

## Chartered Science Teacher Register Exemplar Material – Higher Education Teacher / Lecturer

Applications for the Chartered Science Teacher register are completed through the online registration system. Eligibility for the register results from; being a Member or Fellow, holding significant professional experience and responsibility as a teacher, and a minimum of Level 7 qualification in Education or Pedagogy (or demonstrated equivalent expertise).

The CSciTeach application itself predominately focuses on the submission of evidence against the competencies of Chartered Science Teacher. We ask for detailed examples of how you meet the competencies, giving an example from within the past two years of your professional experience. Although applicants may be eligible for CSciTeach, without a satisfactory application, they are not added to the register at that time, examples of what the competencies require and the expectations for professional background can be seen below:

In **red** are answers which would not be sufficient and in **green** are answers that would be sufficient.

It is important that the examples given show the **impact** that is had on **yourself**, your **students**, your **colleagues** and the **wider science teaching community**. Using exam data, levels of progress made, students feedback and colleagues comments can all contribute to evidence to demonstrate the impact that you have made.

### Competencies

A1: Demonstrate a broad and up to date knowledge and understanding of science and wider science curricula related to your teaching.

- I read books and journal articles to keep my subject knowledge up to date and attend conferences.
- I actively publish/present the outcomes of my pedagogical research (12 papers in the areas of learning out of doors (KS2 and HE level), bioscience undergraduate learning autonomy, and HE Scholarship of Teaching and Learning). I have published 26 peer reviewed biology papers, edited a biology conference proceeding and published numerous reports. I was Editor in Chief of the open access HE journal Bioscience Education (2013-2014) and I am an Associate Editor of the Journal of Bioscience Education. I regularly review papers on behalf of mainstream science education journals. I am the Guest Editor of an F1000 collection of papers on the communication and teaching of science in a digital world (currently building). I have written undergraduate textbooks on Animal Behaviour (2005) and Ornithology (2010) and I am currently writing a book on the pedagogy of higher education fieldwork based learning. I attend symposia and conferences concerned with biology teaching. All of these activities contribute to my having a broad understanding of both biology and pedagogy in a range of contexts.

A2: Demonstrate a broad and up to date knowledge and understanding of teaching, learning and assessment specifically related to science education.

- I have maintained an up to date knowledge of pedagogical techniques and assessment strategies through attendance at teaching specific conference where colleagues share good practice.
- I regularly attend symposia/conferences that concern the development of innovative ways to teach, to assess learning and to provide meaningful feedback to students. As a journal editor and paper

reviewer I am up to date with the current literature in these areas (particularly in the area of HE, but to an extent in the area of KS2). I was awarded a University Teaching Fellowship (2006), an HEA National Teaching Fellowship (2009) and was HEA Bioscience Lecturer of the Year (2010) - all of these awards were to some extent in recognition of innovative work that I had done to develop ways in which my students could take ownership of their learning through scaffolded self and peer assessment and critical reflection on self and tutor generated feedback.

A3: Demonstrate a knowledge of students and an understanding of the influences on them including developmental, cultural, gender and other contextual factors that might impact on their learning

- I work with students from a range of backgrounds and who have taken a range of different courses to get onto the general biology course. We complete a variety of key skills at the start to ensure that all students are on equal footing by the end of the first semester.
- I have been a university admissions tutor, a director of learning and teaching, a head of department and I am currently an Associate Dean. In all of these roles I have had some level of responsibility for the support of students from a diversity of backgrounds. I have led initiatives within my institution to re-structure the student timetable to enable part time provision and the development of pre-certificate/foundation level entry routes into higher education.
- I have arranged for lectures to be available online for students to access if they are unable to attend, and have implemented a mentoring scheme to support new undergraduates in developing the skills that they need in the labs. I have seen an improvement in the confidence of my students taking part in practical work as a result of the mentoring. The mentoring also improves the communication and demonstration skills of the mentors in the scheme. We have found this to be a good way to help students access the course when they have not had a lot of practical experience prior to university.

B1: Demonstrate ability to analyse, evaluate and refine teaching to improve student learning.

