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"THE STAFFING OF SCIENCE DEPARTMENTS IN NEW ZEALAND SECONDARY SCHOOLS".

A thesis presented in partial fulfilment of the requirements for the degree of Master of Philosophy in Education at Massey University.

Max Anthony Gerritsen

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ABSTRACT

This thesis attempts to ascertain the state of staffing in science departments of New Zealand Secondary Schools as at lst September 1980.

This study updates, and extends, the work done by E.J. Searle (1954) and O. Taylor (1965) of producing data about the staffing of science departments in secondary schools.

The survey consisted of two different questionnaire forms. One was to be completed by the Head of Department (H.O.D.) Science while a second form was completed by every teacher in the schools who was teaching one or more science classes.

The questionnaires were sent to all State and Private Secondary Schools, District High Schools and the Form 3 - 7 departments of Form 1 - 7 Schools. A response from 70% of the schools resulted.

The major areas for which information was obtained included: qualifications held and qualifications relevant to senior science subjects being taught, the percentage of trained teachers teaching science, salaries, the resources available to the teacher of science, the main areas of concern in science education as perceived by the teacher of science, and information from H.O.D s about the numbers of science teachers leaving teaching and the type of employment they had gone to. Information was also obtained relating to class sizes, the level of training and the teaching ability of teachers in training (i.e. those on Section and List A teachers), morale in science departments, the extent to which science teachers have become subject specialists and the type of people involved in part-time science teaching.

The responses made were hand coded by the researcher, punched on to computer discs and the necessary sorting and statistical analyses were done by Massey University's B6700 Computer.

Listed below are some of the major findings of the project. It seems that most teachers of science teach mainly science (81.7%) which is a marked increase in subject specialisation since 1965.

The teacher of science is generally much better qualified than in 1965 and 86.6% of the sample were trained teachers. Teachers with tertiary qualifications in Education, other than the Diploma in

Teaching, are quite rare (13%).

One of the major findings of Taylor's 1965 survey was that 57.7% of the science teachers in District High Schools and F. 1-7 Schools lacked completed degrees or diplomas. This value has now dropped to 20.5%.

Most teachers (76.4%) are reasonably happy with their present salary even though they do lack salary relativity with other professions having similar qualifications.

Excluding salary considerations, 64.4% of the sample were reasonably happy with their present situation as post-primary teachers of science. Science teachers did, however, recommend most strongly that less class contact time, better equipment and textbooks, more technician assistance and smaller teacher/pupil ratios are essential requisites of future modifications to their present conditions.

There is a definite shortage of well-trained, well qualified teachers which has to some extent been improved by the recruitment of teachers from overseas. For the schools in the sample the total shortage of science teachers was 1170 class contact hours per week.

The mean size of a science class has remained static at 23 over the past twenty-six years since Searle's 1954 survey.

The thesis concludes with some recommendations of future changes that the researcher feels would help improve staffing and conditions in the science departments of New Zealand secondary schools.

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LIST OF ABBREVIATIONS

B.A.	Bachelor of Arts
B.Ag.Sc.	Bachelor of Agricultural Science
B.Ed.	Bachelor of Education
B.H.Sc.	Bachelor of Home Science
B.Sc.	Bachelor of Science
B.Sc.(Hons.)	Bachelor of Science with Honours
Co-ed	Co-educational
Dip.H.Sc.	Diploma in Home Science
Dip.P.E.	Diploma in Physical Education
Dip.Ed.	Diploma in Education
D.H.S.	District High School
F. 1-7	Forms One to Seven
H.O.D.	Head of Department
Hons.	Honours
incom.	Incomplete
M.A.	Master of Arts
M.Ag.Sc.	Master of Agricultural Science
M.Ed.	Master of Education
M.H.Sc.	Master of Home Science
M.Phil.	Master of Philosophy
M.Sc.	Master of Science
M.Sc.(Hons.)	Master of Science with Honours
N.Z.C.S.	New Zealand Certificate of Science
N.Z.I.C.	New Zealand Institute of Chemistry
N.Z.P.P.T.A.	New Zealand Post Primary Teachers' Association
N.Z.S.T.A.	New Zealand Science Teachers' Association
Ph.D.	Doctor of Philosophy
P.P.T.A.	Post Primary Teachers' Association
P.R.	Position of Responsibility
P.S.S.C.	Physical Sciences Studies Committee
S.T.A.	Science Teachers' Association
T.C.	Teachers' College
T.T.C.	Trained Teacher's Certificate
%	Percentage

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CHAPTER 1.

INTRODUCTION.

This Chapter consists of three main sections:

(a) An overview of the thesis

(b) The review of the relevant literature

(c) The hypotheses and aims of the project.

AN OVERVIEW

This thesis attempts to ascertain the present state of staffing of science departments in New Zealand Secondary Schools as at 1st September 1980.

For some time the researcher has felt that there has been a shortage of adequately qualified teachers of science in New Zealand secondary schools and because of this many students are denied a satisfactory education in science. In an attempt to ascertain just what the present staffing position is, and to see whether it has deteriorated or improved some of the findings are compared with those of Owen Taylor's 1965 survey of staffing in the science departments of New Zealand secondary schools. Taylor's survey was based on, and attempted to update, E.J. Searle's 1954 survey published in his book "The Teaching of Science in Post Primary Schools" (1958). Thus, in places it was possible to compare the 1980 situation with what it was both fifteen and twenty-six years ago.

While Taylor's survey concentrated primarily on qualifications this survey looks also at training, salaries and conditions.

The thesis begins with a review of the literature followed by a statement of the hypotheses and aims of the project.

Chapter 2 looks at the procedure that was followed. The nature of the population, the invited sample and the data producing sample is outlined. Comments are made about the questionnaire forms used; the problems that arose in producing the final format of the data collection instruments and a critical appraisal of both their reliability and validity. The method used to analyse the data is discussed.

The results of the survey are presented in the following three chapters headed: "Qualifications and Training", "The Teacher of

Science" and "The Science Department".

Chapter 3, "Qualifications and Training", presents the qualifications held by teachers in the sample and discusses their relevance to the science subjects being taught. The percentage of trained teachers in the sample is also given and discussed.

Chapter 4, "The Teacher of Science", presents the information obtained which the researcher used to attempt to answer the questions:

1. Are most teachers of science happy with their present salary and, if not, why?
2. Are teachers of science happy with their present situation as secondary school science teachers and, if not, why?
3. What things would the teachers of science most like to see take place to improve their jobs as teachers of science?
4. How many teachers of science are members of Science Teacher Associations?
5. From the information given by H.O.Ds on science teachers leaving teaching:
   (a) How many have left teaching in the past year?
   (b) To where have they gone?
6. What sized classes are teachers of science encountering?

Chapter 5, "The Science Department", presents much of the information obtained from the questionnaire form that only the H.O.D. completed. This chapter presents information obtained about the shortage of science teachers in the schools of the sample, the availability of equipment and teacher aids (e.g. laboratory technicians, laboratory monitors, accelerant teachers and remedial teachers), the type of person available to do part-time science teaching and, finally are listed some subjective comments made by the H.O.Ds of science on such topics as: teacher morale, List A teachers, the present situation and the future of science education.

Chapter 6, "Discussion and Conclusions",relates the results obtained to the hypotheses and aims of the survey as outlined in Chapter 1. Decisions are made concerning whether or not the hypotheses have been refuted or verified and conclusions are drawn about the aims of the project.

REVIEW OF THE LITERATURE

"Serious erosion of secondary teacher morale and escalating losses of able, qualified teachers from the profession have been the high-

lights of the 1978-79 Association year", began the Annual Report 1978-79 of the New Zealand Post Primary Teachers' Association (N.Z.P.P.T.A.) and it continued "The loss-rate of quality teachers from our schools is nothing short of a professional arterial haemorrhage which unless promptly arrested, must inevitably and quickly return secondary education to the enfeebled and damaging circumstances of the late sixties".

In 1978 secondary teacher losses for the year reached an all time high of 1,659 i.e. 13.2%, of all full time teaching positions. The drift at that time was to occupations which were not related to teaching. Those that were leaving were, on average, better qualified than the teaching force overall, and the so called 'basic subjects' of Science, Mathematics, Economics and English were being affected most.

In his address to the 1979 P.P.T.A. Conference Mr. Wellington, Minister of Education, pointed out what he considered were the main points of concern as seen by secondary teachers.

Firstly, he felt that there was deep concern that secondary teaching has become more complex. He pointed out that ".... there is a larger more disruptive group of students in schools. Not only does this place a greater strain upon individual teachers but, more importantly, it impedes the work of the classroom teacher with the very large majority of pupils who are keen to learn". This he said "..... lessens individual job satisfaction".

Secondly, he pointed to the dissatisfaction with salary levels. There was at that time (August 1979) an expectation of immediate salary gains which in the last two rounds of salary negotiations had not been met.

His third point concerned staff shortages and the burdens that were then put on staff because of increased teaching loads and the need to help poorly qualified colleagues.

Fourthly, he said that he was aware of the ".... uncertainty that is currently being generated by the problem of falling rolls - by the uncertainty of promotion prospects within the service because of this - by the uncertainty of tenure for individual teachers".

Fifthly, the problems associated with the knowledge of unemployment among school leavers. "In this I am all too aware of the

concern this has for your students and the effect which this has on you as their teachers".

Finally, he believed that there was a feeling among teachers that "... society, parents and employers expect too much from the schools - they provide insufficient support and often their expectations are in conflict. I think here of the conflict between the demand for an improvement in the basics and a desire for a broad liberal education".

There was at this time, too, the legislation based on the recommendations of the registration and discipline of teachers which was soon to be introduced to parliament. Teachers were uneasy about the real possibility that the legislation would keep effective professionalism even further beyond the reach of teachers.

Salaries were not good at the time. From 1972 to mid 1979 the Consumer Price Index had risen 106.2%, nominal wage rates 107% but the salaries of secondary teachers (e.g. top step, Group 3, Basic Scale) had risen by only 69.4% (P.P.T.A. salaries circular July 1979). Many groups had had specific adjustments designed to correct anomalies caused by government wages policies, but secondary teachers needed an increase of 17.8% just to restore their buying power to the level of their earnings in 1972. Wage negotiations seemed to be unproductive, "poor relativity" almost became a cliché and teachers were far from happy.

Statistics were widely publicised, mainly by the P.P.T.A. e.g. "In 1978 1,659 secondary teachers left the service - the most ever. This represented 13.2% of the teaching force. In 1978 only 1,815 new teachers started, giving a nett gain of 156 teachers - the lowest ever. In 1978, over 23% of the teachers leaving went to jobs outside of teaching - the highest ever. This means that the education of up to 120,000 children will be affected to their disadvantage" and so on (N.Z.P.P.T.A. stopwork meeting pamphlet '79).

Fortunately, later in 1979 wage increases backdated to November 1978 were announced and with the promise of large backpay cheques the "bomb was defused". Salaries obtained still fell short of what the N.Z.P.P.T.A. and most teachers wanted and no real improvements in areas such as 'Master Teacher' scales were obtained. In fact, conditions of service are still the major area needing attention.

Secondary teachers have a professional responsibility related to

that critical part of all people's lives in which the child becomes an adult. All professions have some special responsibility towards the development of people, but this particular field - the nurturing of the growing-up process - is the field of the secondary teacher, and of course, the parent, and to be able to perform this professional function adequately matters more, in personal satisfaction and fulfilment, to most secondary teachers than does the amount of money they are paid or how that relates to what other people are paid. This is not to say that salaries are unimportant, but professional frustration is, or should be, more trying than anxiety about the latest salary increment. In fact, both job satisfaction and salary levels tend to be regarded as low, it seems, for a majority of teachers - and this must be presumed to reduce their morale and effectiveness still further.

Mr. Derek Wood, Chairman of the P.P.T.A's Principals' Advisory Committee has pressed for new directives in education and the need for the Government to state a clear set of priorities for education in the 1980's to give teachers a sense of direction. He points out that all the 1980 salary settlement did was to "... restore some relativity with outside professions which have attracted, and are still attracting, teachers to leave teaching". (P.P.T.A. News, June '80).

There is certainly a need for a clear statement of policies. Mr. Wellington however, feels that it is "politically dishonest" to make any promises to teachers (P.P.T.A. News, June '80). But, there must be some overall plan or changes become 'bitsy'; wild efforts are made to cope with today or sort out the problems of yesterday rather than diverting money, time and manpower into planning for a well organised future. The basic educational desideratum of setting broad aims and specific objectives seems to have been forgotten by some who should be most able to improve the state of education in New Zealand.

Long awaited salary increases early in 1980 made little difference to the nett take-home pay of the average teacher ($7 - $8/week). However, as has been mentioned it was accompanied by sizeable backpay cheques which produced a mild state of euphoria among teachers.

