# An Evidence-Based Approach to Developing Faculty-Wide Training for Graduate Teaching Assistants

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## Abstract

In 2000, Sharpe proposed a framework for graduate teaching assistant (GTA) training based on three key principles: departmental training, faculty training, and accreditation. Sharpe's paper culminated in a call for Higher Education (HE) institutes to adopt this framework. Whilst the principles of Sharpe's work remain relevant, the shape and structure of HE and accrediting bodies has changed due to the increasingly competitive market environment. Herein we provide an updated framework for GTA training based around implementation at a large English Russell Group University. We identify seven key elements for effective GTA training based on literature. We then demonstrate how this framework and the key elements can be implemented in practice, using GTA role descriptors and input from staff in Departments and Faculty. We demonstrate how the framework is applicable on a broad subject basis and how training is now supporting the 950 GTAs annually who work across the nine Schools within the Faculty of Science and Engineering, at the University of Manchester. The developed modular training sessions are mapped out and are benchmarked against both the Vitae Researcher Development Framework and the UK Professional Standards Framework allowing postgraduate students to apply for HEA accreditation through Advance HE (after suitable practice). Finally, the report discusses the benefits of implementation as well as lessons for future action, providing a set of key principles for others who want to develop their existing GTA training provision or set up a new training programme.

## Practitioner Notes

1. GTA roles have been mapped to identify where teaching and learning training, delivered by Faculty, can be dove-tailed with department and subject specific training.
2. Evidence from other GTA training studies has been drawn upon to build sessions which support the apprenticeship of these future practitioners.
3. Mapping against recognised CPD initiatives, such as the Vitae Researcher Development Framework and HEAs UKPSF is enabling accreditation for trainee recognition.
4. A diversity of roles has been combined into a map for modular training sessions.
5. The training programme is evaluated and the barriers and challenges to implementation are discussed.

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## Abstract

In 2000, Sharpe proposed a framework for graduate teaching assistant (GTA) training based on three key principles: departmental training, faculty training, and accreditation. Sharpe's paper culminated in a call for Higher Education (HE) institutes to adopt this framework. Whilst the principles of Sharpe's work remain relevant, the shape and structure of HE and accrediting bodies has changed due to the increasingly competitive market environment. Herein we provide an updated framework for GTA training based around implementation at a large English Russell Group University. We identify seven key elements for effective GTA training based on literature. We then demonstrate how this framework and the key elements can be implemented in practice, using GTA role descriptors and input from staff in Departments and Faculty. We demonstrate how the framework is applicable on a broad subject basis and how training is now supporting the 950 GTAs annually who work across the nine Schools within the Faculty of Science and Engineering, at the University of Manchester.

The developed modular training sessions are mapped out and are benchmarked against both the Vitae Researcher Development Framework and the UK Professional Standards Framework allowing postgraduate students to apply for HEA accreditation through Advance HE (after suitable practice). Finally, the report discusses the benefits of implementation as well as lessons for future action, providing a set of key principles for others who want to develop their existing GTA training provision or set up a new training programme.

## Keywords

Graduate Teaching Assistant (GTA), GTA Training, Higher Education, STEM (Science, Technology, Engineering and Mathematics), UKPSF (United Kingdom Professional Standards Framework).

## Principles

- GTA roles have been mapped to identify where teaching and learning training, delivered by Faculty, can be dove-tailed with department and subject specific training.
- Evidence from other GTA training studies has been drawn upon to build sessions which support the apprenticeship of these future practitioners.
- Mapping against recognised CPD initiatives, such as the Vitae Researcher Development Framework and HEAs UKPSF is enabling accreditation for trainee recognition.
- A diversity of roles has been combined into a map for modular training sessions.
- The training programme is evaluated and the barriers and challenges to implementation are discussed with a set of key principles provided.

## Introduction

There are various issues in the Higher Education (HE) environment that execute pressure on universities and educational institutions, for example within England: the Teaching Excellence Framework (TEF) the Research Excellence Framework (REF), equipping graduates with the

necessary employability skills to gain a job in an increasingly competitive market environment, as well as Brexit and the most recent Covid-19 pandemic; other locations have similar pressures The latter two may have impacts that remain currently unknown and/or uncertain (Lim & Javadpour, 2021).

Within the HE environment, the majority of postgraduates are expected to participate in teaching activities at some point in their graduate career; a practice which is especially prominent in the sciences, where graduates are frequently required to serve as a graduate teaching assistant (GTA) as part of their graduate degree (Brownell & Tanner, 2012; Connolly, Lee, & Savoy, 2018; Golde & Dore, 2001; Lee, 2019). A key question that emerges is where GTAs come into the game in terms of the pressures listed above, e.g. TEF or equivalent. GTAs fall within two camps, on the one hand they are research students that work independently to gain their PhD, whilst on the other hand they are members of the academic faculty (Kanuka & Smith, 2019) , through facilitating workshops, labs, and seminars. As such they are the face of any university and can enhance the student experience.

This team has carefully designed a GTA training programme that is executed on faculty level and supported through additional department specific training sessions. Started as of the academic year 2017/2018, which coincidently follows in line with the impact of REF on university intakes, GTAs have a unique opportunity to sign up to an additional mentoring programme, which supports GTAs to gain accreditation through Advanced HE at the level of Associate Fellow or Fellow.

This article outlines how this team from across the Faculty of Science and Engineering at a large English Russell Group University has created a modular training course for GTAs, to support upwards of 950 GTAs, using critical analysis from three evidenced positions:

1) Evidence from other GTA training studies e.g. (Dotger, 2010; Elliott & Boin, 2010; O'Toole et al., 2012) has been drawn upon to build sessions which support the apprenticeship of these future practitioners.

2) GTA roles have been mapped to identify where teaching and learning training, delivered by Faculty, can be dove-tailed with department and subject specific training.

3) Mapping against recognised CPD initiatives, such as the Vitae Researcher Development Framework and HEAs UKPSF is enabling accreditation for trainee recognition.

