Using 'wrap-around credit' for professional development

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Summary
This paper explores methods of broadening and deepening commercial/industrial courses so that participants may gain academic credit. Familiar methods of programme validation, accreditation and credit-rating were explored and were found inappropriate. A novel approach of 'wrap-around credit' is proposed. One existing and one planned programme are discussed.

Introduction
Napier University of Edinburgh is a Regional Academy of Cisco, the world's largest computer networking company. The Cisco Networking Academy Programme (CNAP) was designed by Cisco to meet the needs of networking industry professionals internationally by providing a mixture of on-line (web-based) and by-attendance training and education, leading to the industrial qualifications of Cisco Certified Networking Associate/Professional (CCNA/P) (Cisco, 2003). Napier's School of Computing decided that, from autumn 2002, it would combine both CCNA/P into a flexible learning Masters degree in Advanced Networking.

Several difficulties were associated with this objective, including possible disparities between the volume and level of learning associated with CCNA/P and an MSc, and the lack of control by Napier over the assessment process. The solution to these problems was found to be the application of 'wrap-around credit' - the main focus of this paper.

The lessons being learned from this experience are now about to be applied to a much wider range of industry certifications and academic qualifications.

'Wrap-around credit' in context
The Scottish Credit and Qualification Framework (SCQF), published by the Quality Assurance Agency for Higher Education (QAAHE, 2001), defines *credit* as a measure of the *volume* of learning. Twelve *levels* of outcomes and qualifications are defined within the SCQF with the top six mapping onto Scottish Higher Education (SHE levels 1 through 6) but we will concern ourselves primarily with only three levels:

- SHE 3, Ordinary degrees
- SHE 4, Honours degrees
- SHE 5, Postgraduate 1, Pg Diploma, Pg Certificate, MA, MSc.

The SCQF also defines the number of credits required to achieve an academic award at these levels and a set of *level descriptors* describes the characteristic generic outcomes of each level in terms of, for example, knowledge and understanding, practice and general cognitive skills.

Defining an Honours degree in a particular discipline is further assisted by reference to that discipline's *subject benchmark*, also available from the QAAHE website (QAAHE, 2003) and produced in consultation with leading academics and professional bodies. Although subject benchmarks and level descriptors were created primarily as design tools, helping to ensure that planned learning outcomes are appropriate in terms of level, volume and relevance to discipline, they can also be used as an analytical tool through a reverse mapping from the programme to both the QAAHE level descriptors and the SCQF, the resultant volume of credit being used to indicate a specific award. This process has been carried out less formally

for many years in the assessment of prior (experiential) learning (AP[E]L) and in the *credit-rating* of other institutions' provision.

Validation
This is by far the most common method of allocating academic credit to the achievement of learning outcomes. The term is used by the QAAHE to describe the conventional methods used by all higher education institutions (HEIs) to approve new programmes of study and their component modules. The design of such programmes can be assisted by using the SCQF and subject benchmarks as *specification* tools.

Accreditation
This term can have several alternative meanings but, at Napier University (and many other HEIs), it means the association of academic credit with educational provision delivered by other organisations. The specification and design of such programmes tends to be an interactive and co-operative venture between the HEI and the external body with the volume, level and content of the educational experience being adjusted to ensure that they match the expected learning outcomes for the award. The SCQF and subject benchmarks can be used *both* as *specification and analysis* tools.

Credit-Rating
Students completing a validated or accredited programme will gain credit and, hopefully, an academic award from the HEI. Credit-rating, however, simply aims to measure volume and level (and, for *specific* credit, discipline-relevance) of existing provision. Although this process *can* be very interactive, it need not be. A major distinction is that, although a *course* may be credit-rated as 'x' credits at level 'y', no academic award or *specific* credit is granted to any *individual*. Their *general* credit might, however, allow advanced entry to another programme.

