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Attitudes of Preservice Elementary Teachers Toward Science and the Teaching of Science

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ATTITUDES OF PRESERVICE ELEMENTARY TEACHERS TOWARD SCIENCE AND THE TEACHING OF SCIENCE

(TITLE)

BY

Gregory C. Schaeffer

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

MASTER OF SCIENCE IN EDUCATION

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

1986
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ATTITUDES OF PRESERVICE ELEMENTARY TEACHERS TOWARD SCIENCE AND THE TEACHING OF SCIENCE

BY

GREGORY C. SCHAEFFER

A THESIS PAPER

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR

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CHARLESTON, ILLINOIS

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Thesis Abstract of:

ATTITUDES OF PRESERVICE ELEMENTARY TEACHERS TOWARD SCIENCE AND THE TEACHING OF SCIENCE

Written by: Gregory C. Schaeffer, July 1986.

The importance of attitude toward the teaching and understanding of science has long been a concern of researchers. Its importance in the schools, as a means to influence academic achievement, continues to be felt. Teachers, often without trying, pass on to their students attitudes about science that are unproductive. It is, therefore, important for teachers to possess attitudes supporting the subjects that they teach. The problem then is determining what factors contribute to these teacher attitudes and how are they passed on to students.

Past research has failed to show conclusively what actually contributes to the creation of positive and negative attitudes towards science. It has been shown that students at the primary grades tend to like science more than the older students, while the younger students' teachers dislike science and the secondary grades teachers feel very positive toward science.

This study polled the students in two different education courses in order to determine what effect, if any, these courses had on student attitudes toward science and the teaching of science. The courses polled were Elementary Education 1230, an introduction education class, and Elementary Education 3290, the science methods course that all elementary education majors must

complete.

The findings of the study indicate that the science methods course Elementary Education 3290 does cause an increase in the positive attitudes of those students who complete this course. It is not clear, however, if this change is due to the different age levels of the students, i.e. maturation level or if it was actually the course and course content. Further investigation is needed to determine more accurately the relationship between the science method course and preservice elementary teachers attitudes toward science and the teaching of science.

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CHAPTER ONE

INTRODUCTION

The importance of attitude toward the teaching and understanding of science has long been a concern of researchers. Its importance in the schools as a means to influence academic achievement continues to be felt. Perhaps this is due to the attitudes of those who have control over the content of science that is taught in the classroom, the teachers.

The classroom teacher commands a seat of great power in terms of both cognitive and attitude development. Unknowingly and often very innocently, negative attitudes of people, subject matter and behavior can be transmitted to the student. These students, when asked to express their attitudes, tend to imitate the attitudes of significant adults in their lives. This may lead to the creation of negative attitudes in areas that may hinder their total development.

THE PROBLEM

This problem is a significant one because educators must possess attitudes supporting the subject or subjects in which they teach. Elementary teachers are in a unique position in that they have the responsibility of teaching all of the major subject areas of math, science, language arts, reading, etc. Some may even have the extra requirements of teaching art and music as well. Given this wide range of duties, one can understand why one or more of

these areas is preferred over the others. Oftentimes it is the area of science that misses out. This may be due to some type of neutral or negative attitude toward science or the teaching of science.

PURPOSE OF THE STUDY

The purpose of this study is to try to determine if the science methods course for elementary education majors taught at Eastern Illinois University has any effect on preservice teachers' attitudes toward science and the teaching of science.

HYPOTHESIS

There exists a relationship between the attitudes of students toward science and the teaching of science, who have completed Elementary Education 3290 and those students that have not completed Elementary Education 3290.

THE DELIMITATIONS

This study was conducted at Eastern Illinois University, Charleston, Illinois. The students in four sections of two different education courses, Elementary Education (ELE) 1230 and

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THE DELIMITATIONS

This study was conducted at Eastern Illinois University, Charleston, Illinois. The students in four sections of two different education courses, Elementary Education (ELE) 1230 and ELE 3290, were polled concerning their attitude toward science and the teaching of science as determined by a Likert-type scale survey created for this study.

The courses considered in this study are required of all elementary education majors and consist of an introductory education course, ELE 1230, and a science methods course, ELE

3290. These courses were chosen because the students in ELE 1230 will not have completed ELE 3290, since these courses are required to be taken in sequence. The survey was administered in the spring on the last day of class for each course. This investigation was conducted using the attitude survey as an attitude/opinion poll of the population sample surveyed. (Final exams were held the following week, so administering the survey did not interfere with final testing.)

