**‘Novice Teachers’ Views of an Introductory Workshop about Teaching in the Biosciences**

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## **Abstract**

Seven regional networking events, aimed at supporting and developing ‘early stage’ novice university bioscience teachers were held across the UK. These workshops allowed 230 participants to reflect on teaching styles, learn about Higher Education Academy resources and discuss strategies to deal with a range of teaching situations. Post-event feedback was sought, and the results are presented in this paper. Feedback on the events was overwhelmingly positive, highlighting the need for such events to support the development of new teachers in higher education. Institutional training varies and these opportunities for sharing experiences, asking questions, networking and reflection on teaching practice were highly regarded. Most participants felt more confident about their teaching and believed that students were more directly engaged in their teaching after attending the events. Recommendations for support of this category of teacher include provision of discipline-specific events, opportunity for local area networking and support for the development of reflective practice in teaching and learning.

### **Keywords**

[Novice teachers](http://www.tandfonline.com/keyword/Novice%20Teachers), [guidance](http://www.tandfonline.com/keyword/Guidance), [educational development](http://www.tandfonline.com/keyword/Educational%20Development), [bioscience](http://www.tandfonline.com/keyword/Bioscience), [STEM](http://www.tandfonline.com/keyword/STEM), [graduate teaching assistants (GTAs)](http://www.tandfonline.com/keyword/Graduate%20Teaching%20Assistants%20%5C%28gtas%5C%29)

## **Introduction**

Introducing new lecturers, graduate teaching assistants (GTAs), teaching fellows and demonstrators (collectively referred to herein as novice teachers) to a university teaching environment is an important aspect of training and career development. For bioscientists, a contribution to this development can be made by providing an introduction to the resources, materials and guidance available from the Higher Education Academy (HEA), including the extensive and now archived work of the UK Centre for Bioscience ([HEA 2012a](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref10)). A proposal for a series of introductory events for new bioscience teachers was agreed and supported by the UK Centre for Bioscience Reps Fund ([HEA UK Centre for Bioscience CfB (2010](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref12)). The series of seven events built upon the stated needs of postgraduates new to teaching ([Tierney *et al.* 2011](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref25)) and was designed to meet three of the HEA Strategic Aims (2008–2013) ([HEA 2008](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref9)) namely to:

* raise the status of teaching
* identify, develop and disseminate evidence-informed approaches to teaching
* broker and encourage the sharing of effective practice

The emphasis on providing a high quality student experience is also reflected in the HEA 2012–2016 Strategic Plan, which champions excellent learning and teaching in higher education ([HEA 2012b](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref11)). Additionally, these events were intended to increase the numbers of teaching staff interacting with the bioscience resources provided by the HEA, through the subject centre materials and also more generally. By bringing together groups of new and aspiring academics with interests in educational development but widely differing experience levels on a regional basis, networking, sharing of ideas and approaches to teaching practice can be enhanced through interactions with departmental and institutional representatives, HEA staff and more experienced colleagues. By fostering a sense of community within cohort groups and increasing the accessibility of HEA resources, a sense of belonging to the wider HEA community can be engendered ([Sharpe 2000](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref24)). Originally intended for 20 to 25 participants per event, demand soon outstripped supply and a revised strategy to increase availability was adopted, allowing for 30 to 35 participants per event. Demand for places has been interpreted as a reflection of the increased amount of teaching delivered by non-academic staff ([Scott and Maw 2009](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref23)).

Interest in the development of novice teachers comes from the authors’ professional experience, and from the literature. The Boyer Commission Report ([Kenny 1995](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref13)) identified the need for proficient and knowledgeable GTAs, who are able to help undergraduate students learn by providing opportunities to enquire, rather than merely by transmission of information. GTAs are frequently unable to provide these types of learning opportunities to undergraduate students without effective training and effective support from members of academic staff. The need for reflection on the pedagogic approach taken by teachers whilst not solely limited to novice teachers, is a consequence of the heterogeneous nature and complexity of all student groups and learning systems ([Regehr 2010](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref20)). This complexity may not be readily apparent to many novice teachers, since little is known about the scientific pedagogy of novice teachers ([Gardner and Jones 2011](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref8)).