Now that that has probably been spent teachers look again at their friends in other jobs who stop work at 4.30 p.m. and leave it behind them, while they go home to prepare lessons or to mark and set

examinations. The 1980 Annual New Zealand Institute of Chemistry salary survey points out that those involved in teaching put in far more unpaid hours of overtime than chemists involved in any other form of employment.

John Craig, Principal of Heretaunga College, Upper Hutt, states in the March '80 P.P.T.A. News that staffing shortages this year are the worst on record and already some of his teachers are working at least 60-hour weeks to cope with the shortfall. "Last year we had 23 full-time teachers pass through this school - 23 teachers who left and that is only a little bit higher than the national average". "The taxpayer gets poor value for his tax dollars spent in secondary education", says Bruce Webster, General Secretary of the P.P.T.A., "when so many teachers are leaving secondary teaching where there is a $100,000 training cost of a secondary teacher".

This was, and still is, the overall picture of education as presented by those who are critical of it. The major aim of this thesis is to determine whether it is a substantially - or even partially - true picture of science education. Are science H.O.Ds finding it hard to staff their departments? Are they getting well qualified, well-trained teachers? Are practising science teachers happy with their conditions and salaries? What changes would they most like to see take place to improve their jobs as teachers of science? How many science teachers are leaving the profession and to what jobs are they going?

This list of questions could be expanded and made more detailed - but it can be seen that even the most general questions, and their answers, relate to issues of great significance to this country.

HYPOTHESES AND AIMS OF THE PROJECT

As has previously been stated some of this project is based on and attempts to update research done by others (e.g. Searle, (1952), Taylor (1965), N.Z.I.C. (1978, 1980) and N.Z.P.P.T.A.). Thus, wherever possible research hypotheses have been formulated which state the researchers expectations resulting from the review of the relevant literature.

Other aspects of this project have not previously been studied in the way that they were here. Thus, these areas of the project were treated as aims rather than hypotheses. In most cases the aim

was that of collecting information about the particular phenomenon that was being studied.

HYPOTHESIS ONE

"That the standard of tertiary qualifications held by permanent science teachers teaching science has improved since the 1965 Survey".

Since 1965 salary increases have been considerable (see Supplements to 'Education Gazette' (1965-1980)).

It was hypothesised that the massive percentage increases to salaries in the early 1970's along with increased Government expenditure on Education, which has improved conditions, would result in better qualified people being attracted to teaching.

HYPOTHESIS TWO

"That there is a shortage of science teachers".

In his Minister's address to the 1979 Conference, Mr. Wellington said with respect to staffing shortages that ".... the so-called 'basic subjects' of Science, Mathematics, Economics and English were being affected most". The researcher believed that this was still the case as no data were available to disprove this hypothesis.

HYPOTHESIS THREE

"That science teachers have lost salary relativity with other professions having similar qualifications".

Lack of salary relativity with other professions having similar qualifications has usually been a major argument used by the N.Z.P.P.T.A. in salary negotiations.

This hypothesis is tested using the results of the N.Z.I.C. Annual Salary Survey (1980).

AIMS OF THE PROJECT

Apart from the above three hypotheses the researcher felt that there were other areas related to science teaching where empirical data about staffing and conditions were needed.

Thus, this project also aimed to obtain information from science teachers and H.O.Ds about:

1. The level of tertiary qualifications of those teachers teaching science who are teaching senior science classes.

2. The mean class sizes in science subjects.
3. Whether there has been an improvement in the level of training and the teaching ability of teachers in training (i.e. those on section and List A teachers), as perceived by H.O.Ds.
4. The present conditions under which teachers of science are operating.
5. The things that science teachers feel are most needed to improve their professional activities.
6. The morale in science departments as perceived by H.O.Ds.
7. The numbers of science teachers leaving the New Zealand secondary teaching service.
8. The employment to which those leaving have gone.
9. Whether part-time teachers of science are primarily
    (a) male or female
    (b) married or single.

CHAPTER 2.

THE PROCEDURE.

THE SURVEY INSTRUMENTS.

The survey instruments are presented in Appendix B. Two instruments were used: one a questionnaire form to be filled out by the HOD Science and a second questionnaire form to be filled out by every teacher in the Science Department who taught one or more science classes.

QUESTIONNAIRE FORM ONE.

This was the questionnaire filled out by the HOD Science.

It consisted of two parts. Items 1 to 6 asked for empirical data and aimed to be entirely objective with the exception of Item 6 (h). This latter question required the HOD to decide whether or not his department had ".. adequate audio-visual aids". What each HOD would consider to be adequate would probably be different. This question could have asked for numbers of overhead projectors, slide projectors etc. in the department, but this would still have given no information as to the frequency of their use or whether the number given was in fact adequate. The final decision was to leave this item as it appeared, but its limitations were realised.

Like Item 6 (h), Items 7 and 8 required some objectivity on the part of the HOD, but they were intentionally worded to obtain the general 'feeling' that HODs had about the staffing situation both in their own departments and nationally.

The following is a discussion of the estimated reliability of this questionnaire.

Firstly, one can never be sure that the information received is,in fact,correct. While the questionnaire forms were both headed "STRICTLY CONFIDENTIAL" the requirement of the school's name may have affected the type of response made by some HODs. Only one HOD refused to fill in the name of his school, but did give locality, type and size. As the name of the school was used only to determine type, locality and size, it may have been preferable to have had three such items, thus eliminating the need for the school's name.

Ambiguity also creates problems. Item 6 (e) was not explained in enough detail. Some HODs took "Science Resource Room(s)" to mean

preparation rooms attached to laboratories. What was wanted here was the number of room(s) where resources other than basic equipment were kept i.e. schemes of work, past examination questions, class sets of textbooks, audio-visual aids etc. There would usually only be one such room for science resources. Due to its obvious ambiguity (e.g. one HOD said their school had twelve such rooms) this item was disregarded in the analysis.

The format of Items 7(a) to 7(e) were revised more frequently than any others. The initial format had each of the first four items presented in the form "Morale in your science department is very low" followed by the possible responses: strongly agree, agree, undecided, disagree, strongly disagree. This format was considered to possibly bias the response made by suggesting, indirectly, what the researcher considered the situation to be or how he hoped the HOD would respond.

Variations of this were contemplated e.g. "Morale in your science department is very good" or "Morale in your science department is O.K.", but in each case similar criticisms could be made.

The format used was considered to be less likely to bias the responses made and, as it would thus increase the reliability, it was used. The criticism of this format is that it does allow HODs to remain neutral with responses like "satisfactory" and "O.K." It was noted that most respondents chose this middle category for each item (at least 35%) while very few chose the responses at either end of the continuum (generally less than 5%). Thus, the subjectivity of these items does, to some extent, bring into question their reliability.

Many other factors affect responses to items such as these. A cluster of chance factors such as fatigue and boredom, external distractions like noise, other people or other activities, and internal distractions like tension or anxiety can all operate to reduce the stability of an individual's response to any item at a certain point in time. These naturally reduce the reliability of the results produced.

Reliability, it is realised, is a prerequisite for validity. An instrument must measure something accurately before there is any need to worry about what it is measuring and the mere fact that it is measuring something accurately does not mean it is necessarily measuring what we believe it to be measuring.

This questionnaire form, in the researcher's opinion, has very good face validity for items 1 to 5, but lacks some face validity in

parts of item 6 (e.g. e and h), and in item 7. In these later sections, as outlined above, the instrument may not be measuring exactly what it is aiming to measure.

In conclusion the later sections of this questionnaire form were included to obtain information about the HOD's informed opinion of the staffing situation.

The obvious limitations of the results were realised, but it was felt that with such a large sample the results would provide some insight into the state of staffing in New Zealand secondary school science departments, as perceived by HODs.

QUESTIONNAIRE FORM TWO.

This was the form filled out by members in the science department who taught one or more science classes.

Items 1 to 11 required empirical data and with the exception of item 10 there seemed to be no problems concerning ambiguity. Many respondents were a little unsure about the number of inservice courses they had been on in the past two years. Some made responses like ".. about 2". Such a response was coded as "2". The other problem with this item was that most teachers put down all inservice courses they had attended but,some put down only those that were in science. The researcher wanted the total number of inservice courses attended, whether or not they were directly related to science. This item was attempting to ascertain how much ongoing training the teacher of science was receiving. This item should have been worded "How many inservice courses have you attended over the past two years (include all courses attended, whether or not they were directly related to science)". It is believed that a course in reading may be as important in the ongoing training of a science teacher as a course in junior science.

Items 12 to 14 would probably suffer from similar problems of reliability and validity as did the later sections of the HOD questionnaire. However, these problems will always arise when attempting to obtain information about opinions. One of the major factors affecting results here would have been that all questionnaire forms were returned to the HOD for posting. It was felt that the extra cost involved in providing every teacher of science with a stamped, self-addressed envelope, to ensure complete confidentiality, could not be justified. So there was a need to accept that some

teachers may have moderated their responses in view of who might sight their completed questionnaire form.

Item 14 was not filled out by 10.2% of the respondents. The main group who did not respond were those who taught only one or two science classes. They may not have considered themselves to be science teachers, but the wording was quite specific i.e. ".. to improve your job as a teacher of science". Anyone who teaches one or more science classes is a "teacher of science", but not necessarily a "science teacher". This latter category is taken to mean those who teach mainly science subjects. A more detailed explanation appears to have been needed.

In conclusion, this form appeared to be completed accurately by most, but there were ambiguities in Items 10 and 14 as outlined above.

The forms used were intentionally printed on different coloured paper. The HOD form was green while the form filled out by all teachers of science was white. The aim here was to reinforce the fact that there were two different forms to be completed by the HOD and one by the members of his department.

THE SAMPLE.

The survey forms, covering letter and postage paid, self-addressed envelopes were sent to all State and Private Secondary Schools in New Zealand and to the secondary departments of all District High Schools and F.1 - 7 schools, hereafter referred to as "the population".

Of the 395 schools to which surveys were sent 271 replied in time to be used in the computer analysis, these hereafter are referred to as "the sample". Another 5 replies came later which have not been used in the sample.

The response rate was thus, 70%, and the sample was 68.6% of the population.

TABLE I.

SCHOOLS IN SAMPLE BY SCHOOL TYPE.

School Type.	Number in Population.	Number in Sample.	% of population.	% of total Sample.
Private, Boys	37	20	54.0	7.4
Private, Girls	48	26	54.1	9.6
Private, Co-ed	15	7	46.6	2.6
State, Boys	29	18	62.1	6.6
State, Girls	28	23	82.1	8.5
State, Co-ed	160	131	81.8	48.3
D.H.S. and F.1-7	78	46	58.9	17.0
Total	395	271		100.0

Table I above shows that proportionally Private Co-educational (Co-ed) Schools were not as well represented as other schools and this fact must be taken into account when the data are later used to draw comparisons between different types of schools.

TABLE II.

TEACHERS OF SCIENCE IN SAMPLE BY SCHOOL TYPE.

School Type.	Number.	Percentage of Sample.
Private, Boys	103	6.1
Private, Girls	114	6.7
Private, Co-ed	21	1.2
State, Boys	151	8.9
State, Girls	189	11.1
State, Co-ed	965	56.9
D.H.S. and F.1-7	153	9.0
Total	1696	100.0

Table II outlines the frequency distribution of the teachers in the sample. It can be seen that 1696 teachers of science responded by filling in survey form 2.

The major area of teaching of the teachers in the sample is presented in Table III on the following page.

TABLE III.

MAJOR AREA OF TEACHING OF THE TEACHERS IN THE SAMPLE.

Major Area of Teaching	Number	% of Sample.
Science	1387	81.7
Mathematics	151	8.9
Physical Education	48	2.8
Social Studies	28	1.7
Home Economics	24	1.4
Other	58	3.5
Total	1696	100.0

Of the science teachers in the sample, 81.7% were teaching almost solely sciences. Many HODs commented that other teachers, especially mathematics and physical education teachers, were being brought in to ".. fill the gaps on the science timetable". It was evident from the survey results that mathematics teachers were being used in the science department to teach one or two senior science classes (especially physics) while physical education teachers were being used to take junior science classes. This result was somewhat expected when one looks at the sort of tertiary qualifications that both categories of teachers usually have i.e. a Bachelor's degree in Mathematics often contains Stage I or II physics while physical education teachers cover enough science in the Diploma in Physical Education to equip them to teach junior science.

Data Analysis:

The completed questionnaire forms were coded by the researcher. These coded results were then punched on to computer discs and the punching verified by the computer punch-operators of Massey University's Computer Science Department. The researcher, under the guidance of Mr. W. Abbell, Computer Science Department, then prepared the necessary programmes to produce frequencies, sums, means, percentages and cross tabulations of the data, as required. The computer analysis was carried out using Massey University's Burroughs B6700 Computer. The data produced are presented in the following chapters.

Timing of the Survey:

The survey forms were posted to all schools on the 1st August 1980.

This was three weeks before the end of term two. The decision was made to send them then rather than to wait the six weeks until the beginning of term three. The result was that about 60% of the returns came in before the end of term two and the remaining 40% after the holidays. It is possible that the timing of the survey may have had a detrimental effect on the response rate.

