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COAST Maps: A simple visual tool for articulating key elements of the first-year learning experience within course development

Patricia Cretchley
Faculty of Science and Technology
Queensland University of Technology
Tel: +61 7 3138 8077
E-Mail: patricia.cretchley@qut.edu.au

Dr Ramasamy-Iyer Mahalinga-Iyer
Faculty of Built Environment and Engineering
Queensland University of Technology
iyer@qut.edu.au

Abstract

This paper presents an overview of a Peer Review Instrument (COAST Concept Maps) developed as part of a larger project concerned with design of the first-year curriculum in the School of Engineering Systems at Queensland University of Technology in 2008 . COAST Concept Maps are simple visual tools to enable integrated development of the student learning experience and curriculum design. A COAST Map displays clearly and succinctly the key elements of the student learning experience in a particular degree or program, alongside other design aspects of the program. The instrument provides a mechanism for reviewing curriculum according to the criteria specified by the course outline or selected by the individual academic. By embedding and articulating elements of the student learning experience within curriculum design, the Maps enable alignment of student learning activities with objectives, and design for optimal student engagement. COAST Maps are a useful tool to review the criteria according to emerging priorities of the particular university, and within the framework for enhancing the first-year experience.

Key words*: First Year Experience; Course mapping; course design; Curriculum development.*

COAST Maps for integrated first-year curriculum development

There is growing interest in Australia in what universities can and should be doing to better orientate and support first-year students educationally, socially and personally (Kift, 2004). Efforts to address issues relating to better management of the first-year experience in universities stem from the high costs of drop-out or failure to students, both financially and emotionally, and the determination of universities to reduce the expense and waste associated with high rates of student attrition (Krause, Hartley, James & McInnis, 2005).

With this groundswell comes a growing body of research into effective ways to help students get started and stay focused. From this body of work, evidence has emerged pointing to the fact that to effectively engage incoming students and support their learning, it is important that learning objectives, curriculum development and assessment, and the design of learning activities and student management, are closely aligned (Kift & Nelson, 2004). In particular, Kift and others emphasise the desirability of fully integrating the development of a range of stimulating and engaging learning experiences into First-Year curriculum design and development, preferably from day one.

Australian academics, Skinner & Hughes (2005), are among those who have called for what they called "inter-woven" curriculum design for first-year learning. In the context of design project work in the discipline of architecture, the curriculum model trialed by Skinner & Hughes sought to "*create conceptual linkages between design, theory, technology and communication courses in a manner that facilitated genuinely rich and reflective learning*." By weaving the design projects sequentially through successive modes of enquiry in three discrete courses, the model "*adopted encouraging conceptual connection between the different sub-disciplinary paradigms*". This is one of many examples of inter-related curriculum development that requires careful sequencing of project work and clearly differentiated assessment criteria. The rewards were that the students involved "*overwhelmingly reported that the interwoven courses had supported a depth of learning and engaged them in the characteristic ways of thinking of their future profession*".

The learning experience and curriculum issues that have led to recent focus on the First-Year Experience apply on a different scale to the full spectrum of undergraduate learning. This point was also made by those engaged in the nine projects of a Scottish quality enhancement initiative that investigated relationships between curriculum design and student engagement and empowerment (Bulley, Morss & Bulley, 2008). While the Enhancement Theme focused almost exclusively on the first year, it was acknowledged that findings may also be relevant to other undergraduate years, and even to the first year of postgraduate programs. The desirability of careful planning and integration of learning stimuli, activities, different types of assessment tasks and support structures not just within the First-Year, but across the undergraduate years of study cannot be overstated.

Curriculum Mapping:

A major difficulty for academics who engage in this kind of integrated course design, however, is keeping track of the design elements, both during the process, and later. To solve this problem, we introduce COAST Concept Maps, simple and easy visual tools for coordinated development of the vital elements of curriculum design. A COAST Map displays clearly and succinctly the key elements of the student learning experience in a particular degree or program, alongside other key design aspects of the program. The chosen elements might be Curriculum content, Objectives, Assessment, Student learning activities and Teaching, for example, from whence we derive the acronym COAST. By offering a coherent summary of these and/or other vital elements of a particular degree program or semester or year (First Year, for example), this kind of tool provides a valuable visual aid for assessing the Student Experience and for integrated curriculum development.