- I have received feedback from student satisfaction surveys after taking my courses and modified sections according to the responses.
- In 2010 I was awarded an HEA National Teaching Fellowship. To achieve this status I was required to demonstrate that I actively engaged in critical analysis of my own practice. I believe that the award and my track record in publishing peer reviewed papers that are grounded in the development of my own teaching practice (action research) evidences my ability to analyse, evaluate and refine my teaching. This body of work also demonstrates the positive impact of my developing practice upon the outcomes achieved by my students. I have also conducted a body of research that demonstrates learning gains by children (KS2) who are provided with an opportunity to learn (formally and informally) through fieldwork.
- As principle investigator for “Exploring pupils’ understanding of organ systems” I have developed the proposals and gone on to work with children in small focus groups to assess their understanding of where different organs and body parts are located in the human body and how they link together to form systems. The children have enjoyed having a forum where they were able to have their views heard and have been able to discuss together with their peers areas that interest them to do with the human body. The project has identified that children have a high awareness of organs such as the heart and the brain from an early age, but often struggle to understand the functions of different organs and how they work together in systems. We are now trialling sessions to teach children the respiratory system (with 3 classes) and hope to develop some lesson plans to support teachers, teaching this topic. We will be using the feedback of the teachers and students within the trail to improve the resources and amend the planned lessons.

B2: Demonstrate ability to engage students in generating, constructing and testing scientific knowledge by collecting, analysing and evaluating appropriate evidence.

- I use practical work in many lessons, this gives students opportunities to generate their own data and analyse it.
- I lead on undergraduate field trips during which students engage in self-directed research projects at all levels of study (pre-certificate to final year). The students decide on the area of research and the techniques that they will use to answer their research question. I support the students through the project and deliver seminar sessions on literary research skills and statistical theory so that they can decide upon the most valid approach to conduct their research. Colleagues have used the materials I have developed to support the students in individual tutorials and to help reinforce the steps that the students should take whilst they are conducting their research. The students gain in confidence as they take part in the module and develop team work skills which some students have cited as being useful examples to use during interviews.
- I deliver a final year module in which students negotiate their own curriculum, manage their own learning and evidence it through the submission of multi-authored “books” (20-14,000 words). This approach resulted in my being named as HEA Bioscience Lecture of the Year in 2010. Students regularly describe this module as being key to their development of their own ability to be self-critical and to apply that skill in the production of new work.

B3: Demonstrate ability to develop students' confidence and their use of scientific knowledge and processes to understand the world around them.

- Students have gained in confidence over the course of the year. As they progress, they need less scaffolding in the work that they do, specifically in the lab sessions.
- My work with KS2 pupils has demonstrated that children can, if given autonomy in their field based learning, apply their direct observations of ecological processes to subsequent formal assessment. It has also shown that children can be encouraged to see their learning as a joint endeavour with their teacher – shifting the traditional teacher expert/pupil learner relationship that prevails in some classrooms. The children involved in this project described very clearly their sense of confidence and achievement in this context. See publication X
- I use a similar approach to very good effect in my HE level teaching. At every undergraduate level I provide students with an opportunity to take ownership of their learning in a scaffolded way. From the entry level students are encouraged to design their own research projects that will enable them to contextualize classroom based learning and draw upon their learning from other (outside of university) contexts. As students progress through their degree the nature of these projects becomes more complex and the degree of autonomy enjoyed by the students increases. At final year I have modules where students use an enthusiasm for a particular animal to determine their own curriculum content. Reflecting upon these processes is an assessed component of all of these activities – this encourages students to recognize their own abilities and learning needs.

B4: Demonstrate ability to implement ways of extending students' understanding of major ideas of science.

- I encourage students to ask questions in lectures which they answer through research. By taking students on trips they get to see other areas of science in context.
- Much of my teaching practice involves my handing control of learning to my students. I design activities that will allow students to work together to pool their knowledge and to recognize their personal knowledge gaps. The students then work towards filling those gaps through direct observation and experimentation or through a critical evaluation of the relevant literature. Having done so students are encouraged to actively reflect upon both what they have learned and how they have learned it. Activities of this type typically increase rather than decrease student enthusiasm for

learning and student achievement. For example my action research around this approach enables pre-certificate students to extend their personal knowledge base and their ability to use newly acquired knowledge (See publication Y and Z)

C1: Demonstrate ability to contribute to, and take responsibility for leadership, management and development of science teaching.