Firstly, a teacher's motivational state can be quite low after a long, wet winter term and the questionnaire may not have had a good reception.

Secondly, many schools have examinations at this time of the year and teachers are under pressure to set, supervise and mark examinations, as well as write reports.

Finally, this survey was last in a line of three surveys that had been received by the HOD of Science during term two. One was rather cumbersome, difficult to fill out and had created some bad attitudes towards surveys.

However, the ease of response, the inclusion of a postage-paid, self-addressed envelope and the real concern science teachers have about science education were, in part, responsible for a gratifying response rate of 70%.

CHAPTER 3.

QUALIFICATIONS AND TRAINING.

It is not easy to assess the academic qualifications of teachers in a manner that does justice to them. It is recognised that an incompleted science degree may be a better qualification for teaching science than a completed arts degree. Furthermore, it is recognised that a degree or diploma in science does not necessarily guarantee good teaching.

However, it is probably desirable for a teacher of science to have a wide scientific background and one criterion for judging whether a teacher is so equipped is whether or not he possesses a sound science degree or similar qualification.

Table IV, on the following page, sets out the qualifications of the teachers in the sample. The values in brackets are those from the 1965 survey.

TABLE IV.

HIGHEST ACADEMIC QUALIFICATIONS OF TEACHERS IN THE SAMPLE.
(Percentages).

	Ph.D., M.Sc. B.Sc.(Hons.)	B.Sc.	B.Sc.(incom.)	M.Ag.Sc.	B.Ag.Sc.	B.Ag.Sc.(incom.)	M.H.Sc.	B.H.Sc.	B.H.Sc.(incom.)	M.A.*	B.A.*	B.A.*(incom.)	Dip.H.Sc.	T.C. Courses*	Other*	Secondary School Science	Member of Professional Assn.	Total percentages lacking completed Degree or Diploma in Science
Boys, Private	15.9	44.6	5.9							4.0	5.9		1.0	5.9	12.0	5.0		16.8
	(10)	(35)	(8.3)		(6.7)	(0.5)				(10)	(6.7)	(3.3)	(4.8)	(3.3)	(5.0)	(11.7)		(26.6)
Girls, Private	20.8	42.5	1.9				0.9	7.5		1.9	6.6			4.7	8.5	3.7		10.3
	(19)	(28.6)	(4.8)					(8.5)		(4.8)	(7.1)		(4.7)	(4.8)	(11.9)	(7.1)	(2.4)	(19.1)
Co-ed, Private	14.3	33.3	14.3		4.8									14.3	4.8	14.3		42.9
Boys, State	27.5	47.7		0.7	0.7	0.7				3.4	4.0	1.3		4.0	5.4	4.7		10.7
	(23.2)	(39.2)		(0.9)	(3.3)					(1.4)	(3.3)	(2.3)		(1.9)	(10.3)	(8.5)	(5.6)	(24)
Girls, State	22.5	48.7	1.6		0.5			3.2		1.6	2.7	1.1	5.3	4.8	5.8	2.1		10.1
	(9.5)	(32.3)	(0.8)		(0.8)			(6.7)		(3.4)	(5.0)	(1.7)	(5.0)	(12.4)	(10.8)	(11.6)	(1.7)	(28.2)
Co-ed, State	23.3	50.2	2.2	0.2	1.6		0.3	0.8		1.0	3.3	0.4	1.3	4.2	7.4	3.8		12.2
	(13.7)	(33.2)	(5.0)	(0.3)	(2.9)		(0.2)	(1.8)	(0.3)	(3.2)	(6.3)	(1.6)	(3.4)	(10)	(5.7)	(12.4)	(0.6)	(29.9)
D.H.S. & F. 1-7	19.8	44.4	2.0	0.7	2.6					2.6	4.0	0.7	0.7	7.9	7.3	7.3		20.5
	(3.7)	(22.5)	(8.7)					(1.3)		(1.3)	(7.5)	(10)	(2.5)	(8.7)	(3.8)	(30)	(1.3)	(58.7)

NOTES (i) Values in brackets relate to O. Taylor's 1965 survey.

(ii) * means "contains science".

One thing is immediately apparent: qualifications held have improved dramatically since 1965. The percentage of teachers with a B.Sc. qualification, or higher, has increased from around 40% to around 60-70% overall, and the percentage of teachers lacking a completed degree or diploma in science has fallen markedly. One very notable change is the percentage of teachers in D.H.S. and F. 1-7 schools who lack a completed degree or diploma in science. In 1965 this value was 58.7% while in 1980 it has fallen to 20.5%.

It may also be claimed that those who are poorly qualified in science may well be concerned only with the teaching of junior classes or classes of lower academic ability, and that they are sufficiently well qualified to do this. It is fair to say that higher academic qualifications are more necessary for senior science classes. Table V sets out the relevant qualifications of teachers in the sample teaching senior science classes.

TABLE V.

SENIOR SCIENCE SUBJECTS TAUGHT BY RELEVANT QUALIFICATIONS HELD

(Numbers and Percentages)

	Chemistry		Physics		Biology	
	F7	F6	F7	F6	F7	F6
Above Stage III	71 (28.7)	87 (23.7)	37 (17.9)	50 (14.8)	75 (26.9)	144 (21.5)
Stage III	128 (51.8)	181 (49.3)	63 (30.6)	88 (26.0)	144 (51.6)	352 (52.6)
Stage II	30 (12.1)	48 (13.0)	53 (25.7)	81 (24.0)	39 (13.9)	83 (12.4)
Stage I	14 (5.6)	43 (11.7)	45 (21.8)	106 (31.3)	12 (4.3)	58 (8.7)
Less than Stage I	4 (1.6)	8 (2.1)	8 (3.9)	13 (3.8)	9 (3.2)	32 (4.7)
TOTAL	247	367	206	338	279	669

NOTES (i) Percentages are given in brackets.

(ii) "Relevant qualification held" means that for F.6 and F.7 Chemistry, say, the qualification level given is in Chemistry etc.

It is apparent that Chemistry and Biology teachers are generally well-qualified. At least 73% of the teachers teaching Form 6 or 7 Chemistry or Biology have relevant qualifications at Stage III level

or higher. Less than 5% of the teachers in these areas had relevant qualifications below Stage I.

Physics teachers are, in general, not quite so well qualified. Much smaller percentages have Stage III and above physics qualifications with 35% of Form 6 physics teachers having Stage I physics, or less, as their only qualifications in physics. The percentage of Form 6 physics teachers with Stage I as their highest qualification has increased from 18.9% in 1965 to 31.3% in 1980 - a noticeable decline in tertiary qualifications.

However, it is fair to conclude that qualifications held by teachers of senior science classes are generally very good with most having Stage III, or higher, qualifications.

The next area of interest is that of qualifications in Education. I have always felt that teachers should be given more positive incentives to improve their academic qualifications in Education. The Diploma in Education is an excellent qualification for the practicing teacher. While many science teachers are well qualified in their subject areas they are very poorly qualified in the theories of education, testing and evaluation procedures, curriculum design, the learning process and the like.

TABLE VI.

TEACHERS IN SAMPLE WITH QUALIFICATIONS IN EDUCATION.

	Dip. Ed.	Dip. Ed. (incom.)	M. Ed.	B. Ed.	B. Ed. (incom.)	Post Grad. Certificate in Education.	Total.
Boys Private	13 (0.8)	2 (0.1)	1 (0.1)	3 (0.2)		5 (0.2)	24
Girls Private	10 (0.6)	1 (0.1)		5 (0.3)		4 (0.2)	20
Co-ed Private	1 (0.1)	2 (0.1)					3
Boys State	12 (0.7)	2 (0.1)		1 (0.1)		4 (0.2)	19
Girls State	22 (1.3)	1 (0.1)		4 (0.2)		3 (0.2)	30
Co-ed State	79 (4.6)	18 (1.0)	2 (0.1)	22 (1.3)	3 (0.2)	28 (1.6)	152
D.H.S.and F.1-7.	10 (0.6)	1 (0.1)	1 (0.1)	3 (0.2)	1 (0.1)	2 (0.1)	18
TOTAL	147 (8.6)	27 (1.6)	4 (0.2)	38 (2.2)	4 (0.2)	46 (2.7)	266

Table VI shows the numbers of teachers in the sample with qualifications in Education. It excludes the Diploma in Teaching which around 75% of science teachers have.

Excluding the Post-Graduate Certificate in Education, which many of the British teachers have, and which is very similar to the New Zealand Diploma in Teaching, only 13% of the teachers in the sample have an incomplete degree or diploma, or higher qualification, in Education. [1]

One of the major findings of Taylor's survey in 1965 was that 57.7% of the science teachers in District High Schools and F.1-7 schools lacked completed degrees or diplomas. He also concluded that," Schools in the South Island tend to be better off than schools in the North Island. This is particularly so in Christchurch..." (p.13, 1965 Dissertation).

TABLE VII.

THOSE IN SAMPLE WHO LACK A COMPLETED DEGREE OR DIPLOMA CONTAINING SCIENCE, BY LOCALITY.

LOCALITY.	PERCENTAGE OF SAMPLE.	
Auckland	12.4	(26.0)
Wellington and Hutt	12.6	(18.5)
Christchurch	8.8	(7.0)
Dunedin	7.5	(12.5)
Other North Island under 650	13.8	
Other North Island over 650	11.3	
Other South Island under 650	21.5	
Other South Island over 650	11.2	
D.H.S. & F.1-7	20.5	(57.7)

Figures in brackets relate to 1965 survey.

The conclusion from the 1980 survey is that those science teachers who do lack completed degrees or diplomas in science seem to be well spread throughout the country with only South Island schools with a roll under 650 and D.H.S. and F.1-7 schools being marginally worse off. The improvement in qualifications of teachers teaching science in D.H.S. and F.1-7 schools has been dramatic. (See Table VII).

The only survey of staffing in District High Schools since Taylor's was that done by C.R. Davies ("A look at some of the problems facing the Secondary Departments of District High Schools, Dip. Ed.

1. 'Incomplete' is taken here to mean short by no more than one paper for a Dip. Ed. and short by no more than three papers or one unit for a B.Ed.

Dissertation, 1970, Massey University).

He was able to draw the following conclusions about the staffing situation in these rural schools:

(i) The percentage of permanent positions actually filled is lower than the norm for the country.

(ii) Subject options could really only be catered for by large numbers of part-time teachers.

(iii) Most teachers only have Trained Teacher's Certificates.

(iv) Headmasters felt that the " .. quality of the staff .. " was a major area of concern.

(v) Most teachers were young and were quite satisfied teaching in a District High School, but they did not like the lack of specialist contact and the inadequacy of equipment.

Thus, in the five years since Taylor's survey there had been some improvements and now fifteen years after the 1965 survey things have improved considerably in District High Schools. Their isolation and small senior rolls will probably always produce unique problems with respect to staffing. However, the provision of cheap school houses and the country service requirements do help their lot considerably.

TRAINING

TABLE VIII.

TYPE OF TRAINING BY SCHOOL TYPE
(Rounded Percentages)

	SECONDARY	PRIMARY	NONE	OTHER
Boys, Private	57	10	30	3
Girls, Private	67	8	20	5
Co-ed, Private	62	10	24	4
Boys, State	73	10	14	3
Girls, State	74	7	16	3
Co-ed, State	78	10	10	2
D.H.S. & F.1-7	69	12	14	5
TOTAL	74.3	9.5	13.5	4.7

It can be seen from Table VIII that:

(i) Private Schools have much larger percentages of untrained science teachers, possibly because of the financial penalties that untrained teachers experience in State Schools. The highest is 30% in boys' private schools.

(ii) State Schools are considerably better off with only 10% of

the teachers in Co-ed State Schools being untrained.

(iii) An overall percentage of 13.5% or 229 teachers of science who are not trained.

While it is possible to accept that there is no great need for teachers of junior classes to necessarily have a completed degree or diploma in science to do an effective job, teacher training is essential. If teachers wish for the complete professionalism which seems to be evading them, then it is essential that the first prerequisite of entry to teaching is that of secondary teacher training.

I hope that in time the requirement of a completed degree or diploma will also be obligatory.

There are, of course, methods of remedying the lack of training some teachers have. In-school training is carried out by most schools, but the full-time, expertise and technical equipment that can be offered by teachers' colleges is not available, nor are the variety of experiences that students gain while on their three different 'sections'. The other area of training is that of residential, one-day, and in-school courses that are run regularly.

TABLE IX.

COURSES ATTENDED DURING THE PAST TWO YEARS BY TEACHERS OF SAMPLE.

	1	2	3	More than 3	% of sample involved.
Residential	197	42	6	3	14.6
One-day courses	450	402	178	160	70.2
In-school courses	381	280	60	61	46.1

Table IX shows that during the last two years only 70.2% [2] of all teachers of science have attended one or more one-day courses. The need for in-service courses is a real one and it is pleasing to see that as from August 1980 all schools will be closed one day per year so that all teachers may attend an in-service course of their choice.

