New Zealand School Science Technician Roles

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ABSTRACT

Information about New Zealand school science technicians available from surveys is examined, with overseas comparisons. Use of science technicians to minimise the additional workload science teachers have for practical work is at a low level by international standards. The proportion already qualified and experienced when engaged is higher than in Australia and UK. Accessing further training and professional development is however difficult, even for those lacking basic training.

The variety of ways that science technicians are employed in science departments indicates approaches that can improve productivity. Technician support for teaching currently varies widely between schools, and science teachers could be made more consistently productive by providing them with a minimum ratio of technician time to teaching time. Technicians also have roles beyond those expected. This progression could be facilitated, and career steps recognized. Technician contribution through both teaching support and administration would benefit from attention to technician training and professional development.

INTRODUCTION

A working group representing NZEI, NZ School Trustees' Association, and the Ministry of Education, was established in 2009 to study productivity in support staff employment. The Phase 1 report (NZEI, 2010) outlined the scope of the investigation. It aimed to identify current methods of operation with support staff, with variations, in order to assess and improve the effectiveness and efficiency of their contribution to teaching and administration.

Focus areas identified were induction and training; role definition, guidance, support and mentoring; the right person for the function; teamwork; effective systems; capability for change. Surveys and interviews were planned to establish current operations and needs.

An occupational group such as science technicians with a small number of members is difficult to cover well as part of a broader study. Limited data collection can be expected for such small sub-groups. This report then is aimed to guide enquiries by the working group's researchers by providing more comprehensive information on science technicians in New Zealand schools.

Proposals made by the working group are required to be achievable within existing funding. This constraint will be particularly challenging, because the evidence suggests a dearth of needed funding has long been the main restriction on the effective use of science technicians.

POSITION OF TECHNICIANS

SCIENCE TECHNICIAN SURVEYS

In 1996, the New Zealand Association of Science Educators carried out an extensive survey of schools to collect information about science technician support for teaching. The survey report (Baker, 1997) remains a landmark one for school science. It represented science teachers' views, and conclusions of this definitive work are no less telling in 2010:

"The level of support given to teachers of science for the practical components of their classroom programme has always been a problematic area for New Zealand teachers. In a survey undertaken by NZASE in 1996 science teachers commented that while many aspects of teaching were common to all subjects, the laboratory preparation, the maintenance of resources, and the management of practical activities with large classes placed additional demands on them as teachers. The curriculum changes of the past few years have compounded the issue as *Science in the New Zealand Curriculum* (SiNZC) places considerable emphasis on the investigative nature of science. It requires students to develop their knowledge and skills in working scientifically, and the achievement of this necessitates the provision of activities that involve students in hands-on experiences. An important aspect of this practical experience is the need to have opportunities to pursue open-ended investigations where students are involved in planning, carrying out and evaluating their findings. Activities such as these are particularly demanding of resources as individuals and groups will have different requirements which increase both the preparation time and the cost in providing a relevant and appropriate science programme."

"Science education is now a complex and demanding endeavour and is more dependent than ever for its effective and efficient delivery on the involvement of qualified technical support."

In 2007, there was concern about what (if any) improvements had been made in support for science teaching. This led first to a survey of teaching support ratios (de Stigter, 2007a), then of workforce data (de Stigter, 2007b). In both these surveys there was a greater emphasis on quantitative data than ten years previously.

There was also a major study of Australian school science technicians (Hackling, 2009), funded by the Australian Government Department of Education, Employment and Workplace Relations (DEEWR). This covered the training and support for technicians, their roles and the level of servicing provided by technicians for the teaching and learning of secondary science.

Some common themes are evident in these New Zealand and Australian technician studies, so some of the Australian data and comments are considered also.

HOURS OF WORK

In1997, technician work hours was a principal focus in the schools survey. "While the under-resourcing of education is a common complaint of educationalists it is certainly very evident in the hours allocated to technical support in school science departments. Technician hours compare poorly with countries such as England and Australia, and there was an overwhelming

call, by the respondents of the NZASE survey, that the time available in New Zealand schools was inadequate for the efficient running of science departments. The tasks required of technicians in relation to the hours given to complete the work results in technicians not being able to complete some aspects of their job description and working at times without pay."

Baker showed there was little correlation between technician hours and school roll size. In the later studies in New Zealand and Australia, technician hours were instead considered as a ratio of science teaching hours. Hackling refers to the ASE definition of service factor (The Royal Society, 2001) as the ratio of science technician hours per week to science teaching hours per week. ASE qualified its service factor with a proviso that the technicians were employed for a full year. If this was not the case, an adjustment of the ratio was required. However, the Australian survey did not obtain information on employment weeks for technicians, for correcting data to a common employment basis.

The New Zealand survey took note of the ASE suggestion to adjust service factors for technicians not in full-year employment, and collected data for employment weeks. Since New Zealand schools usually employ technicians only during term-time, all service factors for the New Zealand study were calculated on a term-time only basis.

The New Zealand study showed there was a wide range of service factors for apparently similar schools. Service factors for independent schools varied more than for state/integrated schools. The level of service factor in state schools was shown to decline as school roll increased, while integrated school service factors were little different from state schools of similar size.

