NZ Secondary School Science Technician Employment

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for

Science Technicians Association of NZ

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Abstract

Ways used by others to determine the amount of technician support for science teaching were considered. A survey of NZ schools was carried out and the service factor ratios calculated. The different values for this measure of teaching support were compared in different-sized state/integrated schools, and in independent schools. The assumption that state and integrated schools could be considered together was checked.

Consideration was given to the role of a science technician in a school, and the reasons why larger schools may use proportionately less technician support. A proposal was put forward for a minimum service factor ratio, with the suggestion of central funding the salaries.

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STANZ

Science Technicians' Association of New Zealand
Sub Association of NZASE

10/8/07

To whom it may concern

STANZ endorses this report titled "NZ Secondary School Science Technician Employment".

We wish to commend Ian for his work, dedication and commitment to enhancing the Science Technician profession in New Zealand.

STANZ Executive

07/08/2007

Botany Downs Secondary College
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To whom it may concern

I would like to commend to you the report by Ian de Stigter for the Science Technicians' Association of New Zealand. It is a valuable update on the progress made with respect to the service provided by science technicians in New Zealand. The comparisons with the United Kingdom and Victoria, Australia are sobering.

The work of science technicians in support of the delivery of a quality science teaching programme is essential. Science technicians work in partnership with science teachers to provide practical science opportunities. Excellent technician support – whether it be measured in hours or experience and expertise, or both – is vital in the running of a science department.

I have been very fortunate in my seven years as a Head of Science (at two schools) that I have had the service of superb science technicians. This has made the delivery of a quality programme of teaching and assessment more achievable. A quality science technician is a valued member of the science team and is of particular support to the Head of Science. Ian's report is a very good summary of roles science technicians play; one, I might add, very consistent with the job description of my current technician.

I believe the crucial issues are:

1. The disparity from one school to another in terms of service factor (as evidenced by the data reported).
2. The difficulty in attracting and retaining qualified persons as science technicians; I have been fortunate, but I know others are not so. Part of the issue here is the remuneration and hours of employment for support staff in general in schools. Much of the rest of the problem lies with the availability of qualified science technicians.

I think the working towards the solutions suggested by this report is a valuable first step in the ongoing mission to develop the profession of science technicians. A detailed study into the quality of science technical support and their conditions would be a useful addition to the work.

I am of the view that science technicians, along with other support staff in schools, should be specifically funded as part of the schools' grant. Alongside that should be a comprehensive review of the career pathways, training and ongoing professional development of science technicians.

I wish the Science Technicians' Association and the NZEI every success in promoting the improvement of working conditions of science technicians. Gains made will assuredly lead to gains in the provision of quality science teaching.

Yours sincerely

Michael Hart

Head of Learning Area, Science
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NZ SECONDARY SCHOOL SCIENCE TECHNICIAN EMPLOYMENT

ABSTRACT

Ways used by others to determine the amount of technician support for science teaching were considered. A survey of NZ schools was carried out and the service factor ratios calculated. The different values for this measure of teaching support were compared in different-sized state/integrated schools, and in independent schools. The assumption that state and integrated schools could be considered together was checked.

Consideration was given to the role of a science technician in a school, and the reasons why larger schools may use proportionately less technician support. A proposal was put forward for a minimum service factor ratio, with the suggestion of central funding the salaries.

INTRODUCTION

One of the most important issues for NZ school science technicians is that currently NZ schools have no guidelines to relate technician hours to science department requirements. Some comments on file:

"we need to come up with... the number of technician hours needed for different size schools."

"We need some sort of NZ wide correlation between technician hours and science teaching hours."

"how many schools allocate science technician time based on the requirements for the science dept. to work efficiently, rather than what they consider they can afford?"

"are there acceptable guidelines for schools based on sound research which recommend allocation of hours to science technicians. We often hear stories about how many technicians an equivalent school would have in UK or Australia...."

RULES FOR SCIENCE TECHNICIAN ALLOCATION

Victoria, Australia, has guidelines (1) suggesting a full-time science technician is allocated to a school for 100 or more enrolments at fifth form or above. The trigger for additional technician hours is not clear. In recent practice, workloads in Victorian schools are said (2) to far exceed guidelines.

In the United Kingdom (3), several allocation rules have been used:

(a) The "rule of thumb" of one technician for 3 laboratories, ex Her Majesty's Inspectorate.
(b) Technician Support Index, TSI. TSI = full-time equivalent technicians x 100 / roll number (ex National Science Advisors and Inspectors' Group)
(c) Service Factor. Service Factor = $\frac{\text{technician hrs/week}}{\text{Science teaching hrs/week}}$

ASE proposed a minimum service factor of 0.85 (for technicians employed on a full-year basis). ASE also identified circumstances that required a higher level of technician provision, including:

- Science departments with widely dispersed accommodation or on several levels.
- Schools with inadequate lab storage, meaning frequent movements between labs, prep rooms, stores.
- Other calls on technician time

In 2002 (4), after checking with school inspection reports, which (unlike NZ ones) noted adequacy of technician support, ASE revised its minimum recommended service factor downwards, to 0.65 (still based on full-year technician employment). This ratio thus assumed time was available during school holidays to do some aspects of the work. The ASE (5) also gave a correction factor of 45/37 (number of working weeks in a full-year contract, divided by the number of working weeks in a TTO contract) to apply to service factors if term-time only technicians were involved. Thus the recommended service factor for science technicians in term-time only employment is 0.65 x 45/37 = 0.79.

NZASE STUDY OF NZ SCIENCE TECHNICIANS

This 1996 study (1) provided a source of valuable information about technicians. However, while it noted the ASE rule for technician allocation based on service factor, the NZ study attempted to correlate technician hours with roll numbers and science classes.

Roll numbers did not correlate well with technician hours. Science classes gave an apparently better correlation, but the numbers quoted in the report to describe that correlation appear anomalous. Trying to interpret from the actual graph what was intended, and assuming a number for hours per week for each science class, did not give rise to an average service factor close to current means.

SERVICE FACTOR CALCULATION SURVEY

It was decided to collect some 2007 current data for service factors, from as many NZ schools as could be easily reached, asking for school data that would be used in confidence. A questionnaire was sent out via the RSNZ scitech-talk email network, via the Central Districts Technicians' Newsletter, and directly to other science technician email addresses already available, or acquired for this purpose. The scitech-talk request was also picked up by Team Solutions and forwarded to Science HODs via newsletter and email. Data were obtained from 141 state/integrated schools, and 17 independent schools. The data collected were:

- Name of school
- State/Integrated/Independent
- Science technician hours/week
- Science technician weeks/year employment
- Science teaching hrs/week (with instructions to work this out for other than 5 day cycles)
- Approximate school roll numbers

DATA ANALYSIS

It was thought that since state and integrated schools are funded in the same way, their calculated service factors should be considered together, while independent schools would be considered separately. The assumed similarities of state and integrated schools were checked. The purpose of obtaining school roll numbers was to enable schools to be grouped by roll size, to see whether schools of different sizes were equally-well supported with technician hours. Service factors were calculated on a term-time only basis, which means there were adjustments to the calculated ratio of technician hours/science teaching hours if employment weeks/year were other than 39 weeks. (See Appendix 1)

RESULTS AND DISCUSSION

A. STATE AND INTEGRATED SCHOOLS RESULTS

The service factors for all the state/integrated schools were calculated and ranked in numerical order. The listing was then delineated with deciles, upper and lower quartiles and median. *(The deciles are in no way related to the socio-economic ranking of schools by decile number)*

