bioscience education

Research Article

The Role of the Postgraduate Student in Delivering Bioscience Teaching

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Abstract

There has been much recent interest in the extent to which the teaching in higher education delivered by non-academic staff has increased in the recent past. Within the Biosciences there has always been a tradition of engaging postgraduate students to support the delivery of some forms of teaching. In this paper we report on the findings of a survey of bioscience departments in the UK to explore the delivery of teaching by graduate teaching assistants (GTAs). A key finding is that there does not appear to have been a significant increase in the amount of teaching delivered by GTAs: only 18% of responding departments reported an increase in the use of GTAs over the last five years. The most common form of employment of GTAs is in supporting the delivery of practical classes, particularly in year 1, though GTAs are engaged to varying extents in all forms of teaching. All of the institutions that responded indicated that some forms of training were provided, though this varied in range and in perceived quality. Overall, the academic staff indicated general satisfaction with the quality of the teaching undertaken by GTAs.

Keywords: teaching assistants, teaching support, training of assistants

Introduction

For many years the delivery of undergraduate teaching in the biosciences has been supported by the employment of graduate teaching assistants (GTAs), typically doctoral students, who are undertaking the work to get some money to stretch their stipends and build up some experience of teaching for their CVs.

There are clear benefits resulting from the involvement of GTAs in teaching, particularly given the recent increases in undergraduate recruitment (Park, 2002; National Postgraduate Committee, 2007). For many departments, for example, the large first year practical classes could not be run without the support from demonstrators. With the moves to increased provision of 'small-group' teaching, support from GTAs as facilitators is, again, often essential in order to provide sufficient cover for large classes. Feedback from first year students shows that they often find the GTAs, who are usually relatively close to them in age, more approachable and less intimidating than the academic staff and so they are more prepared to ask questions (Park, 2002; Muzaka, 2009).

However, there are also downsides: many readers may remember from their time as undergraduate students that some of the demonstrators were really good, whereas others were unclear about how to set up the practical or interpret the results. Today, there is rightly an emphasis on the recruitment and training for the GTAs before they are allowed to assist with teaching. This is backed up by extensive guidance from a range of organisations regarding the employment process (Association of University Teachers; accessed July 2009) and the

training provision (UK Council for Graduate Education, 1999; Quality Assurance Agency, 2004). A similar process has been on-going in the USA with recognition of the paucity of educational expertise among GTAs. This has led to a proliferation of training programmes to the extent that most GTAs in the USA are expected to undertake training, although the nature of that provision is still variable (Luft *et al*., 2004).

In recent months there has been a flurry of publicity in the press about the amount of staff-contact time students receive and issues of value for money, particularly where it is perceived that significant amounts of teaching are delivered by teaching assistants rather than academic staff (Attwood, 2008). An undercurrent in the debate relates to a perception that, as the unit of resource has failed to keep pace with the increases in undergraduate numbers, there has been a progressive reduction in staff contact (Attwood, 2009; Newman, 2009) and an increase in the amount of teaching being delivered by GTAs rather than academic staff (Park and Ramos, 2002; National Postgraduate Committee, 2007; Attwood, 2009; Muzaka, 2009). These concerns have also been reflected in reports investigating the sustainability of teaching in the higher education sector (Financial Sustainability Strategy Group, 2008). However, it must also be recognised that much of the evidence is anecdotal and subjective, and there is a scarcity of hard data regarding the amount and nature of the teaching delivered by GTAs, the levels at which they teach and also how much marking they undertake.

To this end, the UK Centre for Bioscience has undertaken an online survey to provide an overview of the type and amount of teaching delivered by GTAs within the biosciences and the ways in which it is supported by institutional and departmental training programmes.

Methods

The information regarding engagement of GTAs in delivery of teaching was gathered via an online questionnaire hosted by Bristol Online Services (www.survey.bris.ac.uk). The questionnaire was advertised to the Centre for Bioscience's extensive network of contacts who are located in the 124 higher education institutions (HEIs) which teach a bioscience subject in the UK.

