports did not have all the desired information, the author consulted transcripts of credits of individual teachers. The information was gathered personally by the author of this study and his wife, in the office of Mr. Mark Godman, director of Supervision, Frankfort, Kentucky.

Similar studies.- Victor H. Noll[1] in his book The Teaching of Science in the Secondary School reveals the dearth of information on the training of science teachers.

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1 Victor H. Noll, The Teaching of Science in Elementary and Secondary Schools (New York: Longmans, Green and Company, 1939), pp. 197-211.

> As far as evidence from scientific studies goes, the desirable training of a science teacher is characterized by almost complete absence of data from such sources.

The author of this thesis has found only one similar study on science teachers: "The Status of the Science Teacher in Nebraska Public High Schools"[2] by Wayne H. Nicholls of the University of Nebraska. He presents the experience, salaries, qualifications, outside activities, and additional school duties of Nebraska science teachers for the year 1940. Although he includes similar data to these presented here, he fails to mention the number of college hours earned in scientific fields by Nebraska science teachers. Mr. Nicholls summarizes the educational qualifications of Nebraska science teachers with the following statement:

> Reports on 645 teachers showed that 554 held a Bachelor's degree, 90 held a Master's degree, and one held a Doctor of Philosophy degree.

It would appear that this investigation, "The Educational Qualifications of Kentucky science teachers," is one of the first studies of the educational qualifications of science teachers.

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[2] Wayne H. Nicholls, "The Status of Science Teachers in Nebraska Public High Schools," Master's Thesis, University of Nebraska, 1940.

# CHAPTER II

## EDUCATIONAL QUALIFICATIONS OF KENTUCKY CHEMISTRY TEACHERS

Chemistry is that branch of the physical sciences which is concerned with the composition of matter and with those transformations which matter undergoes. All objects in the material universe are suitable subjects upon which the interest of students of chemistry may be focused. If the children in our public schools are to understand the world in which they live, they must have a general knowledge about what constitutes the world. Chemistry is the subject from which they obtain such knowledge. Yet in Kentucky, instruction in chemistry is offered in only 101 of the 608 high schools.

From Table I it may be seen that there are 137 chemistry teachers in Kentucky high schools and that 105 of this number are college graduates, 44 of them chemistry majors (only 15 of these majored in chemistry since 1937). It may also be seen that of the 137 chemistry teachers there are 55 who are chemistry minors. This means that 99 are either majors or minors in chemistry; thus, 38 were not majors or minors in the subject. This table also shows that there are 28 who have 10 hours or less in chemistry and 10 who have more than 10 hours in chemistry but not enough hours to have a minor.

Forty-four of our Kentucky chemistry teachers received their training in schools located outside the state. The table discloses that the four teacher training institutions—the Western Kentucky State Teachers College, the Murray State Teachers College, the Eastern Kentucky State Teachers College, and the Morehead State Teachers College, and the

TABLE I
GRAPHIC SURVEY OF KENTUCKY CHEMISTRY TEACHERS

| Name of College Attended | Number Attended | Number Graduates | Number Chemistry Majors | Number Chemistry Majors Since 1937 | Number Chemistry Minors | Number with 10 hours or less in Chemistry | Number with more than 10 hours but no Minor | Number with no Science Major or Minor |
|---|---|---|---|---|---|---|---|---|
| U. of K. | 18 | 14 | 7 | 1 | 8 | 2 | 1 | 1 |
| Western Ky. | 16 | 12 | 6 | 3 | 5 | 4 | 1 | 4 |
| Eastern Ky. | 13 | 10 | 2 | 1 | 6 | 3 | 2 | 4 |
| Morehead | 8 | 6 | 1 | 1 | 6 | 1 | 0 | 1 |
| U. of L. | 5 | 3 | 4 | 1 | 1 | 0 | 0 | 0 |
| Murray State | 5 | 4 | 1 | 0 | 1 | 2 | 1 | 2 |
| Center | 4 | 4 | 2 | 0 | 1 | 1 | 0 | 1 |
| Berea | 3 | 3 | 0 | 0 | 2 | 1 | 0 | 1 |
| Union | 3 | 2 | 1 | 1 | 2 | 0 | 0 | 0 |
| Ky. Wesleyan | 3 | 2 | 1 | 1 | 2 | 0 | 0 | 0 |
| Transylvania | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| Georgetown | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| Kentucky State College | 9 | 7 | 4 | 2 | 2 | 2 | 1 | 2 |
| Out of State | 48 | 37 | 13 | 2 | 19 | 12 | 4 | 0 |
| TOTALS | 137 | 105 | 44 | 15 | 55 | 28 | 10 | 16 |

University of Kentucky—trained only 60 of the chemistry teachers employed in 1946-47. Of these, only 17 are chemistry majors, and only six majored in chemistry since 1937.

