Central Washington University
ScholarWorks@CWU

All Graduate Projects | Graduate Student Projects

Summer 2000

# Out-Of-Field Teaching by High School Science Teachers in the Wenatchee Valley

Warren Gregson
*Central Washington University*

Follow this and additional works at: https://digitalcommons.cwu.edu/graduate_projects

 Part of the Educational Assessment, Evaluation, and Research Commons, Science and Mathematics Education Commons, and the Secondary Education Commons

## Recommended Citation

Gregson, Warren, "Out-Of-Field Teaching by High School Science Teachers in the Wenatchee Valley" (2000). *All Graduate Projects*. 712.
https://digitalcommons.cwu.edu/graduate_projects/712

This Graduate Project is brought to you for free and open access by the Graduate Student Projects at ScholarWorks@CWU. It has been accepted for inclusion in All Graduate Projects by an authorized administrator of ScholarWorks@CWU. For more information, please contact scholarworks@cwu.edu.

# OUT-OF-FIELD TEACHING

# BY HIGH SCHOOL SCIENCE TEACHERS

# IN THE WENATCHEE VALLEY

---

A Project Report

Presented to

The Graduate Faculty

Central Washington University

---

In Partial Fulfillment

Of the Requirements for the Degree

Master of Education

---

by

Warren Gregson

July 2000

# Abstract

Out-of- Field Teaching by High School Science Teachers in the Wenatchee Valley

by

Warren Gregson

July, 2000

The purpose of this study was to heighten the awareness and draw attention to the level of out-of-field teaching by high school science teachers in the Wenatchee Valley. This study was compared to the national average of out-of-field teaching of science. High school science teachers from four school districts in the Wenatchee Valley were surveyed to determine the level of out-of-field teaching. The results showed an increase in out-of-field teaching in the Wenatchee Valley compared to the national average. Recommendations were given to inform prospective science teachers about the necessary level of education needed to better prepare themselves for out-of-field teaching.

# Table of Contents

# List of Tables and Figures

# CHAPTER I

# THE PROBLEM

## Introduction

Out-of-field teaching occurs in all three conditions: when teachers are hired that do not have the necessary qualifications, teachers trained in other fields or grade levels, and the extensive use of substitute teachers. Although three-quarters of the states in the nation have a policy or regulation opposing out-of-field teaching, many of the states make no attempt to cross-check teacher qualification data (Robinson, 1985).

"One of the most significant problems in education is the misassignment of teachers to out-of-field teaching" (Brodbelt, 1990). Many teachers prefer teaching subjects they know, and yet, some evidence suggests they don't always know what subjects they are authorized to teach. There is a reluctance to resist misassignments, especially from new teachers (Robinson, 1985).

Newer teachers are subject to higher levels of misassignment due, in part, to their lack of seniority (Masland & Williams, 1983). It is unreasonable to place a teacher who has little or no previous experience in school procedures and classroom instruction into an out-of-field teaching situation. A more experienced teacher, although they may not be qualified, are more aware of the ins and outs of school procedure, and therefore, can devote more time to the subject area.

Once the newer teachers establish themselves in areas outside their certification,

school administration seems reluctant to move those teachers to areas where they are more qualified.

The reluctance of the school administration may be due to the fact that the out-of-field teacher has been doing the job and may now have a working knowledge of the subject area, even though they are not certified in that field. Another reason may be that when there is a certified teacher available for the subject, there is concurrently no job available for the teacher that has been doing the out-of-field assignment. The school administration may feel loyalty to the out-of-field teacher and be hesistant to replace that particular teacher with one who is qualified for the subject.

The most damaging consequence of out-of-field assignment was its negative effect on the quality of teaching and the education students receive (Robinson, 1985). "Wherever teachers are doing a poor job of preparing their students, it is reasonable to examine the relationship between unacceptable instruction and out-of-field teaching. Declining test scores are widely reported for high school students in math and science -- two areas, as it happens, where teacher shortages have been most acute" (Masland & Williams, 1983). It is unreasonable to expect the out-of-field teacher to adequately instruct the students by staying just one or two chapters ahead of them and, therefore, unreasonable for the students to adequately learn.