Results

The questionnaire elicited responses from 38 different departments, representing 35 HEIs across the UK. Of these, 28 HEIs were 'pre-92' universities and 7 were 'post-92'. This gave a return rate of approximately 31% of HEIs.

All of the departments from which responses were sent indicated that GTAs were employed to assist teaching and in every case post-graduate research students were employed, though nine of the departments reported that they also employed GTAs who were not current students. In the light of the current concerns regarding delivery of teaching, the respondents were specifically asked whether the amount of teaching delivered by GTAs had increased in the previous 5 years: only 18% of the respondents reported that there had been an increase in the use of GTAs in their departments over this period. Several departments commented that recruitment of sufficient GTAs was an issue for them. In the case of a post-92 department this was because they did not have enough students available. Other respondents cited a range of factors limiting recruitment, including pressure on completion dates for theses and the reluctance of supervisors to release their students for teaching duties, as well as the quality of the students' English. Indeed, these constraints led to comments from two departmental representatives:

"GTA teaching has decreased as greater pressures to complete their own postgraduate studies in a timely fashion and better pay have made postgraduate researchers less willing to take on these duties."

"…recruitment is an issue. This is due to a number of factors - unwillingness of supervisors to release students for teaching, demonstrators' English ability, the change in the UG academic year to September whilst the PGs still start in October - we cannot recruit new PhD students in time for the start of the year…"

The main role GTAs play in supporting teaching in the biosciences is as demonstrators, assisting with the delivery of undergraduate practical classes. In year 1 (Framework for Higher Education Qualifications (FHEQ) level 4) 29 departments (77%) reported that they employ GTAs in more than 75% of their practical classes (Figure 1). The proportions of departments employing GTAs for higher level classes decreases with level, with 60% and 34% of departments reporting employment of GTAs in the delivery of more than 75% of classes in yrs 2 and 3, respectively. For year 3 (FHEQ level 6) teaching, 32% of departments did not employ GTAs in practical classes. A higher proportion of pre-92 institutions employ GTAs in support of practical classes compared with post-92: for example, 27 out of the 29 (93%) pre-92 departments employed GTAs in delivering >75% of first year classes compared with 2 out of 7 (29%) of post-92 departments. At third year level, all of the departments that reported using GTAs in supporting 75% or more of their practical classes were from pre-92 institutions.