These positions shall allow the authors to address the following key aims. The first is "what does an evidenced-based approach to developing a faculty-wide training for GTAs entail?". We will then discuss, "what the structure a module should follow?"?" to produce a useful general training programme. Finally, we will examine the key challenges to setting up a programme like this based around our structure.

## Literature Review

With Graduate Teaching Assistants (GTAs) falling into the cracks of being simultaneously research students and members of faculty, it is vital to understand their needs. Thus, just experiencing teaching cannot be equivalent to embedding educational development into graduate study. GTA positions have traditionally been trial-and-error opportunities to teach, with little or no formal training, no theoretical grounding in teaching methods, and a lack of training in discipline-specific classroom strategies (DeChenne et al., 2012). Tanner and Allen (2006) observed that even the most dedicated student would be hard pressed to learn about the intricacies and research base of pedagogy in an unsupported teaching assistantship. Yet despite this many scientists still think that teaching skills are best developed in on-the-job training (Gardner & Jones, 2011).

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Yet, this situation may be changing as pressures on the HE sector change. Increasing undergraduate numbers combined with tighter financial situations, mean universities are increasingly dependent on GTAs to provide sufficient "on the ground" teaching support. The National Student Survey (NSS) and Teaching Excellence Framework (TEF) drive demand for quality learning interactions and many of the first experiences that undergraduates have are delivered by GTAs (DeChenne et al., 2012). GTAs play an important role in the quality of undergraduate education and influence the retention of students to major in the sciences (Gardner & Jones, 2011). Therefore, Continuing Professional Development (CPD) in teaching for GTAs is vital to universities. Nonetheless, attempts to integrate CPD programmes into the graduate curriculum are frequently met with resistance from some stakeholders, so providing evidenced CPD which adds value for both individuals and their line-managers is key.

Providing teaching and learning training for GTAs is not a new phenomenon and various methods have been reported for delivery. O'Toole et al. (2012) surveyed practices in the Australian HE sector. Their report was aimed specifically at GTAs teaching practical sciences in the laboratory, but it provides clear recommendations of good practice for the training of GTAs. The report concludes that GTAs benefit from sharing diverse experiences, communities of practice, and environments which encourage engagement through mentoring. To develop GTA competency they acknowledge the necessity for GTAs to have a shared vision for teaching, a framework for development, and to receive regular feedback. This report also identifies aspects which are subject specific, such as the necessity for GTAs to have clear role descriptors, discipline specific knowledge, and time to discuss the logistics of the course on which they teach.

Current research and practice reports have evolved best practices for GTA training from single or one-off interventions into continuous professional development. Studies draw on effective CPD practices from teacher education to make recommendations for GTA CPD. Wheeler, Maeng, Chiu, and Bell (2017) use K-12 professional development (PD) literature to empirically identify effective CPD programme characteristics: content, coherency, collective participation, best-practices, and sustained support. They argue that although these characteristics are not specific to science education, they are applicable and indeed well-aligned to CPD for GTAs.

(Luft & Hewson, 2014) indicate that CPD should be coherent and provide sustained support. Thus, effective GTA training should incorporate weekly meetings for support, and the practical details should align with the department and university policies. Mentoring in the K-12 PD literature is an intense, sustained relationship between mentor and mentee and has been shown to effectively support new teachers in their instruction. This suggests CPD for GTAs, who typically have limited, if any, teaching experience, may be need to incorporate mentoring to provide effective, ongoing support, which could include feedback.

This similarity between GTA training and K-12 PD programmes also support the use of self-reflection as a potentially effective method of improving GTA instruction; e.g. reflective journals or watching videotaped lessons (Blanchard et al., 2010; Rushton, Lotter, & Singer, 2011).

The various pedagogies described in the GTA training literature mirror the K-12 PD literature, where teachers learn about pedagogies through micro-teaching, discussion about learning theories, and teaching students prior to entering the classroom e.g., Blanchard et al. (2010). Since GTAs have little experience with teaching and education, it may be even more important to incorporate multiple strategies to learn about teaching into GTA CPD.

Modelling can be characterized as a best-practices method of instruction in CPD and has been shown to facilitate shifts in K-12 teacher beliefs (Rushton et al., 2011). In a study of an inquiry based CPD for teachers, Rushton et al. (2011) modelled how to explicitly link content to an inquiry based lesson, impacting teachers' beliefs and understandings. Teachers improved their understanding of inquiry

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and realized they had not been implementing inquiry in their classroom. Luft and Hewson (2014) also suggest that culture may have more influence on teacher change than professional development. Thus, GTA CPD should include components that emphasize the importance of teaching to shift the culture, particularly in research-intensive universities.

In 2000, (Sharpe, 2000) proposed a framework for GTA training based on three key principles:

i)   Departmental training (e.g., course content, local procedures, including administration and health and safety);

ii)  Faculty training, to provide a fundamental understanding of learners and teaching strategies;

iii) Accreditation.

Sharpe (2000) showed that GTAs training needs aligned with those of trainee teachers. Early in the teaching experience, GTAs are primarily concerned with subject specific content, whereas later they begin to acknowledge the needs of the learner and reflect on their ability to meet the learners' needs. She devised the framework to meet the needs of GTAs at different stages of their teaching career, with early departmental sessions being complimented by faculty training delivered over the course of a semester. Sharpe (2000) proposed GTAs benefited most from an experiential learning; she acknowledged the GTA as an apprentice who requires training to be delivered alongside practice.

Whilst the principles of the framework remain relevant, the shape and structure of HE and accrediting bodies have changed. Herein we not only provide an updated framework for GTA training, building on Sharpe's (2000) principles, we demonstrate how this framework can be implemented. We show our strategy, using GTA role descriptors, available literature, and ground-level teaching staff, alongside institution level staff, is relevant to any subject setting. We demonstrate how the training scheme is now supporting the 950 GTAs annually who work across the Departments within the Faculty. The process has been challenging yet rewarding for those involved and crucially implementation has shown multiple benefits as well as lessons for future action.

In summary, the GTA training literature identifies seven elements for effective GTA training which can be delivered by a training course at both locally and centrally (Table 1).

