MyCourseMap: an interactive visual map to increase curriculum transparency for university students and staff

Lisa B.G. Tee
School of Pharmacy
Curtin University

Laetitia Hattingh
School of Pharmacy
Curtin University

Kate Rodgers
Curtin Teaching and Learning
Curtin University

Sonia Ferns
Curtin Teaching and Learning
Curtin University

Vanessa Chang
Curtin Teaching and Learning
Curtin University

Sue Fyfe
Office of the Pro Vice Chancellor Health Sciences, Curtin University

MyCourseMap is an interactive curriculum map created to increase curriculum transparency for both students and staff. It provides access to the entire curriculum at a glance, displays alignment of unit learning outcomes, assessments, course learning outcomes, and graduate attributes and links video from employers, graduates and students to help students reflect on the curriculum and its relevance. A prototype developed for the Bachelor of Pharmacy course at Curtin University as a proof-of-concept was tested and evaluated in 2014 and 2015. This evaluation utilised a mixed-methods approach using a blend of quantitative and qualitative data through online survey and structured focus group discussions. From the evaluation, the perceived benefits of the MyCourseMap include students' increased understanding of their degree structure and its relevance to their chosen profession. From a staff perspective, the MyCourseMap helps with review and development of curriculum and professional accreditation. Barriers and challenges have led to prototype refinements.

Keywords: Interactive curriculum map, mobile application, transparency, staff and student evaluation

Introduction

The increasing pressure on universities to attract and retain students from a wide range of backgrounds demands that more effective modes of engaging students with the curriculum and their course of study are needed (Hagel et al, 2014). Challenges associated with understanding complex course structures and appreciating the relevance of course content is enhanced when students are unfamiliar with academic discourse. Whether students enter university directly from secondary education or return to study as mature age students, academic discourse is frequently unfamiliar and difficult to navigate.

Degree structures are often difficult to comprehend for commencing students due to the complexity of the course information, the unfamiliar discourse, the abundance of information and the non-interactive nature in which subject matter is presented. Imbued with academic culture and language, programs of study – including details on individual subjects – are often unfamiliar to the majority of first year students and those considering tertiary education. Typically, brochures are created to complement university handbooks to provide degree information. These include lists and descriptions of units categorized under progressive years. Prospective and current students are also able to access this information online, but the information frequently lacks detail and is presented such that there is minimal student perception of relevance.

With increasing government requirements that Australian universities are to adopt a more inclusive approach and be accessible to diverse student cohorts, including those from low socio-economic backgrounds and Indigenous Australians (Department of Education 2008; Lenz, 2007), universities must be more innovative in communicating the structure, relevance and content of curricula as well as the graduate capabilities and outcomes resulting from successful completion of students (Australian Government 2011). It is imperative that universities motivate, engage and inspire students about their course of study in a clear, concise and compelling manner.

MyCourseMap is an interactive visual curriculum map that supports students in understanding the structure and integration of units in their chosen or prospective degree and assist them in appreciating

the relevance of individual units of study to the profession or discipline. Furthermore, this dynamic and interactive tool, available through mobile and touch digital technologies, has the capacity to inform, inspire and engage students by enhancing their professional identity development. A comment from a secondary school student upon presentation of the Bachelor of Pharmacy visual degree map as an example of a curriculum map was:

> "This map will show me the entire degree that I will embark on. With references from videos of students and professionals telling me about the units that I will be taking in the entire degree, I will be more confident and with increased confidence, I will perform better".

For academic staff, curriculum review and renewal may be supported through a variety of mapping exercises undertaken to support a whole-of-program-approach in the incremental and progressive development of students' achievements that align with program goals, graduate attributes and professional competencies (Ewan, 2009; Hagar & Holland, 2006). The purpose of any program mapping process is to allow cross referencing and support the integrity of the curriculum intent, thus ensuring that students achieve the intended learning outcomes with neither omissions of essential materials nor unnecessary duplication of student and staff effort. With a conceptual framework and supportive database, a coherent curriculum structure will be easy to assemble, manage and update. Furthermore, the potential of generating reports showing the curriculum elements across a course provides valuable 'intelligence' for informing curriculum renewal. MyCourseMap will facilitate curriculum mapping through assisting staff with examining the intended, taught, and assessed curriculum. It is important to recognise that this relationship is most frequently examined at a "subject" level, however use of an online tool will enable mapping to the level of students' individual learning opportunities.