[Nyquist and Wulff (1996)](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref16) utilise a three-stage model of GTA development, each of which comes with its own challenges, moving from the pre-socialised ‘Senior Learner’, through the socialised ‘Colleague-in-Training’ to the post-socialised ‘Junior Colleague’. The three developmental levels are characterised by the concerns of the GTAs, their discourse level, how they approach authority (staff) and undergraduate students, outlined in [Table 1](http://www.tandfonline.com/action/showPopup?citid=citart1&id=T0001&doi=10.11120/beej.2013.00013).

***Table 1*** *Indicators of teaching assistant development (*[*Nyquist and Wulff 1996*](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref16)*); adapted from (*[*Nyquist et al. 1991*](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref17)*)*

|  |  |  |  |
| --- | --- | --- | --- |
| **GTA development indicator** | **Senior learner** | **Colleague-in-training** | **Junior colleague** |
| Concerns | Self-survival: How will students like me? | Skills: How do I lecture, discuss? | Outcomes: Are students getting it? |
| Discourse level | Pre-socialised: Give simplistic explanations | Socialised: Talk like insiders, use technical language | Post-socialised: Make complex ideas clear without use of jargon |
| Approach to authority | Dependent: Rely on supervisor, supervisory committee | Independent or counterdependent: Stand on own ideas – defiant at times | Interdependent/collegial: relate to faculty as junior colleagues |
| Approach to students | Engaged/vulnerable: student as friend, victim or enemy: “Love” students, want to be friends, expect admiration or are hurt, angry in reponse, personalise interactions | Detached/student as experimental subject: Disengage or distance themselves from students – becoming analytical about learning relationships | Engaged/professional student as client: Understand student/ instructor relationships and the collaborative effort required for student learning to occur |

Mentoring ([Corbett and Paquette 2011](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref6)) and reflection ([Schussler *et al.* 2008](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref22), [Dotger 2011](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref7)) can speed up the development of novice teachers, towards becoming more vibrant teaching contributors by emphasising the key importance of effective communication. Academic staff, GTAs and students can all benefit from facilitating the progression of GTAs through the stages to that of ‘junior colleague’. This model also resonates with [Biggs’ (1999](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref3), [2001)](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref4) Quality Model (QM) generic theory of teaching ([Table 2](http://www.tandfonline.com/action/showPopup?citid=citart1&id=T0002&doi=10.11120/beej.2013.00013)).

***Table 2*** *Biggs’ QM generic theory of teaching (*[*Biggs 1999*](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref3)*)*

|  |  |  |
| --- | --- | --- |
| **Level 1** | **Level 2** | **Level 3** |
| What the student is (Good/bad) | What the teacher does | What the student does |
| Transmission model of teaching | Tips and tricks of teaching | Engagement with learning |
| Blame students if teaching is not effective | Means becomes end – what teacher does is an index of student learning | Engagement achieves outcomes |

The ‘Teaching in the Biosciences’ series, aimed to help new teachers along the path towards becoming expert teachers early in their career. By doing so, they can contribute to student learning more effectively, both as educators, and as academic members of staff.

Seven interactive ‘Teaching in the Biosciences’ events were held from February 2010 to December 2011 (for event programmes and reports see: <http://www.bioscience.heacademy.ac.uk/arunov11.aspx> and links therein). Events were intended to attract a regional or national audience rather than from a single institution, and were held in Glasgow, Manchester, Aberdeen, Belfast, Reading, Cardiff and Cambridge. Two hundred and thirty delegates attended the events, with group sizes ranging from 28 to 39. The popularity of these events meant that ‘Waiting Lists’ became necessary for several of the events. The expectations, impressions and feedback from delegates were assessed using online Pre-Event Surveys hosted by Bristol Online Services (<http://www.survey.bris.ac.uk>) for two events, with 45% replying. A paper-based Immediate Feedback Survey form was collected from 69% of attendees. An online Post-Event Survey was delivered using the Bristol online survey with an email link sent to participants at least three months after five of the events and resulted in an 18% response rate.