Hackling referred to the ASE recommendation for a service factor of 0.85 (The Royal Society, 2001), to enable all functions to be feasible, to 0.60 service factor, supposedly a level to enable a restricted range of functions, and to 0.45 service factor, at which functions are markedly reduced and resources restricted. However, in a later Royal Society report (2002) which he also cites, after checks on school inspection reports, the writers revised the recommended service factor downwards from 0.85 to 0.65. This 0.65 is based, as earlier noted, on full-year employment of technicians. The Royal Society (2002) gave a conversion factor of 45/37 for UK schools using term-time only contracts, so on the term-time only basis (as used for calculating New Zealand school science technician support) the recommended service factor is 0.65 x 45/37 = 0.79.

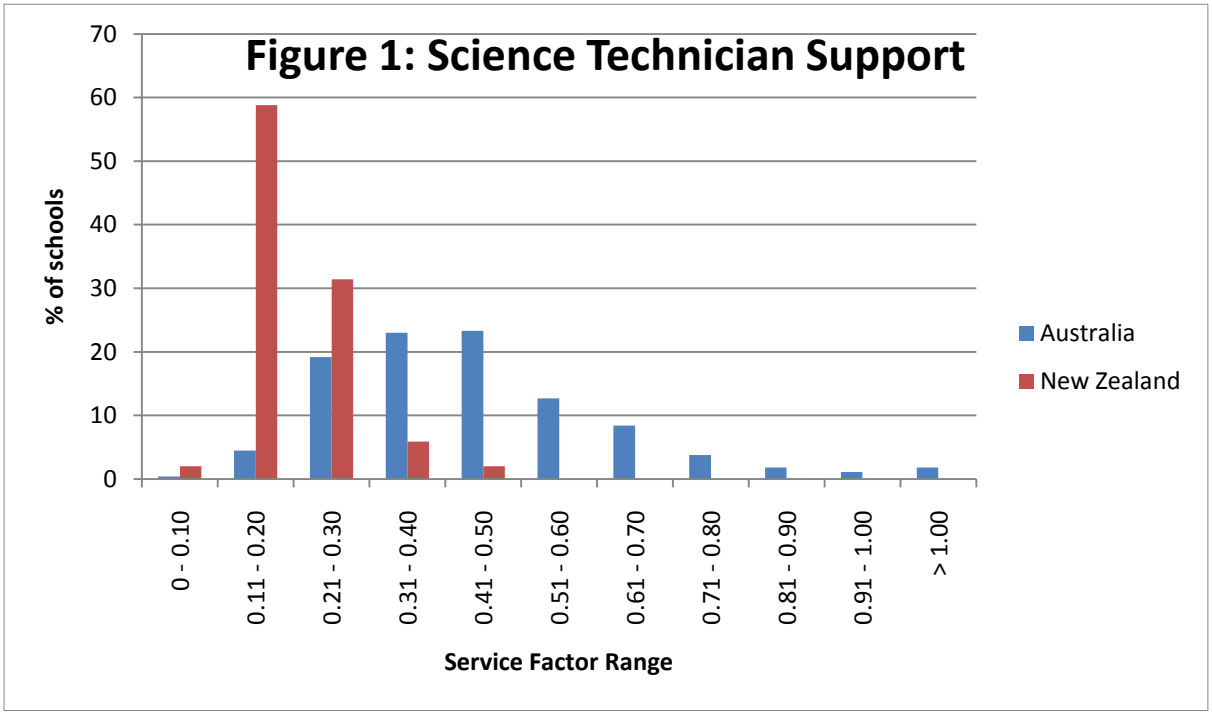
Service Factors (uncorrected) for the Australian study sample of schools that had technicians varied from 0.05 to 1.2, with a mean of 0.45 and a median of 0.41.

In the New Zealand study sample of schools that had technicians, corrected service factors ranged from 0.05 to 0.50, with a mean of 0.199 and a median of 0.185. See Table 1 for Australian and New Zealand schools data in 0.10 service factor bands, plotted also in Figure 1 as percentage for each country. This shows the very high proportion of New Zealand schools in the 0.11 – 0.20 service factor group.

Table 1: Service Factor – Australian and NZ schools of all types

	2009 Australian school data			2007 NZ school data		
S. f. range	**schools**	**%**	**Cum%**	**schools**	**%**	**Cum%**
0.00 - 0.10	2	0.4	0.4	3	2	2
0.11 - 0.20	25	4.5	4.8	90	58.8	60.8
0.21 - 0.30	107	19.2	24.1	48	31.4	92.2
0.31 - 0.40	128	23.0	47.0	9	5.9	98.1
0.41 - 0.50	130	23.3	70.4	3	2.0	100
0.51 - 0.60	71	12.7	83.1			
0.61 - 0.70	47	8.4	91.6			
0.71 - 0.80	21	3.8	95.3			
0.81 - 0.90	10	1.8	97.1			
0.91 - 1.00	6	1.1	98.2			
> 1.00	10	1.8	100			
Total	**557**			**153**		

While a few Australian schools had technician support that reached the level of the Royal Society recommendation of 0.79 service factor, such a ratio is difficult to envisage in a New Zealand school. However, the fact that Australian school service factors average more than double those in New Zealand raises a question about the benefits of making more use of science technicians here.