In looking again at Table I the reader will note that 28 chemistry teachers do not meet the requirements of twelve college hours in a teaching field as prescribed by the Kentucky State Department of Education. Sixteen of the teachers have neither a major nor minor in any science field.

# CHAPTER III

## EDUCATIONAL QUALIFICATIONS OF KENTUCKY PHYSICS TEACHERS

The importance of physics is demonstrated through the numerous discoveries in electricity, communication, radio, radar, nuclear fission, and in similar fields. Since this is true, physics has become real to many young people through daily contact with the modern scientific age. An early knowledge and appreciation of the subjects can be realized through a systematic and practical physics course in high schools.

A study of physics instruction in Kentucky high schools reveals that only 97 of the high schools teach a course in the subject. Out of 608 high schools in Kentucky 511 do not offer physics.

One hundred twenty-one teachers, as shown by Table II, are teaching physics in the state. Of these 85 are college graduates. Thirty are physics majors, but only 11 of the teachers for 1946-47 majored in the field since 1937. Again it may be seen from Table II that 56 of the present teachers minored in physics. In summarizing the previous statements, one finds that 86 of the 121 physics teachers have either majored or minored in physics.

There are 33 high school physics teachers who have ten hours or less in college physics and two who have more than ten hours in college physics but not enough for a minor. It will be noted from this table that there are 33 high school physics teachers who do not meet the requirements of twelve college hours in a teaching field as established by the Kentucky State Department of Education. Sixteen high school physics teachers did not major or minor in any science while in college.

TABLE II

GRAPHIC SURVEY OF KENTUCKY PHYSICS TEACHERS

| Name of College Attended | Number Attended | Number Graduated | Number Physics Majors | Number Physics Majors since 1937 | Number Physics Minors | Number with 10 hours or less in Physics | Number with more than 10 hours but no minor | Number with no Science Major or Minor |
|---|---|---|---|---|---|---|---|---|
| Western Ky. | 26 | 22 | 4 | 2 | 13 | 7 | 2 | 4 |
| U. of K. | 20 | 14 | 9 | 4 | 7 | 4 | 0 | 2 |
| Eastern Ky. | 11 | 8 | 1 | 0 | 6 | 4 | 0 | 1 |
| Murray State | 4 | 2 | 1 | 0 | 2 | 1 | 0 | 0 |
| Morehead | 5 | 4 | 1 | 1 | 3 | 1 | 0 | 0 |
| Berea | 3 | 3 | 3 | 1 | 0 | 0 | 0 | 0 |
| Transylvania | 5 | 2 | 0 | 0 | 3 | 2 | 0 | 1 |
| Union | 2 | 1 | 0 | 0 | 2 | 0 | 0 | 0 |
| Ky. Wesleyan | 4 | 2 | 1 | 0 | 1 | 2 | 0 | 1 |
| Center | 3 | 1 | 3 | 1 | 0 | 0 | 0 | 0 |
| U. of L. | 3 | 1 | 2 | 1 | 0 | 1 | 0 | 0 |
| Georgetown | 3 | 1 | 2 | 0 | 1 | 0 | 0 | 0 |
| Kentucky State College | 7 | 4 | 2 | 1 | 2 | 3 | 0 | 2 |
| Out of State | 25 | 20 | 1 | 0 | 16 | 8 | 0 | 5 |
| TOTALS | 121 | 85 | 30 | 11 | 56 | 33 | 2 | 16 |

Of the 121 high school physics teachers in Kentucky 25 were trained outside the state. Of those trained in Kentucky only 64 received their college work in the four teachers colleges and the University of Kentucky. Of this number only 16 are physics majors and only seven received their training since 1937. This means that only seven physics majors graduated from Western, Eastern, Murray, Morehead, and the University of Kentucky since 1937 are now employed in the teaching profession in Kentucky.

# CHAPTER IV

## EDUCATIONAL QUALIFICATIONS OF KENTUCKY BIOLOGY TEACHERS

Biology is the science of life, including a study of the development, structure, and behavior of living organisms. We are becoming more aware from time to time of what the biologist is doing toward improving health and prolonging life. The inquisitive minds of our public school children present questions about the things that they read and hear. It is the responsibility of our public schools to answer these questions. The biology teacher has an important role to play in the education of young people.

By observing Table III one may see that of the 375 biology teachers in Kentucky high schools, 104 are majors in the subject, 30 of whom finished their work since 1937. The table also shows that 131 of the teachers have a minor in biology. From this table one finds that 240 biology teachers in Kentucky have either a major or a minor in that field. Eighty-seven teachers of biology do not have a major or minor in any scientific field.

