Glasgow University Teaching Excellence Award (2011): Evidence Statement
Dr Helen Purchase, School of Computing Science[1]

Context for the nomination

This nomination covers the period from December 2001 (when I joined Glasgow University) to the present. During this time, I have made the following contributions to the teaching and learning environment of the university. (* indicates new courses that I designed anew as well as delivered).

- **December 2001- December 2008: Leadership and curricula development:** I joined the university as the Director of the MSc(Information Technology) in December 2001. My role was extended to include defining, introducing and leading two new PGT programmes in 2004/5 and 2006/7, and overseeing all PGT activities in the School.
- **2002/3-2008/9: Small group MSc teaching:** Lecturer for following PGT courses:
  - *Human-Computer Interaction* (HCI-IT, 3 years, c. 20 students p.a.): lectures and laboratory sessions;
  - *User-centred Software Design** (1 year, c. 20 students): lectures, studio-based group design sessions;
  - *Professional Software Development* (1 year, c. 45 students): lectures and tutorials;
  - *Research Readings*/Advanced Research Readings in HCI** (3 years, c. 5 students p.a.): research-led led teaching involving class discussions and presentations based on research papers;
  - *General Readings in Computing Science** (GRCS, 3 years, c. 45 students p.a): research-led led teaching involving class discussions and presentations based on research papers.
- **2002/3-2008/9: Large group undergraduate teaching.** Lecturer for the following undergraduate courses:
  - *Information Management** (IM2, level 2, 7 years, c. 80 students p.a.): lectures, laboratory sessions, examples classes.
  - *Human-Computing Interaction* (CS1Q, level 1, 2 years, c. 100 students p.a.): lectures, laboratory sessions, tutorials.
- **2009: Scholarship of teaching and learning.** Sabbatical at the University of Auckland, collaborating with colleagues on educational projects. During this time, I co-published five peer-reviewed educational papers.
- **2010/11: Small group undergraduate teaching**. On return from sabbatical, new teaching responsibilities:
  - *Computing Science in the Classroom* (level 4, 6 students): small-group collaborative learning and reflection sessions;
  - *How Computing Science affects your World** (CSW, level 1, 12 students): lectures, laboratory sessions, regular peer-reviewed exercises, tutorials.
- **2002/3-2007/8; 2010/11: Project supervision:** Supervision of 15 Honours projects and 21 Masters projects. Also supervision of 3 final year projects at the University of Auckland during sabbatical.
- **2006/7 – 2008/9; 2010/11: Advising:** Advisor of studies for approximately 50 students per year, and, for 2010/11, an additional 20 MSc(IT) students.
- **2010/11: Head of Level 1:** On return from sabbatical, I have taken administrative responsibility for our first year courses.
- **2009/11**: **Dissemination of good practice:** Recently I have been engaged with lecturers across several schools across the university, encouraging and supporting the use of the online peer review system, Aropa.

In summary, my learning and teaching contribution over this period has shifted its main focus several times, each new phase building on the last: from leadership and curriculum design, to enhancing students' learning, to engaging in scholarly activity, to dissemination of good practise.

P1: Approach to teaching: I am an energetic and enthusiastic teacher, passionate about the subjects I teach. This is evidenced in student feedback (P1a) and testaments from my colleagues (P1b). My teaching philosophy is one of continual improvement – striving to do better than last time, and knowing that there is always room for improvement – not least because of changes in content, technology, students' attitudes and backgrounds, and new findings from educational research. I am always keen to try new approaches to teaching (e.g. peer-review, contributing student approaches, research-led teaching, concurrent development of graduate attributes, personal development planning (PDP) and studio-based design sessions).

[1] P references (e.g. P1a, P2b) refer to documents in the accompanying portfolio).

There are two sources of information that I use to ensure continual improvement: myself and my students:

- I am a reflective practitioner, and make personal notes after each teaching session (P1c). Every year my preparation is influenced by the notes that I had made after every lecture, tutorial or assessment the previous year. These notes ensure that I don't make the same mistake twice, and that I am continually improving both the content of the course and my presentation of it. I have followed this practise since 1993.
- I take student feedback seriously, and like to engage students in thinking about how the course is being conducted. While end-of-course evaluations are useful in year-on-year improvements, it is often more important to make immediate changes that can affect the current students' experience where possible. I therefore typically conduct an informal monitoring survey mid-way through the semester (P1d), and a summary of the responses is discussed openly with the students at the next lecture – making the improvement of the conduct of the course a collaborative endeavour.

Criterion 1: Effective ongoing contribution to enhancing the student learning experience on a range of levels, evidenced through student feedback.