DEFINITIONS

In this study, the students' attitudes toward science and the teaching of science will be interpreted as the students' responses to a Likert-type scale attitude survey. Also, the word "science" will be taken to include those fields of science such as biology, chemistry, earth science, etc., except where noted.

CHAPTER 2

The literature review for this research is divided into two basic parts. The first part is concerned with articles that deal with preservice and inservice teachers, their attitudes toward science, and how these attitudes may be changed. The second part deals with articles that are about the students' attitudes toward science and their science teacher and, to some degree, how the students' attitudes may be changed.

REVIEW OF RELATED LITERATURE
PART ONE

This research is being conducted as a result of not only concern and interest in science but also as an interest in how science is taught in the elementary classroom. Science does not seem to be a favorite subject among elementary school teachers, and many teachers harbor neutral and even negative feelings toward science (Spooner and Simpson 1979). If this is truly the case in elementary classrooms, it seems doubtful that these teachers would spend much time teaching science. Conant (1974) found that in Portland, Oregon, science was taught on the average of not more than two minutes per day. This would seem to leave a lot to be desired in the area of teaching science.

An individual's attitude toward science would tend to affect drastically how that person would approach the teaching of science. School children have a tendency to imitate the attitudes of

"significant adults" when expressing their feelings and attitudes (Lawrenze and Cohen 1985). Therefore, teachers who do not like science, or in some way harbor negative attitudes toward science, could pass these feelings and attitudes on to their students (Washington 1971).

What needs to be said is that the teacher's attitude toward science affects how his/her students feel toward science and thus how well students do in science class. If teachers develop negative attitudes toward science on their own, or if these attitudes are a direct result of teacher educators, then these attitudes are sure to be passed on to the elementary student.

The key would seem to be to create teachers who like science and change the attitudes of those teachers who do not like science. One possible way to improve preservice teachers' attitudes toward science could be to have them take additional science courses. Gabel (1981) found that the number of science courses a student takes may have a cumulative affect in positively influencing his/her attitudes. She noted a significant difference existed between students who took one to two science courses and those that took four or more courses. This may seem an all too simple solution to a complex and involved problem. It does, however, make sense to learn more science in order to understand science better, teach science with more confidence, and thus carry a more positive attitude toward science into the classroom. Taking another three or four hours of science would not be

very difficult for elementary preservice teachers to fit into their programs. If taking these extra classes means, in general, a more positive attitude toward science for those college students involved, then it is well worth the effort for both the preservice teacher and his/her advisor to help schedule the extra hours into his/her program. More research is needed in this area to help determine the maximum and minimum number of classes to affect most positively preservice teachers' attitudes toward science.

There are indications that preservice teachers' attitudes may be affected not only by science classes but also by science methods classes and practice (student) teaching as well. In an exploratory study into the effects of methods classes and practice teaching on the attitudes of preservice teachers toward science, Lawrenz and Cohen (1985) revealed some startling information.

The study they performed compared the results of findings from attitude tests administered to college students in education. These students were from two different colleges; one group of students who were secondary science education majors from the State University College of New York at Buffalo and the other, a group of elementary education majors who were attending school at Arizona State University. The attitude tests were given at the beginning of their respective science methods classes, after the completion of their science methods classes but before practice teaching, and once more after practice teaching. The Arizona students were studied as a result of questions that arose from

findings from the first group studied (the students from New York).

What was shown in this study is that secondary science education majors after having taught a semester of science classes during practice teaching developed a negative attitude toward science even though they started with a positive attitude while, on the other hand, the elementary education majors experienced no change in their attitudes after one semester of practice teaching, thus maintaining their original positive attitude.

The authors suggested several reasons that the secondary science education majors' attitudes toward science became negative. One reason may have been that these students experienced a rude awakening to the realities of teaching. Another reason may have been the result of trying to teach apathetic junior high and high school students. And still another reason may have been subject matter saturation, i.e. they got tired of talking only about science. The actual reason was probably a combination of these and still other reasons.

Possible reasons that elementary education majors maintained their positive attitudes toward science may be that they did not have to teach science all day, every day, as the secondary science people had to do. Science, to them, may have been just another subject.