This paper provides a strong rationale for the need of an interactive and dynamic tool such as the MyCourseMap. The MyCourseMap prototype and rationale for the entire curriculum map with alignment of unit learning outcomes (ULOs), assessment, course learning outcomes (CLOs) and graduate attributes are described. This is followed by an evaluation of the prototype by staff and students. The paper concludes with the results of the evaluation highlighting perceived benefits, barriers and future plans of the MyCourseMap.

Approach to development of MyCourseMap tool

Development of the MyCourseMap application is based on previous work undertaken in the development of curriculum mapping tools (Oliver, 2008, 2010; Jones 2009; Lawson, 2010). The curriculum map provides information on the key elements in a curriculum and their relationship (Prideaux, 2003). Although students are key stakeholders of programs of study, curriculum maps are typically created for academic purposes but are not necessarily used by academics on a day to day basis. In addition, the role of the curriculum in communication with students has been relatively neglected (Harden, 2001). This project combines the curriculum map, students as key stakeholders and communication in an innovative approach to engaging students and motivating their learning. Its delivery via the internet and through mobile technologies means it can be accessed from anywhere at any time.

Figure 1 provides an image of the visual approach taken, providing a single page shot of all units contributing to the Pharmacy degree and their position over time and across themes.

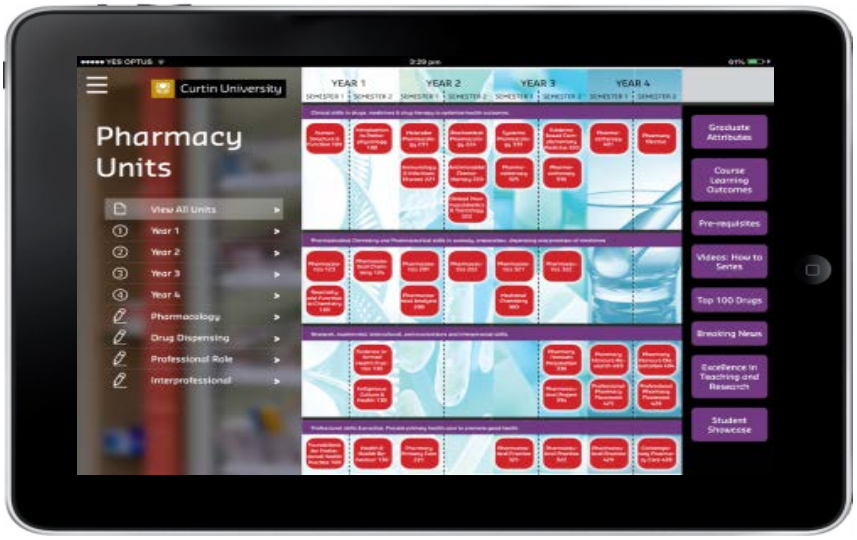

Figure 1: MyCourseMap visual overview.

Specifically, the MyCourseMap structure:

- provides immediate relevance for degree content and its organisation
- provides a visual picture of the horizontal and vertical integration across the curriculum
- identifies the desired graduate capabilities with links to the degree content
- links learning outcomes with unit/courses and assessment tasks
- allows linking of content and assessment tasks to CLOs
- embeds peer, graduate and employer stories (through text, audio and video) to demonstrate the relevance of the course/program structure and content
- clearly identifies graduate employment prospects for degrees and degree streams
- provides a tool which can also be used for curriculum review and renewal by embedding horizontal and vertical integration within a program of study.

For staff, manual construction of curriculum maps is a cumbersome and time-intensive process. The MyCourseMap tool provides a readily accessible curriculum map which enables the curriculum to be interrogated with ease. With the development of the visual curriculum map, information linked to the map will be easily accessible to students and staff.

For each degree there will be information on:

- the course/program learning outcomes
- the graduate attributes
- professional competencies
- themes which add to the matrix of meaning within the course.

The MyCourseMap tool will have the flexibility to allow the curriculum map to be built according to themes (Figure 1) for the Bachelor of Pharmacy at Curtin University, or according to CLOs or professional competency standards.

MyCourseMap prototype

The MyCourseMap tool was first developed as an iPad App with a series of interactive 'buttons', representing units which are linked to the student's course plan and assessments for the unit (Figure 1 and 2). For academic staff MyCourseMap provides a holistic view and is a readily accessible resource to enable them to view other units, their learning outcomes, teaching approaches and assessments.