It seems then, that teachers of science are generally well qualified and well-trained. It is also apparent that senior science classes, especially chemistry and biology classes, have very well

2. Refer to the comments made in Chapter 1 regarding this statistic.

qualified teachers. The concentration of poorly qualified teachers in rural schools is no longer as apparent as it was in 1965 and the only aspect of qualifications that seems to be a little weak is that of the numbers of science teachers with degrees or diplomas in Education. This will be discussed in more detail in Chapter Six.

CHAPTER 4.

THE TEACHER OF SCIENCE.

As can be seen from the previous chapter the teacher of science is generally well-trained and well-qualified.

The questions that must now be answered are:-

1. To what extent is the teacher of science a subject specialist?
2. Is he happy with his present salary and, if not, why?
3. Is he happy with his present situation as a secondary school science teacher and, if not, why?
4. What things would science teachers most like to see take place to improve their job as teachers of science?
5. Is he likely to be involved in a Science Teachers' Association?
6. How many science teachers are leaving the profession and to where are they going?
7. What sized classes are teachers of science experiencing?

Subject Specialization

Table X below outlines the extent of specialization in science of the teachers in the sample. The extent of specialization is presented as a ratio of the number of teachers who teach mainly science to the number of teachers who teach little science.

TABLE X.

EXTENT OF SPECIALIZATION IN SCIENCE.

	Ratio of teachers who teach mainly science to teachers who teach little science.
1954 *	10 : 18
1965 **	10 : 15
1980	10 : 2

* E.J. Searle's results.

** O. Taylor's results.

This is a dramatic change. There has obviously been a real movement from the "all rounder", as is the norm in primary schools, to the "subject specialist". This could be a result of a variety of factors, e.g.

(i) Improved qualifications mean that secondary teachers obtain a degree in one subject area, are thus specialists in this area, and prefer to teach only their specialist area.

(ii) H.O.Ds like to keep their department as a unit i.e. they

prefer to have all their science teachers teaching only science. There are reasons for this e.g. fewer problems with equipment, staff are displaced from their own laboratories less frequently, they have fewer people to be responsible to/for.

(iii) The professional snobbery related to the possible status of being a chemistry teacher, say, rather than a teacher of general subjects.

(iv) The possible move in smaller schools, with a staff of about five, to have one teacher teaching all the science and mathematics.

Whatever the reasons may be there has been a dramatic movement towards subject specialization with about 80% of our science teachers teaching all, or nearly all, science classes.

Two other pieces of relevant information were obtained about the teacher of science:-

(i) 15.5% of the sample are List A teachers. This suggests that in a department of ten science teachers an H.O.D. can expect to have one or two List A teachers who will need some training and advice.

(ii) 53% of the sample have had less than seven years teaching experience which suggests that we have a relatively young group of people teaching science in New Zealand secondary schools.

SALARIES

Perhaps the area that has been most talked about and most publicised over the past ten years or more, is that of salaries. Prior to 1971 salaries of teachers were very low compared to other professions, staffing shortages were chronic, morale was at its lowest ever and only the very dedicated remained. With a massive boost to salaries a marked improvement in recruitment and retention was evident and selection panels of Teachers' College applicants had plenty of good quality candidates to choose from. Towards the later part of the seventies salary relativity again fell and once more principals found it difficult to staff their schools with well qualified, trained, permanent teachers (see Chapter 1). This was followed in 1979 by salary increases and cost of living adjustments that resulted in many teachers receiving gross increases of around 25 per cent. The

situation stabilised a little, but was still felt by many to be far from ideal.

This survey of science teachers, however, shows that a rather unexpectedly high per cent of teachers are quite happy with their present salaries (see Table XI).

TABLE XI.

TEACHERS OF SCIENCE WHO ARE HAPPY WITH THEIR PRESENT SALARY.

	Number	Percentage of Sample
Happy	1295	76.4
Not happy	386	22.8
Did not respond	15	0.9
Total	1696	100.0

Only 22.8% of the sample were not happy with their present salary. The two main reasons given were that it was simply "Not enough!" or that it did not compare well with what one would get in other occupations where similar qualifications were required. It should be noted here that many who said it was not enough pointed out that they were quite happy with their gross salary, but that the tax was too high.

TABLE XII.

REASONS GIVEN BY TEACHERS OF SCIENCE FOR NOT BEING HAPPY WITH THEIR PRESENT SALARY.

Reason.	Number	Percentage
Not enough	166	43.2
Poor relativity	107	27.9
Poor hourly rate	30	7.8
P.R's poorly paid	27	7.0
Poor recognition of higher tertiary qualification or experience in other job.	24	6.3
More steps at top of Basic Scale	8	2.1
No compensation for extra curricular activities	8	2.1
Poor as not trained	6	1.6
Country service bar	4	1.0
Master teacher scale needed	2	0.5
Need for book allowance	1	0.3
No perks e.g. car	1	0.3
Total	384	100.0

Relativity is always a difficult area to analyse. While other professions seem to be earning very good money on an hourly rate, they do have considerable overheads which teachers do not have e.g. consulting rooms, secretary's wages, rates, power, telephone, purchase of new equipment etc.

However, a teacher near the top of the basic scale who puts in fifty hours a week of teaching, marking and preparation, for forty weeks of the year, is grossing around nine dollars an hour which would be no more than many unskilled people are earning in other areas of employment.

The area of reimbursement for P.R. positions has always been one that the P.P.T.A. has attempted to improve during salary negotiations. A P.R.2, which many H.O.D's of Science hold, has a gross value of about $1,200. After tax the P.R.2 Head of Science is likely to receive $2 per day for the extra responsibilities of running a department, purchasing gear, training List A teachers, helping with any discipline problems that members of his department may be having, instigating new schemes of work, keeping up with the current trends

in science education and, of course, teaching five science classes.

Attainment of higher tertiary qualifications once one has started teaching result in small, if any, increments in salary, e.g. the completion of a Diploma in Education entitles one to the "Service Increment" of around $500, BUT one does not receive this until one has been on the top of the basic scale for five years. A wait of ten years for the B.Sc. or B.A. holder who completes their Dip. Ed. in their second year of teaching! There is no direct financial gain for the person who then goes on to complete, say, a Master's degree in Education.

The country service bar is another area of concern. It is entirely punitive. Teachers who are supposed to provide their students with positive reinforcement are themselves subjected to negative reinforcement when it comes to the country service requirements. There should be a financial incentive for those who do go to country schools and not a negative financial 'punishment' for those who do not choose to go.

The Master Teacher concept is one that needs to be looked at very closely. At present the only line of advancement is to move out of the classroom and into administration. Unfortunately, it is to administrative jobs that some of our best science teachers are going. It is not difficult to understand this when an H.O.D. Science can increase his gross salary by some $8,000 - $9,000 on becoming a principal of a Class D Secondary School. If he remains in the classroom his only increases in salary over the next 25-30 years would be cost of living adjustments.

The New Zealand Institute of Chemistry do an annual salary survey of their members, and while it is only those involved in Chemistry who are surveyed the pattern could be similar in Physics or Biology. The 1980 survey consisted of 687 returns. One conclusion of the survey was that, "Government jobs are thought to have the advantage of job security and an extremely good superannuation fund. Industrial positions however, have allowances, some non-taxable, in addition to their salaries and chances for paid overtime", e.g. "A high proportion of members acknowledge the non-taxable allowance of a car (51%) and telephone (39%)".

Two tables have been reproduced from the 1980 Salary Survey with the approval of the N.Z.I.C.

TABLE XIII.

THE MEAN, MEDIAN, MINIMUM AND MAXIMUM SALARIES FOR EACH EMPLOYMENT GROUP.

Employment Group		Number	Mean	Median	Minimum	Maximum
School teaching	S	44	13505	12777	9044	21500
	S + A		13793	13101	9044	21500
Teachers college	S,S + A	2	15356	15356	13684	17027
University	S	131	16750	15999	6523	31000
	S + A		16865	16033	6823	33100
Technical Inst.	S	22	15657	16002	11185	18679
	S + A		15677	16002	11317	18769
Industry	S	219	13858	13000	7800	30000
	S + A		15230	14034	7800	50991
Central Govt.	S	147	16680	16635	7786	28973
	S + A		16687	16635	7786	29013
Local Govt.	S	14	13427	13035	8831	18742
	S + A		13718	13268	8922	18742
Research Assn.	S	45	16506	16062	8066	26003
	S + A		16638	16062	8066	26003
Self-employed	S	8	16438	15500	10800	24500
	S + A		22233	17000	15000	42000
Hospital services	S	18	13660	14209	8221	20007
	S + A		13690	14209	8221	20007
Student	S,S + A	13	2944	3125	120	4264
Other	S	7	16198	15000	10000	22286
	S + A		16831	16276	10300	23105

a. S, Salary, S + A, Salary + All Allowances.

b. Where Mean different from Median, distribution is skewed. When Mean > median, more than 50% of sample are below mean.

Table XIII shows how the allowances available in such areas as Industry and Self-employment dramatically increase the possible maximum of a chemistry graduate's salary. While the maximum salary in school teaching is not the lowest, it is in the lower group, and the median school teaching salary is the lowest of all the employment groups with the exception of students. The school teacher who is un-

able to obtain the allowances, often non-taxable, that are available in the private sector, will never be able to increase his salary by $20,000 plus as some can that are employed in, say, industry.

It is very difficult to compare overtime done in industry to that done in teaching. Many teachers feel that marking and preparation done out of school time is not overtime, but rather part of the job for which they, as professionals, are paid. However, Table XIV does show that those in school teaching and university science teaching put in a greater percentage of unpaid overtime than those in other areas of employment.

TABLE XIV.

PERCENTAGE OF UNPAID OVERTIME WORKED.

Time hours/week	Total	School Teaching	University	Industry	Central Govt.	Research Assns.
NIL	43.4	45.5	35.1	31.1	66.0	46.7
1 - 3	14.3	4.5	1.5	24.2	15.0	15.6
4 - 6	12.4	9.1	16.8	15.1	7.5	11.1
7 - 9	8.8	6.8	9.9	11.9	4.1	11.1
10 - 14	9.1	13.6	13.7	8.2	3.4	6.7
15 +	10.3	15.9	18.3	9.1	3.4	6.7
Unspecified	1.6	4.5	4.7	0.4	0.6	2.2

THE PRESENT SITUATION

Perhaps of more importance to the teacher of science is not his salary, but rather his conditions of employment.

TABLE XV.

TEACHERS OF SCIENCE WHO, EXCLUDING SALARY CONDITIONS, ARE REASONABLY HAPPY WITH THEIR PRESENT SITUATION AS POST-PRIMARY TEACHERS OF SCIENCE.

	Number	Percentage of Sample.
Happy	1092	64.4
Not happy	590	34.8
Did not respond	14	0.8
TOTAL	1696	100.0

Table XV shows that 64.4% of the sample were reasonably happy with their situation as teachers of science while Table XVI on the following page lists the reasons given by the 590 teachers (34.8%)

of the sample who were not happy with their present situation.

TABLE XVI.

REASONS GIVEN FOR NOT BEING HAPPY WITH THEIR PRESENT SITUATION BY SECONDARY SCHOOL SCIENCE TEACHERS.

Reason	Frequency	Percentage
Too much class contact time	146	24.7
Not enough equipment and textbooks	89	15.1
Too much work and stress	70	11.9
High teacher/pupil ratio	56	9.0
Conditions of service poor	31	5.3
Curriculum modifications needed	27	4.6
Other classes preferred	20	3.4
More help required	18	3.1
Low motivated, unruly pupils	17	2.9
Discipline problems	15	2.5
Too many expected 'extras'	14	2.4
Poor laboratories	14	2.4
Lab. technician needed	13	2.2
Boredom/Disillusionment	9	1.5
School environment	8	1.4
Lowering of academic standards	8	1.4
Prefer own laboratory	7	1.2
Home life affected	5	0.8
Lack of laboratory time	4	0.7
Master teachers needed	4	0.7
Staff shortages	2	0.3
Sabbatical leave needed	1	0.2
TOTAL	590	100.0

Many of the responses made in this table are discussed later in this chapter. Some comments are warranted at this point though. Firstly, "Conditions of Service" was a rather non-specific phrase used by 31 teachers. It is included as a separate heading, as it could not have been incorporated under some other area e.g. "More equipment and textbooks", "Less class contact time", or "Stress due to work-load" as it probably includes a little of all of these. Secondly, it is interesting to note that only 32 teachers commented about unruly pupils

or discipline problems. While it is realised that some of the other areas mentioned may well result in discipline problems e.g. high pupil/teacher ratios or lack of preparation time, it is also possible that teachers do not wish to state - or even accept themselves - that they have discipline problems. Discipline problems are what other teachers have! Thirdly, this table and the next one (i.e. Table XVII) both highlight the need for less class contact time, better equipment and textbooks, lower teacher/pupil ratios and more technician assistance. In both tables these four account for more than half of the responses made.