As was stated earlier, Lawrenz and Cohen (1985) intended this research to be of an exploratory nature. It is for this reason

that these findings cannot be generalized to include the entire population, that is, all the elementary education majors and all the secondary science majors. However, as the samples were representative of existing populations and of sufficient size for the intended purpose, these findings were significant and do warrant further research. The questions that these findings bring to mind are such that need to be answered.

One of the questions that comes to mind is that if secondary science education majors experience a negative attitude change from what they originally felt, will this trend continue, or will these students' feelings toward science tend to "bounce back" and become positive again after the initial problems of teaching wear off? And as for the elementary education majors, will they always carry positive attitudes toward science when teaching in the elementary classroom? These questions may not be easy to answer, but the research on student attitudes toward science and their science teacher may be of some assistance in finding answers. The next study, however, is aimed at encouraging the field of education to look beyond education, and to look toward the field of social psychology for possible ways to change teacher attitudes toward science.

Hassan and Shrigley (1985) believe that the field of social psychology can lend much to the problem of changing elementary teachers' attitudes toward science. Using the concepts of persuasion and self-esteem as their focus, Hassan and Shrigley try

to determine if a written persuasive communication would positively affect the attitudes of preservice teachers and if the communication would affect differently the subjects rated at different levels of self-esteem.

After dividing 98 preservice elementary majors into three levels of self-esteem, based on their scores on the Janis-Field scale, the subjects were randomly assigned into one of two treatment groups: one control and one experimental. An attitude scale was administered as both a pretest, posttest, and as a retention test. The groups were given the pretest and three weeks later were given two different written communications to read. The experimental communication was a persuasive message about chemistry and how it is important to be taught in the elementary school. The control group received a message dealing with dreams, taken from literature on the subject. As soon as the subjects were finished reading, they were given the posttest. Three weeks later they were given the retention test. Steps were taken to be sure that all subjects read the communications.

The results indicate that the attitudes of preservice elementary teachers can be changed by a written communication. Self-esteem was not found to have any real affect on the subjects' final attitudes.

Clearly it would be easiest to send new teachers out with a positive attitude toward science securely pinned to their jackets. There is, however, no guarantee that these attitudes

would not or have not already changed. It is for this reason that information exists on changing the attitudes of inservice elementary teachers.

Literature dealing with changing the attitudes of inservice teachers is not abundant. It would seem that most of the effort has been spent on attempting to change the attitudes of preservice teachers, the "old dog, new trick" theory. What literature does exist is dated 1977 and prior. What follows is a brief summary of the most appropriate articles.

Spooner and Simpson (1977) held a five day teacher workshop dealing with "hands-on" activities, films on how children best learn science, some peer microteaching and presentation/ discussion of the goals of science in elementary education. As a result of the administration of an attitude survey to the group of 97 teachers, Spooner and Simpson found that attitudes of inservice teachers can be changed over short periods of time. This is also supported by recent research (see Morrisey 1981, Hassan and Shrigley 1985).

Jaus (1977) carried out a study dealing with microteaching using 64 inservice elementary teachers divided into two groups. After an initial competence test dealing with the teachers' abilities to use an integrated process approach to teach science, one group was sent off to microteach elementary students at a local elementary school while the other group was provided with learning activities from various national science curricula.

After the treatment was finished, both groups were administered a science teaching attitude measure.

The results indicate that training elementary teachers in integrated science process skills and then having these same teachers use these skills in a teaching situation has a significant and positive effect on teaching attitudes towards science. More research needs to be completed so that inservice teachers today can benefit from information regarding an integrated science process approach.

In an earlier study Butts and Raun (1969) measured the attitudes of teachers involved in a program called "Science - a process approach". The 60 teachers involved in the studyt aught in Austin, Texas, and surrounding districts. An attitude survey was administered as both a pretest and a posttest. These researchers found that teacher attitudes do change when they are involved in teacher education programs which are directed at increasing competence in the process of science.

Butts and Raun (1969) also found that grade level is a relevant contributor to a positive change in the attitude of first and second grade teachers, but not as important for teachers at the intermediate level. The number of college credit hours in science that the teachers possess also was a contributor in positive attitude change as compared to those teachers that had fewer or no science credits.

A study similar to that by Butts and Ruan (1969) was conducted

by Shrigley and Johnson (1974). In this study six factors were considered in relation to teacher attitudes. These six factors included 1) sex differences, 2) age, 3) grade level that the teacher taught, 4) school size, 5) classroom organization, and 6) the science program that the school followed.