The schools were also separated into 3 groups, based on roll size: 0-800 pupils, >800 to <1500 pupils, and 1500+ pupils. Each of these groups was also ranked by service factor order, and the deciles, median and quartiles marked. The results are tabulated below, and graphed in Appendix 2

State and Integrated Schools: Service Factor Statistics by School Roll Size

Decile	All schools	0-800 roll	>800 to <1500	1500+ roll
1	0.054 - 0.125	0.054 - 0.123	0.107 – 0.127	0.102 – 0.120
2	0.125 – 0.144	0.123 – 0.153	0.127 - 0.151	0.120 – 0.127
3	0.144 – 0.161	0.153 – 0.165	0.151 – 0.162	0.127 – 0.141
4	0.161 – 0.168	0.165 – 0.188	0.162 – 0.168	0.141 – 0.153
5	0.168 – 0.181	0.188 – 0.205	0.168 – 0.182	0.153 – 0.162
6	0.181 – 0.194	0.205 – 0.213	0.182 – 0.193	0.162 – 0.173
7	0.194 – 0.209	0.213 – 0.228	0.193 – 0.206	0.173 – 0.174
8	0.209 – 0.229	0.228 – 0.252	0.206 – 0.223	0.174 – 0.181
9	0.229 – 0.263	0.252 – 0.287	0.223 – 0.243	0.181 – 0.192
10	0.263 – 0.387	0.287 – 0.387	0.243 – 0.307	0.192 – 0.245
Lower quartile	0.154	0.160	0.160	0.130
Median	0.181	0.205	0.182	0.162
Upper quartile	0.222	0.235	0.216	0.178

B. SCHOOL SIZE AND SERVICE FACTOR IN STATE/INTEGRATED SCHOOLS

The tabulation of service factors in decile bands for the 3 selected roll size groups shows that larger schools tend to have less technician support for their science teaching.

The highest service factors in schools of over 1500 pupils are exceeded in more than 20% of schools with up to 800 pupils.

The median service factor for 1500+ pupil schools is 0.162. This means that 50% of these larger schools exceed this technician/teaching hours ratio. However, 75% of schools in each of the other size groups have more support than this.

Half of all state and integrated schools have a service factor of at least 0.181, as do half of all schools with rolls of 800-1500 pupils. However, only a quarter of schools with over 1500 pupils enjoy this level of science technician support.

C. COMPARISON OF STATE SCHOOLS WITH INTEGRATED SCHOOLS

The assumption that state and integrated school service factors belong to the same population needs to be tested. Of 19 schools identified as integrated, 14 were in the 0-800 pupil roll group, so the decile ranking of these 14 was compared with all state schools in the 0-800 pupil group of schools.

Decile Ranking of Service Factors for State and Integrated Schools of up to 800 pupils

Deciles	Integrated school #	State School #	Integrated to State
1-2	2	10	0.20
3-4	2	10	0.20
5-6	4	7	0.57
7-8	3	9	0.33
9-10	3	9	0.33
Overall	14	45	0.31

From the table, it can be seen that the ratios of integrated schools to state schools in service factor decile groupings 7-8, and 9-10 are close to the mean value of 0.31, decile grouping 5-6 is higher than the mean value, and groups 1-2 and 3-4 are below it. It seems less likely that integrated schools will have service factors at low levels, and more likely that they are close to the median, compared to state schools of comparable size. However, if the state and integrated schools with this roll size are separated, the upper and lower quartile and median values show that the 0-800 pupil state school distribution is closer to that of the integrated schools than to the larger state schools. (0-800 pupil state school LQ 0.156, median 0.200, UQ 0.238; integrated school LQ 0.186, median 0.208, UQ 0.232). There is no reason then to consider service factors of integrated schools separately from those of state schools.

D. RESULTS FOR INDEPENDENT SCHOOLS

Data were obtained from 17 independent schools with science technicians, with school sizes from 300 to 1000 pupils. Independent schools have been separated from state and integrated schools, because funding differences enable at least some independent schools to give superior technician support to their science programmes.

It is evident from the spread of service factors that the recorded independent schools are a widely variable group, and the record does not account for some other (small) independent schools known to have no science technicians. (See also the graphs in Appendix 3) Of the 17 independent schools recorded, 13 have fewer than 800 pupils, and the 4 with between 800 and 1000 pupils are spread through the service factor decile groups. It was therefore considered appropriate to compare the whole group of independent schools with the 0-800 roll group of state/integrated schools, as in the table below.

Decile Groups of Service Factors: Independent and State/Integrated Schools of up to 800 pupils

Decile Group	Independent Schools	State/Integrated 0-800 roll
1-2	0.131 - 0.199	0.054 - 0.153
3-4	0.199 - 0.267	0.153 - 0.188
5-6	0.267- 0.309	0.188 - 0.213
7-8	0.309 – 0.397	0.213 - 0.252
9-10	0.397 – 0.502	0.252 – 0.387
Lower quartile	0.200	0.160
Median	0.280	0.205
Upper quartile	0.325	0.235

It is evident that for the independent schools recorded, the science programmes are generally better supported with technician hours than is the case in a state or integrated school of comparable size. However, 25% of these independent schools do not have as good technician support as 50% of state and integrated schools.

The generally higher service factors for independent schools are expected, because in general they have greater operational funding available, and are able to assign some of this on a value basis to support science teaching.

WORKLOAD, HOURS, ROLES OF SCIENCE TECHNICIANS

The hours that technicians in school science departments have to carry out their work is a subject which has often attracted adverse comment – from science technicians, science teachers, and Heads of Science. A stated objective from NZASE, in distributing the report of their 1996 study, was to help HODs prepare their case for technician hours. Workload and an appropriate number of working hours was a major focus of Royal Society/Association of Science Educators studies of school science technicians in the UK. It remains an issue in Australia.

Some of the comments of NZ science technicians, about guidelines, were quoted in the opening section of the report. Putting aside the more passionate expressions of need, questions should still be raised when technicians commonly refer to a need to do unpaid work to meet job requirements.

CLEAPSS (6) has argued that low service factors (they would consider ours very low) suggest technical support is not being used effectively, with technicians only supplying and collecting equipment and materials, and performing no other duties. It may be that in some NZ schools with longer-term low service factors there may be surprise expressed that a science technician role is more than this!

The science technician role is intended to help teachers to teach science, to play a vital role in departmental hazard management, and to reduce the workload of Heads of Science by managing resources and most of the department budget.

Some of the components of the role are: ensuring labs are ready for practical work, preparing chemical solutions and media , reagent standardisation, calibration, budget preparation, purchasing and budget management, hazard assessment labelling and control, advice to staff on safety, input to safety procedures, input to designs for upgrade of prep and store rooms, chemical and equipment inventory and database maintenance, repair and maintenance of equipment (and sometimes furniture and fittings), construction and improvement to lab equipment, containers and storage, and security responsibilities.

To help the department, the science technician usually also looks after A/V equipment, A/V media, print resources, and stationery. Some science technicians (an increasing trend in better-resourced schools) provide support in the laboratory during practical sessions and practical assessments.

The effect of a low service factor is to dismember the technician function, at a cost to science teachers, the Science HOD, the school, and its pupils. It should be recognised that science teachers have a higher workload than teachers in other departments as a result of the high practical requirement, and that Science Heads often have large departments to run, with more budget and financial items than in other departments. This means that science staff are under more pressure, even with adequate technician support. The disinvestment in safety aspects of the technician role is also of concern, if technicians are not given the time and training to address the safety issues they confront.