- I am Head of the Biosciences Department and have been working in this role for 6 years, prior to this I was the course lead for understanding animal behaviour and the year 1 laboratory training modules.
- I developed the materials that are used across the sustainable environment management course that takes place in year 2 of our undergraduate degree. I have found that using the case studies has helped students to see the purpose of the programme and that they were better able to apply knowledge and analyse data when it was given a relevant context . During the seminar sessions, I have encouraged discussion work and this has increased engagement in the sessions. This has been positive as I have seen the average marks for the course increase over time in line with perceived student engagement. I have also received positive feedback from students taking the classes eg “the use of case studies helped me to see the real life context for this work”.
- In 2014 I was made a Principle Fellow of the Higher Education Academy. This award recognizes individuals who have made a significant contribution to the leadership and development of Learning and Teaching in their field (in my case Biosciences). My current (Associate Dean) and previous (Head of Department) roles both required me to manage learning and teaching during periods of change and challenge within my institution. During my leadership our department grew (from around 35 staff to around 75 staff and in the same period student numbers doubled). My leadership and management during the period led to successful curriculum review, maintenance of NSS scores, increases in the proportion of higher classification degrees awarded and an improvement in our contribution to REF2014. As a result of my success at this level I have been appointed Associate Dean and given the task of completely reviewing the curricula of 7 science departments/schools.
- I believe that I have been successful because I constantly try to find ways to build change around the differing needs of colleagues and students as individuals. I believe that institutional KPIs can only be achieved if the community of individuals contributing to them understand the KPIs, the way they impact upon each of us as individuals and our differing individual roles in their achievement.

C2: Demonstrate ability to work collegially with colleagues and the wider professional community to improve the quality and effectiveness of science education.

- I have collaborated with colleagues to produce our new series of lectures on biodiversity. We host regular training days which school teachers attend to learn practical skills to use in their lessons.
- I am part of a community of HE Bioscience teachers which actively works to improve the quality and effectiveness of science education. For example as a member of the exHEA Bioscience Subject Centre REP group I still attend and contribute to annual meetings (Biology summits) designed to enable the sharing of good practice. Similarly I attend HUBS (Heads of University Biological Sciences) meetings on behalf of my institution. I am a member of BERG (the Biology Education Research Group), a special interest group of the Society of Biology. I am an active member of the Society for Experimental Biology (SEB) Education and Public Affairs section (EPA). As a member of the SEB-EPA I have been actively involved in the organization of two national meetings and one international symposium that were intended to provide an opportunity to share good practice.

- In 2012, 13 and 14 I have led a team of colleagues (experienced HE teachers) who have provided 3 residential and one day long events specifically designed to provide colleagues in HE who are new to teaching with an opportunity to share ideas and anxieties and to take part in workshops led by experienced colleagues who are acknowledged “champions” in their area of teaching practice. More than 100 people have benefitted from these events. I remain in contact with many of them and they regularly refer colleagues to me for support.

D1: Demonstrate ability to enable students to make informed decisions through using a wide variety of strategies, coherent with learning goals, to monitor and assess students' learning and provide effective feedback.

- In line with university policy all assignments are marked and returned to my students within a three week period.
- I used a range of strategies to assess my students to identify the areas they required further support in. Throughout my lecturing I used online formative MCQ tests in advance of the lectures to assess areas where knowledge was weaker. I was able to identify Hot Spots where there were issues. For example, in plant biology students were well prepared for subjects related to Photosynthesis but were weaker on water relations. The lecture therefore concentrated on this aspect. I used peer and self-assessment strategies which the students worked in groups to identify for themselves the areas in which they or their peers excelled and the areas that required development. Subsequent Post lecture formative tests showed an improvement in this aspect on the module and I am optimistic that the exam results will improve in this area.
- In a second year plant biology module I had developed a series of practicals that were written up as a formal scientific paper. This formed 30% of the module mark but marks were below what was expected for an in-course assessment (average of 57%). To train students formatively for the exercise I wrote to exemplars on a different topic, students marked these against the published criteria and discussed their interpretation. The actual write up was peer marked summatively, with the students having the opportunity to modify their submission following the comments of their peers. Following final submission and formative marking I returned annotated scripts to the students without the mark. Students were required to post one thing they had done well and one thing they would do to improve next time (this was normally their final year project write up). Despite the fact that this was not compulsory and students were able to access their marks via the University VLE 84% participated. Following this new approach the mark for this component has risen to 63%

