CODE FOR SUCCESS: A ROADMAP AS AN ORGANISING DEVICE FOR THE TRANSITION OF FIRST YEAR SCIENCE STUDENTS AND THE DEVELOPMENT OF ACADEMIC SKILLS

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ABSTRACT
An online roadmap has been introduced to improve the standard of academic skills by embedding a semester long sequence of stimuli and resources for new students within our large, general science degrees. This device is faculty managed and links administration, curricular and support services to the just-in-time needs of the students. This institution-wide curricular and co-curricular approach extends and supports our existing workshop and mentoring activities. It answers and prompts frequently asked questions, inducts students into the broader culture of the faculty and integrates information literacy and other academic skills which will be taught, practised and assessed during their first semester at university.

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INTRODUCTION
Students start university from a wide variety of backgrounds and with a large variation in their preparedness for study. The Australian university campus can be an arena in which the ability for self-directed and independent study is often a synonym for being able to survive in large classes (Kift *et al.*, 2006). These problems may be exacerbated in big, research-intensive universities and in programs of study that require students to move conceptually and physically between multiple disciplines from the day they arrive on campus.

Kift (2004, 2008 and 2009) and Kift, Nelson, and Clarke (2010) have outlined and demonstrated the efficacy of a “transition pedagogy” for cross-institutional integration, coordination and coherence of first year experience policy and practice. One approach to achieving a successful transition employs a “just-in-time” method involving a faculty-managed but student-centred timeline. Such a process (Macken, 2009) develops the important elements of the student’s transition when it is needed: namely, just before and at each key milestone in the semester.

STATE OF PLAY FOR INCOMING FIRST YEAR SCIENCE STUDENTS
The Faculty of Science at the University of Sydney enrols a large number of students into its 5 degrees. The Faculty is made up of 8 Schools and a number of research institutions. These are themselves large institutions and are effectively semi-independent with their own approaches to teaching and learning. In addition, students in a wide range of professional and generalist degree programs from other faculties enrol in its science units, either because these degrees require core scientific knowledge or because of intrinsic interest. All of these students have a wide range of abilities and family/personal experience of higher education. This arrangement is quite typical of research-intensive universities.

The transition process is thus divided between, at least, 3 organisational units: the whole university, the faculty and the disciplines. This presents a particular challenge for developing an institutional approach to transition (Kift *et al.*, 2010) and for avoiding “piecemeal” approaches (Krause, Hartley, James, & McInnis, 2005). As noted by Kift *et al.* (2010), successful transition is strongly influenced by activities that relate both to the curriculum and to co-curricular support. Our experience at Sydney is that many students do not take advantage of the academic support available in orientation week and in the first part of semester. Interaction between this support and the formal academic program and a

realisation of their relationship are the keys for success. There is a clear necessity for an "organising device" to "bring the two together for program coherence" (Kift *et al.*, 2010).

To be useful and hence successful, such a device needs to present logically and help to manage curricular and co-curricular activities for students. It needs to minimise overlap and workload for the different cogs in the institution and to recognise that orientation is "a process, not an event" (Kift *et al.*, 2010) which occurs across the "whole of first semester" (Kift, 2004).

In recent years, the number and diversity of students entering the university mid-year (i.e. at the start of semester 2) has increased. Alongside international students enrolling following a northern hemisphere summer, this cohort typically contains mature and transferring students. The orientation of these students is problematic: institution-wide activities are more subdued and tend to be targeted at the international students whilst teaching staff need to balance the needs of the new students with those already familiar with the institution. The organising device thus needs to be flexible enough to be useful to both cohorts in semester 2.

Many students commute to the campus, sometimes over large distances, and a majority of the cohort continues to rely on their existing social circles for, at least, the first part of the higher degree. Whether these students are transitioning from state or private schools, or from the workplace, the size of the campus and of the classes can be a real shock. Alongside the more independent style of learning that is expected, students can choose to, or may drift into becoming disconnected from the whole experience. Having a formal transition process in place can help avoid this disconnection and enhance the experience.

Students have a variety of academic skills and proficiencies when they begin university. For students in our main science degrees, there are no core units and there is no introductory unit or time within the first part of semester to try to ensure adequate preparation for study at the higher education level. Depending on their strengths, preferred major or interests, students have the choice to study from a range of fundamental sciences and mathematical topics and electives. Most of these subjects offer multiple streams as well as variations for students with no, or advanced, high school knowledge.

The positive side of this is, of course, that students have a wide range of choices while the downside is that students' timetables are complex. Friends starting their degree together may well end up in different classes even with the same combination of choices. Whilst this may be seen as a positive in the long term, this separation can cause angst at the start of the year. Individuals may only get the opportunity to meet up with new people once or twice a week unless they proactively chose to do so by seeking people out in the large lecture theatres and laboratories. Forming social and study networks beyond their existing circles can be difficult.

At Sydney, there is presently a reluctance to introduce a separate 'study skills' unit into the already crowded first year of the BSc degree, despite a growing appreciation of the variability of the standard of skills amongst incoming students (Pyke, 2011). At worst, information skills are seen as "someone else's business" (Arndell, 2012). At best, a number of discipline-based initiatives have been introduced to patch up these deficiencies. These include some interesting and effective interventions – see, for example, Lilje, Breen, Lewis, Yalcin (2008) and Bridgeman and Schmid (2010). When individually effective but isolated, discipline-based interventions are introduced, however, the improvements are similarly isolated. Moreover, duplication naturally results, leading to increased workload and frustration for students.

