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Identifying the issues of Early Career Science and Mathematics Teachers

Bruce White
 University of South Australia
 Email: Bruce.White@unisa.edu.au

Abstract

There has been an increased emphasis on training and recruiting appropriately qualified teachers of science and mathematics (ACDS, 2002; MCEETYA, 2004; Harris, Jensz & Baldwin, 2005). There has also been concern over the age profile of the current teaching force which is generally older in comparison to other professionals and the implication that many will soon retire and the separation rates of new teachers (MCEETYA, 2004). In South Australia, this is being addressed partially through recruitment schemes for Mathematics/Science graduates particularly targeting rural and isolated schools (DECS, 2009). However at present in South Australia, there is very little research data to inform employers or teacher education institutions about the preparedness and support of early career teachers. There is also very little information available to allow tracking of graduates with respect to the contexts in which they begin their teaching career.

This paper reports on a small scale project that collected data on graduate employment and the experiences of early career mathematics and science teachers (and early career teachers who are teaching in these subject areas). The lack of background research in the area meant that a mixed methods approach was used. Data was collected in two forms, via an online survey and through focus group interviews. The survey was used to collect general background information about their early teaching careers while the interviews were used to ascertain what the main issues were for them as early career teachers. The survey was made available online and advertised via the South Australian Secondary Principals email list. The target population was teachers of Science and Mathematics with less than 5 years teaching experience. This group included both teachers trained in the teaching of mathematics and science and those teachers who are not trained in these areas but still teaching them. It was important to sample both groups as there is evidence to suggest that teachers who are not specifically trained in these subjects often teach them in schools. The survey gathered important data about employment of graduates, in particular where they are employed, on what basis (temporary, part-time etc), what influenced their decision to take particular jobs, what influences their decisions to stay in the jobs or move and how are they supported. Four focus groups were conducted three with teachers who predominantly taught science and one with teachers who predominantly taught mathematics. The focus group teachers were participants of professional development activities that were run for teachers, funding was made available for country teachers to attend some of these activities in order to ensure a spread of geographic locations of the teachers.

The results of the survey indicated that almost all of the respondents considered teaching as a long term (at least 10 years) if not life time career. That there was a wide range of initial support experienced by the teachers, including none, mentors, time release for professional development and smaller teaching load. Most of the teachers indicated teaching was as they expected but commented that they were not prepared for the administrative load. The focus groups raised a number of issues including

teaching science and mathematics to students with low English literacy levels (in particular new arrivals), accessing of professional development (particularly country teachers), and confidence in running practical activities in particular those involving chemicals.

Introduction

There has been an increasing National and State emphasis on the teaching of Science and Mathematics and as part of this, the training and recruitment of Science and Mathematics teachers (ACDS, 2002; MCEETYA, 2004; Harris, Jenz & Baldwin, 2005). There has also been concern over the age profile of the current teaching force which is generally older in comparison to other professionals with the implication that many will soon retire and also the separation rates of new teachers (MCEETYA, 2004). It has been shown that early career teachers are located in significant numbers in country schools (Lyons, Cooksey, Panizzon, Parnell & Pegg, 2006).and that their needs as entrants to the profession may be at risk of not being met due to geographic isolation (Aldous, Barnes, Clark, White. & Morony, 2006). Although the sense of community (Aldous et al, 2006) described by some teachers may result in a better introduction to the profession. There is evidence (Cresswell & Underwood, 2004, Lyons et al, 2006) to suggest that students in rural and remote schools have been underperforming in comparison to metropolitan based students in the areas of science and mathematics, although it is not clear from these reports as to the reasons for the difference.

One of the strategies used to address these issues nationally was to survey former teacher education students (Department of Education, Science and Training, 2006). The report identified that only about a quarter (28%) of the graduates were working in a permanent position with approximately a half (57%) on contract and 15% in casual or relief work. The participants also identified the aspects of teaching that they liked and disliked “The aspects new teachers liked most about teaching were feeling like they were making a difference, and job satisfaction. On the downside, the aspects they liked least were poor student behaviour, out of hours work, workload and administration, paperwork and reports.” (Department of Education, Science and Training, 2006, pg 42).The report also identified that half of the new teachers were having difficulty establishing a work / life balance, that over a quarter were being asked to teach outside of their areas of specialisation and that the majority were positive about their university teacher preparation. .