There is nothing new about course mapping, and a range of models for course mapping is in use internationally, many of them focusing on mapping where and how graduate outcomes are developed across the program. Interest in such tools has been given impetus in Australia in the wake of Government audits of Australian university quality which have put pressure of universities to be more transparent and accountable about learning objectives and outcomes, and graduate capabilities. As a result, course mapping exemplars, templates and tools are beginning to emerge on university websites. See the examples offered by the University of Tasmania (2009) and Queensland University of Technology (2009), for example. Similar trends are discernible internationally: see, for example, the course mapping tool developed for the University System of Georgia (2009), as part of the Advanced Learning Technologies Project.

The simple fact is, however, that few models or templates place emphasis on tracking the range and type of student learning activities, and their timing. A survey of university websites reveals some curriculum development guidelines and frameworks for the planning and development of learning activities, and some that include mapping tools for the cognitive levels of learning activities and assessment items using taxonomies like that of Bloom (1956-1964). However, most focus on classifying and mapping subject learning outcomes and assessment portfolios onto a desired range of graduate capabilities - generic, course, program and/or discipline specific. The mapping tool offered on the QUT Learning Support website, for example, states that "*A Curriculum Mapping Tool provides a template for the contextualisation and integration of Graduate Capabilities in the course learning outcomes, unit learning outcomes and learning and teaching activities; and the demonstration of these in the assessment processes*" (Queensland University of Technology, 2009). Generally, therefore, the mapping tools that are emerging place emphasis on mapping graduate capabilities, rather than student experience.

The objective here is different: a tool to visually display existing or intended key student learning activities within a broader curriculum development framework. Aiming, thus, at a broad mapping tool that is easy and quick to use, and shows visually the key aspects of the student learning experience (assessment and classroom activity, for example), we developed the simple and effective COAST Maps. Simplicity and immediate visual impact were key objectives. Without those properties, the essential key information may be lost in detail, and the effort of developing the map wasted. Ownership of such a tool by the user is vital. The simple but effective nature of a COAST Map was the product of academics working with a team engaged in curriculum development, renewal and re-vitalisation.

What is a COAST Map?

Easy to develop, and easy to use, a COAST Map is a simple series of layers (or pages), each comprising a table with cells representing the subjects the student takes in a particular program. Each layer summarises one element of the student learning experience or curriculum design. For example, one layer displays the range of different types of classroom experience, one for the range of types of assessment, one for the learning objectives, etcetera. Hence each cell of the table contains a summary of the key aspects of that element. More than one layer is used for a particular element, if helpful. Colour coding or text-styles are used for similar types of objective, themes in assessment, etcetera,(for example, group work, practical work, field work, etc) to facilitate the tracking of particular themes.

Features may be common to a series of Maps, and across the layers of a particular Map, but it is important that the nature of a Map is determined by the context. Consultation with the range of stakeholders during its development is vital so that the elements displayed and level of detail offered for each are appropriate for the purpose of the Map. To track the development of graduate outcomes, for example, *subject* and *program* objectives might occupy separate layers.

COAST maps are best illustrated by example. Since a full map exceeds the space permitted here, only a brief snapshot is offered below. Two examples are offered here:

- a COAST Map for a particular major program, and
- an excerpt from a COAST Map portraying some of the vital aspects of the First-Year Experience within a discipline.