Figure 2: Interactive 'buttons' representing units linked to detailed unit information including tuition pattern, syllabus, ULOs and assessments

In particular, the MyCourseMap prototype allows students to clearly visualise where each assessment links to the ULOs and CLOs, highlighting the relevance of the units and their assessments for students. The application allows for unit buttons to be linked to videos of students enrolled in the course, teaching team, alumni and practitioners (Figure 3). This is a valuable approach as peer learning has been identified as a powerful and relevant learning tool which is particularly relevant to the millennial or Gen Y generation (Nimon, 2006).

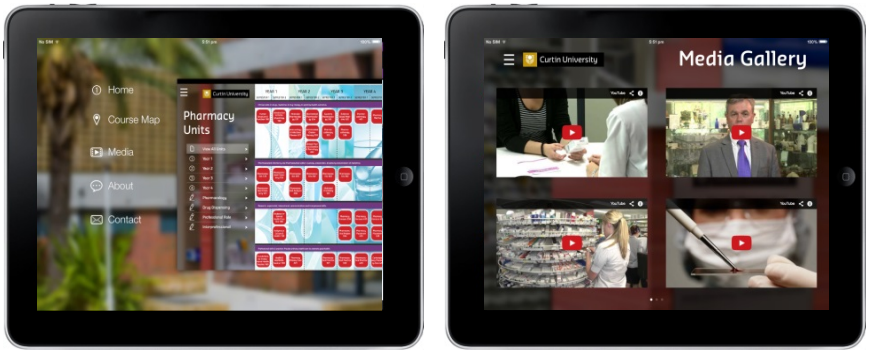

Figure 3: MyCourseMap homepage and unit buttons linked to short video clips of students, teaching team and professionals

MyCourseMap also provides students and staff with explicit and transparent information about the entire curriculum. For example, at a touch of a button, a specific Graduate Attribute associated with particular units in the degree will be highlighted (Figure 4). Similarly CLOs associated with the degree will be illustrated. Students may not always see the relevance of units and their collective contribution. For example, first year students at Curtin are introduced to Interprofessional Education (IPE) and Indigenous Cultures and Health, but may not recognise the relevance this early on in their studies. At a click, all units with learning outcomes associated with IPE, for example, will be highlighted. With MyCourseMap, student engagement will be enhanced with the realisation that there is a continuum of learning throughout the course.

Figure 4: All units linked to a specific graduate attribute are highlighted

The tool has particular applicability for year coordinators and staff advising and counselling students on degree progression. It also provides “one stop” information for professional staff who may be the first point of contact for students and provide advice on study plans.

Methodology

This investigation employed a mixed methods approach using a blend of quantitative and qualitative data to evaluate the robustness of the proof-of-concept of MyCourseMap developed for the Bachelor of Pharmacy curriculum. Through using a mixed methods design, the qualitative data provided a deeper understanding of the findings ascertained through the quantitative data collection and analysis (Creswell & Plano Clark, 2011). The quantitative data were collected through the adminstration of an online survey which gathered the perceptions of both students and staff in relation to the features of the MyCourseMap prototype. The qualitative data was collected through a series of focus group discussions.

This study received ethics approval from the Curtin University Human Research Ethics Committee. Potential participants were provided with a participant information sheet with details of the study and signed a consent form. Participants were informed that participation in the study was completely voluntary and that they could withdraw at any time from the study without prejudice.

Workshop and data analysis

During the workshop participants were provided with an iPad to interrogate and test the robustness of the MyCourseMap App and provide feedback on its features. Each workshop was presented in three parts.

1. Background information of the design and concept of MyCourseMap was provided

2. Participants “played” with the MyCourseMap prototype using the iPad provided to test the functionality of the application including features such as video, interactive capability, entire course view at a glance.

3. Quantitative and qualitative data were collected.

Quantitative data were collected via an online survey and focus group discussions evaluated the visual map features and determined further revisions and refinement of features to strengthen the MyCourseMap App. The online survey covered a range of strategies including the use of Likert scales and open-ended questions. Specifically the online survey was designed to gather the perception of students and staff on the features of the MyCourseMap tool and comprised of a suite of three questions:

- To what extent do you think the following features have provided relevance or are useful to the course you are enrolled in?
- How important do you think each of the following features are for inclusion in MyCourseMap application?
- To what extent do you think these features will help enhance learning and teaching experiences in your course?

