HE Bioscience Teacher of the Year 2017 Application Form
Dr Sarah Gretton – University of Leicester

1. **Individual excellence in the development and implementation of teaching bioscience**
   In not more than 500 words please outline, with evidence (references are not included in the 500 word limit), how the candidate displays individual excellence in the development and implementation of approaches to teaching that have proven successful in promoting bioscience student learning and achievement

In 2010 I was appointed as the Biology Teaching Fellow on the University of Leicester's Natural Sciences (NS) programmes. These NS undergraduate programmes deliver content from Biology, Chemistry, Physics and Earth Sciences using an interdisciplinary problem–based learning approach (PBL). The new post involved coordination of the biology curriculum of the programme. I conducted a review of the existing curriculum which has led to a number of changes over the following years to enhance the biological teaching and embed key employability skills, some of which are outlined below.

The enhancement of curriculum involved working closely with research experts to develop novel problems, supporting materials and aligned authentic assessment for modules in Evolution, Cell Communication and Astrobiology. For example, a re-evaluation of the Evolution module was necessary due to changes in personnel and lack of student engagement at the appropriate academic level. This involved collaborating with an expert in plant macroevolution (Dr Drea) to develop a novel problem for this module which introduced more sophisticated material and concepts, and the introduction of two authentic assessments (group production of a textbook chapter and a museum podcast) that gave the students practise at communicating these concepts to a variety of audiences. Following these revisions 89.7% of students surveyed agreed the sessions "increased my understanding of the material".

Dr Drea said:

"Working on this was a revelation in terms of informing my own teaching as well as the positive impact it had on the learning experience for the students. I have taken what I learned about PBL and module design and applied it to my teaching in Biological Sciences where the PBL and flipped learning approaches are not as common."

When I joined the programme optional first and second year modules in Sustainability were available but were focused on research into sustainability rather than "real-life" scenarios and applications. In response to this and to create re-usable resources for teaching

sustainability, I worked with the School of Biological Sciences to acquire £15,000 of funding from the HEA to develop resources for teaching sustainability literacy. I managed the delivery of this project, which resulted in the creation of two further modules and amendment of the existing two modules ensuring each workshop had accompanying online resources. I also recruited several external experts to deliver workshops including a consultant from a local energy partnership and an Ecological Economist. All the resources were made available as Open Education Resources (material from one of the workshops is now used by the University of Nottingham). Attitudes to modules were evaluated by questionnaire. All students surveyed agreed that the course improved their knowledge and understanding of sustainability. The majority (94%) of students indicated that the module prompted them to consider different viewpoints and that they had developed useful skills throughout the course, which would be valued by future employers and suitable for a range of careers (78%). The value of the modules was also recognised externally by Environmental Association for Universities and Colleges with shortlisting for their Green Gown Awards in 2012.

2. Involvement in scholarly and professional development activities

In not more than 500 words please describe all scholarly or professional development activities that the candidate has undertaken, which have influenced and enhanced the learning of bioscience students

From the start of my teaching career I've aimed to deliver the best possible experience for students and ensure that my teaching practice is informed by evidence. I started as a relatively inexperienced educator and was keen to improve my personal practice and knowledge of pedagogy and elected to undertake the University's PGCAPHE, gaining distinctions for both modules.

Following this I have aspired to continue my learning and reflection and have been a regular attender (and laterally a contributor) to the University's Biological Sciences Pedagogic Research group meetings. Participation in these informal monthly meetings has not only provided a valuable opportunity to learn about current educational developments and pedagogic research but has also provided the opportunity to discuss and engage with more experienced colleagues.

I have also attended a number of higher education meetings including HEA STEM Conferences (2012, 2013, 2014, 2016), Society of Experimental Biology Education Meetings (2012, 2013, 2015), ESERA (2013) and International Conference for STEM in Education (2014) as well as teaching events hosted by my own institution.

Attending these meetings has developed and provided inspiration for many areas of my teaching practice. One example of this is my engagement with peer learning. Presentations at the 2012 and 2013 HEA STEM conferences inspired me to propose a new system of peer marking and feedback for tutorials on the NS programmes to tackle existing issues of around poor engagement and exam performance and increased staff marking load. Existing questions were collated/ repurposed so that could be easily marked by peers in groups in the tutorial session rather than by a staff member/ graduate teaching-assistant beforehand. In the tutorial students discuss their answers with peers in groups. Model answers are then discussed as a class with groups recording marks for their

members. The changes resulted in increased attendance at and engagement with tutorials, and an increase in average exam marks across modules. Additionally, despite initial scepticism towards the development from some students, responses from cohorts that had experienced both systems indicated the new system was more effective in terms of learning gain when anonymously surveyed later in the year.

My engagement with scholarship of teaching and learning has inspired me to develop my own research practise which has focused on three main areas (which are detailed elsewhere in this application):
Implementation of PBL in Bioscience/ Interdisciplinary Science context
Embedding Employability for Science Graduates
Reward and Recognition for Teaching- Focused Academics (focusing on Bioscience/STEM disciplines).

The development of my practice has been recognised by the award of a University Distinguished Teaching Fellowship (for "excellent contribution to the teaching of Biological Sciences within an interdisciplinary problem-based framework") in 2014 and Senior Fellowship of the HEA in 2016.