Every science technician should have adequate hours to address a job description which fully supports the department teaching, safety procedures, and administration; and should have a training plan, access to the technicians' email network and newsletter, and opportunities for suitable professional development through a regional technicians group, short-course release, or distance learning.

SCHOOL SIZE AND TECHNICIAN SUPPORT

Why do large schools (as a rule) support their science teaching with lower service factors?

There are 3 theories which could be put forward to account for this:

(1) Economies of scale. The mechanism needs explanation, but some will see pupils as involved in a processing operation, with higher labour productivity being achieved in a more-capitalised processing unit.

(2) Better management in larger schools. It is to be hoped that larger schools have better management, because they can have much more to manage. Just how the burdens of added responsibility for the senior management team could improve productivity in the science technician role is not clear.

(3) The invisibility factor. Science technicians in NZ and UK have pointed out that they are graded lower than their qualifications and responsibilities would suggest appropriate – in contrast with more visible administration and ICT staff. They believe that their contribution in schools is vastly under-valued, because management is less aware of what they do.

NZ science technicians have seen recognition of the value of their work as their most important issue that needs to be addressed, and have had a lot to say about it. They are not alone; this is a problem which has been raised (7),(8) at the highest levels in UK education:

"Technicians are a vital part of any science department and are highly valued by staff and students. But the essential contribution that technicians make to science education has not, until now, been widely recognised outside the science department."

"Technicians are clearly essential to high-quality science education in this country. Yet, despite their vital role, for many years the contribution and professionalism of technicians have gone unrecognised outside school science departments. Fortunately, things now seem to be changing."

It is reasonable to assume that if invisibility of science technicians is a problem, it will have affected not only grading, but also technician hours allocation. Further, the effect will be more pronounced in larger schools, unless the Head of Science can forcefully argue the case for the technician time required to support science teaching.

In those larger schools where relatively high service factors have been achieved/retained, despite the invisibility of the technician function, I think the Principals and Heads of Science should be commended for achieving what has been lost elsewhere.

In those larger schools where low service factors have become the norm, there is a need for Principals to confer with their Heads of Science about this. There is potential here to improve the teaching of the school science programme by increasing the technician support for it.

DETERMINATION OF SERVICE FACTOR GUIDELINES

The reason to conduct a survey was to establish the extent to which school science departments currently use technicians. With that knowledge it becomes possible, already, to take forward steps by indicating to some schools they may be able to better use science technicians within present operations grant constraints.

However, with the government poised to announce in August some changes to operations grants and Support Staff funding, it is possible to look beyond current funding constraints. The government announcement in August should not be seen as the last word on Support Staff and Operations funding – the point has been made to the review committee that an increase is needed, but an on-going review process will be required to guide change for appropriate outcomes.

Current funding for science technicians does not in general provide the hours for them to fully use their experience and skills in support of science teachers and Heads of Science. With more money potentially available for technician hours, the technician role may be able to expand to fill out the role description earlier outlined. Current service factors are generally not adequate for that purpose.

There are practical limits to the rate at which the school science technician role can be re-built. While some current part-time staff may be happy to work extra hours, recruiting numbers of trained technicians may be difficult. At present, most NZ school science technicians are highly qualified and experienced, but retirements are increasing, and replacements may not have the same expertise. With further information, options such as recruiting foreign nationals can be considered.

Adjustments to pay rates, conditions of employment, training and development, and introduction of certification, may be needed to replace an undervalued and ageing workforce. NZEI is currently looking at claims for higher grading and central funding of salaries for specialists such as science technicians, and these may be part of what is needed. Further study on replacement and training needs in the next few years is urgently required.

A further limitation to greater science department use of technicians comes from HOD and technician experience over recent years. Where technician roles have been dismembered by excessive workload for an extended period, HODs may not trust their technicians (or they lack the capabilities) to take additional responsibilities.

Because the rate of change is necessarily constrained, it would be unthinkable to recommend that NZ schools adopt the service factor recommended in UK by ASE – a service factor of 0.79 when adjusted for a term-time only employment basis.

A service factor of 0.25 (term-time only basis) would be a suitable minimum for NZ schools at present. Although this is less than one-third of the support recommended for UK science departments, achieving it with suitably-qualified staff will be challenging enough, since it is a 39% increase on current median values.

To make best use of current expertise, many of the current experienced technicians could be promoted to become senior technicians in medium-sized or larger schools, and less skilled and experienced assistants could be hired to help them.

This minimum service factor needs to be centrally-funded for all secondary schools. Evidence from Australia and UK of well-meant voluntary guidelines being almost totally ignored is conclusive. In

NZ we need a conservative, achievable, universally available funding level for science technicians, that can be relied on. There should also be a review date for the 0.25 service factor in several years, when the adequacy and value of the increased support for science teaching can be fully assessed.

Factors involved in setting this proposed service factor are:

1. Current levels of technician support in exemplar state/integrated schools are already at 0.25 or higher, even with existing funding constraints. So this is no leap in the dark. If there are Principals or Heads of Science who doubt they want or can use this level of technician support, then they can draw on experience elsewhere, from those who value it highly.

2. Technicians have largely not been given the time to fulfill the role in school science that they are capable of. A significant increase in service factor is necessary to give technicians the opportunity to fill out that role description, for the benefit of science teaching, and to restore the professional status of science technicians.

3. Workloads have made it difficult for technicians to get training or PD which is appropriate for their full role. There is probably already a substantial backlog of required skill training and knowledge updating for experienced staff, and new staff will have greater requirements.

CONCLUSIONS

The majority of state and integrated schools do not have sufficient technician support for their science teaching, and larger schools in general make less use of technicians than smaller schools.

This situation has come about through long-term funding constraints and can be remedied by centrally funding technician support at a consistent minimum level. Voluntary guidelines for science technician hours will offer only false hope as they have in other countries, especially if funding through the operations grant at a comparable level continues.

The proposed funding at a service factor of 0.25 is related to the use made of technicians in exemplar schools and the capabilities of experienced science technicians, but also heeds anticipated recruiting difficulties.

Achieving improvements for technicians and science teaching in this respect will require negotiation of central funding for science technicians.

A full survey of school science technicians is urgently needed to produce a workforce plan for future recruiting and training requirements.

ACKNOWLEDGMENTS

The assistance of the following is acknowledged in getting the service factor survey to schools and returning results: Netta Brown, editor of Central Districts Technicians' Newsletter; Peter Spratt, Executive Officer for RSNZ and NZASE, Michal Stone and Carol Young of Team Solutions, and a multitude of hard-working science technicians (and some Science Heads and Principals) in the schools, below, who contributed data. Craig de Stigter, Software Engineer, helped with computer processing of data.