A four point Likert scale was used (1. Very little; 2. Some; 3. Quite a bit; 4. Very relevant, useful or important).
Semi-structured focus groups consisting of 8-12 participants and approximately 30 minutes in duration were conducted at the end of workshops. Facilitators used a focus group interview guide with open-ended questions to facilitate the discussion and to ensure some consistency between the various focus group discussions. Discussion focused on the best aspects of the prototype and those aspects that needed improvement and other features which participants thought might be useful. All interviews were audio-recorded and manually transcribed verbatim. Participants were de-identified and codes used in the analysis to indicate whether the participant was a staff member (SF) or student (ST) i.e. SF1 was staff focus group 1.Data were entered into NVivo and analysed using thematic analysis.

Results and discussion

Demographic data

In total 134 participants completed the online survey. Sixty-one students from all four years of the Bachelor of Pharmacy course and 73 staff members from various schools across Curtin University participated in the workshop (Table 1). The staff members who participated included 35 academics with different roles (teaching academics, course coordinators, and unit coordinators), 32 professional staff (from Curtin Teaching and Learning, Curtin Learning Institute, Curtin Information Technology Services, Student Services), and six administrators.

Table 1: Demographic details of students and staff

Participants	**Groups**	**n**	**% responses**
BPharm Students	Year 1 Year 2 Year 3 Year 4	17 2 7 35	12.6 1.5 5.2 26.1
Staff	Academic Professional Administrator	35 32 6	26.1 23.9 4.5
Total Respondents		***134***	
Area of enrolment or work		**n**	**% responses**
Centre for Aboriginal Studies		1	0.8
Curtin Business School		2	1.5
Curtin English Centre		1	0.8
Faculty of Science and Engineering		6	4.6
Faculty of Health Sciences		101	77.1
Faculty of Humanities		5	3.8
Vice-Chancellery		8	6.1
Others		7	5.3

Survey responses

Survey responses provided evidence about the MyCourseMap features that were perceived to be relevant, useful and important for inclusion in the mobile application (Figure 5).

In order of preference participants valued : (1) the ability to view the entire course map, (2) interactive unit buttons which provide unit details including tuition pattern, ULOs, assessment at a touch, (3) home page which shows the overview of the course, (4) pre-requisite map, (5) key word search functionality, (6) the “contact us” functionality to provide easy access to submission of queries, (7) interactive CLOs, (8) testimonial videos of students, staff and industry, (9) student showcase, (10) interactive graduate attributes, (11) media gallery, (12) staff showcase and (13) breaking news blog.

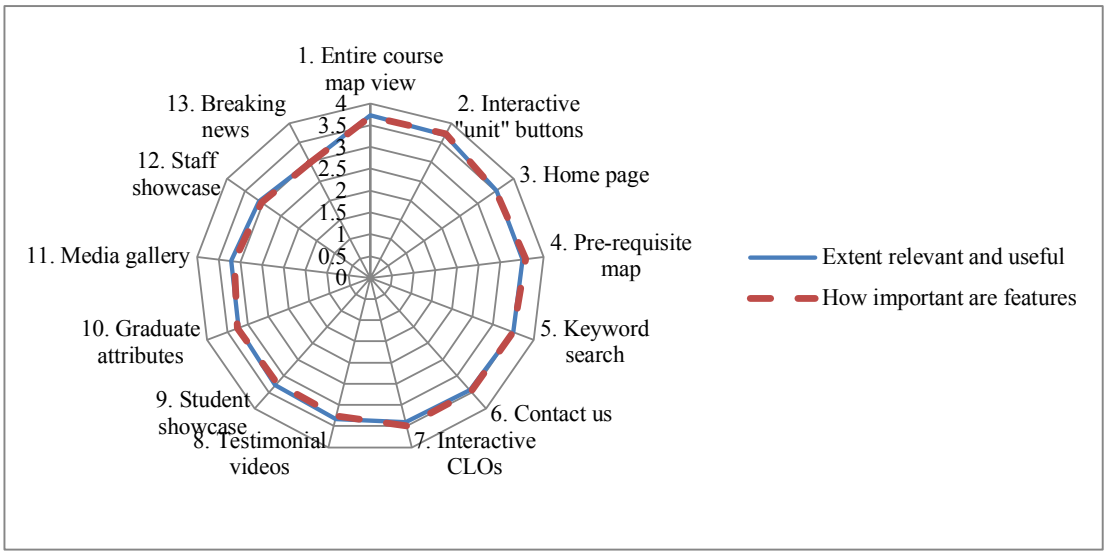

Figure 5: Students and staff perception on the relative relevance, usefulness and importance of MyCourseMap features. A four point Likert scale was used, 1 for minimum and 4 for maximum value in terms of relevance, usefulness and importance of features in the MyCourseMap tool.