*Table 1. Seven key elements for effective GTA training mapped against Sharpe (2000) categories departmental (delivered locally) and faculty (delivered centrally). Accreditation is not directly include within this table, but it would be related to making sure all of the elements are covered.*

| Subject specific training – To be delivered locally | Supporting Literature |
|---|---|
| **Course Details**<br><br>Providing practical details about the course to aid GTAs in understanding their role. | (Luo, Grady, & Bellows, 2001); (Kurdziel, Turner, Luft, & Roehrig, 2003); (Kendall & Schussler, 2013); (Geraets et al., 2021). |
| **Mentoring**<br><br>One-on-one support from a more experienced instructor; the mentor should have knowledge, experience, and beliefs aligned with best teaching practices. This is necessary so that the mentor can provide explicit instruction on teaching practices, give constructive feedback, and model best practices. | |

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| | |
|---|---|
| **Feedback** <br><br> Feedback can come from: mentor, peers, students, or non-mentoring faculty. To be helpful, feedback must be constructive and critical. <br><br> Whilst some studies have suggested the use of summative feedback, such as final performance grade for teaching or end-of-semester student evaluation score, others suggest student evaluations are not a valid measure, as students' grades may influence their evaluation of GTA effectiveness. | |
| **General training – To be delivered centrally** | **Supporting Literature** |
| **Pedagogy** <br><br> Pedagogy is an essential GTA training component as GTA training typically provides the only support GTAs receive before becoming instructors themselves. Prominent approaches include the use of microteaching, holding discussions about teaching, teaching about learning theories, reading articles or case studies about teaching, attending workshops, and utilizing explicit instruction. | (Kendall & Schussler, 2013) |
| **Dual Components – To be delivered by both** | **Supporting Literature** |
| **Modelling** <br><br> Modelling can be described as learners observing or engaging in appropriate practices facilitated by an expert. This modelling can be in the form of the instructor modelling best practices, GTAs completing labs as students, or GTAs experiencing pedagogical approaches such as cooperative learning. | (Sharpe, 2000); (Kurdziel et al., 2003); (Luft & Hewson, 2014); (Kendall & Schussler, 2013). |
| **Teaching Culture** <br><br> Teaching culture includes forming collaborations between GTAs and Faculty on teaching, involving Faculty and department chairs in GTA training, helping GTAs build a community of practice, treating GTAs as professionals, and making GTA training mandatory. By shifting the culture around GTA training to emphasize the importance of GTAs, more effort may be put in to providing quality GTA CPD. | |
| **Self-reflection** <br><br> Self-reflection to learn about teaching practices. <br><br> For GTAs, self-reflection can be promoted by watching videos of their own teaching, identifying their own strengths/weaknesses, completing learning logs, and developing a philosophy of teaching. | |

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## Methods

### Context

To support the teaching of the 8000 undergraduates (UGs) enrolled within the Faculty of Science and Engineering (FSE) across the nine Departments, approximately 950 GTAs are recruited annually. Given the large numbers of GTAs employed, ensuring they can deliver quality support for UG teaching and learning is essential for the student experience.

Until the end of close 2015/2016 training was delivered by a central Staff Development Team. Training was delivered via a single 7-hour session, prior to GTAs beginning to teach and covered learning and teaching theories, teaching activities and methods, assessment, and feedback. Attendance records show that engagement was poor, averaging 200 attendees per annum and inconsistent uptake by GTAs from different Departments. Attendees felt training was not relevant to their role and staff likewise commented that the training did not cater for the needs of their discipline.

The aims for the new training were to provide value for the individual and the community in which they work, as well as link to other available CPD within the sector. The training was to combine the best practice reported for GTA teaching and learning training and best practice reported for continuous professional development (CPD). Thus, it was key to maintain an ethos in which (CPD) should allow GTAs:

- A broad teaching & learning focus and appreciation of it in HE;

- An understanding of their own role within Department & Faculty & as member of staff;

- An understanding of the diverse needs & expectations of the GTA role;

- To know the impact the role has on stakeholders & limitations of the role;

- To develop a set of tools to deliver these needs;

- To practice tools for successful teaching & learning within a safe environment.

### Data Collection for GTA Roles

In order to understand the training needs of GTAs, it is necessary to understand the types of roles GTAs are recruited to and, to ensure training is valuable to departments, the demand for these roles across FSE.

Each department within the Faculty has key staff associated with the allocation of their GTAs. These staff members were asked to individually list the GTA roles that they could think of within their department. The resulting 9 lists were then shared with the authors of this paper who produced an initial list capturing the key roles under a common set of names.

The list of roles was then returned to the departmental staff, with brief descriptions of the roles, to make sure that all roles were captured, and for departments to indicate if they used students within this role or not.

To gain a deeper analysis of the roles, and thus the training areas needed. Each department was asked to a provide a full role description across the roles they identified as using. This required the departmental staff to contact the users of GTAs to collect information on what the GTAs were actually doing in their classes.

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Many of the role descriptions consisted of the same list of activities, with minor differences, e.g., number of teaching weeks and number of reports to mark, which did not affect the responsibilities of the GTAs. Therefore, the authors sorted and removed these replicants to reduce the analysis load.

A thematic analysis was then undertaken on the roles to identify key activities. These key activities identified, e.g., report marking, were then grouped into key themes, e.g., assessment and feedback. The analysis was undertaken individually by different team members, and the key themes were discussed to create a combined and agreed list. Each role description was then rechecked by making sure the key themes captured all elements within them.

### Mapping Against Evidence Based Frameworks

It is key for GTAs to gain accreditation for their teaching experience, irrespective of whether they intend to seek teaching-focused roles (Pitt & Mewburn, 2016). Detailed analysis of early career academic roles aimed at those with a doctoral degree and found that the majority listed teaching experience as a key skill. Teaching experience was a key skill found in many adverts that described a "research only" position. The percentage of job adverts requiring teaching experience increased with pay grade. This was also true of teaching related skills such as mentoring and supervising other students and staff.