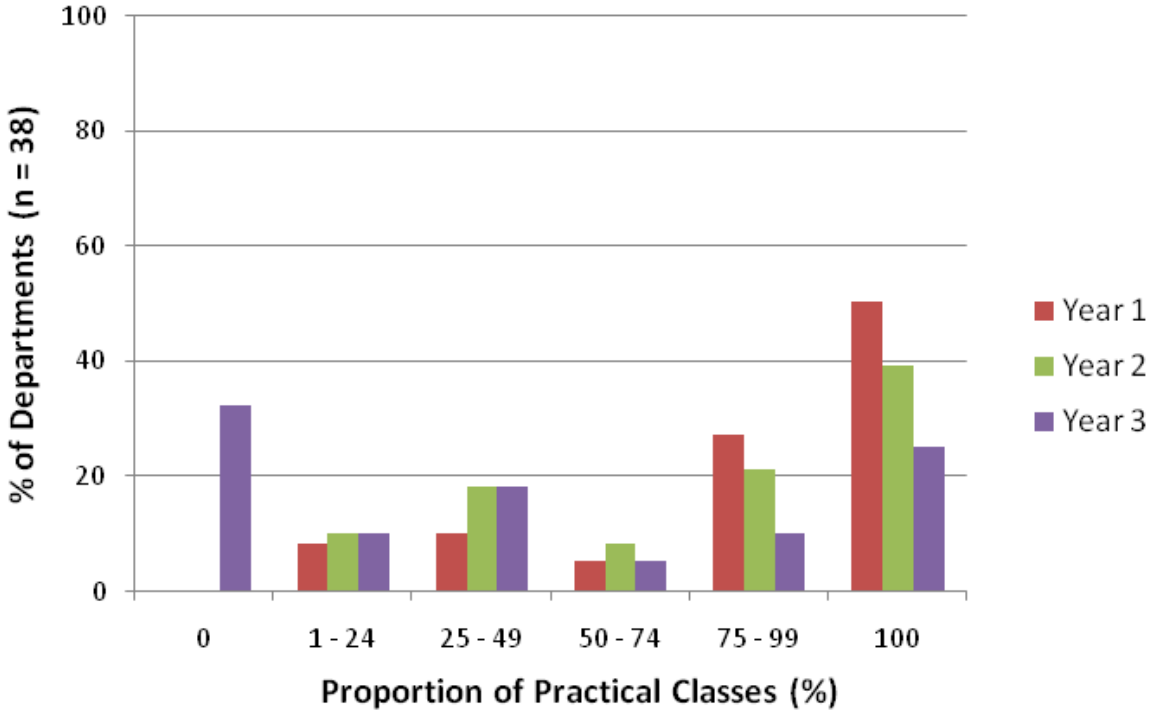

Figure 1 *Proportion of departments employing GTAs to support practical classes*

Support from GTAs for the delivery of all other forms of teaching was much more limited. For small group teaching, for example, 55% of the departments reported not employing GTAs at all (Figure 2) and 31% of departments employed GTAs for less than half the provision in years 1 and 2. However, 24% of the departments employed GTAs to assist in the delivery of some third year small group sessions. At all levels, GTAs were employed in supporting up to 25% of small group teaching in approximately one quarter of the departments surveyed.