RECRUITMENT, QUALIFICATIONS AND CAREER

In 1997, the employment context was briefly described: "Technicians employed in schools have a diverse background with people holding qualifications such as passes in senior sciences from school, a range of science papers from universities and polytechnics, New Zealand Certificate in Science, BSc, MSc, MA or the Technician Assistant Certificate. A number of people have had considerable experience in laboratories in industry or hospitals and others have developed their expertise through the long service they have given to science departments in schools. There is, however, no career structure for technicians employed by schools, and this is detrimental to the stability of staffing and to the way the position is perceived by those outside science departments."

The later studies provided more analysis. In both Australia and New Zealand, technicians had been employed in schools for an average of almost 11 years. In Australia 84% of technicians were female, and in New Zealand 92%. Those less than 40 years of age were 22% in Australia, and 7% in New Zealand. Those over 50 were 40% in Australia and 59% in New Zealand.

Hackling suggested significant numbers of the most experienced technicians would retire in the next five years, but did not explore the matter further, or suggest who will replace them. The New Zealand survey asked about intentions to retire, reduce hours, or find non-school employment over the next 5 years. The number indicating these options was similar to the 7% per year average that had been replaced over the previous 5 years.

Female technicians recruited in New Zealand in the previous 5 years were recruited at a median age of 42, and 78% of these had Level 6 qualifications or better on the NZ Qualifications Framework. This compared with a median age of 40 at recruitment for those starting more than 5 years previously, 72% of whom had Level 6 or better qualifications. The New Zealand workforce was better-qualified than Australian or UK school science technicians, with overall 74% having qualifications at Level 6 or above on the NZ framework, compared with 40% in the UK and about 60% in Australia. (If Independent school technician data is separated out, the Level 6 qualification level for technicians in State and Integrated schools in New Zealand is 70%.)

The New Zealand context of a very depressed science sector accounts for the greater availability of mature science-qualified and experienced applicants, compared with Australia and the UK. In 2007, as in 1997, there was still no career structure for New Zealand science technicians.

NZEI has recognised the need in New Zealand for higher grades to provide an opportunity for advancement for better-skilled support staff such as senior librarians, senior science technicians, nurses and ICT managers. In both the UK and Victoria 4-level technician career and pay structures have been proposed, but the lowest level is considered inappropriate for science support. The stories of safety issues from the Australian technician survey bear out concerns for untrained and inadequately supervised people dealing with hazardous chemicals and equipment.

Level 2 (B scale) is noted in Victoria and UK as not appropriate for a sole charge science technician role, which accords with the New Zealand grade interpretation.

The majority of New Zealand school science technicians may continue to be in Level 3 (C scale) graded roles, but advancement to the more managerial or higher-skilled Level 4 senior technician needs to be recognised and promoted if science technicians are to take a greater load of responsibility. There are examples of NZ technicians whose senior role has already been recognised by their school, and there are others who should be so recognised. The general technician role and enhancements are considered in a later section.

PROFESSIONAL DEVELOPMENT AND TRAINING

In 1997, there was concern about skill development: "The lack of professional development for science technicians employed in schools is of considerable concern to teachers of science and technicians. The new science curricula have placed different demands on technicians as has the Health and Safety in Employment Act. The nature of support that technicians can give a science department and hence the school is severely limited by the few opportunities technicians have for ensuring that their expertise is appropriate for the 1990's and beyond. Those opportunities that do exist are generated by the technicians themselves."

The later surveys of Australian and New Zealand technicians echoed concerns about the training and support they received. In Australia these concerns were focused on the relevance of basic technician training meant for mining and medical lab technicians, and the proportions of technicians who had had no in-school and no out-of school training over 5 years. There were also generalist support officers with no science or lab skills training. (These, thankfully, have not appeared in New Zealand, although some schools have suggested using such generalists, and possibly using them in the science department.)

In New Zealand, there is no organized training for school science technicians. Basic training of school science technicians has been given little attention. The majority of school applicants have been mature science-trained mothers (from a variety of science backgrounds) returning to the work force, and generally with good results. Some schools have hired technicians with little or no science training, possibly because those schools have placed little value on the technician role and the need for science skills.

Twenty percent or more of Australian technicians needed support or training in a number of tasks involving newer lab practices or technology, and 25% needed support or training in a number of safety issues. New Zealand technicians had less new technology, but even more difficulty accessing training to address deficiencies.

In Australia, almost all technicians have access to the internet, to a technician at another school, to an on-line discussion board, and most to a local technicians association. (The access that New Zealand technicians have to the internet has improved, but some still cannot use it at school; only some areas have effective technician groups; and there is no organized mentoring system.)

The New Zealand workforce survey found that 53% of technicians had an annual performance review which looked at development and resource requirements. However, 26% had neither performance review nor consideration of resources and professional development.