P2: Honours and PGT project supervision: I typically supervise three or four Honours or Masters projects a year. Students have reported that they value the effort that I put into supervising them (P2a), particularly that I encourage them to write up their project as they go along, and to keep a detailed log book recording their progress from the start. I emphasise the development of critical enquiry and research skills, and have published five Computing Science papers based on Honours or Masters project supervision (P2b).

P3: Engagement and interaction: My classroom teaching style encourages engagement through a contributing student pedagogy. A distinctive feature of my lectures is interaction and discussion. This takes the form of asking students to attempt an exercise in the class (in pairs, or small groups), with a time limit. This is followed by discussion, typically asking students to swap their solutions with the people next to them and engage in pair or group discussion. I then collect suggestions for solutions from a few students and open the discussion up to the whole class.

Examples of such classroom activities include:

1. (P3a) CS1Q-HCI (2007/8): Pairs of students are each required to analyse one of seven evaluation methods according to a set of given criteria. I then lead a whole-class discussion on the advantages and disadvantages of each method, using only the ideas generated from the students themselves, and write them on overhead transparencies. I later summarise these ideas in a more formal document that is then put on the course webpage – based almost exclusively on the students' ideas.
2. (P3b) IM2 (2005/6): Students answer a relational algebra question in class, and three students are asked to write their solutions on overhead transparencies which are then discussed with the whole class. As the exercise has more than one possible solution, the students are very active in pointing out how their peers' solutions differed.
3. (P3c) IM2 (2007/8): Students are given five minutes to write a sentence of not more than 25 words giving their opinion on the introduction of National Identity cards. Some students voluntary read out their sentences: I write these on an overhead slide and lead a whole class discussion on each of them.
4. (P3d) CSW1 (2010/11): Two student volunteers sit back-to-back at the front of the class. One builds a structure out of cuisenaire rods and describes it aloud, while the other student has to try replicate the structure. The exercise is repeated four times, with different levels of interaction and feedback permitted.

Class exercises like these promote engagement, contribution to a community of learning, development of analytic and critical skills, and ownership of the material.

P4: Development of Graduate Attributes: I believe that many of the transferrable skills that we expect of our graduates are best developed within discipline-specific learning, in a context that is meaningful to the students. My use of both informal peer-review (as part of in-class activities) and formal peer-review (as part of formative assessment) encourage reflection and critical analysis skills, and develop students' skills in engaging with a learning community. I have recently submitted a LTDF grant proposal entitled "Developing Graduate Attributes Through Routine Peer Review", and am co-author on a paper entitled "Peer Assessment: A Conduit for Developing Graduate Attributes?" at the 2011 GU Learning and Teaching conference (P4a).

Two particular instances of embedding graduate attributes in my teaching are:

1. **PDP in for second year students.** I issued all Information Management (IM2) students with a small, hard-covered notebook (their 'logbook') in 2006/7, the aim being to encourage students to reflect on and take responsibility for their studies. During lectures, I interspersed the content with small reflective exercises (P4b) – e.g. encouraging students to think about: what kind of learner they are, generic problem solving strategies, their current understanding of the course material, time management for assessment deadlines etc.
   While responses to these 'logbook exercises' were mixed with some students thinking they were a waste of time ("*Felt logbook was a waste as well as exercises like 'how much of this material out of 10 did you understand'*"; "*Too much emphasis spent on the log book that could have been better spent on course content*"), others clearly found it beneficial ("*Best taught course since coming to uni, unique style of teaching made me be disappointed if I couldn't make lecture. Keep up good work."; "I found logbook work interesting and useful*."). One former student told me recently that I had 'changed his life' – he now carries a logbook around with him everywhere, using it to record idea and activities.
2. **General Readings in Computing Science (PGT students).** I am concerned that computing science students often have difficulty expressing themselves in written form. In this course students were required to read two research papers a week, and, when they arrived at the lecture, write a one-sentence summary (maximum 25-words) of each paper (P4c). Group feedback on the sentences was provided (P4d). The aim was to encourage students to read critically, to identify the single key point of a paper, and to express it succinctly in a valid English sentence. It did not take long for the students to realise that what seems a simple task requires considerable skill (P4e).

P5: Student feedback: It is not unusual for me to receive unsolicited messages from students commending my teaching (P5a). Appendix P5b presents a summary of 25 quantitative responses from student evaluations to ranked questions focussing on the overall quality of the course and the standard of lecturing. On a five point scale:

- 18 question responses result in both a mode and a median of 4.
- 1 question has a mode of 5 and a median of 4;
- 6 questions have modes and medians of 3 (these are all associated with the first presentation of a new course).