Table XVII on the following page lists the responses given by all teachers in the sample to the question: "Name the one thing you would most like to see take place to improve your job as a teacher of science".

All the responses made to this question have been included for they represent a hierarchical ordering of future changes to science education as recommended by seventy percent of the teachers of science in New Zealand secondary schools.

10.2% or 174 teachers made no response to this question for the reason that they did not feel that they were science teachers. Many were taking one science class to help with staff shortages in the science department. 361 science teachers felt that less class contact time was essential in order to improve their job as teachers of science.

The largest problem for teachers who truly attempt to enter into the spirit of 'learning by doing', or enquiry based methods of science instruction, is that all their students are doing practical work and each student is often doing something different. There is a tremendous amount of teacher preparation necessary for this, gear has to be set up and tidied away as each class comes and goes. For forty minute periods the problem is compounded. The preparation involved becomes so onerous for a normal teaching programme - let alone a pupil centred, enquiry-based one - that practical work is avoided. Thus, teachers are avoiding the one thing that science educators agree is the best learning environment simply because of lack of non-contact time and technician assistance. The need for technician assistance was fourth highest on the list of improvements needed. Many smaller schools are not eligible for a part-time laboratory technician and thus must make do themselves or enlist the aid of lab. monitors. However,

TABLE XVII.

RESPONSES GIVEN TO THE QUESTION - "NAME THE ONE THING YOU WOULD MOST LIKE TO SEE TAKE PLACE TO IMPROVE YOUR JOB AS A TEACHER OF SCIENCE".

Improvement needed.	Frequency	Percentage
Less class contact time	361	21.3
More equipment, facilities and textbooks	303	17.8
Lower teacher/pupil ratios	231	13.6
Increased lab. technician time	214	12.6
Science curricula changes	74	4.3
More laboratory time	68	4.0
More refresher courses	34	2.0
Improvement in student attitudes	32	1.9
Sabbatical leave needed	29	1.7
Improvement in science dept. organisation	29	1.7
Laboratory design	22	1.3
Non-compulsory education introduced	16	0.9
Slow learner courses needed	13	0.8
A more academic attitude	12	0.7
Not to teach science	8	0.5
More assistance from Dept. of Education	8	0.5
Less exam emphasis	8	0.5
No clerical or administrative tasks	8	0.5
Communication between Universities, Teachers' Colleges and Schools	7	0.4
Streamed classes needed	7	0.4
More help	6	0.4
Better qualified colleagues	6	0.4
Improvement in pupils' English or Maths.	5	0.3
Own Laboratory	5	0.3
Master teacher needed	4	0.2
Compensation for extracurricular activities	3	0.2
U.E. moved to F.7	3	0.2
No complaints	2	0.1
More P.R's in science department	2	0.1
Educational daytime T.V. needed	1	0.1
Better library facilities	1	0.1
No response	174	10.2
TOTAL	1696	100.0

there is a limit to what the latter can be expected to do and they need a considerable amount of training which again uses up the few free lunch hours that the teacher of science has.

The need for more money to purchase equipment, improve facilities and upgrade science textbooks was the second most important area needing improvement. Some private schools and smaller state schools appear to be very badly off in this area. Science teaching without apparatus is a fraud. The nature of science demands that students observe natural phenomena for themselves. If those crying "back to basics" have this in mind then they would deserve support. Ideally each student should have a piece of apparatus to himself, but there are many reasons why this is usually impossible. At best students will work in two's or three's, and to economise on time and equipment teachers may perform demonstration experiments - one piece of equipment for the whole class. This is not to deny that there are many who improvise brilliantly with apparatus - but there is a limit to what can be done with cardboard, rubber bands and jam jars.

The third highest priority was that of smaller teacher/pupil ratios. This will be discussed in a later part of this chapter.

The other areas suggested are by no means any less worthy than the four already mentioned and it was interesting to note that only two teachers out of 1696 had no complaints at all about their present situation.

Perhaps the last word should be left with the obviously disillusioned teacher who simply said that the one thing he needed to improve his job as a teacher of science was "A visit from God!"

SCIENCE TEACHER ASSOCIATIONS.

The New Zealand Science Teachers' Association (N.Z.S.T.A.) is a reasonably active group with branches throughout the country. It aims to bring science teachers together on usually a monthly basis to discuss problems of science education, listen to guest speakers, visit places of interest and to just get together over a cup of coffee to swap good and bad ideas.

For many science teachers it can be a very heartening experience to find that you are not the only one with a class of forty slow-stream third formers, no equipment and a textbook with a reading age three years above that of your best student.

The N.Z.S.T.A. publishes a magazine the "Science Teacher" which keeps teachers up-to-date with changes and new ideas in science education.

TABLE XVIII.

TEACHERS OF SCIENCE WHO ARE MEMBERS OF A LOCAL SCIENCE TEACHERS' ASSOCIATION.

	Number	Percentage of Sample.
Members	632	37.3
Not members	1049	61.9
Did not respond	15	0.9
TOTAL	1696	100.0

It can be seen from Table XVIII that just over one third of the sample are members of the N.Z.S.T.A. Many said that they would like to be, but that there was not a branch near them. Membership is well worthwhile, but it is not difficult to appreciate that with the work-load most science teachers are experiencing and with family commitments, it is not easy to attend yet another meeting each month.

REASONS FOR LEAVING THE PROFESSION.

While Table XI showed that only 22.8% of the sample were not happy with their present situation, Table XIX below shows that during the year October 1979 to October 1980, 347 teachers of science from the schools in the sample, left science teaching.

TABLE XIX.

SCIENCE STAFF LEAVING DEPARTMENTS IN THE SAMPLE DURING THE PAST YEAR.

Reason.	Number in sample.
To teach overseas	31
Overseas, but not to teach	95
Industry	27
Other area of teaching	60
To bring up a family	57
Another job	45
Other	32
TOTAL	347

Notes. (i) This does not include staff who have transferred to another secondary school in New Zealand.

(ii) "Past 12 months" was backdated from time of filling out the questionnaire.

(iii) "Another Area of Teaching" is taken to mean University, Primary, Training College, Technical Institute, Departmental Inspector, non-teaching Principal, Guidance Counsellor etc.

It can be seen from this that just over one third of the teachers left New Zealand and well over two thirds left teaching. It should be noted though that some of those who left to go overseas may well return in a few years time and take up teaching again - possibly to do a better job after a break from the stresses of teaching science.

Table XX lists the jobs that the forty-five teachers went to who were classified as "left to go to another job". The jobs gone to were, to say the least, diverse.

TABLE XX.

JOBS TO WHICH THOSE UNDER THE CATEGORY OF "ANOTHER JOB" IN TABLE XIX WENT TO.

Type of job.	Number
Farming	7
Agriculture or Horticulture	4
Spouse on transfer	3
Catering/Restaurant/Take-away Bar	3
Teachers' College	3
Counsellor at Hospital	2
Insurance	2
Housekeeping	2
Left with no job in mind	2
Singer in pop group	2
Tertiary Education	2
Shopkeeper	1
Red Cross Director	1
Computing	1
Salesman	1
Labourer	1
Ski Instructor	1
Missionary	1
Civil Defence	1
Barman	1
Tour Organiser	1
Real Estate Agent	1
Organiser of protest group	1
Nursing	1
TOTAL	45

It is evident from Table XIX that, contrary to popular opinion, industry with its higher salaries, paid overtime and allowances - some non-taxable - is not attracting a large proportion of science teachers at all. In fact, 1.6% of the sample is very small in these times when teachers are reported to be so dissatisfied with their salaries and conditions of employment.

The thirty-two teachers in the category of "other" consisted mainly of teachers who have retired or left teaching as a result of a mental breakdown. There were four in this latter category.

CLASS SIZES

One of the major areas of concern of teachers in the sample was that of class sizes. It was the third most popular response in Table XVII.

Class sizes certainly varied with the minimum being one student in some senior classes and a maximum of forty-three in one fourth form science class. It was disturbing to see how many junior science classes in the sample were in the 35 - 40 range.

One interesting statistic is that of mean class size. In 1954 Searle arrived at a mean science class size of 23.1 pupils, in 1965 Taylor produced a mean science class size of 23.0 and now in 1980 the mean size is 23.3. Twenty-six years and no improvement in the mean teacher/pupil ratio!

TABLE XXI.

MEAN CLASS SIZE OF CLASSES IN SAMPLE.

Class.	Mean Size.	Number in Sample.
Form 7 Chemistry	11.7	247
Form 6 Chemistry	18.3	367
Form 5 Chemistry	24.4	64
Form 7 Physics	11.7	208
Form 6 Physics	19.1	340
Form 5 Physics	24.5	65
Form 7 Biology	12.7	279
Form 6 Biology	19.8	669
Form 5 Biology	22.5	331
Form 5 Science	25.5	1070
Form 4 Science	27.2	1315
Form 3 Science	27.6	1387

Table XXI lists the mean class sizes of the classes in the sample. Perhaps the comment many teachers would make is: "I seem to teach a lot more students than that." It should be remembered that there are many small or rural schools in the sample with very small numbers of senior pupils. It is not, however, this end of the continuum which is in need of immediate attention, but rather the end where junior science classes are around 40 pupils. This is quite unacceptable. No science teacher can adequately control, instruct and carry out pupil experimentation safely and effectively with a class of forty third or fourth formers. Principals would be hard pressed to adequately justify science classes of this size, even if they do have acute staff shortages.

The science teacher has difficulties which are unique. Every subject has its special burdens: the technical teacher has his workshop, tools and materials to organise. Language and mathematics teachers have much marking. English teachers have to correct long essays. Art teachers have to store work and organise materials, and protect much easily purloined and attractive equipment. The science teacher fights his or her battle on many fronts simultaneously. There is both the purchasing and the day to day distribution of apparatus and consumables. Visual aids are important, and it takes time to make and store them. Textbooks are often not suitable or even available, and the teacher is forced to write study sheets. With the growth of individualised learning, the construction of experiment worksheets is almost a full-time job. Seldom is a laboratory entirely self-sufficient, and equipment has continually to travel from one room to another. Equipment repair is time-consuming. Due to the shortage of staff, science classes are often over-large, and the teacher is under even more pressure because the subject is more intellectually demanding than some others and this does not improve pupil behaviour. Plenty of suitable experimental work can help to minimise the problems, but this in turn requires good equipment, technical assistance and non-contact time to allow the teacher to prepare for, and to clean up after, each practical session.

CHAPTER 5.

THE SCIENCE DEPARTMENT.

Many of the staffing problems experienced by science departments result from the science departments themselves. If a new science teacher enters a school where the science department lacks any cohesion, where the teachers do their own 'thing', where there is no sharing of ideas and resources, where there is no real leadership and help from the H.O.D., where laboratories are scarce and poorly equipped, where there is no ancillary assistance in the form of a laboratory technician, where the 'better' classes are taken by senior science teachers and where there are no efforts to improve the present schemes of work or to try new methods of presenting the science cirriculum, then any enthusiasm the new recruit may have had will be precipitated first as confusion, then disillusionment and finally as a complete rejection of science teaching as a career.

Many of the problems and frustrations science teachers face today are major ones, but most are surmountable if he or she is a member of a well-lead, co-operative, sharing, and concerned team of science teachers who aim to make the best of the present situation, but are intolerant of the suggestion that nothing can be done to improve it.

Thus, the morale of science departments is dependent to some extent on staffing shortages, but can also produce these staffing shortages.

The aim of this chapter is to look in more detail at the area of staff shortages, to assess the availability and types of relievers and part-times available in science, to look at the availability of equipment, aids and resources and finally to look at some subjective comments made by H.O.Ds of science.

STAFF SHORTAGES

One aim of the questionnaire that was completed by the H.O.Ds was to determine the total number of class contact hours per week, that each school was short by.

TABLE XXII.

ACTUAL SHORTAGES, IN CLASS CONTACT HOURS (PER WEEK), OF SCIENCE TEACHERS.

	Number of Schools.	Total Number of Hours.
Boys, Private	2	6
Girls, Private	7	92
Co-ed, Private	4	72
Girls, State	7	167
Boys, State	8	66
Co-ed, State	42	620
F. 1-7 & D.H.S.	18	147
TOTAL	88	1170

Table XXII shows that 88 of the 271 schools in the sample have actual shortages of science teachers. This amounts to a total of 1170 hours or 55 - 60 full-time science teachers. D.H.S. and F. 1-7 schools again have quite a large proportion of the shortages due probably to their isolation and small numbers of senior students, which often results in students without teachers.

One method of counteracting this deficiency of science teachers is to recruit teachers from overseas. As can be seen from Table XXIII below, the number of shortages would be twice the above value if the 54 science teachers from overseas had not been recruited.

TABLE XXIII.