The general findings of Shrigley and Johnson (1974) were that science was viewed as masculine in nature, and the younger teachers had more positive attitudes toward science. The factors of school size, classroom organization, and the science program followed, did not seem to have a significant affect on teachers' attitudes toward science.

Earlier research in many ways seems to be echoed by the research of today. This trend indicates a continuous searching for the correct formula, the magic potion that will best effect and affect teachers and then students. This search is sure to continue.

PART TWO

Although a large body of research exists concerning students attitude toward science and their science teacher (Fraser 1978, Krockover and Malcom 1978, Ost and White 1979, Towose 1983, Hasan 1985, Lazarowitz et al. 1985, Talton and Simpson 1985), the most relevant research seems to be that of Robert Yager.

Yager and Yager (1985), combining some of their own research with that of the 1977 National Assessment of Educational Progress (NAEP) Third Assessment of Science report, indicate that secondary

students believe their science teacher really likes science. Less than half of these secondary students also feel that their science teacher makes science class interesting, and the majority of them feel that their science teacher does not encourage them to contribute to class, or share their own ideas.

The elementary students said they felt their teacher did not like science because their teacher told them so. These students also said that their teacher made science interesting and (80%) encouraged them to share their ideas and to participate in science class. How does this relate to the study by Lawrenz and Cohen (1985)? It could indicate some important relationships.

Assuming for a moment that the exploratory study by Lawrenz and Cohen (1985) is correct (that secondary science education majors dislike science after student teaching and that elementary education majors still like science the same as before they completed practice teaching, then it would seem that sometime after practice teaching the secondary teachers' attitude toward science became positive again. While this may be an indication that things will be "okay" for these teachers, Yager and Yager (1985) may indicate otherwise. Secondary students, while feeling that their teachers cared a great deal for their subjects, felt uninterested and that the teachers did not really encourage them to participate in science class. Elementary students, however, believed their teachers did not like science but these students still felt that their teacher made science interesting and exciting.

Even if the study by Lawrenz and Cohen is not correct, the data still seem to indicate that improving a teacher's attitude toward science may not be the best way to facilitate the teaching of science in the secondary and elementary schools. Yager and Yager (1985) showed that as grade level increased, student interest and attitude toward science decreased, while teacher attitude toward science increased as grade level increased. Also borne out in this study was the fact that the higher the grade level taught, the less likely a teacher would be to admit not knowing the answer to some question or problem. It seems that the higher the grade that is taught, the more egocentric the teacher becomes. What is it that teachers are so afraid of? Learning? Perhaps.

In an attempt to learn why students did and did not like science, Lazarowitz et al. (1985) asked 1885 students evenly distributed between grades six through twelve to list the reasons they liked or disliked science. This was accomplished via a survey created for the study. The top reasons why students liked science were 1) "I like to be outdoors", and 2) "I like to see things live and grow". As the grade level of the students increased, the reasons why students liked science shifted. These new reasons were more concerned with the human body and anatomy.

The number one reason why students did not like science was related to the teachers as persons and the way they taught. However, in regards to the students liking science, the teacher

as a consideration was chosen second to last.

Lazarowitz et al.(1985) was the only study of its type to be found. This indicates that more research in this area should be initiated.

The relationship that exists between peers and the affects on the individuals involved is not a new phenomenon. Talton and Simpson(1985) investigated these relationships and the affects these relationships had on student attitude toward science. In general they found that attitude toward science may be contagious. Talton and Simpson(1985) felt that when this "snowballing" occurs, students may be caught up in a movement toward a more positive attitude about science. However, they point out that the reverse could also be true. Keeping students' attitudes toward science positive is desirable, but it may be possible to influence positively students' attitudes through curriculum changes.

Several studies exist, which will not be detailed, that indicate an improvement in curriculum may positively affect a students attitude toward science. One such study Krockover and Malcolm (1978) conducted concluded that the use of a "hands-on" approach to science instruction can positively change students' attitudes toward science.

Hasan (1985), in an elaborate study attempting to find the relationships of seven independent variables, concluded in part that the one variable which most affects the attitudes of students

toward science is the student's perception of his/her own science abilities. These results have implications for both the development of science curriculum and teaching techniques utilizing specific styles of teaching.