P5c presents some student comments which highlight my enthusiasm, knowledge of subject, the engagement of students in the in-class exercises, and general satisfaction with my overall performance as a teacher.

Criterion 2: Innovative practices relating to curriculum or course design, particularly in relation to interdisciplinary working.

P6: Research Readings in Computing Science: The current course specification is unchanged since I designed and implemented this course in 2005/6 (P6a). The current lecturer has this to say: "*As far as I know this course is quite a distinctive feature of our MSc programme ... it is a pleasure to observe [the students'] discussion and critical analysis of the papers*." A current student wrote: *" [T]he RRCS course is a lot of work. Reading four papers a week and writing one page summaries for two of these takes a substantial amount of time. .... By the end of the course, however, the summary writing process was much more smooth - almost automatic - with students becoming more adept at writing... The students, including myself, were particularly happy with the course covering a new topic each week providing an interesting breadth of knowledge both in terms of the style of research observed and its content."*

P7: How Computing Science affects your World: I presented a paper on this new and innovative course at the HEA workshop on the first year computing science experience (P7a). Novel hands-on teaching examples in this course used a variety of props, for example, playing cards and card tricks (P7b), scrabble tiles, cuisenaire rods, and hats. The course interspersed the historical context of logic, computation and computers amongst the primary content, material seldom taught in computing science curricula (e.g. P7c). Students found this course interesting, enjoying the range of topics and the inclusion of expert guest lecturers, although some indicated they might have preferred more depth over breadth (P7d). The course specification was substantially updated after the first offering in 2010/11. As a highly innovative course of which few examples exist, its original definition was aspirational, and proved to be unrealistic given the background of the students and the length of the course. In revised course

specification is (P7e), the course is renamed to 'Principles and Practise of Computing Science.' so as to better reflect its content.

P8: The Professional Skills Honours course: Together with the course co-ordinator, Dr Cutts, I assisted in the design of this course (P8a) , in particular in defining the innovative essay assessment method (peer assessment, with a response to reviewers comments, as documented (P8b)). This course, and in particular, its peer-assessment component, was commended by the British Computer Society at their most recent accreditation visit (P8c).

Criterion 3: Impact of learning and teaching practices

P9: Peer-review using Aropa: I introduced the Aropa system to the university in September 2010, and it has since become well-established. Four case studies demonstrating successful use in the Business School, Veterinary Medicine and Computing Science have been prepared for Professor David Nicol's JISC-funded PEER project (P9a). The following lecturers are planning on using Aropa in 2011/12: Finlay (Biology), Honeychurch (Philosophy), Nicolson (Veterinary Medicine), Bell and Pate (Management), Rogers (Computing Science), Azzopardi (Computing Science), Chalmers (Computing Science), Bishop (Psychology). Since returning to Glasgow after my sabbatical at Auckland University at the start of 2010, I have also provided remote support for ten Auckland lecturers in using Aropa for the first time. More information about Aropa can be found at www.dcs.gla.ac.uk/~hcp/aropa.

P10: Computing Science in the Classroom: At the suggestion of this course being discontinued, the students of 2010/11 made a written submission to the School (P10a), expressing their desire that future students be given the opportunity to engage in this outreach activity. The content of the letter summarises the graduate attributes that students develop in this course, and their own recognition and appreciation of these learning outcomes.

P11: Human-Computer Interaction Disciplinary Commons: My portfolio for this year-long commons activity covers the context of my HCI teaching, as well as information on the content, instructional design, evaluation and feedback. It is interspersed with personal reflections. Two extracts (covering the topics of assessment and delivery) are included as P11a. Positive feedback from a colleague who found it both interesting and useful is presented as P11b.

Criterion 4: Involvement in, promotion of, and dissemination of Scholarship of Teaching and Learning

Within the period covered by this application, I have the following 12 peer-reviewed publications in the area of Teaching and Learning (P12b), supported by testimonial letters from two international research colleagues (P12a).
Contributing Student Pedagogies:

1. Hamer, J., Purchase, H., Luxton-Reilly, A., and Sheard, J. Tools for "Contributing Student Learning". SIGSCE Bulletin, 2011 (to appear). *(A survey of existing tools used to support educational collaborative activities)*
2. Hamer, J., Purchase, H., Cutts, Q., et al. Contributing Student Pedagogy. SIGSCE Bulletin. 2008; 40(4):196-214. *(A survey of different educational methods for encouraging student collaboration).*

For these two papers, I acted as co-leader of two working groups held in conjunction with the Innovation and Technology in Computer Science Education conference. My contributions were conducting a literature review, devising the overall structure and 'story' of the papers, co-ordaining the efforts of other team members, and writing a substantial portion of the paper itself.