ACG Senior College	Kavanagh College	Rosmini College
Auck Girls Grammar	Kelston Boys High School	Rotorua Boys High
Aorere College	Kelston Girls College	Rutherford High
Auck SDA High School	Kings College	Sacred Heart Coll, Auck

Ashburton College
Auck Grammar
Avondale College
Awatapu College
Birkenhead College
Blue Mountain College
Botany Downs Sec College
Bream Bay College
Buller High
Burnside High
Carmel College
Cent. Hawkes Bay College
Chilton-St James School
Christchurch Boys High
Christchurch Girls High
Christ's College
Church College of NZ
Corran School
Darfield High School
Dargaville High School
Dilworth School
Edgewater College
Ellesmere College
Epsom Girls Grammar
Fairfield College
Feilding High
Flaxmere College
Geraldine High School
Gisborne Boys High
Green Bay High School
Greymouth High School
Hagley Community College
Hastings Girls High School
Hauraki Plains High School
Havelock Nth High School
Hillcrest High School
Hillmorton High School
Hornby High School
Horowhenua College
Hutt Int Boys School
Hutt Valley High School
Inglewood High School
James Cook High School
James Hargest College
Kaikorai Valley College
Kaipara College
Kaitaia College
Kamo High School
Katikati College
Kings High School
Kings Way School
Lincoln High School
Linwood College
Long Bay College
Lynfield College
Makoura College
Mana College
Mangere College
Manurewa High School
Marist College
Marlborough Boys College
Marlborough Girls College
Massey High School
Menzies College
Mercury Bay Area School
Motueka High School
Mt Albert Grammar
Mt Aspiring College
Mt Roskill Grammar
Naenae College
Napier Girls High School
Nayland College
Nelson College for Girls
Nelson College
New Plymouth Boys
New Plymouth Girls
Newlands College
Northcote College
Onehunga High School
Onslow College
Orewa College
Otago Boys High School
Otago Girls High School
Otahuhu College
Otumoetai College
Palm Nth Girls High
Papakura High School
Papanui High School
Papatoetoe High School
Penrose High School
Pinehurst School
Porirua College
Pukekohe High School
Queen Margaret College
Queens High School
Rangi Ruru Girls School
Rangitoto College
Rosehill College
Sacred Heart Coll, Ham
Sacred Heart Coll, N.P.
Sacred Heart Coll, Nap
Samuel Marsden College
Sancta Maria College
Scots College
Selwyn College
Shirley Boys High School
Sir Edmund Hillary Collegiate
South Otago High School
St Andrews College
St Bernards College
St Catherines College
St Cuthberts College
St Dominics College
St Johns College
St Margarets College
St Marys College, Wgtn
St Patricks College
St Pauls Collegiate
St Peters College, Auck
St Peters School, Camb
Stratford High School
Takapuna Grammar
Tamaki College
Tamatea High
Tangaroa College
Taradale High School
Tauranga Girls College
Tawa College
Te Aroha College
Tikipunga High School
Tokoroa High School
Tuakau College
Villa Maria College
Waiheke High School
Waimea College
Waiopehu College
Wairarapa College
Waitaki Boys High School
Waitaki Girls High School
Waiuku College
Wanganui Collegiate
Wesley College
Western Springs College
Westlake Boys High
Westlake Girls High
Whakatane High School

REFERENCES

(1) Robyn Baker, "Science Technicians in NZ Schools, 1997, NZASE.

(2) Geoff Gleadall, President, LTB-STAV personal communication.

(3) 'Survey of Science Technicians in Schools and Colleges', p3. The Royal Society, July 2001. From www.ase.org.uk/careerstructure.php.

(4) 'Supporting Success: Science Technicians in School and Colleges', p9. The Royal Society, Jan 2002. From www.ase.org.uk/careerstructure.php.

(5) 'Survey of Science Technicians in Schools and Colleges', p4.

(6) 'Technicians and Their Jobs', p18. Report L228, CLEAPSS School Science Service, December 2002. From www.ase.org.uk/careerstructure.php.

(7) Gibson, Dr Ian, MP, 'Technicians and Their Jobs' preamble.

(8) MacFarlane, Sir Alistair, RS Education Committee, 'Technicians and Their Jobs' preamble.

APPENDIX 1: CALCULATION OF SERVICE FACTORS

It was noted that UK service factors are based on full-year employment of science technicians, so that the ratio of technician hours/week to science teaching hours/week assumed also that there was time also during school holidays to do part of the work.

Where this is not so (and term-time only employment has become more widespread in the UK as in NZ) then an adjustment of the service factor of 45/37 was suggested to the term-time only service factor. Instead of using a full-year employment minimum service factor of 0.65, this translates to a TTO minimum service factor of 0.79, since no extra time would be available in holidays for work.

The factor 45/37 was derived from the number of working weeks in a UK full-year contract, divided by the number of working weeks in a TTO contract in UK.

In the NZ situation, where the majority of schools have TTO science technician contracts (or something close) and full-year contracts are rare, it makes sense to use TTO service factors to estimate how well a school's science teaching is supported.

If we then take the TTO service factor based on 39 weeks work in the 4 terms as the standard, then service factors for 39 week employment need no adjustments, but service factors from other numbers of weeks employment need to be adjusted to this base.

This adjustment is not as straightforward as it may first appear, if the objective is to use it for general predictive purposes, and be reasonably accurate. There are some complications:

Firstly, in New Zealand, we have 39 weeks of term-time, compared with 38 in UK.

Secondly, we currently have 4 weeks annual holiday for all staff, compared with 5 in UK. In UK there are 10 national holidays recognised, with 5 assumed to fall during term-time, and 5 assumed during the rest of the year, which makes for an easy adjustment from a TTO service factor to a full-year service factor or the reverse.

Currently we have up to 12 statutory (or Education) holidays, reducing to a maximum of 11 in 2010, but not all are available in every year, and some may or may not fall in term-time or during the employment weeks of those with intermediate arrangements.

(From 2008, the annual holiday entitlement increases by 3 days (in the 5th year of service, which means most technicians will get it), and in 2010 there will be 2 more days annual leave, but the Education holiday on Easter Tuesday will be relinquished.)

Over the last 5 years, those working the 39 weeks term-time lost on average 0.9 weeks to statutory holidays; those working 44 weeks lost 1.4 weeks to statutory/Education holidays. Those with full-time

employment and 4 weeks annual leave (with 4 embedded statutories) would have 47.2 working weeks, less the 1.4 weeks of earlier statutories. These points of reference were used as the basis to draw up a table of correction factors to calculate service factors back to a 39 week employment basis, which were used in the study:

Factor for 44 weeks, to 2007, and 2008 = (44-1.4)/(39-0.9) = 1.118

In 2010 = (44-1.2)/(39-0.9) = 1.123

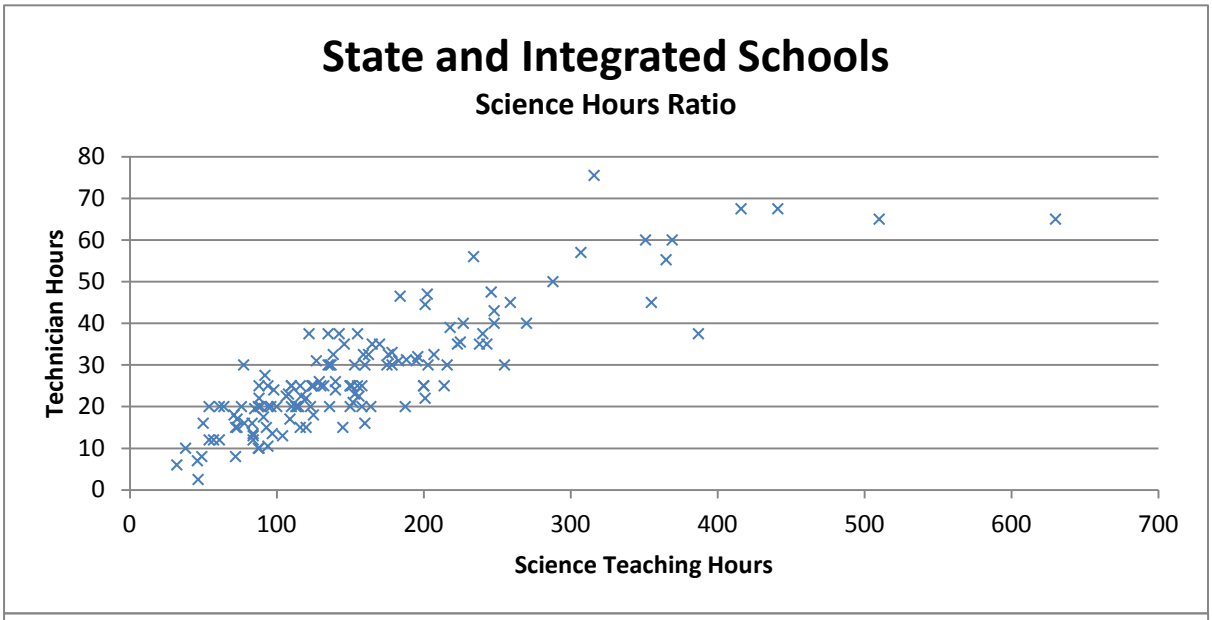
Factor for full-year,to 2007 = (47.2-1.4)/(39-0.9) = 1.202