Credit-rating might be thought of as a 'light-touch' or 'arms-length' form of accreditation. In this approach, the SCQF and subject benchmarks are normally used simply as *analysis* tools.

Alternative design approaches for the MSc

Before considering the problems - and solutions - involved in creating the MSc in Advanced Networking, it first helps to understand the nature and structure of the underpinning Cisco courses.

Structure of CCNA
This course has four, progressive component parts (called 'semesters' by Cisco), each of which requires a nominal 70 hours student effort. Learning material on computer network hardware and protocols is produced by Cisco and delivered through the World Wide Web, allowing students to study at home or at work. Examinations are taken on-line and are under the control of Cisco. Much of the 70 hours involves competence-based practical laboratory work where students are expected to demonstrate achievement of learning outcomes to Cisco-qualified instructors. Intermediate certification is given for successful progression through each 'semester' but the title of CCNA is only awarded after successful completion of a final overarching certification examination. In Europe, CCNA is commonly undertaken midway through a first degree so this clearly has consequences for the material's use in a Masters degree.

Structure of CCNP
CCNP builds on CCNA and is described by Cisco as being appropriate for use at Masters level. Although structured similarly to CCNA (four 'semesters', 70 hours each), the first three 'semesters' of CCNP may be taken in any order and all require their own certification examinations.

Awarding credit
At Napier University, a Masters degree requires 180 credits at SHE 5 with the first 120 credits commonly subdivided into eight 15-credit modules followed by a 60-credit dissertation. For module validation, a 'going-rate' is presumed of 1 credit requiring 10 hours of student effort and the internal coherence of the module components, its teaching and learning strategy and its assessment methodology would all be scrutinised. Each of the above methods of associating credit with the Cisco CCNA/P courses was considered by the Programme Team.

Validation was considered to be inappropriate, as there would be no significant University control over the assessment process, resulting in minimal quality assurance and demonstration of academic attainment to peers.

Accreditation, although theoretically possible, would have required Napier to quality assure Cisco itself. Napier has a good working relationship with senior Cisco UK staff but the level of partnership between Napier and Cisco required for this approach would have been tedious, inflexible and highly unlikely to meet the needs of each organisation.

Credit-rating would appear, superficially, to have been the best approach to counting the Cisco courses towards some type of award. The organisation was reputable, the learning material at a high standard. The CCNA/P material could not, however, have been claimed to have the academic coherence, breadth, depth and volume required for a Masters level award. Also, future revisions by Cisco of that material could only be *measured* and given an adjusted credit-rating rather than allow adjustment of content to continue satisfying the levels and volume required for a specific award.

The conclusions were that no one of the above approaches was entirely satisfactory and that a fourth approach was needed. Following initial discussions within the School, this was dubbed 'wrap-around credit'.

'Wrap-around credit': a fourth approach to associating credit

It would be a remarkable coincidence for an industry-certified course to map precisely onto a SCQF level descriptor and to indicate a volume of study meeting the exact requirements for an award at that level. Although minor variations of volume/level could be easily dealt with, disparities such as 70 hours student effort (rather than 150 hours for a university module) and academic level being mid-first degree (rather than Masters) could not possibly be overlooked.

Designing the syllabus - teaching and learning
The MSc Advanced Networking Programme Team analysed the syllabus (and stated learning outcomes) for CCNA and CCNP and identified areas needing deepened and broadened. In Cisco's design of its own courses, underlying theory has been omitted in many instances, with students achieving SHE 3 outcomes such as ‘use a selection of principal skills’, ‘practice routine methods of enquiry’ and ‘identify and analyse routine professional problems’. The Programme Team extended these outcomes to those of SHE 5 such as ‘use a range of specialised skills … at the forefront or informed by forefront developments’ and ‘critically review, consolidate and extend knowledge, skills and practices’. Additional learning material was produced in flexible learning *units*, each dealing with a specific sub-topic. Instructional material contained further links to on-line supportive resources of the University and other relevant sources. Learning was supported by self-assessed questions for formative assessment.