## Purpose of the Study

The purpose of this study was to find out how much out-of-field teaching by high school science teachers occurs in the Wenatchee Valley. The results were then compared

to the national average for the years 1990 and 1991. This study aimed to inform prospective teachers about the level of out-of-field teaching taking place and encouraged additional teacher credentials. It also helped draw attention to the problem for school administrators, so that further development of policy occurs.

## Limitations

One limitation of this study was that it only surveyed eighteen secondary science teachers in the Wenatchee Valley. Teachers in other subject areas and those in lower grade levels were not surveyed. You cannot make the conclusion that these results apply to all teachers in the Wenatchee Valley.

Another limitation of this study was that not all science teachers returned their surveys. All of the figures and estimates are based on the surveys returned; therefore, the results are subject to sampling error. Of the eighteen surveys handed out, only ten (10) were returned, giving a 55.5% response rate.

Because of anonymity, it was not known which science teachers filled out the survey, so the results cannot be applied to an individual teacher or school. Results can only be applied to Wenatchee Valley, in general.

The rate of return may be due to the fact that surveys were handed out during the last two weeks of school. Teacher time constraints with final exams and wrapping up the school year may have contributed to them not wanting to complete and return the form. The topic of out-of-field teaching may have led some science teachers to refrain from completing the survey in case they might be labelled as contributing to out-of-field teaching.

## Definition of Terms

Out-of-field teaching - teaching in subject areas that are outside one's major or minor

Wenatchee Valley - includes Wenatchee High School, Eastmont High School, Cashmere High School, and Entiat High School

# CHAPTER II

# REVIEW OF THE RELATED LITERATURE

Some out-of-field teaching is probably unavoidable, yet there are explanations for why it exists. The following literature review suggests explanations for out-of-field teaching to include the teacher unions, economic incentives, lack of teacher training, certification requirements, and teacher shortages. Solutions to this problem include offering competitive salaries, increasing existing teacher salaries, offering free retraining programs, cutting back on misassignment of beginning teachers, upgrading the quality of the teacher environment, and establishing a national teacher policy.

## Explanations for Out-of-Field Teaching

Teacher unions have long been faulted as a reason for out-of-field teaching. In cases where seniority rules, it is believed in cases of staff cutbacks that the "first hired last fired" policy will lead to the most senior staff members being required to teach more classes. This is not necessarily the case. Beginning teachers are more likely to be required to teach more classes out-of-field (Boe, 1999 & Ingersoll, 1999).

When faced with a choice, talented people will often choose a field that offers them the greatest economic reward. Public schools that have a rigid salary and benefit package cannot compete with the private sector, which can offer creative salaries, benefits, and incentive plans. The public and private sector often compete for the most desired science teachers who are qualified in either sector (Brodbelt, 1990).

One of the first things that come to mind when people think of a reason for out-of-field teaching is lack of training for teachers. In this view, teachers are considered poorly prepared when completing college or university training. They believe that the teaching program lacks adequate coursework in an academic field and aim to solve the problem by requiring an academic degree in the field they would be teaching (Saunders, 1985).

State "certification 'is the formal acknowledgement that the individual is qualified to supervise the learning experiences of children who reside in the state' (Burdin, 1982, 1865); it is the state way of reassuring the public that a competent teacher is being placed in the classroom" (Brodbelt, 1990). Not only are states requiring certification, but states are also testing for competencies in general knowledge. It is to say that while taking education courses necessary to learn how to teach, it is also necessary to pass a state exam in your endorseable subject area.

Both of these requirements are reasonable, but when combined they create a smaller pool of teachers in the critical areas (i.e. science, mathematics) from which to choose. This can lead to employing certified teachers who are not qualified to teach the subject for which they are hired. It can also lead to employing teachers who possess only an emergency certificate, thereby giving the legal right to teach the subject even though all qualifications have not been met. Though a smaller pool of teachers may result, this does not indicate teacher shortages, as a whole.