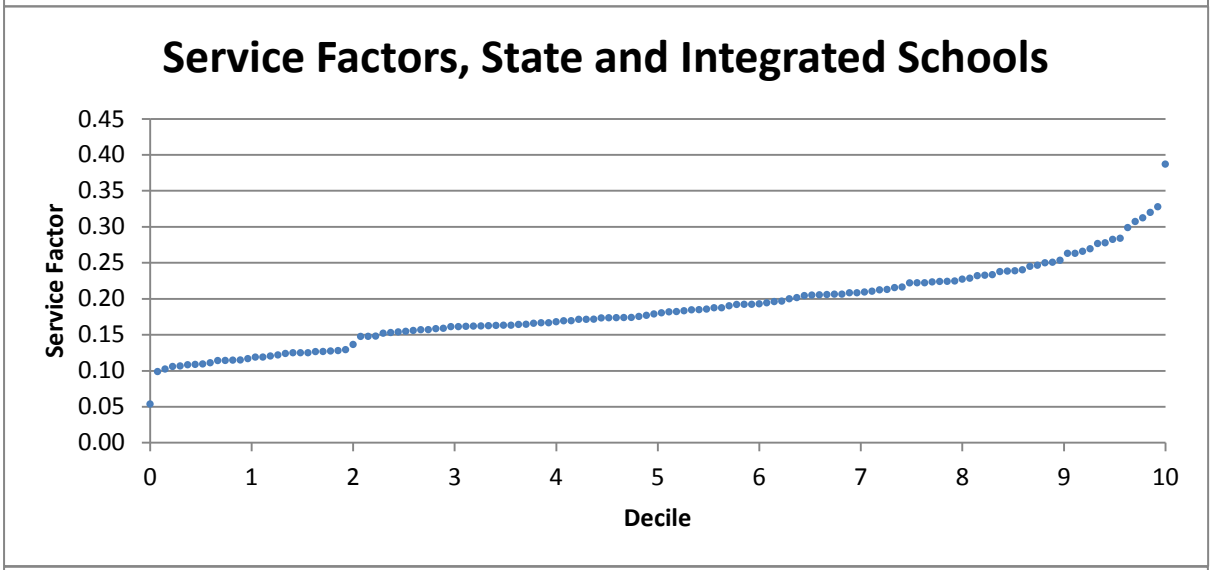
in 2008 = (46.6-1.4)/39-0.9) = 1.186

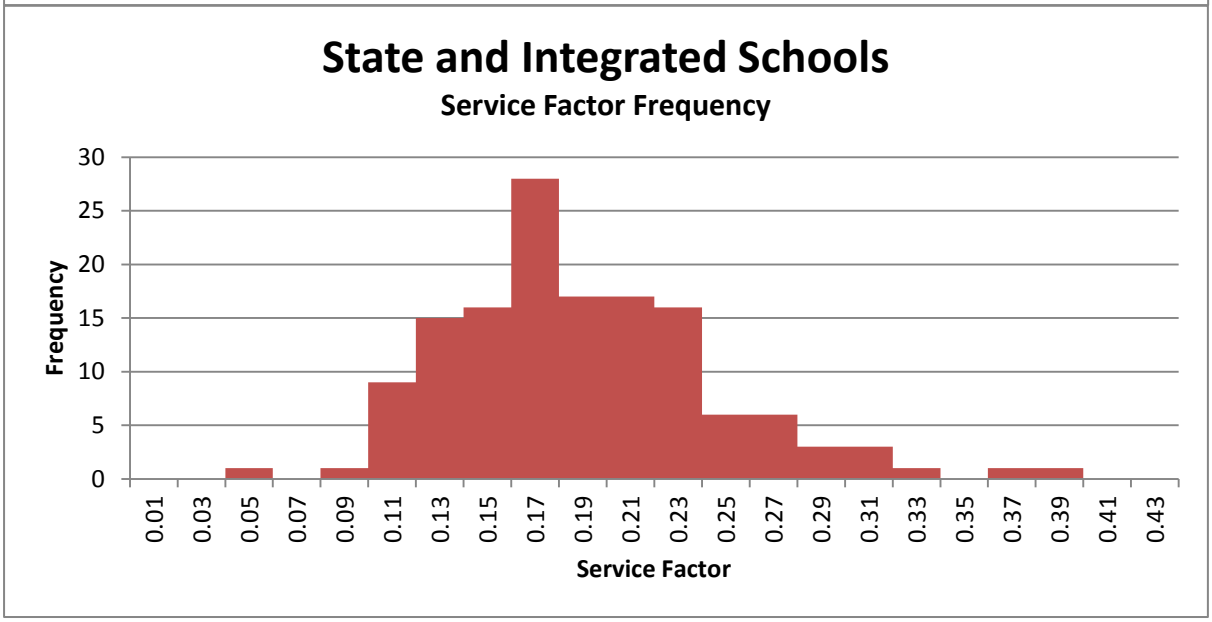
in 2010 = (46.2-1.2)/(39-0.9) = 1.181

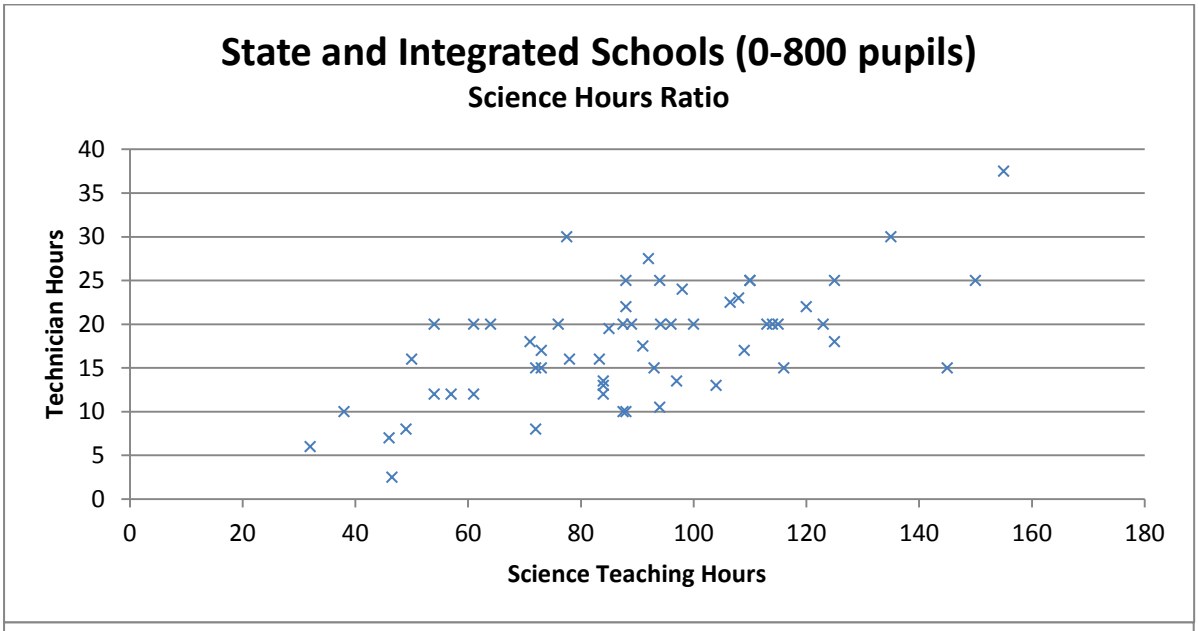
Weeks employed	Correction	Weeks employed	Correction
34	0.870	41	1.047
35	0.895	42	1.071
36	0.921	43	1.094
37	0.948	44	1.118
38	0.974	45	1.144
39	1.000	46	1.170
40	1.024	47.2 (full-year)	1.202