In South Australia, the issues identified earlier are being addressed partially through recruitment schemes for Maths/Science graduates particularly targeting rural and isolated schools (Department of Education and Children’s Services, 2009). The beginning teachers of 2007 onwards will have amongst them recipients of these graduate recruitment positions, which have included an opportunity for permanency. However at present in South Australia, apart from the national survey (Department of Education, Science and Training, 2006) there is very little research data to inform employers or teacher education institutions about the preparedness and support of early career teachers. There is also very little information available to allow tracking of graduates with respect to the contexts in which they begin their teaching career. Through the use of a survey instrument and parallel focus groups, this study investigated the experiences of recently graduated Science and Mathematics teachers. Graduates from the past 5 years were invited to participate in the survey and/or be

interviewed. The main areas of focus for the study were initial support, workload and professional development needs.

Method

The research methodology used was a mixed methods approach because of a lack of current research in the area. Qualitative and quantitative data was collected using questionnaires and focus group discussions. The questionnaire used was adapted, from a similar project based at the SiMERR Tasmania hub (<http://www.simerr.educ.utas.edu.au/project11.htm>) to suit South Australian teacher education; it was made available in both online and paper form. The questionnaire consisted of two sections. Section one consisted of tick box and open text box response questions which collected demographic information (education, age group, gender), motivations for entering teaching, current and previous teaching positions and reflections on their early years of teaching (eg Is teaching what you expected, How many years do you intend to be teaching). Section two consisted of a series of 31 questions where the participants were asked to respond to statements on a 5 point likert scale (Strongly agree, Agree, Neutral, Disagree, Strongly disagree). The statements in section two related to support as an early career teacher, school environment, workload and job satisfaction.

All Secondary and Area school principals were contacted through the support of the South Australia Secondary Principals Association. They were asked to provide an information pack to the early career teachers of Science/Mathematics, (this included Secondary and Middle School early career teachers) in their school. The information pack included a letter of invitation, an information sheet and the URL of the website hosting the questionnaire. Teachers in both metropolitan and country schools were asked to participate and the survey identified these groups to allow for comparison. It was intended that this approach would result in a broad sample i.e. as many as possible early career teachers (less than 5 years teaching experience) of Mathematics / Science. This group will include both teachers trained in the teaching of Mathematics / Science and those teachers who are not trained in these areas but still teaching them. There were three areas discussed in the focus groups, main issues facing early career teachers, support given to early career teachers and professional development needs and delivery. The focus group teachers were participants of professional development activities that were run for Science and Mathematics teachers, one of the activities was a state conference one was a professional development activity run in the country and third was a conference run for early career teachers where funding was made available for country teachers to attend to ensure a spread of geographic locations of the teachers

Participants

Despite the wide circulation of the survey there was a disappointing return, with only 25 teachers completing the survey, 10 from rural / remote schools and 15 from metropolitan schools. They were an almost equal number of males (13) and females (12) and the age range was from 23 to 46 with the majority being in their early to late twenties.

There were three focus group interviews conducted with 19 early career teachers in total taking part. Of these five were teaching mainly Mathematics eight were mostly

Science and the rest were teaching a range of subjects including mathematics and science. Nine of the participants were from country schools and ten from metropolitan schools this provided a reasonable spread across the state with there being representation from both government and non government schools.

Four research questions were explored:

- What are the lived experiences of new Science/Maths teaching graduates as they begin their teaching careers?
- What support processes are successful in assisting first year Science/Maths teachers?
- What recommendations would the graduate teachers make to improve their early career experience?
- What factors influence early career teachers' decisions to enter and continue teaching as a career?

Results and Discussion

What are the lived experiences of new Science/Maths teaching graduates as they begin their teaching careers?

The size of the sample for the survey is quite small and so the data and results must therefore be considered with that in mind. However the data does however provide some insights and these are outlined below.