## **Delegate Profiles and Expectations**

Amongst the 230 attendees 56% were post-graduates, with a further 44% being post-doctoral scientists. Teaching or demonstrating in the current academic session was being undertaken by 53% of participants. Of those currently teaching, 39% were supporting Honours project or MSc students in the laboratory, with 36% demonstrating in wet-lab or computer-based environments, whilst 11% were lecturing and 11% giving tutorials. For 56% of attendees, the ‘Teaching in the Biosciences’ event was the first occasion they had received any training for teaching or demonstrating in higher education. Amongst delegates who had received some training, 38% had been briefed on demonstrating, 31% had obtained generic training in teaching and 19% had received training in giving tutorials. Only 6% had benefitted from any training in large group presentation skills, or in giving feedback on assessed student work.

[Table 3](http://www.tandfonline.com/action/showPopup?citid=citart1&id=T0003&doi=10.11120/beej.2013.00013) summarises the top four responses when attendees at five events were asked what they were hoping to achieve by attending the event.

***Table 3*** *What were you hoping to achieve by attending the event?*

|  |  |
| --- | --- |
| **Comment** | **Percentage responses (*n* = 201)** |
| How to improve teaching skills | 29 |
| What makes a good teacher and teaching system | 18 |
| To get more formal support on teaching methods, styles and networks | 17 |
| Careers advice | 13 |

Comments from initial events indicated a surprisingly strong interest in participants obtaining careers advice, particularly in higher education careers. This led to the production of a UK Centre for Bioscience Short Guide ([Weitz 2011](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref26)) written in response to the interest and demand displayed by participants.

**Content**

The content of each event evolved during the series, in the light of experience accumulated over 22 months and reflecting the availability and interests of delivery team members. Typical programme topics were as follows.

### **Teaching in the biosciences**

An overview describing the range of qualifications, delivery methods, styles and approaches adopted in UK higher education. Considers how learned societies, professional bodies and the HEA support teacher development alongside individual institutional training. Provides guidance and advice on utilising promotion and career development pathways along with the Higher Education Role Analysis (HERA) Framework. Uses the metaphor of consumer branding to introduce reputation management and personal reflection on the concept of individual teaching styles.

**Key resources:**

Society of Biology <http://www.societyofbiology.org/home>

HEA Biological Sciences HEA Biological Sciences <http://www.heacademy.ac.uk/disciplines/biological-sciences>

### **Support from Higher Education Academy sources for teaching**

A description of the electronic and paper based resources available through the HEA website including archival UK Centre for Bioscience resources, such as the New Lecturers Resource Folder and copyright-cleared images database ImageBank. Details of information for tutorials, laboratory practicals, fieldwork and assessment. Helpful guidance on Bioscience Teacher of the Year and Student Awards, bioethics resources and pedagogic journals such as *Bioscience Horizons* and *Bioscience Education*. Advice on why and how to apply for Associate or Fellow status of the HEA.

**Key resource:**

Imagebank <http://www.bioscience.heacademy.ac.uk/imagebank>

### **What makes a good teacher?**

An examination of some of the skills, strategies and ways of engaging with students to enhance learning. Small group based identification of the strengths and weaknesses of different learning settings, e.g. lectures, laboratory practicals, tutorials. Discussion of the ways by which reflecting on the needs and opportunities of a particular context can help any teacher to improve the quality of the learning experience. How to develop the generic and specific skills needed by all higher education teachers.