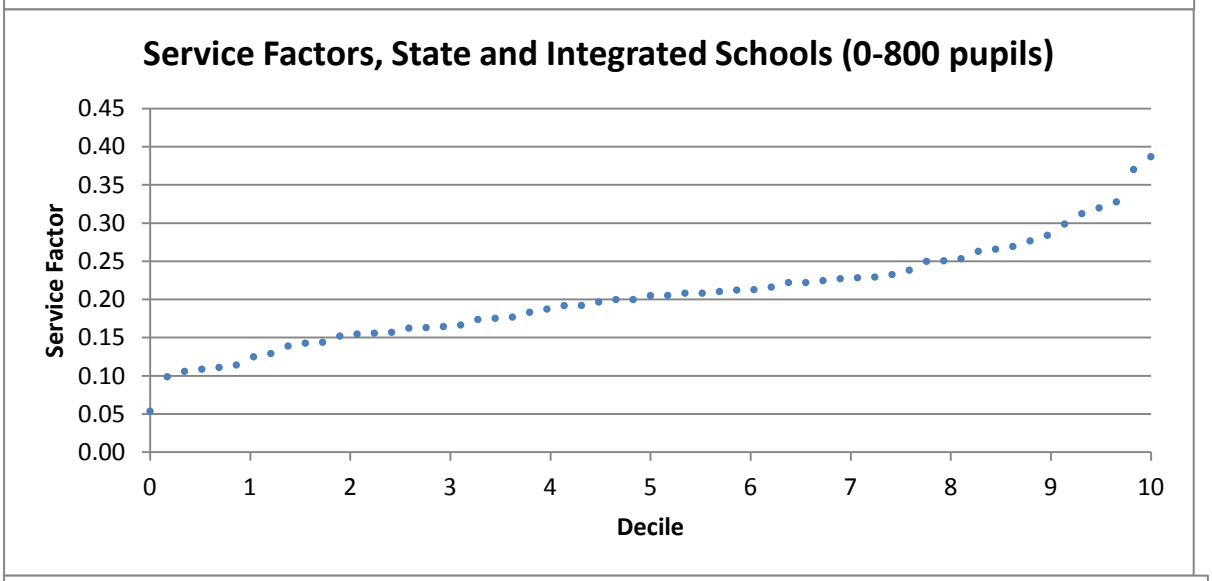
APPENDIX 2: PLOTS OF STATE/INTEGRATED SCHOOL DATA

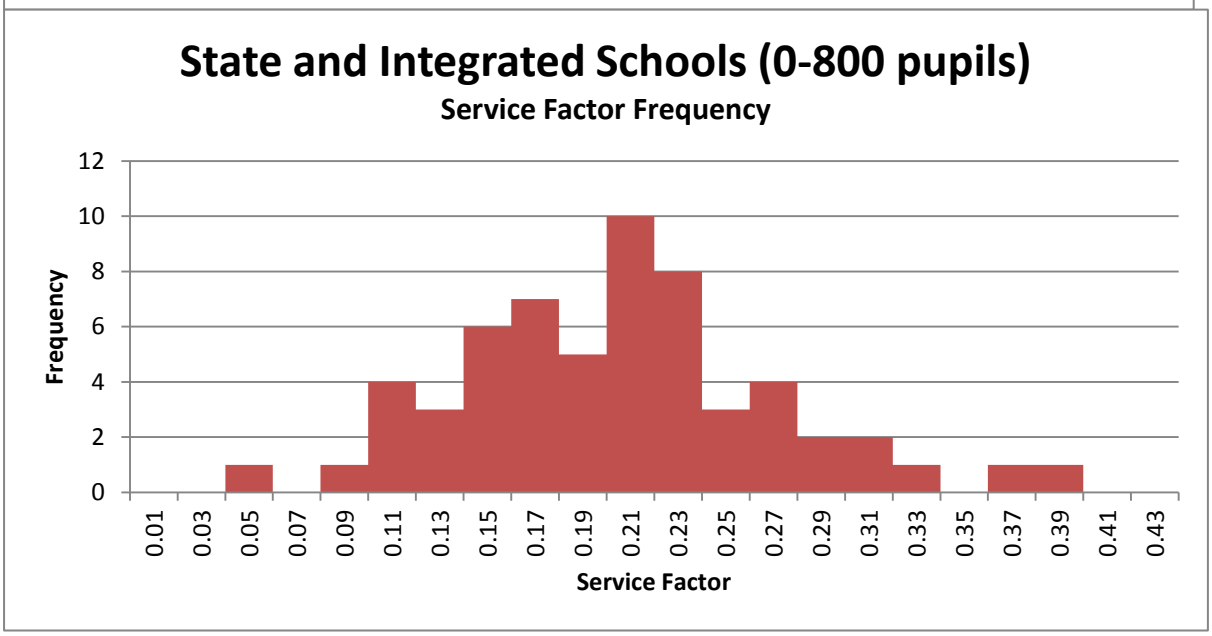


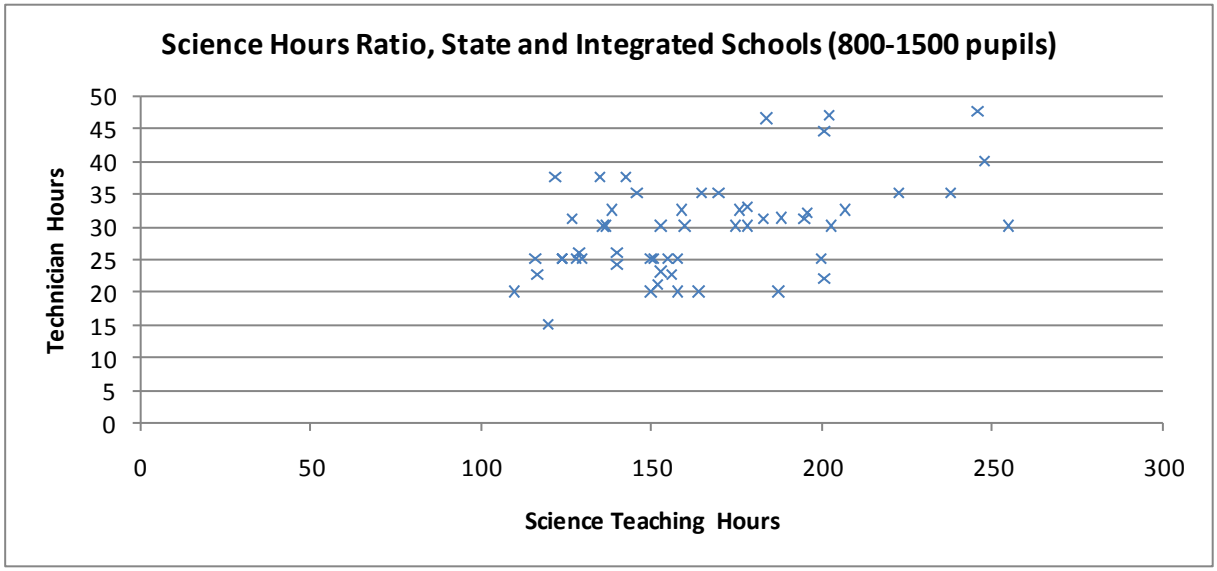


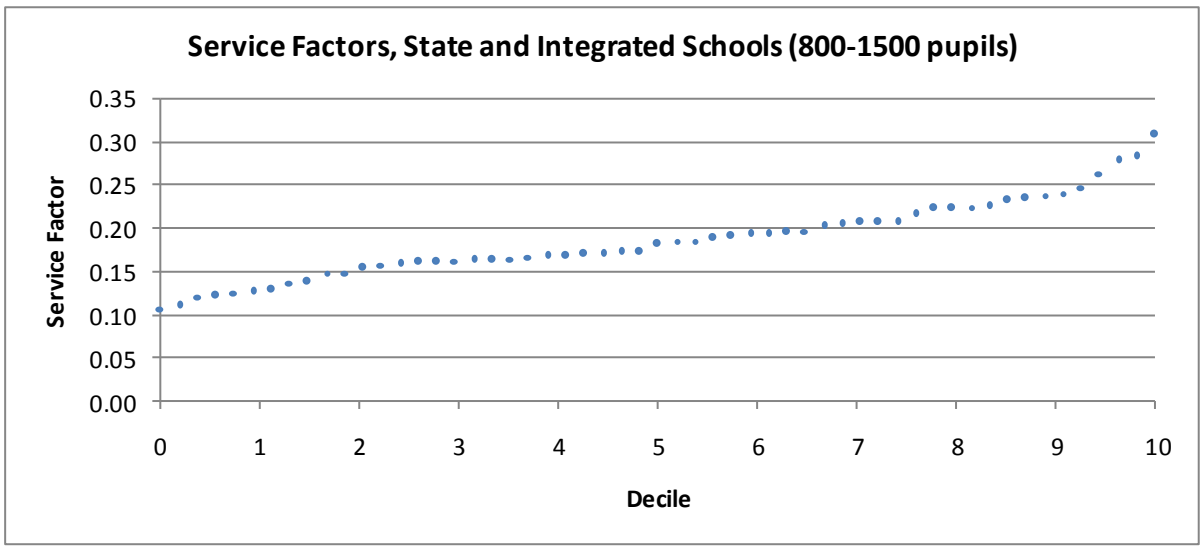