New Zealand in-school training is more difficult to achieve than in Australia, because most are sole technicians. When training in chemical basics has been required, the on-site training provided has been variable and the best often at a school which has previously struggled to keep a technician. Training may be left to the Head of Science, who is not necessarily a chemistry specialist, and may have too high a teaching load to be available to a trainee technician.

Further on-site training is usually limited to subject areas available to teachers, such as ICT or first aid. Technicians are often given low priority when it comes to ICT training and access to computers, despite the increasingly important role these have directly in discharging the job responsibilities, as well as in supporting the sole charge role through sharing assistance with other schools, and accessing necessary information from the internet.

Not all departing technicians leave information for the incoming employee, and even if such details are left they may not be handed on to the new employee.

Out of school training is largely through regional technician groups where these exist, or by attending a conference or training day. Release from school for training purposes, or funding to attend a conference, is by no means certain. Many technicians need the assistance and support of an experienced technician while they find their way in a new environment. Even an experienced technician can find it daunting in a new school – the safety protocols are different in every school and some lack defined safe procedures.

Most local technician networks are organized by a local volunteer who does the work either during their work time, if the school agrees, or after hours. Waikato and Canterbury Universities have also run annual training days for school science technicians in their catchment, in conjunction with the regional science technician group. Technicians organize and run their own biennial conference.

Although there is ongoing training available for other support staff occupations such as teacher aides and librarians, with progress through the pay scales, school science technicians who need upskilling do not have such opportunities. There needs to be significant recognized training for under-qualified school science technicians.

However, since school science covers such a range of specialties, there is also a need for qualified science technicians to be able to extend their knowledge and practical skills with help from someone familiar with the specialty. The limited and informal links that science technicians currently have do not generally suffice for significant upskilling that can be recognized and rewarded. It would be helpful if every science technician had a formal development programme, an experienced technician mentor, and avenues by which technical and organizational skills used at work could be attested. In the UK there has been a move to

central attestation of technician competence through uploading evidence to a registration website.

Hackling tabulated the percentage of Australian technicians that could confidently perform various tasks. New Zealand school technicians will find this of interest, because most could only dream of enhancing science teaching by obtaining specialist skills in forensic science, working with digital cameras, rocketry, robotics and electronics, and telescope operation. Even the reported confidence levels for electrophoresis (37%) and working with data loggers (30%) suggest Australian schools and technicians make better use of these instrumental techniques.

The Science Technicians' Association of New Zealand (STANZ) arranged with the University of Otago for it to offer from 2008 a school-oriented variant of their Managing Chemical Hazards paper HAZX401, available by distance learning. Despite the fact that this paper deals with key safety responsibilities of most school science technicians, and that there has been a high level of technician interest in it, relatively few schools (less than 10%) have up to 2010 funded their technicians to study the paper.

The HAXZ401 paper is helpful for even well-educated technicians with long experience, but those taking the paper need first to be familiar with procedures in their schools. It does not therefore substitute for a basic chemical training course that is run both frequently and at a cost that schools will pay for their technicians to take part.

STANZ would like to work with a training provider to set up a suitable web-based course with a basic chemical handling training and assessment module. To achieve significant progression for more experienced technicians, a central attestation process, coupled with additional web-based training modules and/or assistance from other science technicians is required. To date there have been no clear prospects of funding such training, assessment, and attestation, despite obvious needs.

PD funds for New Zealand school support staff are often restricted by the school Executive Officer or equivalent. Priority is given to student outcomes, (or contribution to achieving school and department goals) and it can be difficult to demonstrate a direct connection between increasing science technician competence and achieving school goals.

RATES OF PAY AND CONDITIONS

In 1997, pay required particular mention: "The rates of pay for science technicians are very low…Overall, the rates of pay were viewed as woefully inadequate for the nature of the tasks undertaken by technicians in schools."

(Science technician pay had seriously declined relative to the Public Service and all-sectors NZ average hourly rates (Statistics NZ, 2010) from 1989, to a particularly low point in 1996.)

The Australian study did not include questions about 'industrial' issues for fear that such inclusion may limit the distribution by schools and compromise the return rate. Despite this,

some descriptive data were obtained. For example: an increasing number of science technicians were part-time. Technicians were often at the lowest levels in the pay structure, as for general office assistants, library assistants, and home economics assistants. In some schools, there was also a status issue, and technicians were taken from technician work to carry out administrative assistant work such as photocopying. Poor pay and work conditions, (including term-time only employment), were cited as reasons for recruiting difficulties. Lack of a career path was also an issue, as was the use of short-term employment.

In New Zealand the NZEI Support Staff Collective Agreement has been interpreted since 2002 as requiring sole or supervising science technicians covered by it to be paid on the Associate C scale. NZEI has successfully pursued compliance cases involving science technicians who were not paid according to this scale. The scale does not provide for a career path, but reduces the number of cases of extreme underpayment as reported from Australia. In the New Zealand workforce survey, 38 of 122 State school technicians who indicated their pay scale (31%) were paid below the C scale. While some may have been supervised by another technician, this is relatively uncommon, so compliance issues remain. The collective agreement also provides for a qualifications allowance, and a further 11 respondents (8%) were not receiving the appropriate allowance.