There was no typical pathway into employment for the participants, however most of the metropolitan teachers had done a series of short term contracts and in most cases were still in this form of employment. All of the teachers in the country except for two who had been appointed permanently in their first appointment had followed a similar path and there were two who had gained permanency after several contracts. There were two metropolitan teachers who had a permanent position directly from their university studies. Overall just under one quarter were in permanent positions with the remainder being in contract positions, these proportions are similar to those in the Department of Education, Science and Training (DEST) (2006) survey where just over a quarter were in permanent positions.

Fifteen of the respondents had completed a graduate education degree, either a 1 year Graduate Diploma or a 2 year Bachelor of Education, the others had 4 year Bachelor degrees including Primary / Middle, Design Technology and one with a Junior Primary / Primary degree who was teaching middle years science. Only two indicated that they were teaching outside of their teaching areas, which is lower than the number (about a quarter) from the DEST (DEST 2006) survey but this may be due to the participants being identified as mathematics and science teachers by the principals.

What factors influence early career teachers' decisions to enter and continue teaching as a career?

There were a range of reasons given for choosing teaching as a career, all but one respondent listed either "Desire to help children learn" or "Pass on knowledge" as a motivation and most listed both. Job satisfaction as well as enjoyment was listed by

most of the teachers and holidays were listed by half. While employment opportunities was listed by more than half of the teachers only two indicated that their decision was influenced by the recent media reports about teacher shortages. Interestingly the majority (68%) of the teachers indicated that they intend to teach for many years with just under half indicating that they intend to teach until they retire. Three were unsure how long they would teach while the remainder all indicated that they would teach for at least 5 years. Three of the teachers indicated in the open comments section that they were considering leaving the profession, one of the teachers commented on the frustration of contract work as being the reason for possibly leaving, another on the lack of communication about future employment while the third was looking at employment in another area of interest.

What support processes are successful in assisting first year Science/Maths teachers?

The teachers were asked to indicate what support they had received as an early career teacher as an open response text question. The support indicated was inconsistent and varied dramatically from school to school. Approximately one third felt that they were well supported within the school and four felt that they had little or no support, most had some support from a variety of sources. There was very little difference between the level of support indicated by the teachers between country and metropolitan schools. The type of support varied greatly and included mentor teacher within the school, release time, induction programs and faculty support. In addition to the open text question about support there were a series of statements that required a response from strongly agree to strongly disagree on a five point likert scale (1 being strongly agree). These questions were related to support as an early career teacher indicated that in general there was a sense of feeling supported which was consistent the responses to the text question and from the focus group discussions. In particular the teachers indicated that the senior staff provided effective support (mean response 2.0) and that they received support on discipline issues (mean response 1.9) which was identified in the focus groups as being an area that should have been given more time in their university study.

Statement	Mean	Standard Deviation
Senior staff members provided effective support	2.0	1.46
I received support on discipline issues	1.9	0.974
I had opportunities to share work experiences and resources with other beginning teachers	3.0	1.24
Professional development was available at a convenient time for me to attend	2.5	1.166
There were facilities within the school that allowed me to use a variety of teaching strategies	2.4	1.146

Table 1 Support as an early career teacher

The questions that related to the overall school environment were similarly quite positive indicating that overall the respondents felt comfortable and in particular had good relationships with the school staff (mean response 1.65). The results in table 2 also indicate that generally they were encouraged to show initiative however they were less positive about being involved in decision making within the school.

Statement	Mean	Standard Deviation
The school works as a team to make learning more effective	2.4	1.251
I have good relations with senior and other staff members	1.65	1.504
The school policies support teaching and learning	2	1.27
There is a climate of achievement within the school	2.5	1.154
I am encouraged to show initiative within the school and classroom	1.8	1.534
I can participate in school decision making	2.4	1.166

Table 2 School environment

The area of workload was quite different with the overall responses indicating that the teachers felt that the workload was too high. In particular it can be seen from table 3 that they did not think that they could balance their work and personal life (mean response 2.7), that their workload was beyond their capabilities (mean response 2.8) and that there was too much administrative work (mean response 3.2). The amount of administrative work was also commented on by about half of the teachers as the part of the job that they were not expecting in the first section of the survey. This was further supported from the focus groups where a number of the participants commented on the amount of administrative work that they had to do and that they thought that it took time away from their teaching. Over half of the participants were concerned that they did not have enough time for planning (mean response 3.5) and a similar number were concerned about the behaviour management within their classes.