D2: Demonstrate ability to plan coherent programmes of teaching and learning in science that are intellectually challenging, emotionally supportive and physically safe.

- Every year we review our plans for lecture courses and review the skills developed to ensure that they are in line with what is expected from the QAA benchmarks.
- During my career I have developed and delivered lectures, practical classes, residential fieldtrips, modules and degree programs. In planning a degree program it is necessary to work within the regulatory framework of the institution, to meet the requirements of the QAA and relevant accrediting bodies and to do so in a way that supports students in their development as independent learners and scientists. I believe that the degree programs that I have been responsible for achieve this (some have IBMS accreditation) all are looked upon favourably by my institution through periodic review and all have the support of respected external examiners. I believe that it is essential that these are coherent programs rather than collections of modules reflecting the research interests of the available teachers. I am aware that the level of independence that is appropriate to a new entrant is very different to that expected of a student coming to the end of their period of undergraduate study (and that all students progress through that novice to expert journey at their own rate. In light of this my teaching is designed to challenge students to move beyond their personal comfort zone in an incremental way, and in a way that supports their needs.

So for example whilst a pre-certificate student might take part in a low stakes (worth 10% of a modules marks) assignment to plan and conduct a self-directed data collection exercise over a period of a few hours, a similar task might last a number of days for a second year (worth 30%) or weeks for a finalist (worth 50% or more).

- Much of my teaching takes place out of doors. Prior to any field trip I undertake a personal site visit (even to sites with which I am familiar) and undertake a risk assessment. I always begin field based sessions with a safety briefing (this would take place prior to the event for a residential course) and where possible I involve students in their own risk assessment.

E1: Demonstrate your commitment to continually maintaining and updating your professional expertise and competence.

- I have attended training in the last year on small group and seminar teaching and the Heads of University Biosciences spring meeting which focused on assessment and feedback.
- I have regularly attended meetings and conferences concerning both advances in Biology and initiatives in teaching. I always cascade the results of such meetings on to colleagues. I believe that keeping myself in touch with advances allows me to inspire my students as evidenced by the data that shows 65% of my students continue on to further study or go on to work in the bioscience field.
- I regularly attend the meetings of the Heads of University Biosciences where at their most recent meeting (assessment and feedback May 6<sup>th</sup>-7<sup>th</sup> 2015) I was asked to make a presentation on my action research where I flip my lectures. In order to greater engage my students I provide information for the students ahead of the lectures, then during the time slot allocated for the lecture there is a chance for discussion of the issues relating to the topic and opportunities for students to work together to develop explanations in answer to questions which they have generated. The meeting also has provided me with feedback on best practice in other institutions including cutting edge cross curricular work and interdepartmental collaborations which I am keen to bring into my own practice. I find that attending teaching conferences enthuases me to try out new techniques and reinvigorates my lectures.

## Career Overview / professional background

To be awarded CSciTeach you need to have a minimum of four years' experience of teaching science following QTS (or equivalent) of which two should involve an appropriate level of responsibility. This can include leadership through coordinating a course, developing new schemes of work, resources for new courses, mentoring colleagues or coordinating training and professional development of others.

For those teachers who do not have QTS (e.g teachers in HE, teachers in the independent sector or those working in other settings) you will normally need six years relevant and demonstrable experience. If you do not have a Masters degree in education or pedagogy you can demonstrate skills and experience that have been gained through professional practice.

**Important!** For each entry, you should include sufficient details to allow assessors to validate your professional background with regard to your application. It is particularly important that you describe carefully the scope of your role and your responsibilities. Make sure to also include your current position in the list.