Baumgartner (2007) acknowledges GTAs as professors-in-training and thus the need to provide effective professional development on teaching strategies. Since his report, the Vitae Researcher Development Framework (RDF) (Vitae Researcher Development Statement, 2010) was created to enable researchers to identify their own professional development needs as well as helping Faculty in the planning and provision of support for researchers' development. The RDF identifies descriptors which define the characteristics of an excellent researcher; importantly these characteristics identify the need for excellent researchers to work beyond the remit of carrying out research, including the ability to communicate, disseminate, to engage and work with others.

At a similar time, Advance HE (then named Higher Education Academy - HEA) published the UK Professional Standards Framework (UKPSF) to enable evidenced CPD for teaching focused staff (UK Professional Standards Framework, 2011).

Thus, to add value for GTAs by acknowledging their development as teaching-staff, central to the student learning experience, the Faculty training courses were mapped against both the RDF and the UKPSF. This was undertaken after development of the training module outlines. Comparison to the UKPSF up to the limits of descriptor 1 (Associate Fellow) was useful to make sure that items suitable for accreditation at this level was possible for GTAs who wanted to apply for this.

The aspects of the training modules mapped against the RDF and the UKPSF are also presented in a pictorial manner in the style of the RDF. This allows GTAs to examine the skills they are developing against these two key CPD frameworks.

## Using Department Specific GTA Roles to Evidence Faculty-Wide Training Content

To understand GTAs' training needs, it is necessary to understand the types of roles GTAs are recruited to and, to ensure training is valuable to Departments. Table 2 summarises the different roles with FSE across the departments. It is clear that there are a number of roles that are common across most or all of the departments. The main exception is attending field trips which only occurs in the department of Earth and Environmental Sciences(Earth and Enviro.) which means specific skills required for this role can the provided in the department.

*Table 2. Results of a Faculty Analysis of GTA Roles across the Nine Departments*

| GTA Roles across FSE | Brief Description | Departments with GTA Role Demands |
|---|---|---|
| Practical demonstrator | With/without assessment of face-to-face/written work | Chem. Eng., Chemistry, Earth & Enviro., EEE, Materials, MACE, Physics |
| 1:1 tutor | Tutorial/exam support | Computer Science & Maths |
| Coursework assessment of worked answers | Assessment & feedback on solutions to numerical problems, tutorial or workshop preparation etc. | Computer Science, Maths & Physics |
| Coursework assessment of reports | Assessment & feedback on longer written work – essay and lab reports etc. | Chem. Eng., Chemistry, Earth & Enviro., EEE, Materials, MACE, Physics |
| Small group teaching lead | Tutorials, workshops & practical demonstrations | Faculty wide |
| Large group teaching lead | Lectures & workshops | Computer Science, Materials & Maths |
| Large group teaching in teams | Workshops, seminars | Faculty wide |
| Public events representative* | Tours for the public, demonstrations & talks | Faculty wide |
| Field work / field trips | Small group facilitation | Earth & Enviro. |
| Examination invigilation* | Exam & assessed practical invigilation<br><br>Providing incident reports. | Computer Science & EEE |

\* Training not within scope of this GTA training as these activities are looked after by different teams.

To ensure training would provide value for all stakeholders, a deeper analysis of the roles identified was conducted. Role descriptors from each department were carefully analysed. Table 3 shows the analysis of two example roles selected from two of the nine Departments outlining the key themes identified under those suitable for teaching at the faculty level and those which are departmental specific.

*Table 3. Department Specific GTA Roles to Identify Common Training Needs across FSE*

| Role descriptions | Roles and Responsibilities Common across FSE | Roles and Responsibilities Specific to Department Subject |
|---|---|---|
| **Materials: Garment Technology Seminars** | | |
| You will be supporting the delivery of the seminar sessions for the first 8 weeks of the semester. | Knowledge of learning environs<br><br>Large group teaching | Supporting course teaching<br><br>Understanding course logistics. |
| This role will require you to facilitate student learning through guidance on learning methods and enquiry techniques. | Facilitate student learning<br><br>Knowledge of learning methods | |
| These sessions focus on analysis of garments and some familiarity with clothing production and terminology used in production is helpful to support these sessions. | | Subject specific knowledge |
| Students will be analysing and deconstructing garments, you will be required to help them use the resources to steer them through the process. | Knowledge of enquiry-based techniques for teaching | Awareness of course resources |
| **Chemistry: Report Marking** | | |
| You will be responsible for providing summative assessment of written work for 1st year students, on a weekly basis. You will work as part of the Marking College team. | Working in a team | Supporting course assessment |
| You will need to be well versed in technical writing and prepared to offer technical advice and feedback to the undergraduates. The assessment will require you to use marking rubrics and to provide constructive feedback, which is accessible and interpretable by students. | Assessment & feedback<br><br>Professional standards | Subject specific knowledge |
| You will be responsible for ensuring the marks and feedback are entered into Blackboard each week and for reporting any issues to the course leader. | Use of online learning & virtual learning environs | Understanding course logistics |

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This process facilitated identification of common needs (teaching and learning focused) of training, which could be delivered by a Faculty training provision. Simultaneously, it identified where knowledge of local procedures and logistics would demand Department specific training. This information is summarised in Table 4 which shows the key themes identified.