Statement	Mean	Standard Deviation
I can balance my work and personal life	2.7	1.085
There is sufficient non-contact time for planning and preparing lessons	3.5	1.076
The workload is within my capabilities	2.8	0.869
Students' behaviour issues are easily handled	2.8	1.041
I have opportunity to influence school policies	2.8	1.029
The number of students in the class is such that I can teach effectively	3.1	1.193
The administration work is accurately balanced	3.2	1.107

Table 3 Workload

The results also indicated that while they felt supported within the school there was not that same feeling of support outside of the school environment. In particular within the general population (mean response 3.1) and there was a strong sense of not being supported by the government (mean response 3.6).

Statement	Mean	Standard Deviation
The general population value teachers and their work	3.1	1.087
I receive appropriate recognition for my efforts	2.8	0.953
I work with others to achieve shared goals	2.5	1.041
I receive support from students' parents.	2.6	1.01
My colleagues have a positive view on teaching	2.6	0.976
I am given sufficient support to assist with additional responsibilities	2.8	1.114
Professional development offered is relevant to suit my individual needs	2.6	1.168
The federal and state government support teachers	3.6	1.085

Table 4 External support

Despite not feeling supported outside of the school there was a strong sense of job satisfaction indicated by the teachers with all of the teachers indicating that they enjoyed helping the students learn. This result is not surprising given that all of them indicated that this was one of the main reasons for them entering the profession.

Statement	Mean	Standard Deviation
I enjoy helping students to learn	1.4	1.644
Teaching challenges me intellectually	1.6	1.441
There are opportunities for career advancement	2.3	1.254
The salary is sufficient for the workload	3.6	1.049
Constant change and initiative levels required makes the job interesting	2.3	0.99

Table 5 Satisfaction with teaching

The sense of being undervalued and overworked was also evident when asked about the salary being sufficient for the workload with the majority indicating that they thought that it was not sufficient.

What recommendations would the graduate teachers make to improve their early career experience?

The focus group comments supported the survey findings and highlighted a number of issues in particular. The English language skills of the students were of particular concern; there were a number of the early career teachers who had students who were new arrivals for whom English was their second language and in many cases very recently second language. Literacy levels of their students in general was an issue for many of the teachers and in particular the metropolitan teachers. They did not feel prepared for the diverse literacy levels and needed support and teaching materials for these classes. Practicals were also highlighted as an area of concern, some of the teachers for who science was not their main teaching area did not feel confident when running practical activities particularly those involving chemicals. Often this was a teacher in a small country school with limited science support. Professional development was an issue often raised and a variety of formats were suggested. The

country teachers were very aware of the distance factor and they were keen to try some of the emerging Information and Communications Technologies (ICTs) to overcome these difficulties. Email was cited as a very commonly used support mechanism with some of the teachers being avid emailers and receiving support from email groups such as the one that the Australian Association of Mathematics Teachers. Video conferencing was another alternative with the example of the Monday Night Mathematics sessions currently being run by the Department of Education and Children's Services (DECS) being a model that could be used.

Conclusions

The small number of respondents to the survey means that the results should not be generalised, however the consistency of the survey results with the focus group interviews and with the recent DEST (2006) report does give some confidence to highlight some areas to be further investigated. The inconsistency of support for early career teachers suggests that there should be some form of systemic policy in the area and that while the support should be obtained locally as that is where the early career teachers felt most comfortable it needs to be more centrally funded. The initial mobility of the majority of early career teachers does make supporting them more difficult but it is clear that if we are to retain these teachers some support particularly in the workload area must be made available.

The issue of teaching students with low literacy levels needs to be considered, Universities who prepare teachers need to incorporate this into their programs and there needs to be development of science and mathematics specific materials to help support teachers of these students.

Professional development tailored for early career teachers should be considered and the use of ICTs for the delivery of this professional development trialled.

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