**Key resource:**

Resources for New Lecturers <http://www.bioscience.heacademy.ac.uk/resources/resourcepack.aspx>

### **Small group teaching and dealing with tricky situations**

Consideration of what constitutes a small group and differences in approach for tutorials, workshops and seminars. Interactive discussion of the benefits and challenges of small group teaching. Reflection on ‘10 Pointers for Successful Sessions’ and further information on developing tutorial skills such as group dynamics, maintaining and supporting groups, and clarity of roles. Scenario-based activities considering potentially difficult situations that can arise from small group teaching, including dysfunctional behaviours such as monopolising, aggressive or withdrawn students. Encourages sharing and reflection on what communication and advice might be needed and who should be kept informed if things might get out of hand. By discussing their experiences, delegates can become more confident, e.g. through realisation that others have faced similar or perhaps even more daunting challenges and how to overcome them. Emphasises the importance of context, cultural sensitivity and communicating with senior staff where necessary, in dealing with awkward teaching situations.

**Key resource:**

Guide to Small Group Work <http://www.bioscience.heacademy.ac.uk/ftp/resources/shortguides/smallgrpwork.pdf>

### **Delivering laboratory practicals**

Considers what makes a good, or less good, practical laboratory experience. Examines the role of the demonstrator, by reflecting on which laboratory staff were particularly helpful – and why. Builds a character profile for excellent demonstrators through interactions not just with students, but also with lecturers, programme teams, technicians and other demonstrators. How to identify and meet the behavioural and technical skills needs of highly diverse student populations ([Regehr 2010](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref20)). Reflects on the position of the demonstrator in the teaching team, mapping their current interactions and identifying possible opportunities to feed into teaching design and revision, for example through greater use of creativity in teaching ([Adams *et al.* 2009](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref2)).

**Key resource:**

Creativity in the Sciences <http://www.heacademy.ac.uk/resources/detail/subjects/bioscience/event-report-2009-glasgow>

### **Assessment and feedback practice**

Understanding the purpose and importance of assessment in higher education. Considers the properties of various assessment types. Discusses the purpose of feedback, to enhance current and future learning. Participants design assessments for different learning activities to examine what makes a well-designed assessment and feedback strategy and how it relates to the learning outcomes of a module, or programme.

**Key resource:**

HEA Assessment and Feedback <http://www.heacademy.ac.uk/assessment>

### **Reflections, resources and future actions**

Draws together attendees’ event highlights whilst reinforcing the plethora of resources available to support new teachers through their universities, learned societies, trades unions and the HEA. Encourages delegates to identify their own action learning points and provides an opportunity for feedback on the day.

**Immediate Event Feedback**

An initial paper-based feedback survey was distributed at all seven events and completed by 69% of delegates. Using a four-point Likert scale (Very Good–Good–Fair–Unsatisfactory), 95% of 169 respondents rated the event as ‘Very Good’ or ‘Good’ overall, whilst 1% considered it as only ‘Fair’. No respondents rated the event as ‘Unsatisfactory’. The vast majority (92.4 ± 1.87%) of attendees felt that the event met or exceeded their expectations. The most frequently cited free-form comments when asked in which ways the event met expectations are shown in [Table 4](http://www.tandfonline.com/action/showPopup?citid=citart1&id=T0004&doi=10.11120/beej.2013.00013).

***Table 4*** *In which ways did the event meet your expectations?*

|  |  |
| --- | --- |
| **Comment** | **Percentage responses (*n* = 109)** |
| Exceeded expectations | 19 |
| Sharing experiences | 12 |
| Discussing effective learning styles | 11 |
| Providing access to resources | 11 |
| Small group teaching | 8 |
| Nature of biosciences teaching | 8 |

The event contents were considered relevant by all attendees, whilst &gt; 95 ± 2.84% considered the contents timely and an appropriate blend of activities. The content was considered to be thought provoking (92 ± 2.75%) and challenging (72.35 ± 5.54%) by the majority of respondents. These data suggest that participants were prepared for a greater degree of challenge in future, in depth considerations of pedagogy in the biosciences. The mix of activities undertaken was rated as the best feature by 28% of respondents, whilst 19% particularly found the information and resources provided most helpful. Assessment and feedback resources, and ideas for small group teaching were considered the most enjoyable aspect by 12% and 9% of participants, respectively. Being able to ask questions about support and high quality training for teachers from universities, professional bodies and learned societies was considered the most valuable or innovative idea gained by 25% of respondents. Learning about how to access resources, solve teaching problems and new ideas for teaching skills were each considered the most innovative idea by 10–12% of participants.