*Table 4. Teaching and Learning themes arising from mapping Department Roles*

| Faculty Training – Teaching and Learning Focussed | Department Training – Subject and Local Procedures Focussed |
|---|---|
| **Knowledge of learning methods**<br><br>• Teaching & learning theories and their ethos in HE;<br>• Engaging learners;<br>• Planning a teaching activity using SMART objectives, ILOs. | Supporting course teaching |
| **Working in a team & professional standards**<br><br>• The GTA role and the expectations of department & course leader;<br>• Importance of professionalism;<br>• Where roles and expectations do not meet and how conflicts can arise. | |
| **Facilitate student learning & knowledge of enquiry techniques**<br><br>• Understanding individual learners (e.g., unconscious bias, equality, diversity);<br>• Communication skills to engaging students. | |
| **Knowledge of learning environs**<br><br>• What makes a good teaching session;<br>• Large, small and team teaching. | Course logistics<br><br>Subject specific knowledge |
| **Assessment & feedback**<br><br>• Types/purpose of assessment;<br>• Using rubrics & providing constructive feedback;<br>• Importance of consistency & timeliness. | Supporting course assessment<br><br>Knowledge of local health & safety requirements |
| **Use of online learning & virtual learning environs**<br><br>• Purpose & use of online learning;<br>• Electronic submissions, marking and feedback. | Course resources |

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## Using Evidenced Based CPD to Map to Structures for Faculty-Wide Training

The Researcher Development Framework (RDF) identifies descriptors which define the characteristics of an excellent researcher beyond the remit of carrying out research (Vitae Researcher Development Statement, 2010). Whilst a Faculty-wide training focused on teaching and learning could not provide training in all areas of the RDF, clearly mapping areas which would be supported is key. Value for Departments would be evidenced by acknowledging where the training course could add to Continuing Professional Development (CPD) for postgraduate researchers. Likewise, value for Faculty would be gained by acknowledging where the Faculty could not cover subdomains of the RDF.

By comparison with the common teaching and learning areas identified in Table 4, training for GTAs was mapped against the RDF to enable individuals and supervisors to identify training provision. Areas which the Faculty training would directly cover were (though it could be argued that other areas are touched on):

- Domain A – Knowledge and intellectual abilities: **A1** Knowledge base.
- Domain B – Personal effectiveness: **B1** Personal qualities, **B2** Self-management.
- Domain C – Research governance and organisation: **C1** Professional conduct.
- Domain D – Engagement, influence and impact: **D1** Working with others, **D2** Communication and dissemination.

This benchmarking helped sell the idea of this modular training to the Faculty leadership and also allowed it to sit alongside other central training courses (with a research focus).

The UK Professional Standards Framework (UKPSF) (UK Professional Standards Framework, 2011) enables evidenced CPD for teaching focused staff. As with mapping against the RDF, value for Faculty was gained by acknowledging where the Faculty teaching and learning training fell short of the UKPSF; thereby identifying areas for further development. The suitable level for GTAs to undertake is the descriptor 1 (Associate Fellow), this means that the training should be mapped to cover the relevant criteria for this.

To align with Sharpe's (Sharpe, 2000) third principle, accreditation, as well as providing training linked to the GTA role, effective training needed to provide access to ongoing CPD. Within FSE, further CPD is therefore provided through a peer-mentoring system which facilitates the individual to develop a portfolio of evidence suitable for recognition by Advanced HE (Slaughter, Henninger, & Rodgers, 2019). Thus, to ensure Faculty GTA training was valuable to individuals, Departments and the wider Faculty, any training was required to include development of an evidence basis suitable for AFHEA application.

## Combining a Diversity of Roles into a Map for Modular Training

The training course was built on a flipped classroom and action-based learning model that would enable this ethos to be delivered through modules. Each module would pick up a key theme identified from mapping the GTA roles (Table 4). Theory relevant to the module would be delivered online through videos, surveys, and papers; thus, allowing open-access resource which the trainees could use to prepare for the workshop session but also refer back to as a resource during their ongoing teaching experience. Delivering the theory online prior to the workshop, enabled workshop sessions to focus on practicing key skills such as communication and discussion; whilst time and

staff intensive, face-to-face session were considered essential to enable GTAs to interact with those beyond their subject specialism, to see the diversity of GTAs, and to give and receive feedback. Finally, a post-session reflective portfolio element was attached to each session, encouraging trainees to utilise the training session in a role and subject specific manner; the aim of this was two-fold, to enable a subject and Department specific focus to develop from the broad teaching and learning session and to provide an evidence basis for those wishing to pursue AFHEA in the future. A summary of this approach is presented in Table 5.

*Table 5. Module Design in Three Stages, Based on Flipped Classroom, Action-Based Learning and Reflective Portfolio.*

|  | **Pre-session** | **Session** | **Post-session** |
|---|---|---|---|
| Content | Theory component | Practice of theory/tools<br><br>Elaboration of concepts | Department/subject specific focus |
| Timing | Always open<br><br>Engagement required pre-session | 2-hour face-to-face workshop | Dependent on trainee & Department engagement |
| Delivery | Online via videos/papers/reflective surveys etc. | Large/small group discussions;<br><br>Collaborative elaboration of concepts;<br><br>Small group practice of teaching tools | Reflective portfolio of evidence |

Evidence from GTA roles provided overlapping responsibilities, these themes were mapped into a modular based training programme. A modular design was chosen to acknowledge the apprenticeship nature of the GTA role. Modules were timed to take place each month, thus allowing GTAs flexibility to fit their training around the demands of their researcher and teaching roles. Furthermore, having sessions spread through the year enabled development of practicing communities which came together at various periods during their teaching experience to share practice and experience. Whilst the order of sessions was designed to evolve, no session was determined as a pre-requisite for any other, allowing trainees to attend the sessions at their convenience, Figure 1; sessions were to be taken at the advice of the Department based on roles, allowing for differences in responsibilities of GTAs.