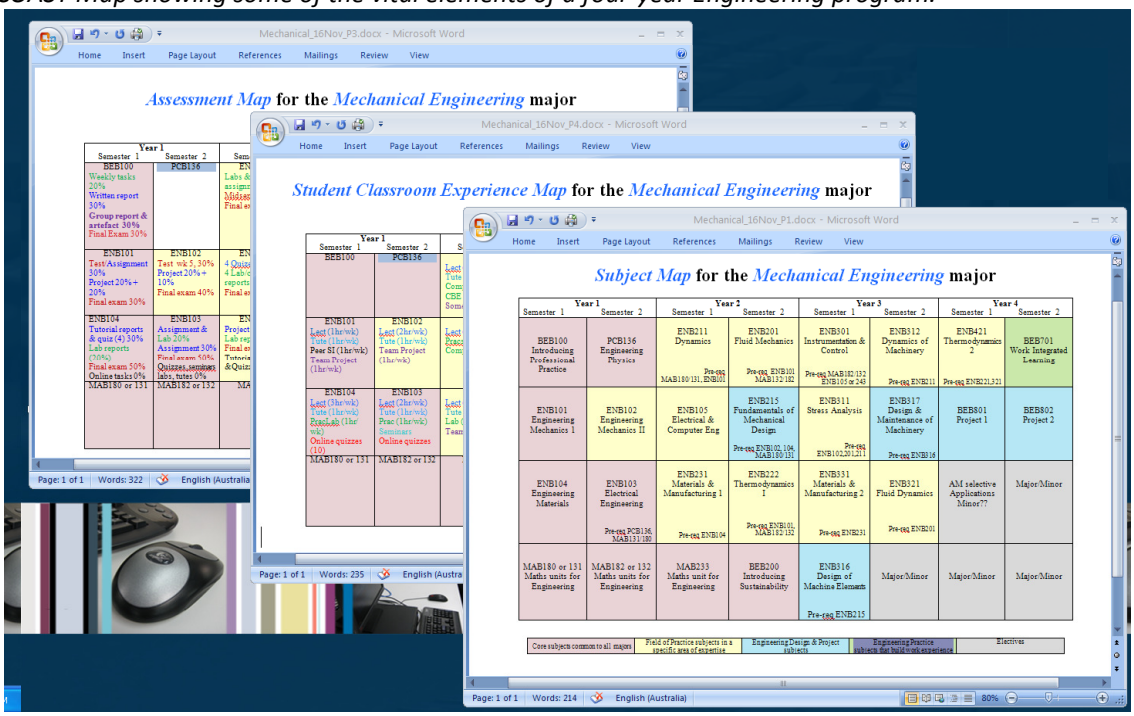
Example of a COAST Map

The Map in Figure 1 shows some vital elements of the four-year Mechanical Engineering major at QUT. In this instance, the academic stakeholders chose six layers that track vital elements of the program as follows:

Layer 1: **C**ourse pathway: the suggested sequence of units, each hyperlinked to its Unit Outline.
Layer 2: **O**bjectives: unit and degree objectives could be displayed on separate layers.
Layer 3: **A**ssessment profile of timing & colour-coded type: assignments, projects, exams, groupwork
Layer 4: **S**tudent learning experiences: the nature of classes & study activities, colour coded.
Layer 5: **T**eacher: Coordinator and/or teaching approaches.
Layer 6: **N**ature/type of unit: Colour coded classification for course accreditation purposes.

Three of the six partially completed layers of this Map are displayed below, with no order intended. Each column displays one semester of the four-year program, progressing from left to right. Text and fill colour (and/or style) are used to link related aspects appropriately.

Figure 1:
COAST Map showing some of the vital elements of a four-year Engineering program.



Using COAST Maps to summarise and advance the First-Year Experience

For assessing or designing aspects of the First-Year Experience for students within in a particular academic program, a COAST or similar Map can be used for a clear visual summary of current or intended practice. A First-Year Experience (FYE) Map would include layers that detail the orientation

activities and special support provided for first-year students, within each unit, to enhance the elements already suggested (that is, the nature and sequence of Course Units, Objectives, Assessment, Student learning experiences, and Teaching approaches).

Where this kind of COAST Map already exists, the information in the first two columns is readily extracted, or viewed in overlay. Clearly, once the Map exists, information for a particular semester or period can be obtained similarly.

An incomplete example of the class activity and assessment portfolio for first-year students in a particular (fictitious) major is shown in Figure 2, to demonstrate how the nature and timing of assessment work across four subjects can be seen a glance. Use of the Map in this way makes it quick and easy for the Teaching Team to see the collective portfolio for first-year across the semester, rectify pressure points, and balance the assessment types.

For simplicity, the learning objectives and other key elements are not shown in Figure 2, but typically they would comprise other elements of the Map. Our Teaching Teams wanted them on hand for ready reference and mapping; hence our proposal that these types of Maps include all the key components identified as being important to the stakeholders. Importantly, too, check points on students' progress, and intervention strategies can be planned and listed on the Map.

Figure 2:
Excerpt from a COAST Map displaying some of the Learning and Assessment activities for first-year students in a fictitious major.