Teacher shortages are another area to blame for out-of-field teaching. When faced with a teaching position that is unfilled, administrators will use one of three methods to fill the position: hire less-qualified teachers, assign teachers assigned in another field or

grade level to teach in the understaffed area, or make extensive use of substitute teachers (Ingersoll, 1999). There are plenty of qualified teachers available, but not enough available in the critical areas. Teachers in critical areas are leaving teaching because they are dissatisfied with teaching as a career or are more interested in moving on to better their careers (Ingersoll, 1997). Ingersoll contradicts other studies (Masland,1983) by saying that there is no teacher shortage as a whole but only a shortage in critical areas.

## Solutions

Developing a multi-phased solution: make salaries competitive to private sector jobs and increase social status teachers receive. Competitive salaries "are the most significant means of attracting an ample supply of those fields of critical shortage" (Brodbelt, 1990).

By increasing entry-level salaries and making teaching more economically competitive with other occupations, more people will consider teaching as an occupation and pursue the field (Hawley, 1986& Kane, 1987). This will increase the number of people from which to choose the best and brightest. The low-social status of the teaching profession is a fundamental problem. If teaching could be treated as a highly regarded profession, one needing a great deal of skill, then there would be no problem in attracting and retaining highly qualified teachers (Ingersoll, 1997).

In order to attract current teachers into critical areas, schools could offer free retraining programs. Teachers that may be cut from a teaching area that has an oversupply could be retrained to teach in a critical area. Retrained teachers would allow for a

reduction in the percentage of teacher turnover within schools. Furthermore, schools could limit the number of out-of-field teaching assignment for beginning teachers.

Beginning teachers have one of the highest rates of teacher turnover. To solve the problem of the high rate of teacher turnover, provide an across-the-board forty percent increase in salary, thereby making it competitive with similarly educated professions (Hawley, 1986). It is also important to have a plan in place to curtail student discipline problems, and to involve teachers in other school decision-making processes. By addressing these three issues, it will decrease teacher turnover, which, in turn, will eliminate the shortages in the critical areas (Ingersoll, 1997). Other articles suggest working for smaller class sizes, which benefit students and teachers. Another is to break down teacher isolation through team teaching and joint planning (Ascher, 1991).

A need for national policy will assure that teacher training and standards are consistent across all state and local education boards and that standards are not waived whenever a shortage of teachers in a specific field exists.

# CHAPTER III

# PROCEDURES

## Data Collection

The purpose of this study was to find out how much out-of-field teaching by high school science teachers occurs in the Wenatchee Valley. Eighteen high school science teachers in the Wenatchee Valley were surveyed to determine the level of out-of-field teaching. Of the eighteen science teachers surveyed, nine resided at Wenatchee High School, five resided at Eastmont High School, three resided at Cashmere High School, and one resided at Entiat High School.

There were reasons for choosing a survey to complete this project. The straight-forward method of questions and answers leaves little ambiguity in the question being asked or the answer given. The survey allowed all respondents to be contacted at the same time, and the ability of the respondents to complete the survey at a time convenient for them. Most importantly, the survey was chosen for the anonymity the respondents had. The respondents would have no fear in answering the questions truthfully knowing that the answers they give, have in no way, the ability to being attributed to them.

The survey was developed using the guidelines set out in the text "Guide to Sensible Surveys. The questions were developed using the guidelines set forth in the text. Each question was carefully worded, made sure to ask for one answer per question, each question that could have more than one answer was provided with a checklist for respondents to mark, and other questions were provided closed-ended answers for clarity.

The eighteen high school science teacher were chosen for this survey because it dealt with out-of-field teaching at the high school level. For this reason all other science teachers at other grade levels were not included. The Wenatchee Valley area was chosen because this is the area I am living in and most likely teaching within.