In response to the observations of [Kreber and Castleden (2009)](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref14) that hard science discipline novice teachers often lack reflection skills, one objective for the series of events was to encourage reflection and stimulate actions to develop novice teachers. Participants identified a range of actions, the most frequently cited being shown in [Table 5](http://www.tandfonline.com/action/showPopup?citid=citart1&id=T0005&doi=10.11120/beej.2013.00013).

***Table 5*** *What actions will you take as a result of the event?*

|  |  |
| --- | --- |
| **Comment** | **Percentage responses (*n* = 114)** |
| Will utilise sources of resources and information | 25 |
| Will use information provided to develop my career | 16 |
| Will keep in contact with the HEA | 15 |
| Will use information for HEA membership application | 11 |
| Will go to more teaching development and networking events | 11 |

Amongst attendees, 75.4 ± 6.08% indicated they would follow up their interest in the HEA, with the most frequently mentioned types of support requested being shown in [Table 6](http://www.tandfonline.com/action/showPopup?citid=citart1&id=T0006&doi=10.11120/beej.2013.00013).

***Table 6*** *How can the Higher Education Academy support you in your follow up actions?*

|  |  |
| --- | --- |
| **Comment** | **Percentage responses (*n* = 106)** |
| Providing access to resources, e.g. web-based | 18 |
| Providing high quality information and events | 14 |
| Offering encouragement and support to teachers | 13 |
| Delivering more teaching development days | 12 |

Encouragingly, 89.7 ± 5.19% of respondents indicated they would recommend the ‘Teaching in the Biosciences’ events to other post-graduate and post-doctoral colleagues. This reflected the interest and stimulating discussions amongst new teachers observed during the events. The most frequently given free-form recommendations are shown in [Table 7](http://www.tandfonline.com/action/showPopup?citid=citart1&id=T0007&doi=10.11120/beej.2013.00013).

***Table 7*** *Why would you recommend the ‘Teaching in the Biosciences’ events to other post-graduates and post-doctoral colleagues?*

|  |  |
| --- | --- |
| **Comment** | **Percentage responses (*n* = 136)** |
| Interesting and informative | 22 |
| Excellent interactive experience | 13 |
| Encouragement to enhance teaching quality | 12 |
| Useful experience | 12 |

Exploring teaching styles and approaches, obtaining academic career positions and supervising MSc students were all identified as potential topics for future novice bioscience teacher events.

When asked to consider wider topics relevant to bioscience teachers of all experience levels, 268 suggestions were made, the most frequently mentioned are shown in [Table 8](http://www.tandfonline.com/action/showPopup?citid=citart1&id=T0008&doi=10.11120/beej.2013.00013).

***Table 8*** *Which topics would you recommend for future teaching development events?*

|  |  |
| --- | --- |
| **Comment** | **Percentage responses (*n* = 268)** |
| Linking teaching and research | 14 |
| Supervising Masters students | 9 |
| Laboratory practicals/fieldwork | 8 |
| New lecturer events | 8 |
| Developing creativity | 7 |

Requests for publications or further information were collated, with the most frequent requests being shown in [Table 9](http://www.tandfonline.com/action/showPopup?citid=citart1&id=T0009&doi=10.11120/beej.2013.00013). Additionally, 52% of delegates requested a Certificate of Participation, which mapped the event content against the UK Professional Standards Framework to assist those seeking professional recognition via the self-application route for Associate of Fellow status of the HEA.