TEACHERS RECRUITED FROM OVERSEAS DURING THE 12 MONTHS FROM SEPTEMBER 1979 TO SEPTEMBER 1980.

	Number of Schools Recruiting.	Total Number Recruits.
Boys, Private	4	5
Girls, Private	3	3
Co-ed, Private	2	3
Girls, State	2	3
Boys, State	3	3
Co-ed, State	22	35
F. 1-7 & D.H.S.	2	2
TOTAL	38	54

Yet another method of counteracting the shortages of well qualified, trained science teachers is to reduce science options available to students. Whether this is an acceptable way of coping with the situation is debatable. Its long term repercussions are not necessarily easy to ascertain, however, there would also be harmful effects to the student and to science if he were taught science by a teacher who was not fully skilled in the methodology of science. Science by its very nature, requires that the student and teacher become directly involved in it. Without this direct participation in the subject, what is being taught is not science, but the facts or history of science.

TABLE XXIV.

RESPONSES TO THE QUESTION "ARE YOU HAVING TO REDUCE SCIENCE OPTIONS TO COUNTERACT SHORTAGES OF SCIENCE TEACHERS?"

Response.	Number	Percentage
Yes	30	11.0
No	227	83.8
No response	14	5.2
TOTAL	271	100.0

Table XXIV shows that 11% or 30 schools in the sample are having to reduce science options. This is an area of concern and needs more, in-depth, investigation to decide whether it is an acceptable alternative for the principal who has problems staffing his science department.

PART-TIMERS AND RELIEVERS.

Many schools find it hard to attract full-time science teachers, but are able to employ part-time teachers e.g. the wives of farmers in rural areas. These people do an excellent job and many, if not most, are trained and well qualified, however, by the very nature of their job they never become a full member of the science department and so the science department suffers from fragmentation which places more stress on the morale of the department.

TABLE XXV.

STAFF BY SEX, PRESENT TEACHING POSITION AND MARITAL STATUS.

	Male		Female	
Full-time Married	852	(50.2)	296	(17.4)
Full-time Single	250	(14.7)	147	(8.6)
Part-time Married	29	(1.7)	95	(5.6)
Part-time Single	4	(0.2)	12	(0.7)

Notes (i) Missing Observations = 11.

(ii) Values in brackets are percentages of sample.

Table XXV shows that the actual percentage of part-timers is tolerable at 9.1% of the sample. Of the 140 part-time teachers 67.9% are married and female.

Of equal importance to the principal and H.O.D. is the availability of relieving teachers. The prolonged illness of a science teacher results in senior examination classes being left teacherless unless relievers are available. In many areas relievers are almost impossible to procure and to find one qualified in science is rare.

The lack of trained, well qualified relievers will not be solved for a long time, unless falling rolls produce a large number of unemployed science teachers - a state of affairs that this survey suggests is not likely to occur for quite some time!

EQUIPMENT, AIDS AND RESOURCES

The availability of adequate, good equipment, teacher aids and resources does two things: first it improves the lot of the practising teacher, and hence morale, and second, it should improve the quality of science instruction that students are getting.

Laboratories:

Table XXVI, on the next page, shows that just over three quarters of the schools in the sample have adequate laboratories to allow all science classes to use a laboratory for 75% of their science time. It is apparent that state schools, especially Co-ed Schools, are marginally better off than private schools. Again many H.O.Ds said that their situation, with respect to laboratories, appeared better than it had been in the past due to falling rolls.

TABLE XXVI

RESPONSE MADE TO THE QUESTION: "DO YOU HAVE ADEQUATE LABORATORIES TO ALLOW ALL SCIENCE CLASSES TO USE A LABORATORY FOR 75% OF THEIR SCIENCE TIME" BY SCHOOL TYPE.

(Percentages)

Response	Boys Private	Girls Private	Co-ed Private	Boys State	Girls State	Co-ed State	D.H.S. & F. 1-7.	Total Overall.
Yes	65	65	67	67	78	83	74	76.6
No	35	35	33	33	22	17	26	23.4
								100.0

Senior Studies rooms:

Most new schools are now being equipped with senior studies blocks. These blocks usually contain senior laboratories especially for form 6 and 7 Chemistry, Physics and Biology. There is often one or two small seminar rooms and a courtyard which can be used to set up an aviary, animal pens and fish pond, if so desired. These blocks are well equipped with quite sophisticated apparatus. Older schools are able to apply for a senior studies modification to bring their present laboratories up to a standard similar to those being built in new schools.

TABLE XXVII

SCHOOLS WITH SENIOR STUDIES ROOM(S) FOR SCIENCE SUBJECTS BY SCHOOL TYPE.

	Boys Private	Girls Private	Co-ed Private	Boys State	Girls State	Co-ed State	D.H.S. & F. 1-7.	Total.
Number	1	0	1	4	7	42	3	64
	(5.0)	(0)	(14.3)	(23.2)	(30.4)	(32.1)	(6.5)	(23.6)

Note: Figures in brackets are percentages of total sample.

Table XXVII lists the numbers of schools in the sample who have such laboratories. It is understandable that the greatest proportion of these are in Co-ed State Schools as this is the type of school that is being built at present and hence the sort of school which is most likely to have a senior studies block.

Audio-Visual Aids:

To most science teachers audio-visual aids probably include: an overhead projector, a slide projector, possibly a tape recorder and the availability of a movie projector. A recent addition to the audio-visual aids line up has been the closed circuit television with its movie camera and film cassettes. This equipment can be used to record

television programmes of interest, to film dissections or to keep on record an interesting field trip. The total cost of this sort of equipment is in the vicinity of $4,000 - $5,000 and can be paid for by a Gala Day or from Old Pupils' bequests.

The overhead projector is a very popular aid used by many teachers of science. It allows the teacher to prepare well in advance and frees him from the blackboard. Many excellent demonstrations can be done on it e.g. electrolysis, magnetic fields and oxidation state changes. The problem is one of easy access. If a teacher wants to use an overhead projector then it must be readily available. Too often a well prepared lesson of overhead projector transparencies terminates very rapidly because someone else is using the overhead projector. This only has to happen once or twice and the science teacher will revert to more traditional 'talk and chalk' methods of presentation.

The Department of Education produce a large number of very good film strips and slides as do certain industries and teachers themselves. These need continual updating and should only be used at the appropriate time and with the appropriate classes. Similar comments hold for movies. The chemistry and physics movies, at six form level, were very good, but most are twenty years old and badly need updating.

TABLE XXVIII.

RESPONSES MADE TO THE QUESTION: "DO YOU HAVE ADEQUATE AUDIO VISUAL AIDS?" BY SCHOOL TYPE.

(Percentages)

Response	Boys Private	Girls Private	Co-ed Private	Boys State	Girls State	Co-ed State	D.H.S. & F. 1-7.	Total Overall
Yes	75	89	86	67	78	71	80	75.3
No	25	11	14	33	22	29	20	24.7
								100.0

As can be seen in Table XXVIII most schools are reasonably well off for audio-visual aids. The interpretation of the word "adequate" in the questionnaire may well make the picture seem 'blacker' than it is. However, one or even two overhead projectors is not enough for a science department of six or seven teachers. The ideal is, naturally, one per classroom. Bulk government buying would result in this not being an overly expensive project.

Many schools, especially the private ones, seem to be well off in this area as government supplies of audio-visual equipment have been supplemented using money from fund raising activities, old pupils' bequests and donations. The main area of concern is for the 24.7% who did not have adequate audio-visual aids!

Teacher Aids:

Very few teachers of science would hesitate in agreeing that a well trained laboratory technician is essential in any science department. They need not be full-time, but their availability for a few hours a day makes life for the teacher of science much more acceptable. While pupil laboratory monitors can do an excellent job in keeping the laboratory tidy, moving gear from lab. to lab. and in preparing simple experimental gear the laboratory technician is needed to prepare standard solutions, make agar plates, do glass blowing, mend electrical equipment and help in the ordering of new equipment to name but a few tasks.

From Table XXIX on the following page it can be seen that only 189 schools (70% of the sample) have a laboratory technician and most of these are part-time and unqualified. Pupil laboratory monitors are only used by 40% of the schools in the sample. Well trained, conscientious lab. monitors can be a valuable asset to any science department.

The availability of a remedial or accelerant teacher to help those science students who are less able or who are particularly gifted is extremely limited. This is an area that needs much more attention; particularly where non-streaming of classes is practised. Individualised instruction programmes can help to cope with the differences in ability and relevant past experiences of the students, but such programmes require a lot of preparation and most science teachers would simply not have the time available that is necessary to implement them. Perhaps a well organised science department could make such a programme a group activity, where two or three teachers try it initially with one class level and expand the project from there, BUT more time, more preparation, more meetings and still five other classes to teach!

Meetings:

Communication problems can be a major factor in creating poor morale. The need for formal and informal meetings to keep everyone

TABLE XXIX

TEACHER AIDS BY SCHOOL TYPE.

	Laboratory Technicians				Lab Monitors.		Remedial Teacher		Accelerant Teacher	
	Qualified Full-time	Qualified Part-time	Unqualified Full-time	Unqualified Part-time	Paid.	Unpaid	Full-Time.	Part-Time.	Full-Time.	Part-Time.
Boys Private	1	2		6		7	1		1	1
Girls Private		4		6	1	11		1		
Co-ed Private					2	1	1			1
Boys State	2	7		7	4	5	1	1	1	1
Girls State	1	10		12	3	9		2		
Co-ed State	11	29	7	60	21	51	8	16	4	7
D.H.S. & F. 1-7.		6		18	2	5		2	1	1
TOTAL	15	58	7	109	33	89	11	22	7	11

Notes: (1) Entry in each unit is the total number of schools which have one or more of these forms of teacher aids.

(2) "Qualified" for laboratory technicians is taken to mean, at least, N.Z.C.S. or equivalent.

in touch with what is happening, to allow a sharing of ideas and to create a feeling of unity is most important.

TABLE XXX.

FREQUENCY OF SCIENCE DEPARTMENT MEETINGS IN SCHOOLS OF SAMPLE.

Frequency of Meetings	Number	Percentage
Daily	12	4.4
Weekly	27	10.0
Fortnightly	22	8.1
Every three weeks	22	8.1
Monthly	87	32.1
Bi-monthly	25	9.2
Once a term	59	21.8
Bi-annually	5	1.8
No response	12	4.4
TOTAL	271	100.0

Table XXX shows that there is a great diversity in the number of formal science department meetings held. The most common is a monthly meeting. This is probably adequate in a well organised science department provided there are other informal meetings of specialist area teachers as well.

SOME COMMENTS FROM THE HEADS OF SCIENCE DEPARTMENTS.

The latter sections of the questionnaire, filled out by the H.O.D., aimed to assess the subjective "gut feelings" that these people had about science teaching and about their department.

The following four tables give, in detail, the frequency of the responses made.

TABLE XXXI.

STAFFING SITUATION IN SCIENCE DEPARTMENTS OF NEW ZEALAND SECONDARY SCHOOLS, AS PERCEIVED BY THE H.O.D. SCIENCE, BY SCHOOL TYPE.

	Boys Private	Girls Private	Co-ed Private	Boys State	Girls State	Co-ed State	D.H.S.& F.1-7.	TOTAL
Excellent	1	1				6	2	10
	(5.0)	(3.8)				(4.8)	(4.3)	(3.8)
Good	6	4	1		3	17	4	35
	(30.0)	(15.4)	(16.7)		(13.0)	(13.6)	(8.7)	(13.3)
Satisfact-ory	8	8	1	6	10	43	18	94
	(40.0)	(30.8)	(16.7)	(31.3)	(43.5)	(34.4)	(39.1)	(35.6)
Poor	5	13	4	10	10	57	21	120
	(25.0)	(50.0)	(66.7)	(55.6)	(43.5)	(45.6)	(45.7)	(45.5)
Very bad				2		2	1	5
				(11.1)		(1.6)	(2.2)	(1.9)
TOTAL	20	26	6	18	23	125	46	264
								(100)

Note: (i) Number of missing observations = 7

(ii) Values in brackets are percentages.

TABLE XXXII.

RESPONSES MADE TO THE QUESTION: "AS A RESULT OF EFFORTS TO IMPROVE RECRUITMENTS AND RETENTION THE FUTURE FOR SCIENCE DEPARTMENTS IS.." BY SCHOOL TYPE.

	Boys Private	Girls Private	Co-ed Private	Boys State	Girls State	Co-ed State	D.H.S. & F. 1-7.	TOTAL
Excellent	1				1	1		3
	(5.0)				(4.3)	(0.8)		(1.1)
Good	4	1		1	2	12	8	28
	(20.0)	(3.8)		(5.6)	(8.7)	(9.7)	(17.4)	(10.6)
Satisfactory	10	13	2	7	10	50	23	115
	(50.0)	(50.0)	(33.3)	(38.9)	(43.5)	(40.3)	(50.0)	(43.7)
Poor	5	12	4	9	10	58	14	112
	(25.0)	(46.2)	(66.7)	(50.0)	(43.5)	(47.6)	(30.4)	(42.6)
Very bad				1		2	1	4
				(5.6)		(1.6)	(2.2)	(1.5)
TOTAL	20	26	6	18	23	124	46	263
								(100.0)

Note: (i) Number of missing observations = 8

(ii) Values in brackets are percentages.