Because of clear progression and coupling between the four CCNA 'semesters' (particularly the third and fourth), they were grouped in pairs (as were the CCNP, more through convenience than necessity), appropriate additional university material was then added and the result was four 30-credit Masters modules.

This approach also matched well with the planned learning style, which would be flexible-learning with all attendance being 'out-of-hours'. Each 30-credit module would be taught over one university trimester with attendance one evening per week for three hours plus two hours on alternate Saturday mornings.

The assessment methodology
CCNA/P certification requires assessment through Cisco-controlled on-line examinations and competence-based laboratory exercises. These assessment tools could not, however, be used *directly* for Masters modules. Napier's Postgraduate Regulations expect each 15-credit module normally to have two components of assessment, each of which is graded. For 30-credit modules, the regulations were slightly adjusted to allow for an increase to three components of assessment of equal weighting.

This approach allowed students to be assessed in a variety of ways:
- The on-line examinations remained but were only considered towards CCNA/P outcomes;
- Two components were to be courseworks comprising assignments, reports, case studies, class tests and/or presentations. Formal written examinations were considered inappropriate for the subject matter;
- Some laboratory exercises were enhanced and graded (rather than just competence demonstrated), leading to 'practical laboratory work' as a third components of assessment for the module.

The overall result of this approach was that externally-assessed, industry-specified learning was transformed and augmented so that the achievement of all learning outcomes in each module could be judged through university-specified and controlled assessment methods.

It is this approach of 'add on then assess all' which is core to the 'wrap-around credit' concept.

Costs, feedback, recent experiences and developments
Developing and running the MSc in Advanced Networking has been an expensive exercise and simply relying on normal fee income from the Scottish Higher Educational Funding Council (SHEFC) would not have sufficed so the programme was made 'full-cost' with students being charged a commercial rate.

Questionnaire responses from initial intakes demonstrate strong agreement with the statement that 'My joint Cisco/MSc qualification will assist me professionally more than just the CCNA/P certifications or MSc alone'. A clearer understanding is being developed of the appropriate programme admissions requirements and a partial redesign of programme structure is underway.

Graduate Diploma/Certificate in Professional Development in Computing

In summer 2002, the School of Computing's Industrial Advisory Board suggested creating a qualification comprising several credit-bearing courses with a high vocational content. After initial discussion, it became clear that issues to be addressed in designing such a programme would include:
- industrial/professional-relevance of content;
- flexibility of the programme structure and student choice in selecting modules;
- method of delivery of the modules to professionals in full-time employment;
- level of modules/courses comprising the qualification;
- expected volume of credit to be undertaken and resultant academic award.

Relevance, flexibility and choice
Typical undergraduate programmes are designed top-down from a discipline-specific set of aims and fully prescribed (other than the occasional module option). The programme

designers decide (with the aid of QAA subject benchmarks) what is in the future professional interest of the student, whose choice is largely *between* programmes rather than *within* them.

Working professionals will commonly already have qualifications or experience broadly equivalent to a first degree and are looking for skills, qualifications and certifications upgrades suited to their own personal needs. Trying to fully specify a single programme of study suitable for up-skilling all such professionals would be almost impossible.

Just as module 'wrap-around' credit augments and transforms industry-specified learning, the programme should build on the student's skills, allowing the choice of component modules to be made by the student rather than the programme designer.

Individual modules would be validated against conventional academic criteria but their inclusion in the framework would be decided on the basis of professional/industrial relevance.

At the time of writing, industry-certified courses (or suites of courses) being considered for 'wrap-around' and addition to the framework include:

- CCNA - with a revised 'wrap-around' at level 3 (and, possibly, CCNP later);
- Two Cisco/Hewlett-Packard courses in IT Essentials (delivered similarly to CCNA);
- Two Cisco/Sun Microsystems courses in Fundamentals of Unix/Java;
- Prince2 and ITIL;
- Several Microsoft and Oracle courses.