During June 2000, a survey was prepared and distributed to eighteen (18) science teachers residing in four (4) high schools in the Wenatchee Valley (see Appendix A). The purpose of the survey was to gather information useful in determining the level of participation of out-of-field teaching by science teachers in their respective high school. The science teachers were asked to check boxes appropriate to their response, and to provide short answers (see Appendix B). Each of the high school secretaries placed the surveys in each of the science teacher's mailbox. Once completed, each science teacher mailed their survey in the enclosed envelope. Each return envelope was not identified as to which high school or teacher from which it came in order to preserve anonymity. The name of each high school and the number of surveys left with each high school, as well as the total number of returns, are listed in the table below:

**Table 1 - Schools Surveyed**

| School Name | Location | Surveys Distributed |
|---|---|---|
| Wenatchee High School | Wenatchee | 9 |
| Eastmont High School | Eastmont | 5 |
| Cashmere High School | Cashmere | 3 |
| Entiat High School | Entiat | 1 |
| | | Total Returned: 10 (55.5%) |

Of the eighteen (18) surveys distributed, ten (10) were completed and returned, a 55.5% response rate.

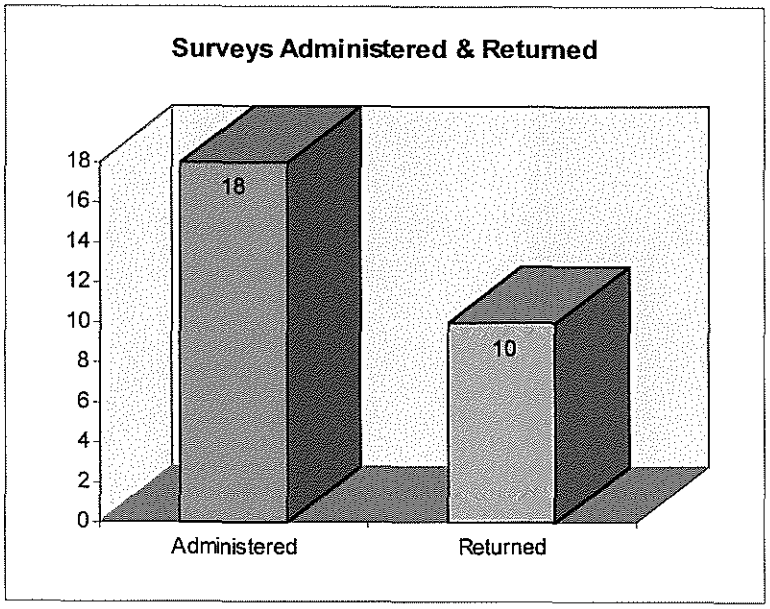
Surveys Administered & Returned
18
16
14
12
10
8
6
4
2
0
18
10
Administered
Returned

**Figure 1**

# CHAPTER IV

# RESULTS

## Participants

During June 2000, a questionnaire was prepared and sent out to eighteen (18) high school science teachers in the Wenatchee Valley (Appendix A). Each high school received surveys equal to the number of science teachers employed. Wenatchee High School received nine (9) surveys, Eastmont High School received five (5) surveys, Cashmere High School received three (3) surveys and Entiat High School received one (1) survey.

## Demographic Information

Distributed the questionnaire to all science teachers of the four high schools in the Wenatchee Valley, regardless of experience level, race, gender, or religion. The size of schools ranged from 117 to 1946 students.

## Data and Analysis

Forty percent (40%) of the responses indicated out-of-field teaching occurs in Wenatchee Valley. Of the four (4) responses, two (2) indicated teaching in related physical science courses. The other two (2) responses indicated mathematics as courses taught. All four responses indicated an expressed desire to take more physical science courses to better prepare themselves for the courses they taught. The number of years experience of those who taught out-of-field ranged from 2 to 32. Sixty percent (60%) of the responses indicate in-field teaching. The number of years experience who were not teaching out-of-field ranged from 0.5 to 14.