TABLE XXXIII.

RESPONSES MADE BY THE H.O.D. SCIENCE TO THE QUESTION: "MORALE IN YOUR SCIENCE DEPARTMENT IS ...." BY SCHOOL TYPE.

	Boys Private	Girls Private	Co-ed Private	Boys State	Girls State	Co-ed State	D.H.S. & F. 1-7	TOTAL
Very high	4 (20.0)	3 (11.5)	2 (28.6)	1 (5.6)	2 (8.7)	13 (10.2)	6 (13.6)	31 (11.7)
High	6 (30.0)	12 (46.2)	1 (14.3)	6 (33.3)	10 (43.5)	49 (38.6)	14 (31.8)	98 (37.0)
O.K.	9 (45.0)	10 (38.5)	3 (42.9)	10 (55.6)	10 (43.5)	58 (45.7)	21 (47.7)	121 (45.7)
Low	1 (5.0)	1 (3.8)	1 (14.3)	1 (5.6)	1 (4.3)	7 (5.5)	1 (2.3)	13 (4.9)
Very low							2 (4.5)	2 (0.8)
TOTAL	20	26	7	18	23	127	44	265 (100.0)

TABLE XXXIV.

RESPONSES MADE BY THE H.O.D. SCIENCE TO THE QUESTION: "THE LEVEL OF PREPARATION AND THE TEACHING ABILITY OF LIST A TEACHERS AND THOSE ON SECTION HAS, OVER THE PAST 5 YEARS, IN GENERAL, ..." BY SCHOOL TYPE.

	Boys Private	Girls Private	Co-ed Private	Boys State	Girls State	Co-ed State	D.H.S. & F. 1-7	TOTAL
Improved Dramatically		2 (8.3)	1 (14.3)		1 (4.3)	7 (5.5)		11 (4.2)
Improved Slightly	4 (20.0)	6 (25.0)	1 (14.3)	8 (44.4)	6 (26.1)	34 (26.8)	7 (16.3)	66 (25.2)
Remained the same	14 (70.0)	14 (58.3)	3 (42.9)	8 (44.4)	14 (60.9)	64 (50.4)	33 (76.7)	151 (57.3)
Declined slightly	2 (10.0)	2 (8.3)	2 (28.6)	2 (11.2)	2 (8.7)	19 (15.0)	3 (7.0)	31 (11.8)
Declined Dramatically						3 (2.4)		3 (1.0)
TOTAL	20	24	7	18	23	127	43	262 (100.0)

Note: (i) Number of missing observations = 9

(ii) Values in brackets are percentages.

Perhaps what is most interesting is the general trend of each table.

As perceived by H.O.Ds of Science:

(i) The staffing situation with respect to science teachers is satisfactory to poor

(ii) The future for science departments is satisfactory to poor

(iii) Morale in science departments seems to be in the O.K. to high range

(iv) The quality of list A teachers seems to have remained very much the same over the past five years with only a slight improvement suggested.

TABLE XXXV.

COMMENTS MADE BY HEADS OF SCIENCE DEPARTMENTS AT END OF QUESTIONNAIRE.

Comment	Number	Percentage
Hard to get and/or keep teachers	54	19.9
All is going well	52	19.2
More freedom in curriculum choice needed	16	5.9
More money needed for equipment	15	5.5
All is not going well	12	4.4
Need for more laboratory technician time	9	3.3
Science teachers are worst off of all teachers	8	3.0
Hard to get part-timers and relievers	3	1.1
Less class contact time needed	3	1.1
Problems of teacher movement between labs.	2	0.7
More labs. needed	2	0.7
Poorly designed labs.	2	0.7
Teachers becoming less professional	1	0.4
Fewer periods of science needed	1	0.4
Need extra P.R's in department	1	0.4
Too many teachers of science not qualified in science	1	0.4
Need local Science Teachers' Association	1	0.4
Too many administrative tasks	1	0.4
No comment made	87	32.1
TOTAL	271	100.0

At the end of questionnaire one there was a space left for the H.O.D. to make any comments that he or she wished to. Of the 271 in the sample 184 made some comment. These have been listed in Table XXXV on the previous page.

Again a wide variety of responses resulted. But no matter how the question was phrased both H.O.Ds of science and teachers of science see that less class contact time, more ancillary aid and better facilities and equipment are essential if we are to improve the staffing situation in secondary school science departments.

CHAPTER 6.

DISCUSSION AND CONCLUSIONS.

This chapter summarises the main findings of the project by commenting on the hypotheses and aims of the project as outlined in Chapter 1. Some of the implications of the findings are discussed in light of the findings that the study has produced.

This project looked at four main areas related to science teaching in secondary schools namely: qualifications, conditions, teacher shortages and salaries.

QUALIFICATIONS

"That the standard of tertiary qualifications held by permanent science teachers teaching science has improved since the 1965 survey", was the first hypothesis that resulted from the literature review.

The study showed that tertiary qualifications have improved dramatically since 1965 especially in District High Schools and F. 1-7 schools. The percentage of teachers with incompleted degrees or diplomas in these schools has dropped from 58.7% to 20.5%. There is now a much more even spread of well-qualified teachers over the whole country. This was not the case in 1965 when urban, university towns had much higher percentages of qualified science teachers than other areas.

Only 13% of the sample have made any efforts to attain any tertiary qualifications in Education, other than the Diploma in Teaching course.

If teachers wish to achieve full professional status - which they do not seem to have at the moment - then as professional educators they need to be well-qualified in Education. Most teachers have spent a minimum of three years achieving tertiary level, subject qualifications, but spend very little time studying the theories of teaching and learning, the processes of evaluation and assessment, the theories of curriculum design and sociological aspects of education. Here the Diploma in Education does an excellent job. Later on the teacher needs to study aspects of educational administration and public relations if he moves out of the classroom and into an administrative position. The Diploma in

Educational Administration is a very relevant qualification for such people.

At present there are no study grants or paid leave to obtain such qualifications. Study is usually done extramurally and when completed there is no financial reward until one has been on the top of the basic salary scale for five years. Thus, it is strongly believed, by the researcher, that more positive incentives should be given to teachers to improve their tertiary qualifications in Education. This could take the form of study grants, paid study leave and immediate increases in salaries for those who do complete a degree or diploma in Education.

86.5% of teachers have undergone some tertiary teacher training. As it is now a prerequisite that all new teachers are trained, and that those who are not trained are financially penalised, this percentage should increase considerably during the next few years.

A second aim of the project was to obtain information about the level of tertiary qualifications of those teachers of science who are teaching senior science classes. The study showed that teachers of F.6 and F.7 chemistry and biology classes are generally very well-qualified with 73% having relevant tertiary qualifications at the stage III level or higher. Physics teachers are generally not as well-qualified with 35.1% of F.6 physics teachers having stage I physics, or less, as their major physics qualification.

However, the percentage in all subjects, of teachers with no university qualifications in the subject they are teaching is very low (less than 4.7%).

Finally, in the area of qualifications and training the project determined whether, as perceived by the H.O.Ds, there has been an improvement in the level of training and the teaching ability of teachers in training (i.e. those on section and List A teachers) during the past five years. The information obtained showed that 57.6% of H.O.Ds felt that there had been no change during this time while 25.6% felt that there had been a slight improvement. A much smaller number felt that the teaching ability and level of training had declined slightly. Many commented on the excellent training and teaching ability of teachers recruited from Australia.

The fact that some H.O.Ds made this comment suggests that we may need to look at our own Teachers' College programmes in relation to what is being done in Australian Teachers' Colleges.

CONDITIONS:

The next group of aims of the project were included to obtain information about the conditions under which teachers were operating. It is very easy to use statistics to make all appear well. What should be pointed out is that while 76.6% of the schools may have adequate laboratories, say, there are 23.4% who haven't. It is this latter group of sixty-three schools that warrant concern.

The teacher of science who is about to choose a school in which to teach has a 23% chance of choosing a school with inadequate laboratories, and a 25% chance of choosing a school with inadequate audio-visual aids. He will be teaching anything from one to forty-three students in his classes and will probably teach for 22 out of a possible 25 hours per week. He has only a 24% chance of teaching his senior science classes in a senior studies block. There is a 31% chance that he will not have any technician assistance to help him prepare and tidy away laboratory equipment. He is entering a system where most H.O.Ds are tending to be pessimistic about the future for science departments. The colleagues he works with will probably be well trained, well qualified, subject specialists, 35% of whom are not happy with their present situation, as secondary school science teachers. Thus, it can be seen that in many schools considerable improvements are needed.

There were four main things that teachers of science felt were most needed to improve their professional activities. These four improvements were chosen by 65% of the sample. In order they were:

(i) Less class contact time
(ii) Better equipment, facilities and textbooks
(iii) Lower teacher/pupil ratios
(iv) Additional technician assistance

An improvement in each of these would free the teacher to improve his courses of work and be better prepared for each lesson. These, in turn, improve his classroom discipline. The result would certainly be an improvement in the retention of well-qualified, well-trained science teachers.

In the area of teacher/pupil ratios it was predictably found that the mean class sizes increased from form 7 classes down to form 3 classes. The mean class size at form 7 level was around 12, at form 6 level around 19, at form 5 level around 25 and at form 3 and 4 level around 27-28.

The mean over-all size of a science class in the sample was 23.2 which compares with a 1954 value of 23.1 and a 1965 value of 23.0. No noticeable change in twenty six years! The range of class sizes was 1 to 43.

As perceived by H.O.Ds most science departments appeared to be in good spirits. Only 15 H.O.Ds (5.7% of the sample) felt that the morale in their science departments was less than O.K., while 132 (48.7%) felt that the morale in the department was high or very high.

TEACHER SHORTAGES:

A third aim of the survey was to determine whether there was a shortage of science teachers.

Of the 271 schools in the sample (68% of the population) there was a total shortage of 1170 class contact hours per week. This means that there is a shortage of 53-59 List B teachers in the science departments of the sample.

The situation would be 100% worse if the 54 overseas teachers had not been recruited during the year.

From the schools of the sample a total of 347 science teachers left science teaching during the year October 1979 to October 1980. This extrapolates to 496 for the population. Of those who left teaching an unexpectedly low 7.8% of those leaving went to industry. Most left to go overseas, but not to teach (27%). The variety of jobs to which science teachers went was very diverse as can be seen in Table XX.

One method of remedying the situation of a lack of full time science teachers is to employ part-time teachers. Of the sample, 76% of the part-time teachers were female. The majority of part-time teachers of science were married and female (67.9%). No statistics were produced to assess the qualifications or level of training of these part-time teachers - an area that warrants further study.

SALARIES

The fourth major aim of the survey was to attempt to determine whether science teachers have lost salary relativity with other professions having similar qualifications.

Statistics available from the P.P.T.A. showed that teachers' salaries were behind other professions with similar qualifications. However, improvements had resulted from the salary increases that occurred early in 1980. The 1980 N.Z.I.C. Annual Salary Survey showed that school teachers are in the lower income group of the chemists sampled in their survey. It is probable that physicists and biologists with their very marketable qualifications would be in a similar, if not worse, situation.

It appears then that the morale, conditions and salaries of teachers of science have improved since 1965. Science teachers are now better qualified and most are trained. However, the conditions under which they work are far from ideal, and this may, in part, be responsible for the relatively large number of science teachers leaving the teaching profession (20% of the sample).

There are two main factors which will determine the success of recruitment and retention of science teachers in the future: salaries and conditions.

The P.P.T.A. do an excellent job in the area of salary negotiations and are well aware of the need for increases in the basic scale, more steps at the top of this scale, removal of the country service bar, the poor return for P.R. positions and the need for a Master Teacher scale, to name but a few. Salary claims must be vetted by many Government Departments. Progress is slow, claims are seldom fully met and consequently teachers become frustrated and disillusioned. Positive financial incentives are needed for those at the top of the basic scale who do not wish to be promoted out of the classroom and into administrative positions. There is a need for immediate financial rewards for those who improve their professional qualifications and some financial assistance for those involved in extra-curricular activities. The area of relativity, though difficult to assess,also needs attention.

Highest on the list of improvements to conditions is that of less class contact time. Six classes, three non-contact periods per week, and no ancillary assistance is taxing to say the least.

A minimum of one non-contact period per day is recommended as essential for any full-time teacher of science.

Insufficient and unsatisfactory apparatus fails to develop manipulative skills and full understanding. This must handicap advanced studies, and in the event of these pupils entering science teaching they will be hindered by lack of practical skill. A vicious circle may be set up.