The Compulsory Schooling Pay & Employment Equity Review (Ministry of Education, 2008) found clues from the support staff focus group of a belief that work was undervalued and rewards for support staff were not equitable. With very limited data collected, the report conceded only the possibility that support staff work was undervalued because of historical gender bias, and recommended pay investigations only for teacher aides and cleaners.

The Review's focus group discussions and second survey also raised concerns that pay rates did not take into account relevant qualifications. Reference was made to valuation of work by librarians, and the possibility of a public sector pay investigation for librarians. School science technicians and librarians have similar high qualification levels and grading, and their low pay rates deserve the same attention.

MAIN TASKS AND ROLE OBJECTIVE

In 2007, technician roles were painted with a broad brush: "School science technicians complete a diversity of tasks with equipment and solution preparation, equipment repairs, stock-taking and budgeting…Other roles of technicians are to be a creative handyperson who can deal with biological, chemical and electrical hazards, to have expertise in computers and designing and repairing equipment, to be resourceful in finding materials for minimum cost, to have the ability to budget and order stock, to know where and how to collect animals such as slaters, grubs, snails, and shrimps, and to be creative, diplomatic, and to have a sense of humour."

The 2007 New Zealand workforce survey report gave a standardised role description for a science technician, and collected information on enhancements. Appendix 1 gives the technician role description, modified to include non-core tasks usually also performed.

Appendix 2 lists significant enhancements which some technicians have had added to their roles, (omitting some of the more individual enhancements recorded in the workforce survey). It shows something of the potential for increasing support for teaching and administration, and of opportunities for career advancement.

The work which science technicians do is difficult to comprehend without knowing the people who do it, because people so strongly affect the way work is carried out and the success achieved. Baker reflects this in her discussion of the main tasks of technicians by referring to a "creative handyperson" , "expertise in", "be resourceful in", "have the ability to", "know where and how to", and "be creative, diplomatic and have a sense of humour."

For this reason, the science technician role description in Appendix 1, and the role enhancements in Appendix 2, need to be read together with the person description in Appendix 3. Appendix 3 also cites regrettable examples of science technician hiring based on an idea of a suitable qualification – but without definition of a suitable person for the role. As the person description indicates, science technicians need a "can do" disposition. When complemented by a useful education, this should enable progression in responsibilities.

Baker emphasised that the school is dependent on having such a person:

"The effective implementation of a school science programme requires the support of a science technician. The quality of the classroom programme is enhanced with relevant practical activities, and these require time and expertise to prepare, maintain, and store."

OPPORTUNITIES TO IMPROVE TEACHING PRODUCTIVITY

TECHNICIAN SUPPORT FOR TEACHING

No doubt New Zealand schools cope with lower service factors than Australian schools (and UK schools) in part because they have less equipment for science teaching, as noted in the training section. It is clear, however, from the limited technician time made available, that New Zealand science teachers are obliged to do many things themselves which these other teachers have done for them. Indeed, in schools where there are low service factors, teachers are called on to carry out core technician duties.

There is scope here to make a worthwhile reduction in the workload of teachers. This should be done in a way which reduces some of the variation in technician support now available to teachers at different schools. Currently science teacher support depends on budget decisions made by the schools where they work, as part of the self-governing status of schools. However, technician support is an aspect of teacher workload which could be more uniform for teachers in science departments throughout the country, and should be, for reasons of both teacher equity and productivity.

STANZ has proposed targeted funding of State and Integrated schools to provide a minimum service factor of 0.25 (achieved already by exemplars), and well below levels recommended or reached in Australia and UK. The case for this funding is similar to that for the targeted

funding which has been provided for ICT. Achieving this from 2007 science support levels was estimated to require an increase of 40% in science technician hours (de Stigter, 2007b), and 25% more science technicians in schools. If recruitment on this scale proceeded, it should also enable at least some science departments to add staff with additional practical specialty skills and so further enrich student learning opportunities.

Provision has been made in this recommendation to accommodate the doubt that UK service factor recommendations (when correctly identified and calculated) are applicable in Australia and New Zealand. To apply them directly would dubiously assume the science curricula of the countries require and are provided with similar quantities and complexity of equipment.

WORK DONE BY THE APPROPRIATE PERSON

If the teaching process is assessed on the basis of who should carry out tasks for greatest productivity (e.g. Stevenson, 2007), then this leads to efforts to have teachers concentrate on what are seen as the core teaching and learning requirements. This "workforce remodelling" leads to increased use of support staff in various teaching and support roles.

The remodelling looks at why teachers do what they do, and how work can be reassigned and controlled to improve outcomes. There are valid concerns that the use of unqualified staff can compromise the teaching/learning process, but the intention is for teacher workloads to be reduced while the quality of education is improved, by replacing teachers with support staff in work which they are qualified to carry out. Under a 2003 collective agreement, UK education has been restructured to reduce administration by teachers, provide a statutory entitlement to non-contact time, and reduce their relief responsibility for other teachers.