***Table 9*** *On which topics would you like to receive publications or further information?*

|  |  |
| --- | --- |
| **Comments** | **Percentage responses (*n* = 256)** |
| Joining the Bioscience Network | 25 |
| Guidance on teaching practice | 11 |
| Contributing to Bioscience Bulletin | 11 |
| Effective use of information technology | 11 |
| Submitting images to Imagebank | 8 |

**Post-event Feedback**

Delegates from the first five events delivered were sent a *post hoc* survey 3–12 months after attendance, with an 18% return rate. The relatively low return rate is perhaps not surprising from such a diverse group of attendees. Overall, 79% of respondents felt more confident in their teaching as a result of participating in ‘Teaching in the Biosciences’ events with 38% having directly changed their teaching practice as a result. The most frequently cited areas of enhanced practice were increased student engagement, providing better feedback, greater understanding of teaching styles, increased confidence and better preparation of teaching materials.

Amongst respondents noticing changes in their teaching, 83% felt that their students were now more directly involved in teaching situations, whilst 17% observed that enhanced feedback was translating into improved student learning experiences. Desire to undertake more or different types of teaching development activities was expressed by 79% of delegates, with improving teaching skills, increasing teaching experience and obtaining career development advice being the most frequently cited needs, as a result of the event.

Whilst 31% of post-event respondents intended to apply for HEA recognition for their teaching, the majority (52%) were unsure whether they would do so. Achieving enhanced levels of academic community penetration is an important aspect of the HEA strategic plan and key indicators by which future performance will be judged by funders and stakeholders. The HEA UK Centre for Bioscience ‘New Lecturers Folder’ was being put to practical use by 28% of respondents. The most popular ways in which these resources were being used included: as a source of reference materials (33% of respondents), as a direct source for teaching activity resources (25%) and as a generally useful toolkit (17%). ImageBank was a widely used HEA web resource, with 69% of respondents having made use of the available copyright cleared images.

**Lessons for the Future**

Designing, delivering and deliberating over feedback from the series of seven events has provided considerable opportunities for reflection on aspects of teaching and learning practice, involving &gt; 230 participants and deliverers. The extensive networking involved around the UK has added to the breadth and depth of these opportunities. In free-form comments, participants were wholly positive about the events, whilst highlighting the current lack of and future need for more such events, as new cohorts of bioscientists seek to become teachers each year, typically from a post-graduate or post-doctoral studies base. Anecdotal views of existing introductory training within institutions were varied, where any such training was offered. Frequently, training was considered much too generic, of little perceived value, or sadly, as something to be endured because senior staff had demanded attendance. This is consistent with the findings of [Scott and Maw (2009)](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref23) that novice teacher training varied both in range and quality. [Dotger (2011)](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref7) and [Nicklow *et al.* (2007)](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref15) have all highlighted the expressed need of novice science teachers for discipline specific rather than generic teacher instruction. In the new climate of austerity, finding better ways to address the conundrum of providing more generic ‘mega-discipline’ based events, such as STEM (Science, Technology, Engineering and Mathematics) sessions, whilst also giving adequate single discipline based coverage to be worthwhile, is a considerable challenge. Consideration of different teaching styles and approaches for different settings, perhaps extended from the materials covered in this series, independent advice on how to develop careers and obtain academic positions, as well as the practicalities of supervising Honours and Masters level students in laboratories were all identified as key topics for new teachers. Bioscientists have indicated clearly that they would like to have access to follow on events, where particular topics can be explored in greater depth as their teaching experience and skills develop. Examples such as linking teaching to research, aspects of designing practicals and fieldwork, assessing Masters students and developing creativity skills ([Adams](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref1) [2008, Adams *et al.* 2009](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref2)) might all usefully be included. What is clear from the survey responses, comments of attendees and reflections by the delivery team, is that new entrants to bioscience teaching are highly appreciative of the availability of independent advice and guidance on approaches to teaching. By providing coverage of how the HEA, learned societies and professional bodies can contribute to the development of teaching staff, this series of events has successfully offered encouragement and support to this growing community.