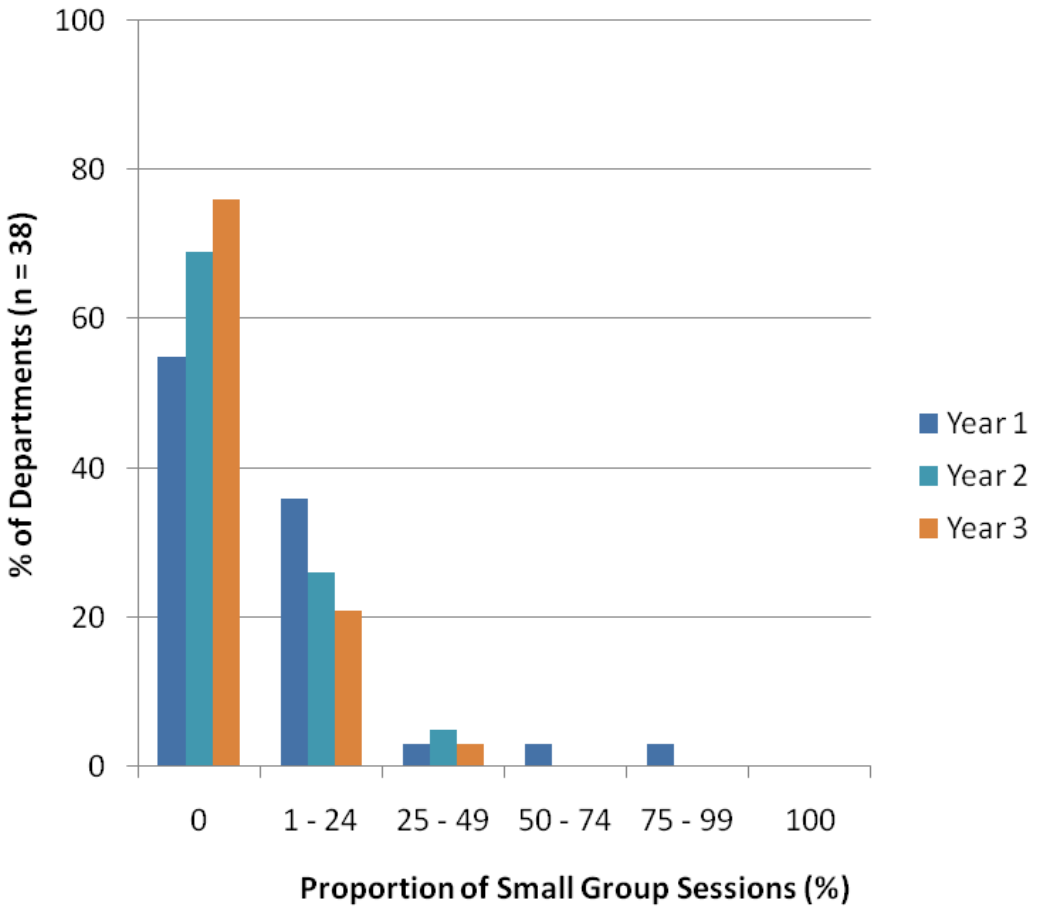

Figure 2 *Proportion of departments employing GTAs to support small group teaching*

Lecture delivery by GTAs was very limited, with only 8 departments (21%) reporting that GTAs delivered any lectures, and for these departments it represented less than 25% of the lectures. However, this level of contribution was reported for all three years of undergraduate programmes. In some instances, the contribution of GTAs to delivery of lectures reflects utilisation of specific skills sets that may be in short supply; for example in the case of a Welsh HEI:

"GTAs are involved in very limited lecturing - mainly due to a HEFCW/WAG initiative to support an increase in Welsh-medium teaching."

All the departments reported that there was some level of supervision of the teaching delivered by GTAs, with 58% responding that the GTAs were supervised at all times. There was some evidence that the level of supervision depended on the type of teaching, for example:

> *"GTAs in Lab practicals are supervised at all times by at least one member of academic staff. GTAs involved in small group teaching are not directly supervised during teaching but are given detailed briefings by a member of academic staff before the teaching sessions and the teaching session structure is determined by the academic staff member."*

As well as contributing to the delivery of teaching, GTAs may also be called upon to undertake marking and, again, the vast majority of the work is involved with practical classes: 30 departments (79%) responded that GTAs were involved in marking first year reports, with 32% and 18% also having GTAs marking second and third year reports, respectively (Figure 3).

GTAs were often also involved in marking data handling exercises with 50% of departments using GTAs to mark first year and 24% for marking second year exercises. Other forms of marking were much less commonly undertaken by GTAs with 79% of departments reporting that GTAs did not mark any essays and 68% not having GTAs marking oral reports. However, in 24% of departments GTAs did mark first year oral presentations, and 13% and 11% of departments reported using them to mark second and third year presentations, respectively. A number of the representatives commented on the nature of the marking undertaken, for example, in the case of marking of practical work, it was restricted to assessing pro-formas, or short-answer questions rather than full practical reports.