It is clear from this literature review that attitude research is chaotic. This does not need to be all bad, because a little confusion to some people is often inspiration to others. Many important discoveries were made quite by accident. It should suffice to say then that attitude research in science education is not a straight-forward consideration. Attitude research is involved and complex, and within it exists many nooks and crannies that have yet to be explored.

CHAPTER THREE

THE PROCEDURE

As was indicated in the delimitations, the students surveyed in this study were enrolled in elementary education courses 1230 and 3290. The description for these courses are as follows:

ELE 1230 Laboratory in Education. 'A laboratory course emphasizing directed observation and participation in classrooms with children of preschool through junior high school ages.

ELE 3290 Science in the Elementary School. Content methods and materials of elementary school science, grades K-9. Emphasis on strategies and modern science education programs.

There were four sections of each course. The attitude survey was administered to each section on the same day, the last day of class.

The Population

The students in this study were about to complete the respective elementary education courses they were enrolled in, whether successfully or not was not a consideration. The majority of the students enrolled in ELE 1230, 78%, were second semester freshmen or first semester sophomores with fewer than 45 hours of college credit. The average age for these students was 19.

Less than 70% of the ELE 1230 students had completed their natural science or chemistry/physics requirements, while 78% had finished their life science requirements.

Of the majority of students enrolled in ELE 3290, 84%, were second semester juniors or first semester seniors. Of these students, 87% were 20 - 22 years of age. Ninety-eight percent of these students had completed their life science requirements, 85% had completed their natural science requirement, and 78% had completed their chemistry/physics requirement.

For both groups of students in ELE 1230 and ELE 3290, fewer than ten percent said that they had science as a field of concentration.

The Survey

The attitude survey consisted of seven questions that dealt with age, area of concentration, college class, etc., and 27 Likert-type statements that required the student to choose from "strongly agree", "agree", "undecided", "disagree", and "strongly disagree" for responses. The first seven questions were used to identify the population as to age, college class, and area of concentration. Question number 25 was omitted from the analysis of the data because of lack of subject consistency with the other statements.

The survey was constructed using the basic format of several different surveys, but for the most part the statements were original. Prior to administering the survey to the target groups, a field test was performed using a graduate elementary education research class as the dry run. This was done to "get the bugs out" and to change statements that were not appropriate.

Analysis of Survey Data

The data was analyzed using the positive responses to the 26 statements. Each statement was analyzed separately by adding up the positive responses to each statement and then dividing by the total number of responses for that statement. This decimal was then multiplied by 100 to give the percentage. This was done for all 26 statements.

The total number of students surveyed were as follows:

ELE 1230 n=95

ELE 3290 n=94.

However, due to omitted responses and other factors beyond the control of the investigator, the n for each statement within the groups vary. This is indicated in tables 1 - 4 and was taken into consideration when the percentages were calculated. Also, because each statement is independent of the rest, the percentages are not cumulative and do not equal 100.

THE POLL

This survey was conducted as a poll to indicate possible relationships beteen the two courses and their effects on attitudes toward science. To further test these findings, it would be necessary to conduct a study measuring the attitudes of ELE 1230 students before they start ELE 3290 and after they have completed it. It may also be interesting and informative

to continue the study and include the affects of student teaching on attitudes toward science.

CHAPTER FOUR

THE RESULTS

The results of the attitude survey appear in tables 1 - 4. A copy of the survey used appears in the appendix. The statements listed on the attitude survey were divided into four categories that may affect the teaching abilities and attitudes of preservice teachers. The categories were:

1) Students personal feelings toward the field of science.

2) How students view the effects/ affects of science in society.

3) The perceived attitudes students have as preservice teachers.

4) Attitudes toward success as an elementary science teacher.

Prior to the interpretations of the data, it must be noted that several of the statements were stated in a negative form. The positive response for these statements would be "Disagree" or "Strongly Disagree". The statements that were stated in the negative are: Category one, questions 1, 2, 3 and 4. Category two, questions 1, 5, 7. Category three, question 4. And category four, questions 4 and 5.

ANALYSIS OF THE FINDINGS

The results of this survey are best determined by an individual analysis of each question within each category. This

can be found listed in percentage form in tables 1 - 4. General findings are much more difficult to extract due to the large volume of data and would tend to be interpretation and not direct factual information. Therefore, the general analysis will appear in the discussion.

DISCUSSION

The overall findings of the study from category one would seem to be that after students have taken ELE 3290 they have a more positive attitude toward the field of science and the teaching of science than those students who have not taken ELE 3290. For statements 1, 2, 3, and 6, the response is nearly two to one, indicating a large change.