Focus group discussions

Between September 2014 and February 2015 a total of eight focus groups were conducted: five with staff members and three with students. Each focus group consisted of between eight and 12 participants and on average took 36 ± 13 minutes.

Staff and students identified various advantages using MyCourseMap and provided some insights into some of the challenges and barriers to utilising the application.

Advantages

The four main themes about the advantages of using MyCourseMap that emerged from staff focus group data were:

- Incorporation of modern technology,
- User-friendly and easy to navigate,
- Providing a holistic picture of a degree, and
- Multiple applications and uses.

Table 2 provides a summary of the four themes with selected quotations to support the themes.

Three main themes about the advantages of using MyCourseMap emerged from student focus group data namely:

- User-friendly and easy to navigate,
- Providing a holistic picture of a degree, and
- Useful for planning.

Two of the themes overlapped with the staff themes (*User-friendly and easy to navigate* and *Providing a holistic picture of a degree*). Table 3 provides a summary of the three themes with selected student quotations to support these themes.

Table 2: Summary of staff themes about MyCourseMap advantages

Theme	Quote
Incorporation of modern technology	"It looks like most Apps, you know it works like most Apps work, which means everybody will know how to use it" SF4 "It is exactly what my teenagers would want" SF3
User-friendly and easy to navigate	"I think this is a great concept and I like the idea that you can click on first year or second year, or third year and see specific units within each year" SF1 "I am not very technical and all the testers, so I managed to find my way around it very easily so that was good" SF1
Providing a holistic picture of a degree	"But I think it is just going to help students to see where they are going, literally." SF4 "... they can go in and say ...we have to learn how to present to an audience. We're going to do it in this unit, this unit. I think that sort of mapping will give them much more connection with where they're going to end up, because we do teach unit by unit" SF4 "... it was great to be able to see an overview, because whenever, as a designer, I would come in to work on something, it would take a while to assemble that information." SF5
Multiple applications and uses	"I think it would be really useful, particularly just having done our curriculum re-accreditation that we have spent a lot of time doing exactly this." SF1 "You can make sure that they are scaffolder across the course. So you can take one competency and say we teach it to this lower level in the first year and in the second year we will ramp it up a bit. So you can map competencies and you can make sure that it is being done properly, rather than a bit hit-and-miss." SF1 "I can't really emphasise how great it is for curriculum builders, unit coordinators, Head of Schools, within Faculty. Even for the admin staff at University." SF1 "Visually I think it is so much easier. I mean we've gone through accreditation. You got all your units and you're counting down how many do I have and how many on excel spreadsheets and bits of paper. But you can just press this and go "okay my graduate attribute .... Communication, oh I've got that many, beautiful." SF3

Table 3: Summary of student themes about MyCourseMap advantages

Theme	Quote
User-friendly and easy to navigate	"It's quite visually simple, easy to work your way around it, work your way around it." ST1 "I think it is great because when you are studying and if you need to look at a course outline, or if you need to look at the assessments it's quick, you can just go to the one spot instead of looking through Blackboard." ST3
Providing a holistic picture of a degree	"When I enrolled I wasn't sure actually what I was going to be going into. And I had no idea about any of the units that I would be having to enrol in but having this App it shows you all the units." ST3 "I think especially for the first year which again is, I keep saying this, but it's a very general year just being able to see where it fits in a greater context and that it is important because it leads into a few other units, is probably quite helpful." ST3
Useful for planning	"Yeah it will help me get prepared ... it helps me prepare for what I am

	actually going to do in like the course." ST3 "... so that was all in one place, it would help me get organised so that I can plan ahead and stuff like that. So yeah in the long run it would help me in my learning experience." ST3

Barriers or challenges.

Staff participants identified barriers and challenges that may impact on academics in MyCourseMap implementation, as summarised below.