To achieve this meant that support staff took on greater importance and additional roles in schools, in administration, student support, management, and teaching and learning.

The UK rationalisation of school roles suggests something of how current NZ school science technician functions might be changed to productive advantage. Since trained science teachers are better-paid than science technicians, qualified technicians can and should be used effectively in science roles which do not require teacher training. New Zealand science technicians are under-utilised for their laboratory and field support roles, to the extent that teachers are carrying out what are core science technician roles. Technicians are also qualified to progress to take a greater part in science administration.

School science technicians usually have a role with hazardous chemicals, and to varying extents, with laboratory safety. Most have the primary role in dealing with chemical hazards, but in general the funds have not been found for the appropriate PD for hazard management, which is available by distance learning.

The science technicians have a role in equipment management, and have varying levels of responsibility in monitoring and managing the actual laboratories. Examples of experienced well-qualified science technicians promoted to Laboratory Manager roles are given in the next section.

Science technicians usually have a role in budget preparation and purchasing, and to varying degrees (with potential for extension) in department monitoring of expenditure against budget.

Some NZ science technicians currently have classroom or practical involvement in their school with students, as demonstrators or tutors. While this is not a role for all science technicians, the UK interest in using science technicians in a laboratory context, as High Level Teaching Assistants, suggests possible further application in NZ. It should be recognised that not all NZ science teachers exhibit strong laboratory and field practical skills, and those that do may benefit from assistance to cover the range of useful expertise. A local example (from a better-resourced school) has a biology teacher working alongside a teaching technician who instructs students in use of data loggers and digital cameras and the attendant software manipulations.

Those supporting remodelling claim to have obtained improved rewards for teachers who wish to remain in the classroom, rather than seeking promotion by taking on managerial responsibilities. Continuous professional development played an important part in this.

The current New Zealand school situation recognises an administrative role as both a means of teacher advancement and a measure of status within the system, which many teachers would therefore be reluctant to pass on to support staff. To deal with this, an effective means has to be found to give teachers recognition of the value of staying in the classroom, rather than seeking promotion through taking on administration. Giving more departmental administration to support staff would be seen at present as losing career opportunities and status for teachers.

Teachers may be justified also in opposing reorganisation of their work in a way that removes some of its key components and passes them to less-qualified and lower-paid staff. To deal with this concern, it is important not only that teachers benefit, but also that professional standards are protected – that the work is transferred to support staff who are competent to carry it out, and that fair pay issues which arise for support staff are concomitantly addressed.

A rebalance needs to be achieved by distinguishing the roles which support staff are (and can be) qualified to take, from the key pupil-focused ones which teachers need to perform (and be affirmed in, and promoted for).

As outlined in the training section, training and professional development arrangements for school science technicians need to change. Professional development needs to be assured, not only for teachers facing new teaching challenges, but also for science technicians called on to reduce teacher workloads by providing effective support for practical lessons and reduced administrative burden.

SCIENCE TECHNICIANS AS SCHOOL LABORATORY MANAGERS

It is customary for science technicians to provide administrative assistance to the Head of Faculty within the scope of the technician role description, as in Appendix 1, and some have taken an enhanced role beyond the technician role description, as in Appendix 2. However, qualified science technicians could take an administrative role which goes beyond this. The prospect of the formal responsibility for school chemical safety being taken by technicians has been given particular consideration.

In 2007, gazetting of the schools' Code of Practice for managing chemical hazards led to suggestions of a responsibility for science technicians. The new COP called for a designated Laboratory Manager (appointed in writing by the Board of Trustees) to be responsible for hazardous chemical management. Some schools nominated their science technicians as those to take on this responsibility, but this proposal was generally decried.

Science technicians usually have responsibilities already for purchasing, documenting, classifying, labelling, storing, placing into use, disposal, and maintaining an inventory of laboratory chemicals. For some schools it seemed a logical step to give them also the overall responsibility for chemical safety in the laboratories. In some cases, this was proposed after the head of science, chemistry, etc, had declined to take on extra responsibility, or had asked for more recompense than the school wanted to provide.

In general, science administrators warned against offering the position to a technician, and technicians warned others against taking up such offers. There was good reason for concern: it was clear that some offers were made either in ignorance of the necessary requirements, or as a cynical box-ticking exercise. One science technician who was asked to be a Laboratory Manager was at the time being paid by her school on an Associate A grading, and needed NZEI intervention to get 6 years back-pay as Associate C.

A former science HOF, Michal Stone, perhaps best expressed the argument against offering the role to a science technician. She pointed out that it implied the authority to discipline teachers – which she felt was something New Zealand schools were not yet ready to give to a technician.

STANZ was asked for advice by several science technicians about how they should respond to a request from their school to be the Laboratory Manager. They were advised that it could not be just tacked onto their science technician job description. If they were to do it, it would be a significant promotion with a grading increase. They should expect a formal letter of appointment from the BOT, and to be resourced by the BOT to upgrade chemical storage and handling facilities.