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| Module | Alignment with Professional Standards | | FSE GTA Training Modules | | | Recommended Department Training |
|---|---|---|---|---|---|---|
| | UKPSF | RDF | Online theory component | Workshop sessions | Reflective portfolio component | |
| Learning Outcomes & Lesson Plans | A1, A2 K2 | A1, A3 B2 | Teaching & learning theories<br>How students learn<br>Preparing for teaching<br>Biology of learning | Interpreting learning outcomes<br>Constructive alignment<br>Levels of Knowledge<br>Planning a teaching activity | Own philosophy of T&L<br>Teaching session plan | Assigned role<br>Receive school information |
| Roles and Expectations | A2, A4 K1, K2 | B1<br><br>D1 | Diversity of role<br>Expectations of institute, department & course leader<br>Expectations of students | Scenario based activities on:<br>• Professionalism<br>• How conflict can arise<br>• Recognising problems | Teaching & learning "risk assessment" & questions to raise with School | Shadow teaching session<br>Introduction to logistics of course |
| Professional Practice | A4<br><br>V1, V2 | A2, B1, C1, D1, D2 | Unconscious bias<br>Equality & diversity<br>Data protection<br>General Safety | | How do you interact and teach others | Safety training & risk assessment (local procedures) |
| Small Group Teaching Skills | K2, K3, K4 | A1 B1, B2 | What makes a good teaching session<br>Team teaching | Forming, Norming, Storming, and Adjourning<br>Engaging diverse learners | Plan for questioning in teaching<br>Thinking about facilitation | Using specific kit/software<br>Specific learning outcomes |
| Marking and Feedback | A3, K3, K5 | A1, B2, C1, D1, D2 | Why and how we assess learners<br>Planning for successful feedback | Using a rubric<br>Team marking<br>Providing constructive feedback | Plan for feedback in teaching | Example marking on actual assessment |
| eTeaching Tools | K1, K3, K5 | A1 | Course structures in Blackboard<br>Electronic submission & marking<br>Teaching online (e.g. Zoom) | | Analysis of e-Learning in own teaching | Discussion with course leader on eLearning within course |

*Figure 1. Modular GTA training sessions.*

By mapping the RDF, UKPSF and the training modules, we are able to provide trainees and their Departments with an evidenced framework for development via the Faculty based training programme,Figure 2. This figure takes the RDF subcategories that are covered by the training sessions, Figure 1, and aligns them in the same structure as the original RDF. 12 sub domains are included from the key themes identified from the required GTA roles. 33 descriptors are then aligned to the 12 sub-domains, this allows GTAs to assess the skills that they develop throughout the Faculty training modules so they can be linked in their submission of HEA accreditation. The UKPSF codes are shown on the 12 sub-domains to highlight the areas covered by the training (there are likely other areas and links that exist, but these are the main areas). The descriptors are then indexed with the modules that cover them.
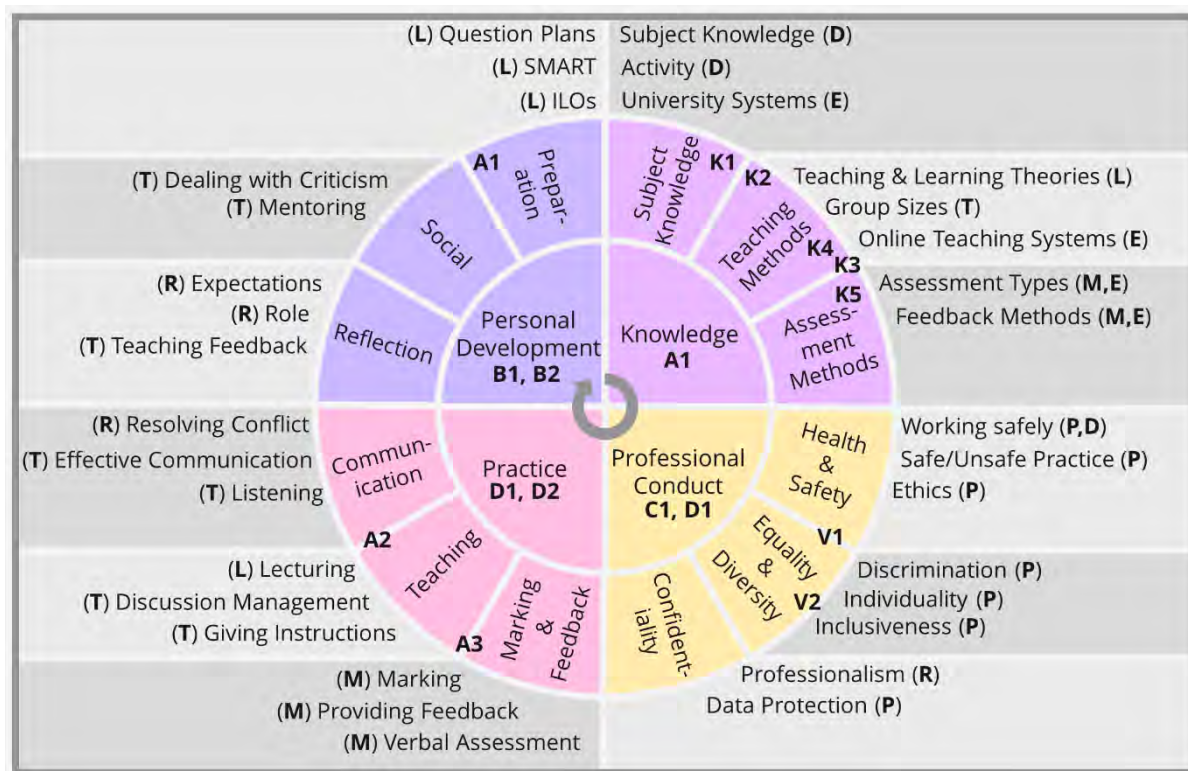
*Figure 2. A Developmental Framework for Faculty-Based GTA Training. Bold tags in the inner ring refer to the RDF codes, and those in the outer ring refer to the UKPSF codes. Bold letters in the outer section refer to the modular training courses in Figure 1; L – Learning Outcomes and Lesson Plans, R – Roles and Expectations, T – Small Group Teaching Skills, M – Marking and Feedback, P – Professional Practice, and E – eLearning Tools. D refers to department-based learning.*

## Developing and Running Faculty-Wide Training

### Developing the Modules

Figure 1 outlines the key topics to be covered in the Faculty training modules. To maintain consistency between the structures of the modules, an overview planner was devised (Figure 3). This planner was developed to keep the same three stages (pre-session, session, and post session), and identify both the content and the resources needed to run the sessions. As well as ensuring the consistency of the sessions, the planner allows sessions to be provided by new instructors if required to make sure that the programme is not dependant on the original session providers.