In category two, the ELE 3290 students believed more strongly that science helps the world to solve its problems, and that science is more orientated toward people than things. Both groups of students felt nearly equal that science has improved our standard of living.

The responses in category three seem to indicate that the ELE 3290 students feel more strongly than the ELE 1230 students that it is important to know the content of science well in order to teach it, and that the process of science is more important to teach than the facts of science. The 3290 students also indicated over the 1230 students that science is important for the intellectual growth of children and that it is important to

develop within students favorable attitudes toward science. Students in both groups of category three felt that many "hands-on" experiences were important for elementary students and that the elementary students' understanding of the process of science was as important as the knowing the facts of science.

It is interesting to note that 18% of the students in ELE 1230 felt that their science methods course (ELE 3290) had boosted their confidence concerning their ability to teach science when none of these students should have completed the course. One reason for this could be that there exists among these younger college students a predisposed positive attitude toward science, and that they felt when they took their science methods course it would further boost their confidence. Another possibility is that they were not paying attention to the question when they answered it. The latter is probably true.

Category four indicates clearly that the ELE 3290 students believe that they will be successful at teaching elementary science. This is not to say that the ELE 1230 people feel that they will do poorly as elementary science teachers. Their responses were positive and encouraging to see.

TABLE 1

Category 1: Students' personal feelings toward the field of science

Statement	Percent who responded positively			
	ELE 1230		ELE 3290	
1. Science requires a lot of study	(n=95)	5	(n=94)	12
2. There is too much math in science.	(n=94)	63	(n=94)	33
3. I do not like reading books on science.	(n=95)	17	(n=95)	33
4. Science is rather difficult for me.	(n=94)	32	(n=94)	34
5. I get good grades in science.	(n=94)	51	(n=94)	62
6. I enjoy talking about science with my friends roommate, and parents.	(n=94)	17	(n=94)	41
7. Science is fun.	(n=94)	56	(n=94)	76

Note: The n's in each table are not cumulative and the percents do not add up to 100.

TABLE 2

Category 2: How students view the effects/affects of science in society

Statement	percent who responded positively			
	ELE 1230		ELE 3290	
1. Science is not as interesting as other subject areas.	(n=95)	44	(n=93)	63
2. Science makes it easier to understand many of the worlds problems.	(n=94)	60	(n=93)	76
3. Science makes us think about what is happening to the world	(n=94)	79	(n=92)	86
4. Science has helped to improve our standard of living.	(n=95)	80	(n=94)	81
5. Science does more harm than good.	(n=94)	82	(n=92)	60
6. Science teaches you to question ideas and opinions.	(n=93)	74	(n=91)	91
7. Science is more concerned with things than people.	(n=92)	28	(n=92)	66

Note: The n's in each table are not cumulative and the percents do not add up to 100.

TABLE 3

Category 3: The perceived attitudes students have as preservice teachers

Statement	percent who answered positively			
	ELE 1230		ELE 3290	
1. Elementary teachers must know science content well to teach teach science adequately.	(n=94)	79	(n=91)	81
2. Elementary students should have many "hands-on" experiences in science such as field trips, experiments, etc.	(n=94)	98	(n=92)	96
3. Student understanding of the process of science such as measuring, classifying, and observing is as important as knowing the facts.	(n=94)	95	(n=92)	91
4. Teaching the basic facts in science is more important than the process of science.	(n=94)	37	(n=92)	52
5. Science is an important subject for the intellectual growth of children.	(n=94)	78	(n=92)	92
6. It is important to develop within students favorable attitudes toward science.	(n=94)	86	(n=91)	93
7. My science method course has boosted my confidence concerning my ability to teach science.	(n=90)	18	(n=90)	61

Note: The n's in each table are not cumulative and the percents do not add up to 100.

TABLE 4

Category 4: Attitude towards success as an elementary science teacher

Statement	percent who answered positively			
	ELE 1230		ELE 3290	
1. I could teach science using the process approach.	(n=94)	54	(n=92)	76
2. I will enjoy teaching elementary science.	(n=93)	42	(n=92)	75
3. I will do well as an elementary science teacher.	(n=93)	44	(n=92)	73
4. My college training in science will be of much value in the teaching of elementary science.	(n=93)	54	(n=92)	65
5. Most fifth graders know more science than I do.	(n=94)	57	(n=92)	42

Note: The n's in each table are not cumulative and the percents do not add up to 100.