Most schools have appointed Laboratory Managers, and these are usually teaching staff with other involvement in science administration. (Some have taken little action on chemical hazard management, since there has been little monitoring that schools are meeting HSNO requirements.) In at least three schools which are taking the requirements seriously, the

appointed Laboratory Manager has been promoted from a science technician role in the school. These three positions provide examples of alternative ways to reassign science administration to qualified science technicians:

SCHOOL A

Here the Laboratory Manager role follows closely the role description provided in the hazardous chemicals Code of Practice. In addition to responsibilities already mentioned as ones which technicians might have in their job descriptions, there is added an onus to ensure other staff, visitors and contractors meet chemical safety requirements. The job description includes carrying out appropriate induction and safety training of staff.

SCHOOL B

This Laboratory Manager has had Code of Practice responsibilities added to a Senior Technician role, in which in addition to teaching support, other technicians are supervised, trained, and led, and technical and health and safety advice is given to teachers.

SCHOOL C

The Laboratory Manager here has a much more comprehensive role. Code of Practice responsibilities are as in the other schools, with the proviso of reference to respective HODs if further specialist knowledge is required. In addition to COP responsibilities, however, the Laboratory Manager role here also has full responsibility for the laboratory budgets, new buildings, repairs etc, ordering, invoices, supervision of technicians and hiring new technicians where necessary. Teacher non-compliance with chemical safety procedures has not been an issue. This is attributed to respect called for as staff OSH representative and a former staff BOT representative, and also because department organisation in this school enables easy control of chemicals and of procedures in laboratories.

This manager has completed the HAZX401 paper on Managing Chemical Hazards and recommends it. She suggested that a science technician would need at least 5 years experience in the job before taking such a role, the ability and desire to be in charge, and a full-time position to enable control of site developments.

CONCLUSIONS

There are ample opportunities for science technicians to be used more productively in New Zealand schools, by doing work which they are (or could be) qualified to do, in place of higher-paid teachers. However, their employment context is one of such long-standing neglect that the steps to greater productivity cannot be taken without making progress on outstanding issues. These issues are: pay equity, access to basic training and ongoing professional development, low and variable levels of technician support relative to teaching hours, routes for (and steps in) career development. While addressing these will improve technician and teacher effectiveness, claims for cost-neutral remedies would be optimistic.

SPECIFIC RECOMMENDATIONS FOR PROGRESS

1. That science departments be provided with targeted funding to provide a minimum technician assistance (service factor) for science teaching. The proposed figure is 0.25 technician hours per science teaching hour.
2. That the Ministry of Education support the establishment of web-based basic training of school science technicians by a tertiary provider.
3. That the Ministry of Education provide funding specifically for numbers of school science technicians to study, by distance learning, the University of Otago paper HAZX401, Managing Chemical Hazards, and that there be consultation with schools regarding prospective transfer of Laboratory Manager roles to technicians.
4. That a database of school technicians with advanced skills be established, and means investigated whereby they can assist other technicians in skill development.
5. That a funded website be set up for technicians to register and upload evidence of advanced skills for attestation purposes.
6. That a mentoring service be set up to link experienced technicians with those wanting mentors to support their school roles.
7. That proposals be developed to link skill attestation and role development with career steps.
8. That the suitability of non-core technician tasks for targeted funding be considered.
9. That the case for a school science technician equity pay investigation be examined.

The STANZ executive would like to offer such assistance as it can give to workforce researchers, and to proposals that enable science technicians to more effectively support science education. This includes openness to being involved in furthering the recommendations above, and also to others which may come from the Workforce Strategy working party or its member organizations.

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APPENDIX 1: SCIENCE TECHNICIAN ROLE DESCRIPTION

RESPONSIBLE TO: Principal/Head of Science

KEY TASKS:

- Set up, operate and run checks on general equipment in the department.
- Make simple pieces of equipment and carry out simple repairs.
- Arrange for repairs and maintenance.
- Advise staff about practical work and resources and equipment available.
- Maintain a satisfactory storage system in line with school safety policies.
- Operate a system for chemical storage, labelling, use, disposal, and inventory to meet HSNO and departmental policy requirements.
- Maintain Safety Data Sheet records for chemicals.
- Operate an efficient system of stacking, storing, transporting, distributing and return of other equipment, materials, and resources used in the laboratory.
- Conduct periodic inventory check of science equipment, books, paper resources.
- Review equipment needs within the science department
- Liaise with other schools to share expertise and resources.
- In cooperation with HOD, arrange budgeting, accounting, ordering, and resources to meet the department's needs.
- Liaise with sales representatives
- Obtain and care for living specimens, plants etc.
- Obtain/collect non-living materials specimens for dissection and experiments.
- Prepare equipment, materials and solutions required for demonstration and class practical work.
- Prepare equipment for practical tests and examinations.
- Assist teachers and students with equipment and equipment manipulation during practical sessions and examinations.
- Assist students with equipment requests for individual projects.
- Supervise students in the laboratory and classroom.
- Clean special equipment and glassware which needs extra cleaning or special treatment.
- Assist with security of science laboratory and equipment.