New Zealand has a particular problem in that its population is not big enough to support a thriving science apparatus industry and we must necessarily import much from overseas. The expense of freight and the import licence system allows for massive increases in costs. Much equipment must be bought by catalogue without inspection.

A report produced by Mr. R.A. Hoare, Science Equipment Advisory Committee, Dept. of Education, 1978 suggested the following:

(a) Cost saving by bulk purchase of basic items by consortia of schools or a central purchasing agency.

(b) Production of kits for assembly by schools. This approach was used in the American PSSC Physics scheme, but was only partly successful, because of the inferior design sometimes used.

(c) Manufacture of basic items by a small equipment unit, operated by the Department of Education. Many parts, of course, would need to be bought in from commercial firms.

(d) Manufacture of equipment to specifications issued by the equipment unit, by tender from local firms. The tender system has been in force for some years for a limited variety of apparatus, and is generally satisfactory.

(e) To guide science teachers, items offered on the commercial market should be regularly assessed, rather in the manner of the Consumers' Institute. Regular information would be sent to schools.

(f) The provision of adequate technician support is vital. The average New Zealand school has about one-quarter of the technician-hours that British schools enjoy- and the latter are not content with their level of assistance.

(g) Redistribution of scientific apparatus no longer needed by higher education or by industry. This is of use mainly to more advanced classes.

(h) Allocation of more time to staff to allow making and maintenance of equipment. This would of course make the staff shortage more acute for a time - but would tend to retain teachers and break the 'vicious circle'.

(i) There must be opportunity for science staff and technicians to learn a range of constructional skills, and familiarise themselves with modern methods. This is especially necessary for teachers in country areas, who are cut off from the cross-fertilisation of ideas which city teachers enjoy. The Inspectorate do take some part in this, but it is impossible for them to have great influence because their main commitment is in another direction and their visits infrequent and without equipment. It is amazing that though (in Auckland) there are four Science Advisers for the Primary Service, there is no permanent full-time adviser for secondary science in the whole country".

Class sizes seem to have changed little over nearly three decades and the range of class sizes is large. With the previously mentioned strains that a science teacher has in a practical laboratory session it is fair to say that he cannot control, advise and effectively teach experimental skills to thirty or forty junior students. Science teachers should insist on a maximum allowable class size of 20-25 pupils at all levels.

Government money would be well spent in training more laboratory technicians. With large numbers of quite well-qualified young people being unemployed this could be one way of (a) giving them a meaningful occupation and (b) helping to reduce the stresses that so many science teachers are experiencing due to heavy workloads. The cost involved in training a laboratory technician would be substantially less than the $100,000 to train science teachers who, because of the poor conditions, leave teaching.

Curriculum change must always be an ongoing process so that what is taught is relevant to the technology and needs of society. The F.5 Chemistry syllabus which has remained unchanged since the 1940's is but one example of the lack of ongoing, updating and modification. Professor B.R. Penfold, Subject Convenor for the Sixth Form Chemistry Syllabus Committee commented in his 1980 report that "... teachers find themselves under great pressure in attempting to cover adequately all topics in the time available

to them ..... and the difficulties have increased in the few years since the present prescriptions were drawn up because of the more diverse clientele".

Curricula must be adapted to cater for the present and future needs both of the individual and the scientific community in which he will operate.

Science education in the future will need to move from an emphasis on academic excellence in the physical sciences to more emphasis on the technological and applied sciences. But perhaps most importantly there will be a need for students to have a deeper understanding of the Social and Biological Sciences, so that the student can learn to cope with the stresses imposed by ever increasing technological advances. These will produce redundancy, many changes of occupation during a life-span, plenty (too much?) leisure time, and associated social, psychological and physical problems will result.

Science students will need to address themselves more and more to the already critical state of pollution, lack of energy resources and psychological health problems. More emphasis will be needed on the control and dispersement of population, industry and food resources. These problems will be addressed to the pure, applied and social scientist, the economist, politician, health authority and, of course, the science educator.

Thus, the 1980's and 90's will bring to science education a revolution similar to that imposed on science education in the western world by the launching of the Russian spacecraft 'Sputnik' in the late 1950's.

New courses, new classroom materials and new teaching techniques will all be needed to educate science students as we move into the latter part of the twentieth century.

APPENDIX A

Covering letter

FEILDING AGRICULTURAL HIGH SCHOOL

PRINCIPAL:
B. H. KERR, M.SC., DIP. ED.
TELEPHONE 34 029

CHURCHER STREET,
FEILDING, N.Z.

1 August 1980

ATTENTION HEAD OF DEPARTMENT SCIENCE

Dear Sir/Madam,

Over the past few years there have been many conflicting reports about the state of Science teaching with respect to staffing shortages, conditions and salaries. Thus, I am doing a survey of "The Staffing Situation, with respect to Science teachers, in New Zealand Secondary Schools". The survey, which is being sent to all secondary schools, has the approval of the Department of Education, the Post-Primary Teachers' Association and Massey University.

The findings of the survey, which will be of interest to all of us as Science teachers, will be made available in due course.

Attached are two different questionnaires. One is to be filled in by you as Head of Science, the other is to be filled in by all teachers who teach one or more Science classes. Please include yourself and any part-time teachers in this second category.

Would you then please collect in all the forms and send them to me in the enclosed, stamped, addressed envelope.

Thank you for your co-operation.

Yours faithfully,

TONY GERRITSEN
SCIENCE DEPARTMENT
MAG:MML

Encl:

APPENDIX B

Questionnaire forms:

(i) Sheet 1

(ii) Sheet 2

SCIENCE TEACHER SURVEY 1980

For Office Use Only.

Sheet 1

This sheet is to be completed by the HEAD OF SCIENCE DEPARTMENT only. All replies to this questionnaire will be STRICTLY CONFIDENTIAL.

1. Name of School, in full 1

_____ 2-4
5
6

2. Number of Science Staff in your Department

Full-time _____ 7-8

Part-time _____ 9-10

3. Science Staff leaving your department during the past 12 months.

Notes.

(i) This does not include staff who have transferred to another secondary school in New Zealand.

(ii) "Past 12 months" is to be back dated from time of filling out this questionnaire.

(iii) "Another area of teaching" is taken to mean University, Primary, Training College, Technical Institute, Departmental Inspector, non teaching Principal, Guidance Counsellor etc.

REASON FOR LEAVING		NUMBER	
(a)	To teach overseas	_____	11-12
(b)	Overseas, but not to teach	_____	13-14
(c)	Gone to industry	_____	15-16
(d)	To another area of teaching	_____	17-18
(e)	To bring up a family	_____	19-20
(f)	To a job not mentioned above	_____	21-22
	Specify _____	_____	23-24
	_____	_____	
(g)	Other		
	Specify _____	_____	25-26
	_____	_____	

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4. Action being taken to counteract shortages in your department of well-qualified science teachers.

PART A

Please indicate the number of hours of class contact time per week for which this form of action has had to be taken. (e.g. if 1 class of Form 7 Chemistry and 1 class of Form 5 Physics are on correspondence this would be 8 hours)

N.B. Please only indicate if due to an actual shortage of teachers i.e. not because it is more expedient time-table wise, or because numbers are very small etc.

		Contact Hours	
(a)	Classes out of normal school time	_____	27-29
(b)	Staff losing non-contact time to teach classes that would otherwise be teacherless	_____	30-32
(c)	Teachers without appropriate tertiary qualifications teaching science	_____	33-35
(d)	Neighbouring schools combining senior science classes	_____	36-38
(e)	Science subjects being taught by correspondence	_____	39-41
(f)	Form 6 & 7 being combined	_____	42-44
(g)	Others Specify _____	_____	45-47
	_____	_____	

PART B

(a) Are you having to reduce science options? Yes ( ) No ( ) 48

(b) How many science teachers has your school recruited from overseas in the past year?

Number _____ 49-50

5. ACTUAL SHORTAGES OF SCIENCE TEACHERS
Include all shortages whether or not they are being covered by action mentioned above. (A "teacher hour" means one hour of actual class contact time. Please convert period length to hours and summate to nearest whole hour if necessary).

Number of Teacher Hours Short _____ 51-53

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6. TEACHER AIDS IN YOUR DEPARTMENT
Please indicate number

		NUMBER	
(a)	Lab Technician(s)		
	Full-time qualified	_____	54
	Full-time unqualified	_____	55
	Part-time qualified	_____	56
	Part-time unqualified	_____	57
	(N.B. qualified means N.Z.C.S. or equivalent)		
(b)	Lab Monitor(s)		
	Paid	_____	58-59
	Unpaid	_____	60-61
(c)	Remedial Teacher(s)		
	Full-time	_____	62
	Part-time	_____	63
(d)	Teacher(s) responsible for accelerant work		
	Full-time	_____	64
	Part-time	_____	65
(e)	Science Resource room(s)	_____	66
(f)	Senior Studies Room(s) for science subjects	_____	67
(g)	Do you have adequate laboratories to allow all science classes to use a laboratory for 75% of their science time?		
	Yes ( )		68
	No ( )		
(h)	Do you have adequate Audio-Visual aids (e.g. overhead projectors, slide projectors etc.)?		
	Yes ( )		69
	No ( )		

7. PLEASE TICK YOUR DESIRED RESPONSE

(a) The staffing situation, with respect to science teachers in N.Z. secondary schools is

Excellent	( )	
Good	( )	
Satisfactory	( )	
Poor	( )	
Very bad	( )	70

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(b) As a result of efforts to improve recruitments and retention the future for science departments seems

Excellent	( )	
Good	( )	
Satisfactory	( )	
Poor	( )	
Very bad	( )	71

(c) Morale in your science department is

Very high	( )	
High	( )	
O.K.	( )	
Low	( )	
Very low	( )	72

(d) The level of preparation and the teaching ability of List A teachers and those on section has, over the past 5 years, in general,

Improved dramatically	( )	
Improved slightly	( )	
Remained the same	( )	
Declined slightly	( )	
Declined dramatically	( )	73

(e) Please indicate how frequently you have a science department meeting. (e.g. annually, once a term, weekly etc.) 74-75

Daily	( )	Weekly	( )
Fortnightly	( )	Every 3 weeks	( )
Monthly	( )	Bi-monthly	( )
Once a term	( )	Bi-annually	( )

8. Please make any comments at all concerning the staffing situation in your science department, or on any aspect of science teaching at all.

THANK YOU FOR YOUR CO-OPERATION. 76-77

_____

_____

_____

_____

_____

SCIENCE TEACHER SURVEY 1980

For Office Use Only

Sheet 2

This sheet is to be answered by any person who teaches one or more science classes. 1 2-4 5 6

1. Sex (Please tick appropriate box) 7
   Male ( )
   Female ( )

2. Present Position 8
   Full-time ( )
   Part-time ( )

3. Marital Status 9
   Married ( )
   Single ( )

4. Completed years of teaching service

   _____ years 10-11

5. Write down all your tertiary qualifications including degree(s), diploma(s) and certificate(s) (e.g. B.Sc., Dip. Ed. etc.)
   N.B. 1. Please suggest N.Z. equivalent in brackets if appropriate.

   2. If your degree is short by 1 unit or 3 papers please write B.Sc.(incom.) etc.

   3. Please put an asterisk next to any degree containing science. (e.g. B.Sc.* M.A.*).

   _____ 12-13

   _____ 14-15

   _____ 16-17

6. Highest relevant qualifications in Chemistry, Physics and Biology.
   Please use stages rather papers for tertiary qualifications. Your highest relevant qualification may be Teachers' College Science or School Science. (e.g. Chem. III, Teachers' College Physics course, School Certificate Biology, 1st Class Honours Chemistry etc.)

   CHEMISTRY _____ 18-19

   PHYSICS _____ 20-21

   BIOLOGY _____ 22-23

7. What is your major teaching area?

   _____ 24-25

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8. Classes taught and numbers in each class.
(e.g. Form 3 Science 28.
Form 7 Chemistry 16. etc.)

	CLASS	NUMBER OF STUDENTS	
1.	_____	_____	26-29
2.	_____	_____	30-33
3.	_____	_____	34-37
4.	_____	_____	38-41
5.	_____	_____	42-45
6.	_____	_____	46-49
7.	_____	_____	50-53
8.	_____	_____	54-57

9. Formal Teacher Training (Please tick)
Secondary ( )
Primary ( )
None ( )
Other (specify) _____(4) 58

10. How many inservice courses have you attended over the past TWO years?
Residential _____ 59-60
One day courses _____ 61-62
In school courses _____ 63-64

11. Are you a member of a local Science Teachers' Association? (Please tick)
Yes ( )
No ( ) 65

12. Are you happy with your present salary?
Yes ( )
No ( ) 66
If no please state why
_____ 67-68

13. Excluding salary conditions are you reasonably happy with your present situation as a post-primary science teacher?
Yes ( )
No ( ) 69
If no please state why
_____ 70-71

14. Name the one thing you would most like to see take place to improve your job as a teacher of science.
_____ 72-73

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