The delivery team felt that each event developed its own dynamic, perhaps based on the speed and depth of interactions between delegates as much as with deliverers. Once initial reticence had been overcome, all event groups engaged fully with the intended activities. The opportunity to make new friends and acquaintances through the formal and informal networking, e.g. lunch discussions, was welcomed by delegates. Amongst the most frequent observations was how helpful the day was in encouraging reflection about teaching skills, consistent with [Kreber and Castleden (2009)](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref14) and the possible need to balance research and wider career development objectives. Participants identified a need for further networking opportunities after the event and it is recommended that future series cover use of social media tools for GTAs and other new teaching staff to share experiences and maintain contacts on a regional basis.

Providing an extended series of low status, low pressure informal communications sessions designed to increase reflection would benefit novice teachers greatly. Research into the needs of GTAs and new teaching staff is sparse, although there is evidence for science GTAs wanting discipline specific rather than generic training ([Park and Ramos 2002](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref18)). [Procter *et al.* (2004)](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref19) have highlighted the variability both of duration and content in support provided for GTAs. One of the premises of engagement with teaching and learning is that of the ‘reflective practitioner’ ([Schön 1983](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref21)). In addition to coming to terms with the technicalities of teaching, GTAs should also be encouraged to reflect on their teaching (and student learning) in order to improve their practice, as recommended by [Schussler *et al.* (2008)](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref22). Failure to do so, as noted by [Gardner and Jones (2011)](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref8) risks under-developed practices being handed down from generation to generation. However, for teachers from a ‘pure/hard’ ([Biglan 1973](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref5)) science background, reflection does not come easily ([Kreber and Castleden 2009](http://www.tandfonline.com/doi/full/10.11120/beej.2013.00013#ref14)). More effort therefore, should be put in to encouraging GTAs to begin the reflective process. One way to do this could be to offer a series of workshops which go beyond the mechanics of teaching, and start to look at more in-depth issues.

Participants in the ‘Teaching in the Biosciences’ series of events showed a strong interest in developing careers as university teachers, but were unaware of this career track in their institutions. Enhancing the student learning experience, designing, delivering and assessing learning whilst also pursuing discipline based or pedagogic research appeared an attractive alternative to the highly competitive research-intensive REF pathway. For this enthusiasm to be sustained however, universities should consider providing more, high quality personal development training focussed on learning and teaching. In much of the UK higher education environment, for example, this will become increasingly important as rising fee levels, increased competition for graduate level jobs and starting salaries means that students will expect not just more for their money, but a higher quality experience. Meeting student expectations for the highest quality learning experience possible will require all universities to improve preparatory training and development opportunities for new teaching staff, from GTAs to teaching fellows. Raising the profile of teaching and learning as an important scholarly activity will encourage novice teachers to increase their knowledge of different approaches and teaching styles. Enhancing understanding of teaching pedagogy can only aid the development of reflective practitioners.

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## **References**

Adams, D.J. (2008) Creativity in the biosciences. UK Centre for Bioscience Bulletin, 24, 1.

Adams, D.J., Beniston, L.J. and Childs, P.R.N. (2009) Promoting creativity and innovation in biotechnology. Trends in Biotechnology, 27, 445–447.

Biggs, J. (1999) Teaching for Quality Education at University. Buckingham, UK: Open University Press.

Biggs, J. (2001) The reflective institution: assuring and enhancing the quality of teaching and learning. Higher Education, 41, 221–238.

Biglan, A. (1973) The characteristics of subject matter in different scientific areas. Journal of Applied Psychology, 57, 195–203.

Corbett, F.Jr. and Paquette, K.R. (2011) An investigation of mentorship as perceived by university faculty, teaching associates, and graduate assistants. Education, 132, 285–295.

Dotger, S. (2011) Exploring and developing graduate teaching assistants’ pedagogies via lesson study. Teaching in Higher Education, 16, 157–169.