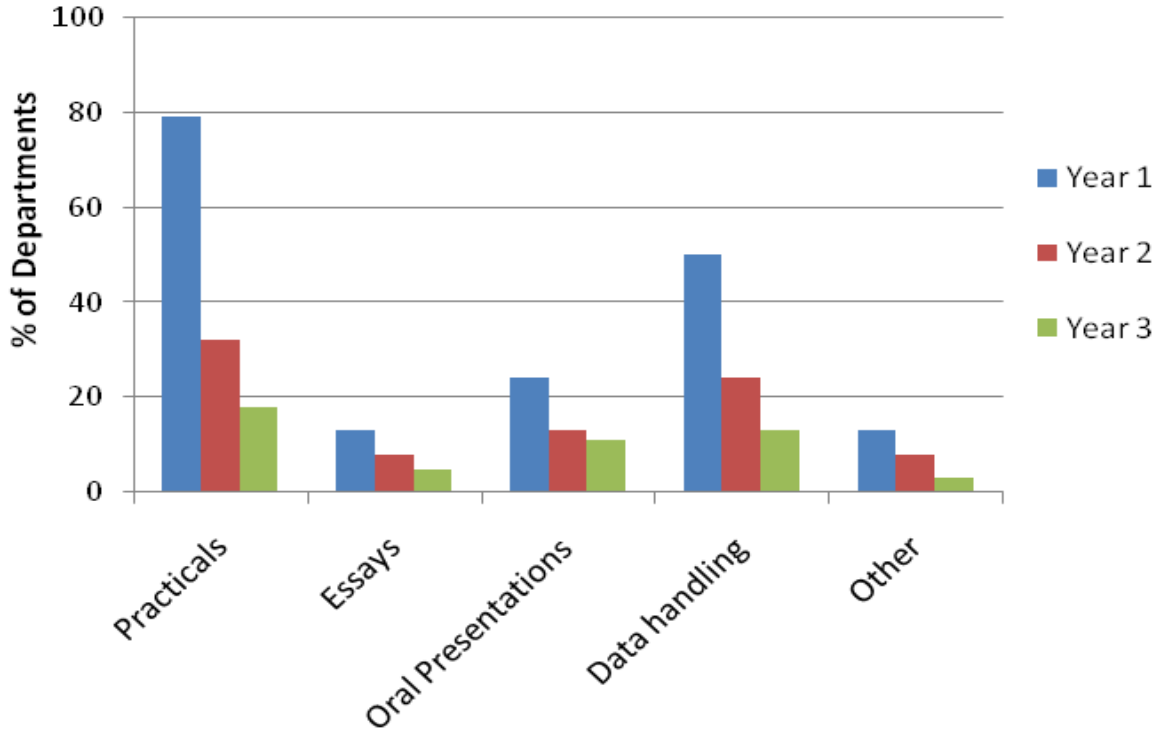

Figure 3 *Proportion of departments employing GTAs to undertake marking*

All the departments in which marking was undertaken by GTAs reported that the marking was moderated by academic staff, with 45% of departments always moderating the marking and 32% usually doing so.

All bar one of the departments provided training in teaching for the GTAs and for 74% of the departments training was compulsory before the GTAs were allowed to teach. The provision of the training was mixed: in 30% of cases the training was provided centrally by the HEI, in 33% it was provided by the department whilst in the remaining 37% it was provided by both the department and the university's central support. The coverage of aspects of teaching was also mixed (Figure 4), in part correlating with the forms of teaching being delivered by the GTAs. Thus training for small group teaching was provided by 45% of departments, corresponding with the proportions of departments reporting using GTAs to support this form of delivery. In other areas, the match was not so complete: for example 82% of departments reported providing specific training for demonstrating, though GTAs acted as demonstrators in all the departments taking part in the survey. Likewise, although 79% of departments reported employing the GTAs in marking, only 50% provided specific training in this area. The latter, however, may reflect the forms of marking being undertaken, since the marking of data handling exercises or one-word answer tests need not require any specific training.