Module delivery -teaching, learning and assessment

Feedback from the Industrial Advisory Board and applicants to the MSc Advanced Networking suggests that the use of web-based, flexible & distance learning materials and 'out-of-hours' attendance is preferred by busy professionals rather than the conventional part-time modes of day- or block-release. An overall aim will therefore be to reduce and minimise face-to-face teaching as much as possible, replacing it with distance-learning and on-line learning supported facilities. A variant of the academic 'wrap-around' for CCNA is already being considered (at SHE 3) which would use on-line laboratory exercises and could therefore be fully distance-learning.

Students would negotiate module start dates with their allocated tutor, study for at least a stipulated minimum period of time, and then have the results of final assessments considered at the next available board of examiners.

Programme level, award and title

A Masters degree programme extends and/or converts a student's skill set beyond that gained through their normal entry qualification of an Honours degree. A personal development qualification requiring an Honours degree might unnecessarily exclude a large group of capable, aspirant professionals. Also, very few commercial certifications and qualifications could be considered to be at postgraduate level. Sub-degree awards, such as Certificate of Higher Education (simply post-school and probably too low level for a professional); Diploma of HE (the 240 credits required would take too long to achieve); and other University Certificates and Diplomas (possibly lacking the recognition and currency of awards named in the SCQF), were also considered and rejected.

Fortunately, a pair of suitable qualifications now exists which meet these needs: Graduate Certificate (GradCert) and Graduate Diploma (GradDip). These are defined in the SCQF as: '*Qualifications that are typically for graduates or equivalent but are not of postgraduate level or outcome*'. The level and volume of credit required for each is:

GradCert: Minimum of 60 credits at minimum of SHE 3
GradDip: Minimum of 120 credits at minimum of SHE 3.

The title of the award should be descriptive but not excessively specific. Given the nature and main discipline of the programme, it was decided that the main awards would therefore be:

- Graduate Certificate in Professional Development in Computing
- Graduate Diploma in Professional Development in Computing

If non-computing modules exceed a given threshold then the title would omit the 'in Computing' part.

Funding considerations

The 'full-cost' fees for the MSc Advanced Networking earn commercial income but no SHEFC income. Similarly, the costs of developing and delivering the core industrial/professional certification elements of the new GradDip/Cert modules could not be met simply by charging a normal module rate (approximately £250 for 15 credits) so this must also be met through charging a commercial rate.

The 'wrap-around' credit process of 'add on then assess all' is similar to AP(E)L. At Napier University, the charge made for credit gained through AP(E)L is the same as for conventional credit because of the considerable costs involved in measuring the volume and level of learning outcomes (and hence credit) being claimed. Similarly, under the new programme, academic credit for core certification elements can only be gained once additional material has been delivered and *all* of the learning has been assessed. This requires personal tuition, support and assessment comparable to the AP(E)L process. Students will therefore be charged a commercial fee for the core courses and then a standard module tariff will apply for the academic module. It is considered likely that this approach will also attract additional financial support from SHEFC for the 'academic credit' element.

'Academic add-on'

The discussion so far has been about undertaking additional academic study as a 'wrap-around', taken in parallel with the commercial element. Many applicants may, however, have already completed the industry certification and be seeking only to earn academic credit. Here, a process of 'add-on' could be more appropriate: students would undertake the additional academic study to build on their prior learning and they would then be assessed on the overall learning, paying only for only the 'academic credit' element.

Conclusions and Future Development

The Continuing Professional Development needs of industry professionals have traditionally been met through either non-credit bearing commercial courses, professional certifications or university-specified academic programmes. Combinations of these are less common and are not easily achieved through the methods of validation, accreditation or credit-rating. The novel processes of academic 'wrap-around' and 'add-on' allow an opportunity to meet all of these needs in an efficient and cost-effective manner.

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