Gardner, G. and Jones, G. (2011) Perceptions and practices: biology graduate teaching assistants’ framing of a controversial socioscientific issue. International Journal of Science Education, 33, 1031–1054.

Higher Education Academy (HEA) (2008) The Higher Education Academy Strategic Plan 2008–2013. <http://www.heacademy.ac.uk/assets/york/documents/aboutus/Academy_2008-13_Strategic_Plan.pdf> (accessed 1 May 2012).

Higher Education Academy (HEA) (2012a) Biological Sciences Resources. <http://www.heacademy.ac.uk/disciplines/biological-sciences> (accessed 29 May 2012).

Higher Education Academy (HEA) (2012b) The Higher Education Academy Strategic Plan 2012–2016. York, UK: HEA.

Higher Education Academy (HEA) UK Centre for Bioscience (CfB) (2010) Networking Events Designed to Encourage Participation of PhD Students and PostDoctoral Fellows with the UK Centre for Bioscience and Promote Engagement and Innovation in Teaching & Learning Development. <http://www.bioscienceacademy.ac.uk/resources/projects/repstierney.aspx> (accessed 23 May 2012).

Kenny, R.W. (1995) Reinventing Undergraduate Education: A Blueprint for America’s Research Universities. Stony Brook, NY: The Boyer Commission on Educating Undergraduates in the Research University.

Kreber, C. and Castleden, H. (2009) Reflection on teaching and epistemological structure: reflective and critically reflective processes in “pure/soft” and “pure/hard” fields. Higher Education, 57, 509–531.

Nicklow, J.W., Marikunte, S.S. and Chevalier, L.R. (2007) Balancing pedagogical and professional practice skills in the training of graduate teaching assistants. Journal of Professional Issues in Engineering Education and Practice, 133, 89–93.

Nyquist, J.D. and Wulff, D.H. (1996) Working Effectively with Graduate Assistants. Thousand Oaks, CA: Sage Publications.

Nyquist, J.D., Abbott, R.D., Wulff, D.H., Sprague, J. (1991) Preparing the Professoriate of Tomorrow to Teach: selected readings in TA training. Dubuque, IA: Kendall Hunt Publishing Company.

Park, C. and Ramos, M. (2002) The donkey in the department? Insights into the graduate teaching assistant (GTA) experience. UK Journal of Graduate Education, 3, 47–53.

Procter, C.T., Spedding, P.R. and Mcisaac, J.L. (2004) A Case Study on Developing the Graduate Teaching Assistant Role in Higher Education. Bristol, UK: Society for Research into Higher Education.

Regehr, G. (2010) It’s NOT rocket science: rethinking our metaphors for research in health professions education. Medical Education, 44, 31–39.

Schön, D. (1983) The Reflective Practitioner, How Professionals Think in Action. New York, NY: Basic Books.

Schussler, E., Torres, L.E., Rybczynski, S., Gerald, G.W., Monroe, E. and Sarkar, P. (2008) Transforming the teaching of science graduates through reflection. Journal of College Science Teaching, 38, 32–36.

Scott, J. and Maw, S.J. (2009) The role of the postgraduate student in delivering bioscience teaching. Bioscience Education, 14, 3.

Sharpe, R. (2000) A framework for training graduate teaching assistants. Teacher Development: An International Journal of Teachers’ Professional Development, 4, 131–143. <http://dx.doi.org/10.1080/13664530000200106> (accessed 25 May 2012).

Tierney, A., Perkins, J. and Shearer, M. (2011) Engaging postgraduates in teaching and learning-networking events. In Effective Learning in the Biosciences. Edinburgh, UK: Higher Education Academy, University of Edinburgh. <http://www.bioscience.heacademy.ac.uk/ftp/bioconf/IP7-AnneTierneyEngagingPostgraduates.pdf> (accessed 31 May 2012).

Weitz, H. (2011) Higher Education Careers. UK Centre for Bioscience Short Guide. <http://www.bioscience.heacademy.ac.uk/ftp/resources/shortguides/HEcareers.pdf> (accessed 23 May 2012).