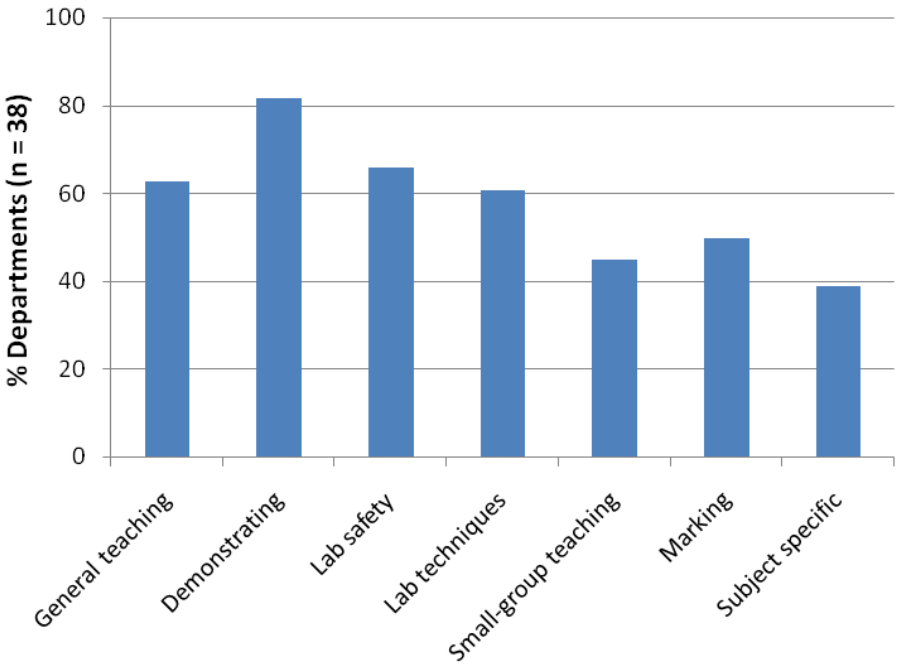

Figure 4 *Proportion of departments providing training for GTAs*

Analysis of the training provision by institution revealed some differences in approach depending on the type of institution. Thus training in general teaching was provided by all the post-92 HEIs compared with only 60% of the pre-92 HEIs; conversely all the pre-92 HEIs reported providing specific training in demonstrating compared with only 2 out of the 7 post-92 institutions. The respondents to the survey were asked to comment on the quality and relevance of the training provided to the GTAs. This elicited a range of responses, the majority confirming the quantitative results and being relatively positive in tone, though reflecting a range of requirements:

> *"All GTAs have to attend three University-run courses on teaching and assessment. They also have in-School training, subject and practical specific."*

> *"GTAs involved in small group teaching must undergo central training. GTAs only demonstrating in lab sessions are trained in the department. There is no specific training in Laboratory techniques, but GTAs are encouraged to come along to the lab before the practical to familiarise themselves with equipment and techniques they are unsure about."*

> *"Our GTAs attend a 1 day generic teaching course, plus a half day lab-based course. They must successfully complete a health and safety course and an academic literacy programme before they are eligible for GTA training. In addition, they have practical-specific training for each new experiment."*

Some of the comments, however, reflected significant concerns regarding the quality of the training:

> *"The 'training' is usually very informal."* and *"The central training is very general, sketchy…"*

> *"The training given in our institution is very minimal and by no means equips students for demonstrating duties. The majority of the skills have to be learnt 'on the job' making a students' first demonstrating very daunting."*

The academic staff were also asked to rate their experience of the quality of the teaching support provided by the GTAs using a standard, 5 point Likert scale (1 = strongly disagree to 5 = strongly agree). For the most part the staff indicated reasonable levels of satisfaction with

the GTAs (Table 1), in particular with regard to their competence in the laboratory and also the promptness of returning marked work.

GTAs are usually…	Disagree	Neither agree nor disagree	Agree	Strongly Agree
…well trained and effective as teachers	11	20	58	11
…competent in the laboratory techniques	3	8	71	18
…well prepared in terms of subject knowledge	8	32	60	0
…able to answer students' subject-specific questions	3	34	63	0
…prompt in returning marked work	0	18	66	16
…good at providing feedback on marked work	5	36	53	5

Table 1 *The percentage of respondents agreeing/disagreeing with statements regarding the quality of the support provided by GTAs (n=38 departments)*

In the final parts of the survey, the staff were also asked what input the GTAs had to the review and planning of modules. Just under one-third of the departments reported involving the GTAs in the review process, through feedback sheets and/or engagement in formal discussions regarding the module. When it came to considering new modules, only three of the departments engaged GTAs in the planning process.

Discussion

This report provides overview data arising from the responses to an online survey of the represented departments in the UK Centre for Bioscience regarding the provision of teaching support by graduate teaching assistants. The first key observation is that, contrary to anecdote, the large majority of the respondents did not consider that there had been an increase in the amount of teaching delivered by GTAs within the biosciences over the last five years; indeed some respondents reported a decrease due to issues of recruitment. Secondly, the majority view reflects a positive picture of the contribution made by GTAs to the teaching (Table 1).