Semester 1, Year 1		
Assessment Plan	**Learning Activities**	**Checkpoints and Interventions**
E100 Weekly tasks 20% Group report & artefact 30% Wk 9 Written report 30% Wk 13 Final Exam 30%	E100 Individual study (.. hr/wk) Group work (3 hr/wk) Lecture (2 hr/wk) Tutorial (1 hr/wk)	**Weeks 3 and 8:** Tutors check engagement in Weekly tasks: Email names of non-contributing students and weak performers to Subject Coordinator
E101 Assignment Wk 10 30% Group Project 20% + 20% Wks 5, 12 Mid-semester Test Final exam 30% Online formative tasks	E101 Individual study (.. hr/wk) Lecture (1 hr/wk) Tutorial (1 hr/wk) Team Project (1 hr/wk) Peer Suppl Instr (1 hr/wk)	
E102 Weekly tute reports 10% 4 Online quizzes 20% Wks 3,6,9,12 Lab reports 20% Wks 4, 8 Final exam 50%	E102 Individual study (.. hr/wk) Lecture (3 hr/wk) PracLab (1 hr/ wk) Tutorial (1 hr/wk)	**Weeks 5 and 10:** Tutors check engagement via Weekly reports and Lab Reports. Email names of non-contributing students and weak performers to Subject Coordinator

Impact: Strong positive response from Academics and Administrators

Because they facilitate a clear summary of learning objectives integrated with assessment and teaching practices, it has become clear that COAST course concept maps offer benefits for educational stakeholders at many levels, not only for administrators and staff, but for students too.

Introduced to academics and administrators in the Faculty of Built Environment at QUT late in 2008 as a visual tool and aid for design, COAST Maps have been welcomed by academic leaders discipline teams, and curriculum developers in the Faculty of Built Environment & Engineering at QUT, and are already proving valuable at all levels.

- Learning & Teaching portfolio managers are using them to assess current practices and to track the development of graduate outcomes.
- Program Coordinators in the School of Engineering Systems are using them to advance program development, with emphasis on aligning learning activities and assessment portfolios with the desired educational objectives of each program.
- Discipline Leaders are using them to track progression across sequences of subjects within their disciplines, designing content and practices appropriately for maturing students.
- Subject Coordinators are using them to align the particular learning objectives, activities and assessment practices of their subjects with program objectives and progression.

Potential Impact on Student Experience and Motivation:

Lastly, and importantly, COAST Maps provide a tool for motivating and engaging students in a particular program because they offer a clear visual picture of how subjects fit together to build desired graduate outcomes, and how the range of classroom and assessment experiences support learning and build graduate capacity.

Our Academics are requesting that COAST Maps prepared for particular majors be accessible to their students in class and on their Blackboard websites, with their own enhancements for the context of use. Further results will be reported later in 2009.

Currently this tool is providing the vital information to examine the learning outcomes of a series of connected units within a program. In BEE, the maps are used by the discipline groups to determine where the deficiencies in developing a particular graduate attribute are and amend the unit content and learning outcomes as well as assessment practices to rectify the problem. It is envisaged that staff will use these maps in the introductory lecture to indicate to the students the position of the unit within the course, what attributes are developed within this unit and how it linked with previous units as well later units.

Discussion

Clearly, what is needed is a technology tool that streamlines changes and updating, and there has been some interest in building such a tool. Current versions of the Maps are simple and visually attractive, but when they need to be updated, the changes must be tracked through manually.

Based on these COAST Maps and the underlying reasons for creating them, a larger project is currently being undertaken in the Faculty of Built Environment and Engineering. This project will investigate the feasibility of creating a tool that will have a database containing the information about the units in a course (program). This would include the learning outcomes of these units, assessment tasks, learning environments and graduate capabilities, along with some simple rules to create Course Maps automatically, tailored to the needs of users.

For example, it is envisaged that a course coordinator could use the tool to track the development of a particular graduate attribute through the course by selecting to view the units in which this graduate capabilities are explicitly taught and assessed. These capabilities could also be linked to accreditation requirements. It is also envisaged that such a tool will allow a student to see how far his/her skills of a particular type (communication, for example) have been developed, and how much further they will be developed in the course. It is hoped to build in interfaces of this tool with the student's E-portfolio that will enable information about his skills development to be directly interfaced with via learning artifacts and reports.

Projects of this type take time and much resourcing. In the meantime, the sheer simplicity of COAST Maps is enabling teaching teams and curriculum developers to engage in careful integrated course development with attention to the student's full learning experience across typical sets of subjects. The succinct overview afforded by these Maps provides such Teams with the opportunity to formalise and build in checks on engagement and progress, and to schedule timely and appropriate interventions.

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