Technology-enhanced collaborative approaches to learning: students sharing MCQs, and peer-review:

3. Purchase, H.C., Hamer, J., Denny, P., Luxton-Reilly, A. The Quality of a PeerWise MCQ Repository. Australasian Computing Education Conference: CPRIT; 2010. p. 135-142. *(The quality of a database of multiple choice questions created by students).*
4. Hamer, J., Purchase, H.C., Denny, P., Luxton-Reilly, A. Quality of peer assessment in CS1. 5th international workshop on Computing Education Research; 2009. p. 27-36. *(Comparing peer-marking with tutor-marking)*
5. Denny, P., Luxton-Reilly, A., Purchase, H.C., Hamer, J. Coverage of course topics in a student generated MCQ repository. ACM SIGCSE Bulletin. 2009;41(3):11-15. *(Difficulty and course coverage of multiple choice questions created by students).*

6. Denny, P., Luxton-Reilly, A., Purchase, H.C., Hamer, J. PeerWise: Students Sharing their Multiple Choice Questions., Fourth International Computing Education Research Workshop; 2008. p. 51-58. *(Analysis of students' performance after creating multiple choice questions)*
7. Denny, P., Hamer, J., Luxton-Reilly, A., Purchase, H.C. PeerWise. Koli Calling International Conference on Computing Education Research; 2008. p. 109-122. *(Engagement of students in creating MCQs.*

For these five papers, my main contributions were to investigate a large, complex data set collected as part of a regular classroom activity, identify the interesting and useful educational research questions that could be addressed using this data, perform the data analysis so as to answer these questions, derive conclusions, and make a significant contribution to the writing of the paper.

Miscellaneous papers:

8. Denny, P., Dahlstrom, D., Purchase, H.C., Luxton-Reilly, A., Hamer, J. Self-Predicted and Actual Performance in an Introductory Programming Course. Innovation and Technology in Computer Science Education (ITiCSE); 2010. p. 118-122. *(Students' reflection on their own abilities)*
9. Purchase, H.C. Student Compliance with Ethical Guidelines: The Glasgow Ethics Code. ITALICS, HEA (Information and Computer Sciences). 2006;5(2):1-5. *(Encouraging an ethical approach to students' evaluations of their project work)*
10. Holz, H., Applin, A., Purchase, H.C., Haberman, B., Joyce, D., Reed, C. Research Methods in Computing: What are they, and how should we teach them? SIGSCE Bulletin. 2006;38(4):96-114. *(Encouraging a research-led approach to teaching Computing Science)*
11. Mitchell, A., Purchase, H.C., Hamer, J., Barr, D., Melvin, S. Computing Science: What do pupils think? , 14th annual ACM SIGCSE conference on Innovation and technology in computer science education ACM; 2009. p. 353. *(Identifying school students' perceptions of university Computing Science)*
12. Purchase, H.C., Mitchell, C., Ounis, I. Gauging Students' Understanding through Interactive Lectures. In: Williams, H., McKinnon, L., editors. Vol. LNCS 3112, BNCOD 21: Springer Verlag; 2004. p. 234-243. *(Using electronic voting devices in teaching databases)*

Prior to the period covered by this application, I published a further 6 peer-reviewed papers in the areas of peer assessment (1), student reflection (1), pre-university students (2), tutor-training (1) and contributing student pedagogies (1).

Criterion 5: Income generation relating to the development of learning and teaching.

I received a £1000 grant from the Faculty of Information and Mathematical Science in 2010 to develop innovative materials for the new How Computing Science affects your World course (P13a): as a new course which we hope will have wide general appeal, it was important that the first offering was successful.

I received a £3450 grant from the Higher Education Academy in 2010 to adapt the Aropa peer-review system for multi-institutional use, so that it could be used effectively at the University of Glasgow, building on its success at the University of Auckland. (P13b).

Criterion 6: Demonstrable impact of exceptional leadership in Learning and Teaching at School/College levels

As director of the PGT programmes, I led the process of defining and restructuring our Masters programmes several times, making the appropriate submissions to the Faculty Board (examples given: P14a and P14b). I arranged and clarified the new, rather complex arrangements for our examination boards when our PGT programmes first started sharing courses with our undergraduates in (P14c). I assisted academic members of staff in our school in adjusting to the new assessment code in 2003, producing an explanatory document (P14d), and giving a seminar to departmental colleagues (P14e). I have recently produced a report and seminar proposing a method for rationalising our elective course offerings so as to improve our teaching efficiency (P14f). Although no longer having a formal role with respect to the PGT courses in our school, I have recently proposed a radical restructure of our Masters provision which focuses on the need for flexibility and expansion (P14g).