Complicated for complex courses

These concerns involved complex degrees as reflected by the following:

> "... but imagine if you come from a Bachelor of Science…" SF3
> "…all the options that you have in the world, it would be a mess developing them…" SF3

Keeping information up-to-date

There were some concerns about the work involved to keep information current and overall the participants agreed that regular updates, i.e. every three months, would be required:

> "I think I am in agreement with you ... I think they want to know probably what the work load is going to be and what it's going to lead to. But it's changing so fast that's the only thing." SF2

Participants also identified the need to link MyCourseMap to Student One (Curtin University student data base) to enable changes to be automatically updated:

> "I think as long as it is linked to the original source of information that it would be a great central area for it. But if you haven't got that link then it would be nightmare." SF3

Easy to include too much detail

There was agreement that the initial scope of MyCourseMap should not be very broad as this might overwhelm academics:

> "You don't want it so big that then people go -Well it's too much." SF2

> "We need to go back and say what do we want this to be? Is it just for marketing, to get them in and then all those other things that we've talked about then is linked further down and it goes to like Blackboard or the website or whatever. So I think we have to maybe make it smaller rather than bigger." SF3

Student use

Some staff participants indicated that MyCourseMap may have limited use for high school students. Other concerns involved the need to make students aware of using the application and there were concerns about students using MyCourseMap instead of Blackboard (Curtin's learning management system) for important information pertaining to course requirements.

Refinement following evaluation of proof-of-concept

Evaluation of feedback collected aided in defining software requirements and features to improve, enhance and refine the product. As a result MyCourseMap will in future be delivered online, as a web application rather than iPad App, available any time and on any device.

Significant improvements to the user experience include offering an intuitive, easy to navigate holistic picture of a degree with unit information pages that continue the information design aesthetic (Figures

6 to 8). For staff members, the administration interface is easy to use, and unlike complex enterprise systems, new users can get started within minutes.

Addressing barriers through good software design

Themes emerged in the evaluation of barriers, including the suitability of the map for complicated courses, ensuring up to date information, and the risk that too much detail could see the software become all things to all people. Furthermore there were concerns about efficacy for high school student needs, and conflict with current students as a source of accuracy for unit information. These were strong considerations in the redesign and redevelopment of the MyCourseMap application. The first principle established was to keep the solution simple – but powerful. User experience for both students and staff was considered paramount, and the design ensured that the features were universal and meaningful.

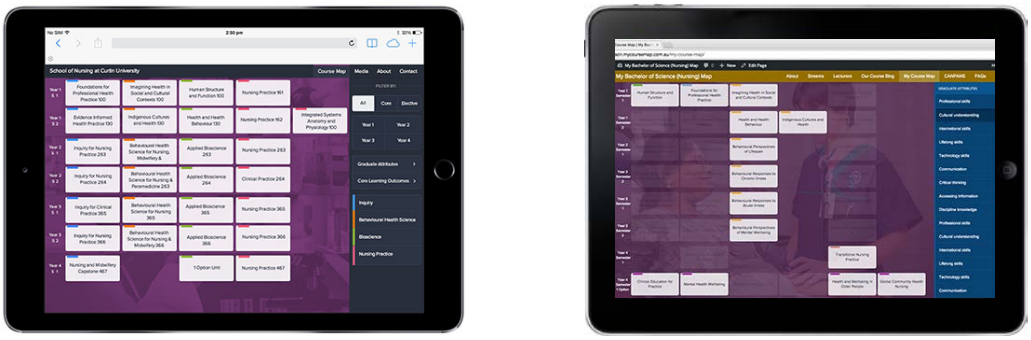

Figure 6: Easy to use at-a-glance portal for course information. Tool is designed to include filters for CLOs, graduate attributes, year of study and discipline areas.

MyCourseMap is fully configurable but comes pre-loaded with standard information such as teaching periods and course duration. A straightforward three year, semester driven course can be set up within minutes. The ability to add filters and streams enables more complex courses to be configured, such as those with common first year streams that then diverge into specialisations.

In addressing the need to ensure up to date information whilst keeping features universal, a solution was developed to allow for manual entry. Technical staff are in the process of developing an Application Programming Interface (API) which will provide a universal language for enterprise systems to connect and share data with MyCourseMap. For small organisations or single schools, this means content can be managed directly in the MyCourseMap system, becoming a single portal for all course information. Enterprise deployments can integrate using the API, aggregating information from sources such as a Student Information System (Student One), Course Handbook, and the Learning Management System (Blackboard).