COMMON NON-CORE TASKS:

- Assist with use and maintenance of A/V, computer equipment.
- Manage for the science department any or all of: DVDs, textbooks, tests, paper resources, stationery.
- Develop and/or organize electronic teaching resources
- File science test and internal exam results
- Teacher and department photocopying

APPENDIX 2: SCIENCE TECHNICIAN ROLE ENHANCEMENTS

Many experienced science technicians take responsibilities additional to those in the general role description for science technicians (to which the NZEI Support Staff Collective Agreement applies). In general, schools have not paid science technicians at a higher rate in recognition of these greater responsibilities, but some have.

There is room for recognition that those whose work includes a number of these role extensions is doing a substantially different job, should be given assistance where required, and should be paid at a higher rate. There should be appropriate PD available to enable such career progression.

Some of the extra responsibilities of New Zealand school science technicians are:

1. Resource Management
   - Responsible for the efficient operation of the science laboratory area, including:
   - Evaluate and select equipment, and recommend for purchase.
   - Develop a satisfactory storage system in line with school safety policies
   - Create and maintain chemical and equipment databases
   - Involvement in development of laboratory designs and plans for science facilities

2. Direct School Programme Contributions
   - Demonstrate experiments where specialist skills are required
   - Advise students about suitable equipment and procedures for individual projects
   - Operate and/or instruct in use of specialist laboratory equipment and instruments.
   - Perform calibration checks and standardizations
   - Tutor or teach
   - Organise field trips and science or school camps, and participate
   - Organise science fairs and competitions
   - Organise prizegiving or parent evenings
   - Coach or manage a team
   - Lead a student club

3. Hazard management
   - Have delegated responsibility under the Science HOD for a major part of hazard management:
   - Act as HSNO Person in Charge for chemical storage and preparatory areas.
   - Develop a system for chemical storage, documentation, handling, labelling, use, disposal, and inventory according to the HSNO Schools Code of Practice and departmental policy.
   - Develop and implement operational guidelines and practices in laboratory (eg some safety policies for science)

- Advise science staff on safety issues; run teacher induction course on chemical handling
- Be a trained first-aider
- Review, evaluate and modify laboratory practices and hazard management
- Conduct safety audits for the laboratories in consultation with HOD

4. Financial etc.
   - Develop budgetary proposals for equipment and consumables, and assist in departmental budget preparation
   - Arrange purchases according to budget
   - Record purchases/incoming orders.
   - Use department computers for financial record keeping and expenditure relative to budget.
   - Operate a system for minor purchases.

5. Leadership
   - Be responsible for supervising and directing the work of technicians and assistants (if any are employed).
   - Help select laboratory staff.
   - Run induction for new laboratory and science staff.
   - Review resource management and/or hazard management procedures and make recommendations.
   - Be staff health & safety representative
   - Be staff representative on Board
   - Be mentor for other school science technicians
   - Take leadership in a science technician group

APPENDIX 3: A PERSON DESCRIPTION FOR SCHOOL SCIENCE TECHNICIAN ROLE

NEED FOR A PERSON DESCRIPTION:

Recent younger appointees, associated with budget constraints, have not all fared well in the Science Technician role. Two examples are given which indicate the necessary person description had not been established before the recruitment:

One appointee was a woman with BSc in Biology, who had not been previously employed. She had a chemistry competence problem that the school overcame, not with training, but by purchasing all solutions already made up, at considerable cost. She continued for a year in a position which was intended to be sole-charge, with severe levels of stress. The administrator who hired her had been pleased to find someone with a qualification in science (as stipulated by the Head of Science) yet prepared to accept a minimal wage. This woman was permitted to attend a local area technicians meeting but was not funded for training of any kind.

The second was a man with BSc in chemistry, also a first-time employee (described at the interview as "shy"). Again, the science qualification and acceptance of a minimal wage were the deciding factors in his employment. This was not a sole-charge position, but he was found unable to do simple calculations needed to make up chemical solutions. His restricted communication ability made it difficult to establish whether he understood the simple instructions which proved necessary to direct his work. In some important instances it turned out that he did not. His work was slow, and independent initiative was very limited.

PERSON DESCRIPTION STATEMENT

A person applying for the Science Technician position should have good language and relational skills and a cooperative spirit, to facilitate discussion of requirements with science teacher clients, to work effectively with others as required, and make a positive personal contribution to the department.

The person required is alert, shows initiative, and has aptitude to learn and apply new information. Planning ahead, working quickly and effectively within time constraints, and reacting to new and urgent requirements, are role expectations. Problem-solving ability is needed in assessing, allocating, and repairing of resources.

The person is required to be physically fit. There is a need to lift and carry moderately heavy items, and to walk considerable distances each day.

Good numeracy skills are essential. Education in a practical science discipline, and previous laboratory or similar experience, are both strongly preferred. Previous work or leisure interests with craft or workshop involvement are also relevant.

In addition to the above, a preferred applicant will have a science qualification at Level 6 or above on the NZ Qualifications Framework. The qualification however does not take precedence over evidence of appropriate aptitudes, demeanour, and life skills.