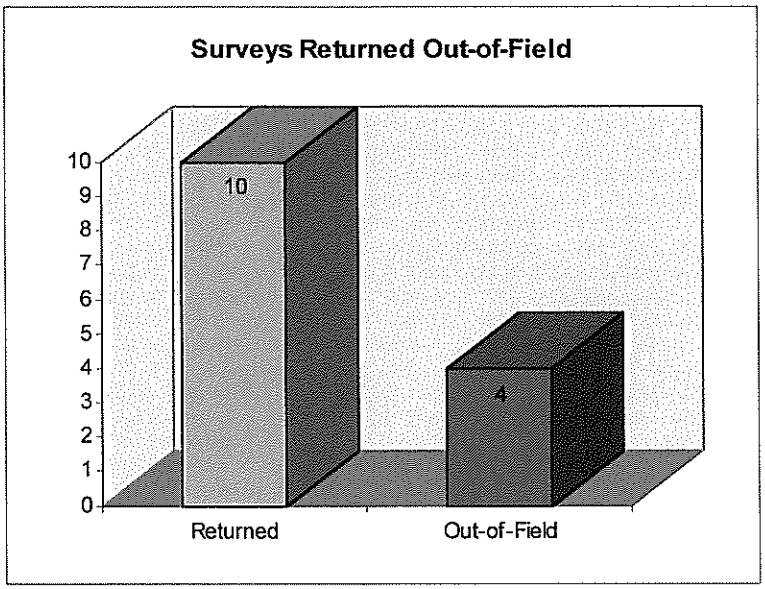


**Figure 2**

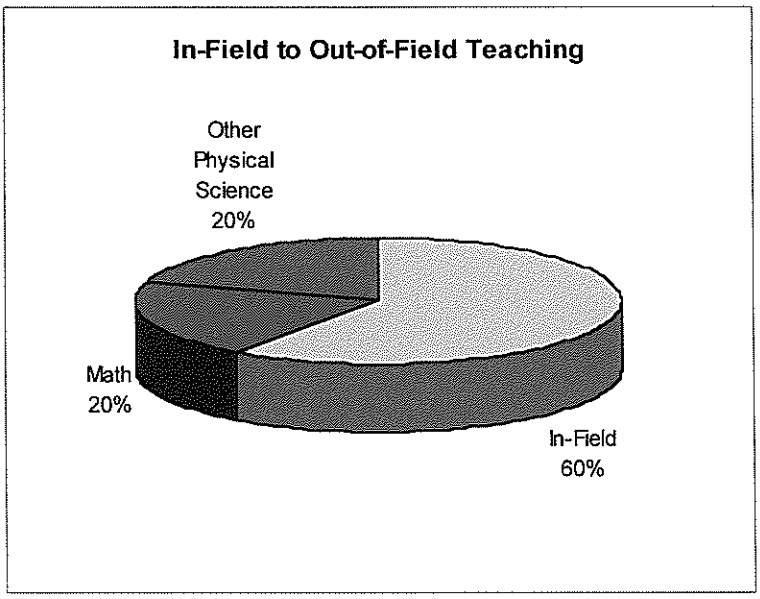


**Figure 3**

Compared to results in the Wenatchee Valley, the 1990 and 1991 national averages indicated nineteen percent (19%) of teachers surveyed are teaching out-of-field.