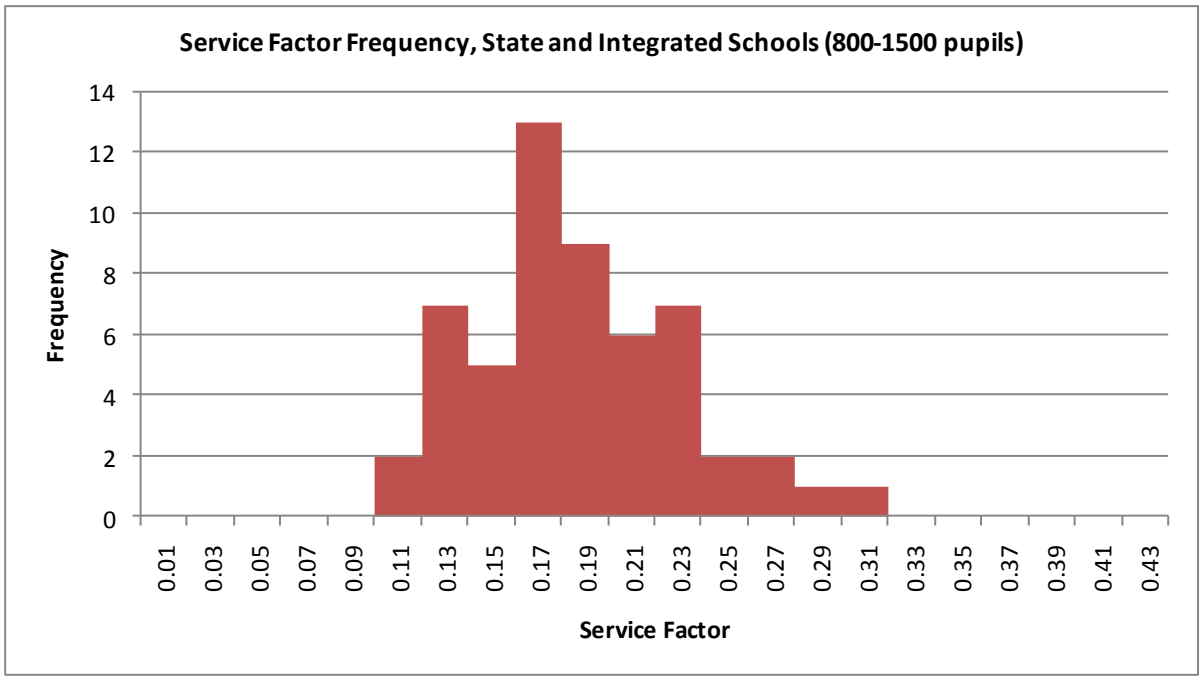

State and Integrated Schools (0-800 pupils)
Science Hours Ratio
Technician Hours
Science Teaching Hours
0
5
10
15
20
25
30
35
40
0
20
40
60
80
100
120
140
160
180