Approximately one-third, or 131 biology teachers, have 10 college hours or less in that subject. These teachers do not meet the requirements of 12 college hours in a teaching field as prescribed by the Kentucky State Department of Education. There are 24 teachers of biology who have more than 10 hours in their field but not enough for a minor in biology.

Table III shows that of the 395 biology teachers in Kentucky 107 received training outside the state. The four Kentucky teachers colleges

TABLE III
GRAPHIC SURVEY OF KENTUCKY BIOLOGY TEACHERS

| Name of College Attended | Number Attended | Number Graduated | Number Biology Majors | Number Biology Majors since 1937 | Number Biology Minors | Number with 10 hours or less in Biology | Number with more than 10 hours but no Minor | Number with no Science Major Or Minor |
|---|---|---|---|---|---|---|---|---|
| Western Ky. | 97 | 79 | 23 | 12 | 35 | 31 | 8 | 17 |
| U. of K. | 52 | 47 | 15 | 3 | 19 | 16 | 2 | 9 |
| Murray State | 20 | 18 | 0 | 0 | 5 | 12 | 3 | 13 |
| Eastern Ky. | 27 | 22 | 3 | 1 | 11 | 6 | 7 | 10 |
| Morehead | 20 | 10 | 7 | 5 | 8 | 5 | 0 | 2 |
| U. of L. | 2 | 2 | 1 | 1 | 0 | 1 | 0 | 0 |
| Center | 7 | 6 | 1 | 0 | 0 | 5 | 1 | 4 |
| Berea | 10 | 7 | 2 | 1 | 3 | 4 | 1 | 6 |
| Union | 13 | 10 | 4 | 1 | 6 | 3 | 0 | 1 |
| Ky. Wesleyan | 9 | 8 | 3 | 0 | 2 | 4 | 0 | 1 |
| Transylvania | 3 | 3 | 1 | 0 | 1 | 1 | 0 | 0 |
| Georgetown | 12 | 10 | 5 | 1 | 2 | 5 | 0 | 2 |
| Kentucky State College | 15 | 11 | 6 | 1 | 5 | 4 | 0 | 2 |
| Out of State | 107 | 94 | 33 | 4 | 49 | 36 | 2 | 20 |
| TOTALS | 395 | 327 | 104 | 30 | 136 | 131 | 24 | 87 |

and the University of Kentucky trained 261 of these teachers, 21 of whom majored in biology since 1937. Of the number trained in the four teachers colleges and the University of Kentucky, 48 majored in biology, 78 minored in biology. This reveals that 126 are biology majors or minors.

# CHAPTER V

## EDUCATIONAL QUALIFICATIONS OF KENTUCKY GENERAL SCIENCE TEACHERS

General science is the integration of all the sciences, both physical and biological. Through general science it is possible to bring together all the information from the several fields of science and thus show the relationship of one science to the other. It is, therefore, the most effective means of giving public school children the information that they desire and need in a scientific environment.

Referring to Table IV one may see that general science is offered in the upper grades of 501 of Kentucky's 608 high schools. All the schools of Kentucky have some form of general science in either the junior or senior high school. This study is merely concerned with those schools that offer general science in senior high school. The material in this chapter deals with those teachers who give instruction in no science other than general science. The teachers of chemistry, physics, or biology in combination with general science are not listed here.

The table shows that there are 315 teachers of general science in Kentucky, and that 231 of these teachers are college graduates. Ten general science teachers in Kentucky have never attended college.

The table shows also that of the 315 general science teachers 56 have had some work in all three of the sciences—chemistry, physics, and biology. There are 83 who have had work in two of the sciences. Fifty-three have had only one science. No college work in a scientific field was found for 113 general science teachers.

TABLE IV
GRAPHIC SURVEY OF KENTUCKY GENERAL SCIENCE TEACHERS

| Name of College Attended | Number Attended | Number Graduated | Number with work in at least three Sciences | Number with two Sciences | Number with only ONE Science | Number with no Science | Number with no College work |
|---|---|---|---|---|---|---|---|
| Western Ky. | 65 | 55 | 11 | 7 | 7 | 40 | |
| U. of K. | 40 | 34 | 7 | 14 | 13 | 6 | |
| Murray State | 23 | 20 | 4 | 9 | 0 | 10 | |
| Eastern Ky. | 25 | 20 | 5 | 7 | 6 | 7 | |
| Morehead | 13 | 9 | 2 | 7 | 1 | 3 | |
| U. of L. | 17 | 14 | 2 | 7 | 7 | 1 | |
| Center | 14 | 10 | 1 | 6 | 3 | 4 | |
| Berea | 11 | 7 | 4 | 5 | 1 | 1 | |
| Union | 9 | 4 | 2 | 0 | 1 | 6 | |
| Ky. Wesleyan | 14 | 11 | 2 | 3 | 2 | 7 | |
| Transylvania | 17 | 14 | 4 | 3 | 5 | 5 | |
| Georgetown | 19 | 14 | 4 | 6 | 2 | 7 | |
| Kentucky State College | 16 | 11 | 6 | 7 | 2 | 1 | |
| Out of State | 12 | 7 | 2 | 2 | 2 | 6 | |
| | | | | | | | 10 |
| TOTALS | 315 | 231 | 56 | 83 | 53 | 113 | 10 |