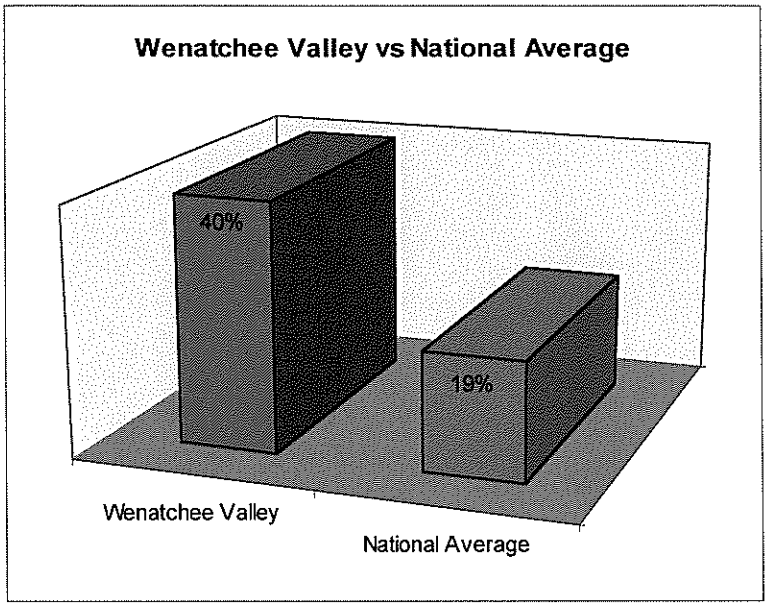


**Figure 4**

# CHAPTER V

## SUMMARY, CONCLUSIONS, RECOMMENDATIONS

The purpose of this study was to find out how much out-of-field teaching by high school science teachers occurs in the Wenatchee Valley. Eighteen high school science teachers in the Wenatchee Valley were surveyed to determine the level of out-of-field teaching. Of the eighteen science teachers surveyed, nine resided at Wenatchee High School, five resided at Eastmont High School, three resided at Cashmere High School, and one resided at Entiat High School.

This study could be expanded in a number of ways. The survey could be expanded to all science teachers in the Wenatchee Valley or even further, to all science teachers in the state. Not only could this survey be expanded to all science teachers, but could be expanded to all teachers at all levels in all subject areas across the state. A longitudinal study could be replicated using the same sample group, with results being compared to the national average for the same specified time period.

# BIBLIOGRAPHY


Ascher, C. (1991). Retaining Good Teachers in Urban Schools. Department of Education, Washington, D.C.

Boe, E et al. (1999). Productivity of Teacher Preparation Programs: Surplus or Shortage in Quantity and Quality of Degree Graduates. Center for Research and Evaluation in Social Policy. National Institute on Educational Governance, Finance, Policymaking, and Management.

Brodbelt, S. (1990). Out-of-field teaching. Clearinghouse, Feb90, Vol. 63 Issue 6, p282.

Darling-Hammond, L. (1990). Precollege science and mathematics teachers: supply, demand, and quality. Review of Research in Education, Vol 16, The RAND Corporation.

Farber, B.A. (1982). Teacher Burnout: Assumptions, Myths, and Issues. Presented at the Annual Convention of the American Psychological Association 1982.

Guthrie, J.W. and Zusman, A. (1982). Teacher Supply and Demand in Mathematics and Science. Phi Delta Kappan. Vol 64 Issue 1.

Hafner, A. and Owings, J. (1991). Careers in Teaching: Following Members of the High School Class of 1972 In and Out of Teaching. Analysis Report. National Longitudinal Studies of the High School Class of 1972. National Center for Education Statistics.

Hawley, W.D. (1986). Toward a comprehensive strategy for addressing the teacher shortage. Phi Delta Kappan, Vol 67, n 10.

Hudson, S.P. (1996). Broad Field Science Endorsements in the United States. School Science and Mathematics. Vol 96, n 6.

Ingersoll, R.M. (1999). The Problem of Underqualified Teachers in American Secondary Schools. Educational Researcher. Vol 28, n 2.

Ingersoll, R.M. (1998). The problem of out-of-field teaching. Phi Delta Kappan, Vol 79, Issue 10.

Ingersoll, R.M. (1997). Teacher turnover and teacher quality: the recurring myth of teacher shortages. Teachers College Record, Vol 99, Issue 1.

Ingersoll, R.M. (1996). Are High School Teachers Teaching Core Subjects without College Majors or Minors in those Subjects? National Center for Education Statistics.

Ingersoll, R.M. (1996). Teacher Quality and Inequality. The Proceedings of the American Statistical Association. Alexandria, VA: American Statistical Association.

Ingersoll, R.M. (1995b). Teacher Supply and Demand in the US. The Proceedings of the American Statistical Association. Alexandria, VA: American Statistical Association.

Ingersoll, R.M. and Gruber, K. (1996). Out-of-field teaching and educational equality. U.S. Department of Education, National Center for Education Statistics.

Ingersoll, R.M., Han, M., and Bobbitt, S. (1990-91). Teacher Supply, Teacher Qualifications, and Teacher Turnover. U.S. Department of Education, National Center for Education Statistics.