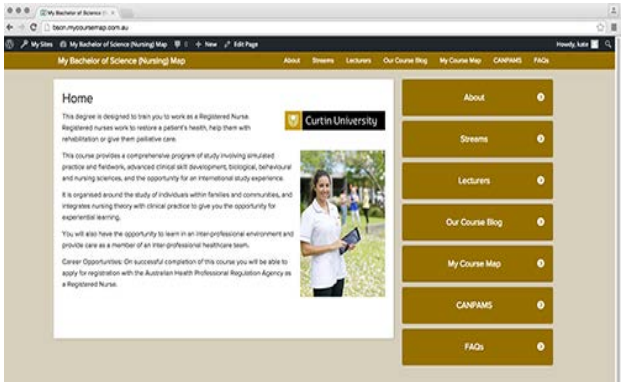

Figure 7: MyCourseMap as a web portal with capacity to publish blogs, galleries and rich media.

As such, the refined design ensures that students receive accurate and on-time information, and are directed to the appropriate sources of information (eg. Blackboard). Furthermore, linking with enterprise systems enables greater transparency of their course and the curriculum, which in turn increases engagement from prospective students by getting them excited about the content they are going to learn.

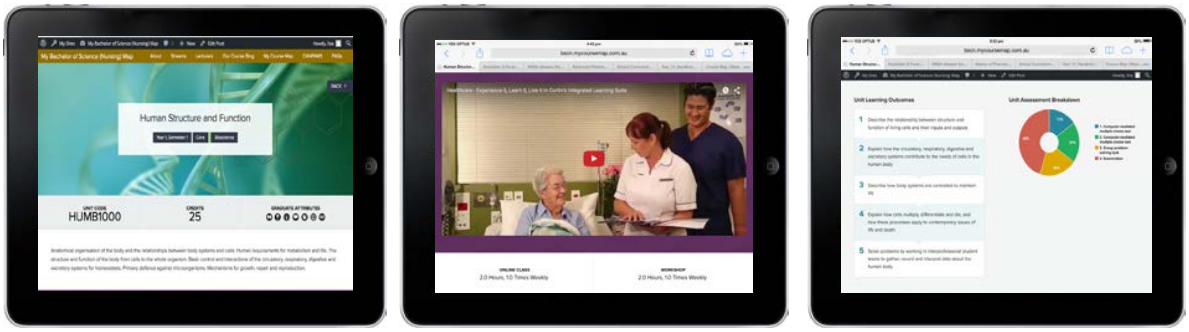

Figure 8: The unit information page can aggregate information Student One, Blackboard and the Course Handbook.

Robust software design delivers increased usability and accessibility on any device at any time, and delivers the opportunity to engage current and prospective students with course curricula in a format that is modern, intuitive, and relevant for the audience. Furthermore, the software offers flexibility, allowing it to scale from small training providers to large higher education institutions. The software is applicable to the diverse needs of training providers, not only offering organisations a better planning tool for their students, but providing a marketing tool that motivates students about the topics they are going to learn through the inclusion of rich media. Finally, by its very design, it delivers a transparent map of the curriculum, in a language accessible to all and understandable by specialists including those who evaluate and conduct accreditation of training courses.

Conclusion

MyCourseMap will provide students and staff with explicit and transparent information about an entire course curriculum. For example, using the touch technology, a Graduate Attribute aligned to specific units in the degree will be highlighted. Similarly CLOs associated with the degree will be illustrated and made clear to both students and staff. Students may not always see the relevance of units and their contribution to the whole course. With MyCourseMap, students will understand that there is a continuum of learning throughout the course. MyCourseMap provides substantial benefits for both staff and students. Awareness of the impending course content and learning experiences can heighten students' expectations and prepare them for the learning journey and optimise outcomes. Providing staff with an easily accessible tool which enables them to interrogate curriculum and monitor alignment between learning outcomes and assessments facilitates quality curriculum and consistent review and reflection on integrity of the student experience.

The MyCourseMap offers scope for future resources to be linked to the curriculum map including simulations and virtual learning tools. Case studies could be developed which may be shared across different disciplines allowing engagement in a discipline specific manner. There is potential for the MyCourseMap to be built into the University's course review process but operational matters such as ongoing maintenance, defining a business owner, and sourcing funds for continued enhancements will need to be considered.

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