To ensure a broad perspective, modules were developed by two members of staff, from different Departments, who constructed the module overview planner. The module planner specifically demands staff link which UKPSF and RDF descriptors are covered as well as the challenges to implementation.

Once complete, the module overview was presented to a team consisting of staff representing all nine Departments, representatives from the eLearning and Staff Development teams as well as Senior Management Team, including the Associate Dean for Teaching and Learning, who were tasked with ensuring modules had broad yet useful application, by comparing modules with the roles of GTAs across Faculty.

| Session Name & FSE Code | Overall Intended Learning Outcomes (ILOs) | UKPSF / RDF | |
|---|---|---|---|
| | Pre-session | Session | Post session work |
| Brief overview of session & Links to other sessions | ILOs UKPSF / RDF Content Resources & where to find them | ILOs UKPSF / RDF Content Activities | ILOs UKPSF / RDF Content Activities/resources |
| Lesson plan for staff | What to expect attendees to have done/to bring | Activities & timing Resources & where to find them Risk assessment | What to do after What to ask attendees to do after Signposting to other modules/reflective portfolio etc. |
| Information for attendees (Blackboard content) | What to do/to bring | Activities & timing Resources & where to find them | What to do after Signposting to other modules/reflective portfolio etc. |
| Manual content | Content required for pre-session | Content required for session | Content required for post-session |
| Challenges / barriers to implementation | Resource requirements | | |

*Figure 3. Module Overview Planner for Faculty GTA Training.*

### *Roll Out of the Faculty Training*

Each year approximately 40% of the contracted GTAs are new, so the training needed to cater for a minimum of 350-400 annually. Each face-to-face workshop is designed to cater for 40 attendees. To ensure sufficient places were available for all new GTAs to attend, modules were timetabled twice monthly throughout the academic year (September-May), with additional sessions running between August and October to cater for the new academic year.

The training was rolled out as a pilot in September 2016 with attendance voluntary for GTAs, during this period feedback was collected from the GTAs who undertook the training modules. From September 2017 the training was made mandatory for all GTAs who have to take the modules related to their GTA role within the first semester of their teaching. It should be noted here that the time for preparation for and attendance at the training sessions are paid to the GTAs at their normal hourly salary rate. Each year, each module trains between 250 and 350 GTAs, except the Marking and Feedback module which is around 150 GTAs due to not all GTAs having a marking requirement to their role.

All sessions are made available online, such that any member of staff can access a description of the session, see the availability of sessions, and book into a convenient workshop. The training course is hosted through Blackboard, which all FSE staff and postgraduate students are automatically enrolled, irrespective of whether they are a current GTA; allowing all postgraduate students access to the materials. This allows all 950 GTAs to have access to training materials to provide themselves with refreshers if needed.

In September 2018, the "Mentoring Excellence" route was started which provides a mentored programme for GTAs who have completed all the training sessions and have undertaken active GTA work to apply for Associate Fellow of the HEA. This route runs once per semester (October to January and February to May) and is supported by mentors taken from successful applicants of the pathway. Mentor meetings occur monthly and in groups of 6-7 including the mentor. Since starting this mentoring route, there have been over 160 successful candidates evenly split across each run (except for 2020-21 where there was a reduction due to increased issues with manging COVID-19).

## Conclusions and Evaluation of the Faculty-Wide Training Programme so Far

The training course constitutes a broad focus on teaching and learning, which services the needs of both the individual GTA and their CPD but also the demands of the Departments, in which they work. This has only been possible by ensuring the Faculty team members are academic teaching staff drawn from across the nine Department, supported by key representatives from eLearning, Staff Development and the Senior Management Team.

It is clear that further evaluation of the training programme is necessary to show all positive outcomes, and to provide information for further development of the programme. For example, surveying staff and GTAs before, during and after training to assess the impact on their teaching strategies and understanding of their roles both within Department and for the University. Additionally, student survey data, such as end of unit evaluations, informal feedback, or student satisfaction surveys, such as NSS, should be investigated. This is however, a very large undertaking. Some areas of evaluation linked to the training has been undertaken, but this has not been undertaken in an holistic manner.

One of the main outcomes of developing the training programme has been to crystallise an ethos for the teaching and learning of GTAs which previously was not consistent across FSE. Staff now have a better understanding of the GTA role in their Department, but also in the Faculty; and in turn, staff are better able to deliver training which helps GTAs understand what it means to be a GTA, rather than just a way to generate additional income or fill a gap in staffing.

Implementing Faculty wide training has had impact beyond the training itself. Role descriptors for GTAs did not exist in some Departments before and often, where they did exist, they were either entirely subject or entirely teaching and learning based. The appraisal of GTA roles by a team of departmental based staff to drive the GTA training has led to greater consistency and more descriptive roles available for prospective and existing GTAs. These are now used as a focus for training at both Department level and in the Faculty "Roles and Expectations" session. These more consistent role descriptors across the faculty have also allowed better integration with Human Resources so that recruitment and pay are much more easily organised and kept consistent across departments, leading to a much fairer system for all the GTAs.

O'Toole et al. (2012) make a set of clear recommendations for effective GTA training which can be used to evaluate the effectiveness of the FSE GTA training programme, Table 6 outlines comments on these.