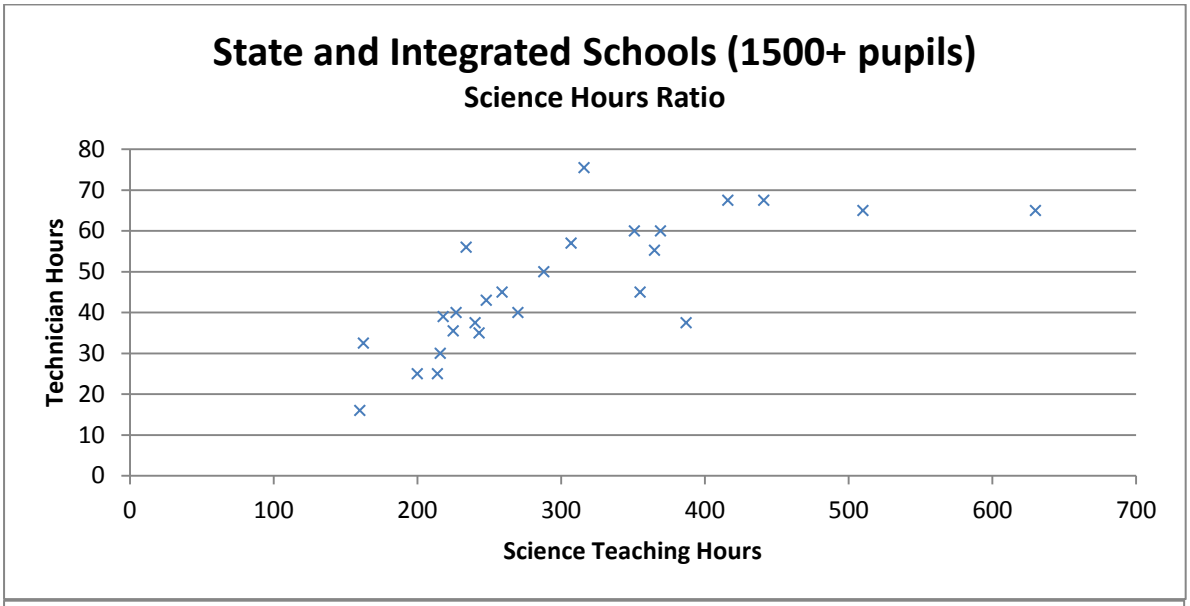

Service Factors, State and Integrated Schools (0-800 pupils)
Service Factor
Decile
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
0.45
0
1
2
3
4
5
6
7
8
9
10

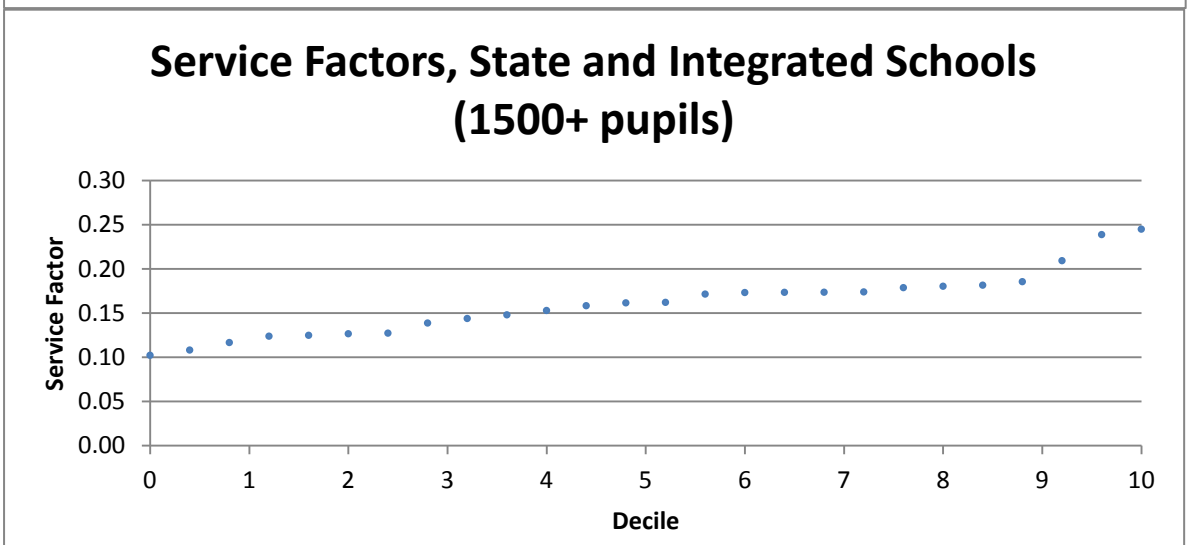

State and Integrated Schools (0-800 pupils)
Service Factor Frequency
Frequency
Service Factor
0
2
4
6
8
10
12
0.01
0.03
0.05
0.07
0.09
0.11
0.13
0.15
0.17
0.19
0.21
0.23
0.25
0.27
0.29
0.31
0.33
0.35
0.37
0.39
0.41
0.43

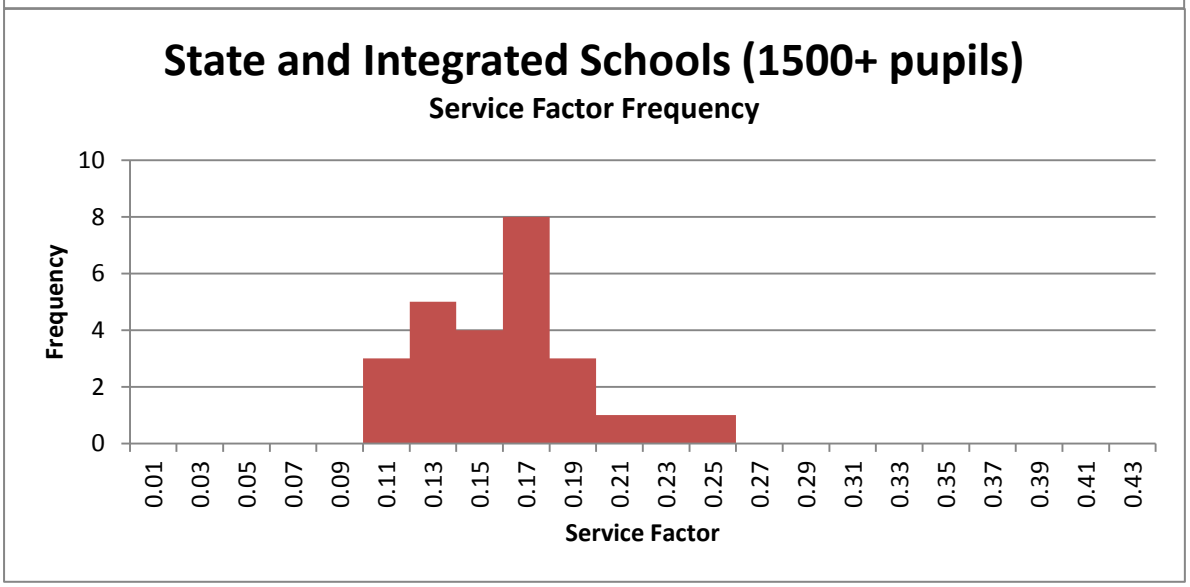

Science Hours Ratio, State and Integrated Schools (800-1500 pupils)
Technician Hours
50
45
40
35
30
25
20
15
10
5
0
0
50
100
150
200
250
300
Science Teaching Hours


Service Factors, State and Integrated Schools (800-1500 pupils)
Service Factor
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0
1
2
3
4
5
6
7
8
9
10
Decile


Service Factor Frequency, State and Integrated Schools (800-1500 pupils)
Frequency
14
12
10
8
6
4
2
0
0.01
0.03
0.05
0.07
0.09
0.11
0.13
0.15
0.17
0.19
0.21
0.23
0.25
0.27
0.29
0.31
0.33
0.35
0.37
0.39
0.41
0.43
Service Factor


State and Integrated Schools (1500+ pupils)
Science Hours Ratio
Technician Hours
Science Teaching Hours
0
10
20
30
40
50
60
70
80
0
100
200
300
400
500
600
700


Service Factors, State and Integrated Schools (1500+ pupils)
Service Factor
Decile
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0
1
2
3
4
5
6
7
8
9
10


State and Integrated Schools (1500+ pupils)
Service Factor Frequency
Frequency
Service Factor
0
2
4
6
8
10
0.01
0.03
0.05
0.07
0.09
0.11
0.13
0.15
0.17
0.19
0.21
0.23
0.25
0.27
0.29
0.31
0.33
0.35
0.37
0.39
0.41
0.43

APPENDIX 3: PLOTS OF INDEPENDENT SCHOOL DATA