Only 12 of the 315 general science teachers received training outside Kentucky. The four teachers colleges in Kentucky and the University of Kentucky trained 166 of the general science teachers, 66 of whom received no training in a scientific field.

# CHAPTER VI

## SUMMARY AND CONCLUSIONS

Of the 787 science teachers in Kentucky during the school year 1946-47, 155 majored in biology; 94, in chemistry, and 50, in physics. One hundred eighty-eight minored in biology; 86, in physics, and 68, in chemistry. There are 299 science teachers who majored in a science and 342 who minored in a science. Of the 488 who did not major in a science, 176 minored in a science. This means that 312 of the Kentucky science teachers did not major or minor in a science.

There are 276 science teachers in Kentucky who do not meet the requirements of 12 college hours in a teaching field as prescribed by the State Department of Education.

If Kentucky is to meet the science needs of its public school children, something must be done to improve the qualifications of the science teachers. Improving the training of Kentucky science teachers should do much toward enhancing our relative position among the several states in the field of education.

The study shows that of the 787 science teachers in the state, 461 receive less than $1500 per year; 202, between $1500 and $2000; and 124, over $2000. The average salary is $1400 per school year.

From these data it is very evident that if we are to have an adequate program of science instruction in Kentucky high schools, it will be necessary to increase teachers' salaries to meet the rise in cost of living. The science students in the colleges today are not planning to teach. They are going into industry, private business, or some profession other than teaching. Something must be done to bring more desirable college graduates into the teaching profession.

TABLE V

NUMBER OF HIGH SCHOOL SCIENCE TEACHERS AND TYPES OF DEGREES THEY HOLD

| Degree | Number of Teachers |
|---|---|
| Bachelor | 556 |
| Masters | 35 |
| Doctor of Philosophy | 2 |
| TOTAL | 593 |

In referring to Table V one may see that there are 593 college graduates teaching science in Kentucky high schools; of these 556 hold a Bachelor's degree, 35 a Master's degree, and two the degree of Doctor of Philosophy. The two with the Doctor of Philosophy degree are college professors and are doing part-time teaching in high school.

In looking back over the data in this thesis, one will note that the teachers colleges and the University of Kentucky are not producing science teachers. These institutions were founded as teacher-training institutions, and until the public sees fit to change them, it is their duty to give returns for the millions of dollars spent each year. Of the many science majors who have graduated from these five institutions since 1937, only 33 are teaching science in Kentucky today. This would indicate that each of the institutions has trained on the average approximately six and one-half science teachers to teach in Kentucky in the last ten years.

SUPPLEMENTARY TABLE I

THE NUMBER OF HIGH SCHOOLS OFFERING INSTRUCTION IN DIFFERENT SCIENCES

| Sciences Offered | Number of Schools Offering |
|---|---|
| Chem., Phys., biol., gen. sci. | 30 |
| Chem., biol., gen. sci. | 41 |
| Chem., phys., gen. sci. | 10 |
| Chem., phys., biol. | 1 |
| Phys., biol., gen. sci. | 30 |
| Phys., gen. sci. | 21 |
| Phys., biol. | 1 |
| Chem., phys. | 2 |
| Chem., biol. | 4 |
| Chem., gen. sci. | 11 |
| Biol., gen. sci. | 197 |
| Chemistry | 2 |
| Physics | 2 |
| Biology | 38 |
| General science | 261 |

SUPPLEMENTARY TABLE II

A GRAPHIC REPRESENTATION OF THE 787 SCIENCE TEACHERS AND THE COLLEGES THEY ATTENDED

| Name of College | Number of Teachers |
|---|---|
| Western Kentucky | 111 |
| University of Kentucky | 91 |
| Eastern Kentucky | 67 |
| Murray State | 58 |
| Center | 55 |
| University of Louisville | 50 |
| Union | 37 |
| Transylvania | 37 |
| Morehead | 31 |
| Kentucky Wesleyan | 31 |
| Georgetown | 25 |
| Berea | 25 |
| Kentucky State College | 19 |
| Institutions outside Kentucky | 121 |
| No College Training | 10 |
| TOTAL | 787 |

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