The responses indicate that GTAs are employed by all the departments that responded to the survey, though it must be recognised that departments that do not employ GTAs at all may not have seen the need to respond to the survey and therefore the picture presented here may in fact represent an over-estimation of the extent of the provision. It was notable that several respondents observed that they would like to employ more GTAs but were unable to do so because of the numbers of postgraduate students available and increasing pressures on completion times for this group of students.

Although GTAs are involved in the delivery of all forms of teaching, by far the most common role for GTAs is in supporting practical classes, particularly the large classes typically run in the first year (FHEQ level 4) of degree programmes. Delivery of other forms of teaching by GTAs was limited with the majority of departments not employing GTAs for delivering anything other than support for practical classes. The proportions of classes supported also decreased markedly by year group. The limitations in terms of form of teaching and in year group reflect the academic requirements of the teaching, with demonstrating to first year classes being the least academically demanding. These distributions reflect long-standing practice within the sector (Park and Ramos, 2002). In an overview of the HE sector, Bekhradnia *et al.*, (2006) reported that in pre-92 universities approximately 35% of seminars were taught by non-academics,

compared with about 15% in post-92 institutions, differences that the authors attribute mainly to the availability of teaching cover from GTAs. It is notable that there are clear subject differences in the extent to which GTAs are employed to deliver different types of teaching. For example, in a recent study of a social science department in a pre-92 university, GTAs were used to teach more than 70% of first and second year small group seminars (Muzaka, 2009).

Marking is undertaken by GTAs in the majority of institutions, again with practical classes representing the main activity. As with the other forms of teaching, the major part of the marking is confined to year 1 and the comments indicate that this may be limited to marking relatively objective exercises using a pro-forma. Despite this, it is notable that less than half of the respondents indicated that the marking was always moderated and that only half provided training in marking. This may be an area where further investigation would be of value to link the types of marking undertaken to the form of training (if any) and moderation that is made available. It is worth pointing out that 82% of the respondents agreed that the markers were prompt in returning marked work and 58% agreed that they were good at providing feedback (Table 1). These figures may be compared with the 2009 National Student Survey (NSS) feedback results for biological sciences in which 60% of students agreed that the feedback they received was prompt and 64% felt it helped them clarify things they did not understand (National Student Survey, 2009). The disjuncture in our findings between the perceptions of promptness and quality of feedback may reflect a number of issues in terms of the feedback given by GTAs, including the level of training they received. However, it seems clear that there is no marked difference between the perceptions of the quality of the feedback given by the GTAs and of that given by staff themselves, as reported in the 2009 NSS scores for biological sciences.

In line with the published guidance (Quality Assurance Agency, 2004; UK Council for Graduate Education, 1999), all bar one of the HEIs reported providing training for their GTAs to help prepare them for their duties and, for the great majority, training was a pre-requisite to being allowed to teach. This reflects changing policy over recent years when previously training was often recommended but not required (Park and Ramos, 2002). The format of the training, however, was variable with a mix of central and local provision. There was also an apparent split along institutional lines in terms of the type of provision provided. Thus all the post-92 HEIs provided training in general teaching to all GTAs compared with 60% of pre-92 universities. Conversely all the pre-92 institutions provided specific training in demonstrating compared with only 2 out of the 7 post-92 HEIs. In other respects, the types of training showed a clearer match to the proportion of the types of teaching delivered. The mixed views of staff regarding the quality of the training suggest a significant range from comprehensive programmes to those that are considered sketchy and informal, showing that this remains little changed over recent years (Park and Ramos, 2002).

This paper gives a brief snap-shot of the delivery of bioscience teaching by GTAs in a group of UK HEIs. It shows that academic staff do not report that there has been an increase in the significance of the role of GTAs in recent years and that the support provided for large practical classes remains the main area of involvement of these individuals. Provision of some training appears to be almost universal, although the perception of staff is that the value of the training is variable; despite this, the staff gave a generally positive view of the contribution made by the GTAs. In future it would be of interest to undertake a more extensive study, and, in particular to determine the views of both GTAs and the students taught by them of the role of GTAs in bioscience education

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