CHAPTER FIVE

SUMMARY AND CONCLUSION

The research that was reviewed in chapter two was varied and covered several related yet different topics. Attitude research is an area where constant methodological problems plague researchers, yet the search continues for answers to the many questions that arise from the study of teacher and student attitudes toward science.

This study was an attempt to determine if the attitudes of preservice elementary teachers at Eastern Illinois University could be changed by the completion of the required science methods course each elementary major must complete. The results of this study show that the science methods course in question may positively affect many of the students that complete it. This attitude change may be short lived. Once these preservice teachers complete their student teaching and venture out into the real world of chalk boards and children, who is to say what will happen to their feelings?

RECOMMENDATIONS

Attitudes of people toward other people, subjects and events change over time. Therefore, it may be necessary to follow up this study by measuring the attitude of these same students after student teaching and even at periodic intervals after they have

taught for one, two, five, and ten years. A study of this type may lend some credence to Lawrenz and Cohen (1985), and help to answer some of the questions their data creates.

For the sake of validity this research should be repeated starting with students as they enter ELE 1230 and follow them at least to the end of their student teaching experience, if not even further. Additional research is also needed in the areas of elementary students' attitudes toward science and their science teacher as well as how to change these attitudes.

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APPENDIX

Attitude Survey

Please provide answers to the following questions. Thank you for your assistance!

1. Age: A. 18 B. 19 C. 20 D. 21 E. 22 F. other
2. Number of college hours completed including spring of 86.
   A. 0 - 15 B. 16 - 30 C. 31 - 45 D. 46 - 60 E. 61 - 75
   F. 76 - 90 G. 91 +, _____
3. General education requirements completed. (mark those that apply)
   A. Life Science 1000 B. or equivalent
   C. Physical Science D. Chemistry E. Physics
   F. Elective
4. If your area of concentration is science, indicate
   A. Life Science.
   B. Physical Science.
   C. Earth Science.
5. If your area of concentration is non-science please list.
   A.
6. My favorite science is (pick only one please)
   A. Life Science.
   B. Physical Science.
   C. General Science.
7 I watch science programs on television such as Nova, Jacques Cousteau, or Mr. Wizard:
   A. Often.
   B. Sometimes.
   C. Once in a great while.
   D. Never.

Please indicate which best describes the way you feel about each statement by circling the letter of your choice.
SA = Strongly Agree, A = Agree, U = Undecided, D = Disagree
SD = Strongly Disagree

1.	Science requires a lot of study.	SA A U D
2.	There is too much mathematics required in science.	SA A U D
3.	Science is not as interesting as other subject areas.	SA A U D
4.	Science makes it easier to understand many of the worlds problems.	SA A U D
5.	I do not like reading books on science.	SA A U D
6.	Science has helped to improve our standard of living.	SA A U D
7.	Science does more harm than good.	SA A U D
8.	Science is rather difficult for me.	SA A U D
9.	Science teaches you to question ideas and opinions.	SA A U D
10.	Science is more concerned with things than people.	SA A U D
11.	Science makes us think about what is happening in the world.	
12.	I get good grades in science courses.	SA A U D
13.	I enjoy talking about science with my roommate, friends and parents.	SA A U D

14. Elementary teachers must know science content well to teach science adequately. SA A U D SD

15. Elementary students should have many "hands-on" experiences in science such as field trips, experiments, etc. SA A U D SD

16. Student understanding of the process of science, such as measuring, classifying, and observing, is as important as knowing the facts of science. SA A U D SD

17. I could teach science using the process approach. SA A U D SD

18. Science is an important subject for the intellectual growth of children. SA A U D SD

19. I will enjoy teaching elementary science. SA A U D SD

20. My college training in science will be of much value in the teaching of elementary science. SA A U D SD

21. It is important to develop, within students, favorable attitudes toward science. SA A U D SD

22. My science methods course has boosted my confidence concerning my ability to teach science. SA A U D SD

23. I will do well as an elementary science teacher. SA A U D SD

24. Teaching the basic facts is more important than teaching science concepts to elementary students. SA A U D SD

25* I enjoy reading books on science fiction. SA A U D SD

26. Science is fun. SA A U D SD

27. Most 5th graders know more science than I do. SA A U D SD

* omitted