Table 6. Recommendations from O'Toole et al. (2012) mapped against the training provision.

| Recommendation | How Included |
|---|---|
| Clarity and parity in recruitment and selection | Collecting role descriptions and aligning these across all Departments in the Faculty has led to more consistency and allows GTAs to apply to relevant roles and be selected based on how they fulfil the role requirements. |
| Diversity in GTA experience, including experience outside of university science research | GTA training sessions now bring together PhD researchers from cross the whole faculty who can share experience within their Department with others. |
| Faculties should consider policies for including experienced science professionals to provide leadership and expertise to GTAs | Training sessions are provided by a mixture of teaching staff from Departments, eLearning specialists and staff development personnel. This provides a mixture of expertise. |
| A link to the more diverse backgrounds and aspirations of students | The Roles and Expectations module specifically gets GTAs to think about their background and what they will be undertaking.<br><br>GTAs applying for AFHEA reflect on the makeup of their classes and the backgrounds of the students they support. |
| Building GTA competency | Training sessions are built around practical activities that the GTAs will undertake, e.g., in the marking |

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| | |
|---|---|
| | and feedback module the GTAs undertake marking in groups. |
| An explicit vision for teaching to be articulated that provides focus for GTA development as well as teaching and learning for students | Module focused on roles and expectations helps GTAs see their role. GTAs can then further develop be undertaking the mentored route to AFHEA. |
| GTA development should be planned within a framework focused by the vision | The vision in this case is to support GTAs directly for the roles and activities they have to undertake. This has meant that the training has been build around |
| Programme coordinators should provide feedback to GTAs at regular intervals and encourage feedback from demonstrators | Initial training sessions had a pilot group of people which allowed updates to the specific content of the sessions. GTAs who have been through the training and the mentoring route for AFHEA, return to the programme as mentors meaning they can provide feedback to the programme and give feedback to their mentees. |
| Working conditions for GTAs, should provide all the resources to enable individuals to perform their work | Training module material is available to GTAs at all times through Blackboard. |

One direct measurement of GTA improvement was undertaken within the Department of Chemical Engineering. There was increased student satisfaction across the GTA-led laboratories (200+ undergraduate students) and their assessment marking. Two key questions were asked of two cohorts, one from 2018 with none of the GTAs having undertaken the next training modules and one from 2021 with all the GTAs having attended the training modules. The calculated p-values evidence that these measures are significant, with GTA teaching and feedback practices having improved:

| Question | 2018 score out of 5 | 2021 score out of 5 | $p$ value |
|---|---|---|---|
| The demonstrators introduced the experiments, provided help and responded to questions well during the lab time | 3.7 | 4.2 | 0.0036 |
| I felt that my lab assessments were marked fairly and clear feedback was provided for improvement | 2.4 | 4.0 | $4.2 \times 10^{-11}$ |

Implementing a Faculty-wide teaching and learning training programme has raised numerous challenges and barriers (7). The training was purposefully built to occur throughout the time a PG student is acting as a GTA and to enable individuals to manage the training alongside the demands of their research careers. From a Faculty perspective, this makes sense as it acknowledges the long-term apprenticeship of the GTA as a future member of academic staff. For Departments however this may be seen as not delivering to their immediate teaching needs.

In almost all cases the challenges arise due to the ability of the Faculty training to deliver the demands of the Departments. By maintaining an iterative process of review and implementation and the conversations that arise from this process, it is hoped that the attitude towards GTAs in FSE will change, viewing them not as quick ways of increasing teaching staff numbers and contact hours but rather as apprentices in teaching and learning.

*Table 7. Barriers & Challenges to Faculty-Based Training for GTAs.*

| Problem | At Faculty-level | At Department-level | Solutions |
|---|---|---|---|
| Timing of sessions | Ethos: Long-term training for apprenticeship<br><br>Delivery team: size limits the number of workshops. | Immediate teaching need | Using Faculty training to enable Departments to focus on subject specific training.<br><br>Share examples of how Department and Faculty training work on complimentary basis. |
| Content of sessions | Broad teaching and learning basis to cater for diversity of attendees | Discipline specific requirements | Map and acknowledge in-house training alongside Faculty training.<br><br>Encourage Departments and individuals to use reflective portfolio to elaborate broad training for discipline specific role. |
| Involvement and engagement | Delivery team: consists of staff from Departments. | Teaching & administrative staff familiarity with scheme.<br><br>GTAs attend "compulsory" sessions. | Involve Faculty & Departments with role creation & roll mapping; Departments to evaluate module map.<br><br>Advertise training to Department, using specific roles as focus.<br><br>Encourage GTAs who have been through the training to spread the message in Department and amongst peers.<br><br>Link to accreditation programmes and provide university recognition. |
| Recruitment of GTAs & staff | Staff intensive multi-session programme limited by size of delivery team. | Timing of sessions doesn't always match with timing of recruitment | Share examples of role descriptors.<br><br>Use role focus to aid Departments in recruiting & showing training needs. |

## Key Principles for Developing a GTA training Programme

Drawing on the literature and the process of developing this large scale central GTA training provision the following principles are proposed:

- **Collate the full range of roles that GTAs undertake within the area that the training provision is for.**
  This allows a number of key processes to be undertaken that benefits the training and the GTAs. The first is analysis of the roles makes sure that all activities undertaken by GTAs are catalogued. The second is that there can be alignment of these roles across the whole area, which allows greater transparency for GTA recruitment.

- **Identify the key teaching themes from the GTA roles.**
  This allows classification of all the activities GTAs need to undertake which can then be aligned as those suitable for teaching at the central level and those which are locally specific.

- **Produce a clear module format which can be allocated with relevant teaching topics/themes.**
  Following Table 5 and Figure 3 for a consistent module outline means that there is clear guidance and expectations of GTAs. A modular training programme means that GTAs can take modules dependant on their role, but can also take additional modules as part of their personal CPD. Training material should also be available to GTAs even if they are not actively engaged with that particular training module.

- **Base the modules around practical activities linked to the specific topics/themes.**

A focus on practical activities that the GTAs will have to do in their roles helps the direct development of the GTAs and their understanding and expectation of their roles.

- **Benchmark training modules against UKPSF.**
  Benchmarking the training modules against the UKPSF allows GTAs to undertake more CPD by applying for fellowship of the HEA. This can either ideally be through a supported scheme or if not then their own individual application. Mapping against the RDF also provides support for departments who map their whole PhD training provision against the RDF as it shows which teaching areas are covered.

- **Involve members of staff from a broad range of areas.**
  A large mixture of expertise when setting up the modules makes sure that the sessions are suitable for GTAs across the whole area required.

- **Include GTAs in the development/provision.**
  Including GTAs in the training provision allows feedback directly from people who have undertaken the training and then tried to use it. One key area for this is potential mentorship of GTAs who are wanting to undertake further CPD activity, e.g., AFHEA.

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