3. Supporting colleagues and influencing learning

In not more than 500 words please provide evidence of how the candidate supports colleagues and influences bioscience student learning beyond their department and institution

My own experience as an early career teaching – focused academic has heavily informed my philosophy in supporting the development of other Biosciences teachers, initially at my own institution but laterally at a national level.

When developing new material on the NS programme I have tried to provide less experienced staff with the opportunity to deliver sessions and I have given 4 post-doctoral researchers (PDRs) their first chance to develop and/or deliver an undergraduate or practical workshop. This has involved providing the PDRs with support, training materials and feedback. Although this can be more time consuming than asking a more experienced member of staff I believe it provides a valuable opportunity for researchers to gain experience in teaching and if it had not been for staff acting in a similar fashion when I was at this stage in my career I may not been able to secure my first teaching position. The support I provided to one PDR is described by them below:

"I took up my appointment as an additional Biology PBL Facilitator for Natural Sciences last year. Although I have spent many years demonstrating and teaching biochemistry practical skills this role was new to me. I observed Sarah's sessions just prior to my own and then observation of my own sessions was followed by written feedback; we then reflected on this in discussions immediately to improve my teaching technique. Sarah has spent productive time in ensuring that I would confidently deliver the new teaching by using pertinent feedback and reflection. This has given me confidence and enjoyment in taking on these new roles."

Nationally I have worked with a colleague from Physics to found a UK Network for STEM teaching fellows; successfully securing financial support for a launch event from HEA. Since this

launch in January 2013 I have worked with members of the network to design, conduct and disseminate results of a survey into the experience of UK STEM teaching-focused lecturers. Outcomes of the teaching network have included a workshop for teaching focused academics fellows at a UK HEA STEM meeting and two publications (Gretton and Raine, 2015; Hubbard *et al*, 2015) which have encouraged dissemination and discussion of the opportunities and issues facing teaching focused academics in the sciences.

In 2015 I was invited by other UK academics to form an organising committee to host a UK STEM HE conference following the HEA's decision to end their STEM conferences. Leicester was selected as a venue and I worked as part of the local organising Conference (laterally taking on additional responsibilities due to the sudden death of the lead organiser). Although there were some teething issues, the conference attracted over 100 delegates and was considered a success by many:

"#UKSTEMconf16 nearing to an end - it's been great - learning from other disciplines"

"What a great conference #UKSTEMconf16. Thanks to@uniofleicester for hosting. We shall see you next year 29-30 Jun 17 @HeriotWattUni"

From https://storify.com/S_J_Lancaster/uk-stem-conference-2016

References:

Gretton, S., Raine, D (2015). Reward and recognition for university teaching in STEM subjects. Journal of Further and Higher Education:1-13

Hubbard, K, Gretton, S Jones K, Tallents, L, (2015). Challenges and opportunities for early-career Teaching-Focussed academics in the biosciences. F1000Research 4, 76

4. Exhibit innovation that has proven to improve their teaching practice to enhance student learning

In not more than 500 words please provide evidence of how the candidate exhibits nnovation in their teaching practices to enhance student learning

I have always aimed to deliver teaching which is engaging, interactive and inspiring and that provides an understanding of biology; in terms of knowledge, application and appreciation of the relevance and importance of the subject within the wider world. As the delivery of the core science material on the NS programme is achieved using PBL, the focus of my personal practice has been understanding this teaching approach and evaluating and refining its delivery within the programme. Following my first year facilitating PBL on the programme (2011) I was involved in reviewing the scaffolding of our PBL modules, with my counterparts in Chemistry and Physics (NS subject convenors in Chemistry and Physics). Our aims were to provide a more a constructivist approach to learning to make it easier for students to engage with and take ownership of the learning process. Following discussions amongst the teaching team a revised structure of the PBL delivery was implemented. This more "scaffolded" approach to PBL including provision of detailed electronic module documents containing: details of a variety of

recommended textbooks and reading topics and online resources, suggested questions to guide preparation and discussion workshop sessions, increased detail in intended learning outcomes and allocation of outcomes to each session. I took on responsibility for the implementation of this for the biological elements of the programme and also researching the outcomes of these interventions. This research (Gretton *et al*, 2014) evaluated the implementation of these interventions and provided quantitative data demonstrating a statistically significant increase in the average exam performance grade for the year group studied. This was followed up by conducting focus groups to elucidate the reason for the improvement. Responses from focus groups indicated students were positive about the introduction of suggested reading and discussion questions and increased prominence of intended learning outcomes but particularly the new structure of facilitated workshop sessions.

Another key focus in my teaching has been both embedding key transferrable skills into the biology curriculum and researching the efficacy of these implementations. As mentioned previously, modules I have developed require students to work in groups to respond to an interdisciplinary research question via authentic assessments (see examples in section 3). In addition to developing these modules I have also conducted research into the success of embedding these skills with the assistance of two final undergraduate project students. Their research indicated students' confidence had increased in a number of areas including: presentation skills, engaging with other students and professionalism. They also rated the effectiveness of elements within of the programme and indicated group work was more effective learning medium than individual work. This research was presented at the 2016 HEA STEM conference and led to an invitation from the Head of HEA STEM to deliver a workshop on embedding employability and to speak at another workshop at the University of Greenwich.

Reference:

Gretton, S., Raine, D., and Bartle, C., (2014) Scaffolding problem based learning with module length problems. E-Book Proceedings of the ESERA 2013