Kane, P.R. (1987). Public or Independent Schools: Does Where You Teach Make a Difference? Phi Delta Kappan. December p286-289.

Lewis, L. et al. (1999). Teacher Quality: A Report on the Preparation and Qualifications of Public School Teachers. Statistical Analysis Report. National Center for Education Statistics.

Ludwig, M.et al. (1995). Sustaining the Supply of Math and Science Teachers: Assessing the Long-Term Effects of Nontraditional and Mid-Career Teacher Preparation Programs. National Science Foundation.

Masland, S.W. and Williams, R.T. (1983). Teacher surplus and shortage: getting ready to accept responsibilities. Journal of Teacher Education, Vol 34, n 34.

National Commission on Teaching & America's Future (1996). What Matters Most: Teaching for America's Future. Summary Report.

Orlich, D.et al., (1975). Guide to Sensible Surveys. Research Coordinating Unit. Washington State Commission for Vocational Education

Risacher, B.F. (1998). Scientists and Mathematicians Become School Teachers. ERIC Clearinghouse for Science, Mathematics, and Environmental Education.

Robinson, V. (1985). Making do in the classroom: a report on the misassignment of teachers. American Federation of Teachers, Washington D.C; Council for Basic Education, Washington D.C.

Roth, R.A. (1986). Emergency Certificates, Misassignment of Teachers, and Other 'Dirty Little Secrets'. Phi Delta Kappan, Vol 67, n 10.

Saunders, R.L. (1985). The Preservice Education of Teachers. Paper presented to the Forum on Teacher Education, Appalachia Edcuational Laboratory.

Ward, C.A., Hart-Hester, S., and Love, R. (1987). A rural state's future: issues and solutions for teacher supply and demand in Mississippi. Mississippi State Department of Education, Jackson, MS.

# APPENDIX A

# SURVEY COVER LETTER

June 08, 2000

Dear Science Teacher:

My name is Warren Gregson and I am a graduate student at Central Washington University, currently working on a Master of Education project. The reason I am contacting you is to seek your assistance in completing a survey of science teachers. The purpose of the study is to find out the degree of out-of-field teaching for area high school science teachers.

Enclosed you will find a survey. Please complete this survey and return it in the envelope provided by Friday, June 17, 2000.

Bob Sotak, President-Elect of the Washington Science Teachers Association, supports this study. Results will be compiled and made available for analyzing the recruitment and hiring practices of science teachers in local high schools. If you would like a copy of the results, please indicate your desire on the back of the survey and write the name and address where you would like it sent.

Thank you for your time and assistance in making the graduate study successful.

Sincerely,

Warren Gregson

# APPENDIX B

# SURVEY

# "SCIENCE TEACHING OUT OF FIELD SURVEY"

**Science Teaching Out Of Field Survey**

1. What science classes are you currently teaching?

| | | | |
|---|---|---|---|
| ( ) | Biology | ( ) | Marine Biology |
| ( ) | Chemistry | ( ) | Anatomy/Physiology |
| ( ) | Earth Science | ( ) | Other _____ |

2. What was your major/minor?

3. Are you teaching any science courses outside your major or minor? Yes / No

   If yes, please check the appropriate box(es):

| | | | |
|---|---|---|---|
| ( ) | Biology | ( ) | Marine Biology |
| ( ) | Chemistry | ( ) | Anatomy/Physiology |
| ( ) | Earth Science | ( ) | Other _____ |

3. Are you teaching any other courses outside your field? Yes / No

   If yes, please check the appropriate box(es):

| | | | |
|---|---|---|---|
| ( ) | English | ( ) | Physical Education |
| ( ) | History | ( ) | Social Studies |
| ( ) | Math | ( ) | Other _____ |

4. Does your high school offer classes similar to your area of specialization?

5. What classes would you take in order to better prepare yourself for the classes you are teaching?

6. Did your major or minor in science education prepare you for the courses you are teaching? Yes / No

7. In order to teach current courses do/did you require further education?

   If yes, what courses specifically?

8. How many years have you been teaching?

9. What college/university did you attend?

Thank you for completing this survey. Please return this survey in the envelope provided.