The range of disciplines that are offered and the lack of a core or introductory unit also mean that it can be difficult to integrate any faculty-managed response to these issues. Each discipline's approach for introducing the student to higher education is likely to be different and to reflect perceived discipline-specific requirements. Coordinating a transition process with limited funding and a diverse set of procedures is daunting.

To reflect these challenges, the Faculty of Science at Sydney introduced an annual one-day 'transition workshop' (Peat, Dalziel, & Grant, 2000). This event occurs before the formal and informal orientation week events and covers both social and academic orientation with a parallel session for parents. All students enrolled in the Faculty of Science are invited and 40 – 50% attend the workshop,

even though the event is not mandatory. A strong correlation between attendance at the workshop and academic success has been demonstrated (Dalziel & Peat, 1998).

Attendees are given the opportunity to meet and talk to current students and academic staff in a relaxed setting, as well as to each other. For part of the day, the students are grouped by planned major so that they are in relatively small groups and can meet educators and students with direct experience of "the route to success" in that subject area. The students are encouraged to form social networks, and even study groups, and have a point of contact in a particular discipline. After this workshop, a mentoring program is used and a number of follow up meetings are instigated to further facilitate contact between the students and ensure the success of the networks (Donohoe & Taylor, 2010).

Although the main benefits from the workshop are probably social, a large amount of valuable information and advice is presented at such an event. Attendees leave with a "showbag" containing valuable tips and details of services (Peat, Dalziel and Grant, 2001). Such resources are expensive to produce and it is an interesting question as to how much they are used, given the volume of information being presented and the other distractions at this point in a student's life.

The workshop is rapidly followed by the social whirl of orientation week ("O-week"). The main academic input from the Faculty of Science to this is the "Welcome" event in which the Dean introduces the First Year Directors from each discipline as well as representatives from the faculty and student services. As with the transition workshop, the amount of information presented is considerable. Whilst highly valuable, the information in the workshop "showbag" and in the "Welcome" event is, of course, often lost in the flurry of events at this time of the year. Moreover, although the workshop and "Welcome" event are well attended, it is probable that the students in most need of assistance do not attend.

The initiative described in this paper aims to build on the success of our transition workshop and mentoring program, within the framework of the transition pedagogy. A "roadmap" for students is introduced as the faculty-managed, organising device for students to keep to during their first semester. The roadmap purposefully links academic support with the formal curriculum through direct links between students, teachers and the University Library. This provides a way for students to follow the advice already available from our existing events but in a managed and simplified timeline.

eCOMMUNITY

Every student enrolled in a unit of study taught by the Faculty of Science is also enrolled in a website on the University's learning management system (LMS) called the 'First Year Science eCommunity'. This site contains program-level information such as resources for developing graduate attributes and answers to frequently asked questions. Its purpose is to impart a sense of "being a scientist in a community of scientists" to students just beginning higher education.

As noted above, beginning students have a breadth of academic skills. As participation at university widens, this range is likely to increase. It is likely that many more students will not have some of the fundamental skills which those teaching them assume they have. The resources on the eCommunity site provide opportunities for students to develop or sharpen these skills in a set of scaffolded and modularised tasks (Knecht & Reid, 2009). The University Library offers a range of online modules in key research and information skills, and these mini-tutorials are short and accessible to new students (Arndell, 2012).

Having a single site containing these resources and having it housed within the LMS is extremely useful. The LMS is an online venue for coursework resources and is therefore heavily used by students. Most students naturally look to it for academic information rather than to the main university or faculty websites. Such a site is obviously only useful if students (a) discover it and (b) use it.

TRANSITION ROADMAP

Figure 1 shows a screen shot of the front page of the community site that students see when they visit it during orientation week or during the first two weeks of semester. It was designed using feedback from the Learning Centre, Library, eLearning Helpdesk and Faculty on transition issues, from a student-focus group and in collaboration with the faculty marketing team to provide a simple, organising device for first semester. The image on the left shows a sequence of steps up a stylised

DNA “ladder” with tasks, questions or information coded by week in which they are most relevant. For O-week, the steps are:

- What is eLearning?
- How do I access my timetable?
- How do I access and redirect my email?
- What is a unit outline?

Figure 1: Front page for First Year Science eCommunity site showing roadmap for orientation week and weeks 1 and 2.

Some of these are frequently asked questions but others are questions that *we* want or need students to ask. For example, the necessity to use eLearning for providing access to tutorial worksheets and lecture slides begins in Week 1 yet many students will not be aware of its key role in content delivery at university. Others will discover software and hardware issues when they attempt to use the more complicated tools of the LMS. It is clearly better to have this awareness and to solve these problems before classes and assessments begin in earnest.

Hovering over these generates a small pop up window, as illustrated in Figure 2, with more detailed information. For the eLearning question, for example, this provides links to deal with common issues reported by faculty, the eLearning helpdesk and the student focus group such as browser compatibility and plugin requirements. Such issues are often easily solved once help is sought. Many students, however, assume the problem lies elsewhere, or may simply move on, leading to a delay in accessing online resources. The roadmap aims to prompt the student to seek assistance and to link them with it.

These questions and steps are presented in 3-week blocks so that students can plan ahead and see upcoming barrier points. Thus, the last date to change enrolment and, of course, the census date do not rely on just-in-time communication. Students can also backtrack for events and transition steps that they may have missed or overlooked.

If a student is seeking answers to these questions then administration time and queuing for information is reduced. If a student is not asking these questions then hopefully they are prompted to consider that these are the types of questions that they *should* be asking and addressing.

Whilst the O-week steps are directed to encouraging organisation and readiness to study, Weeks 1 and 2 mix such issues with questions aimed at triggering academic skill development. In Week 1 students may ask:

- Where are my classes?
- Where can I get my lecture notes?
- How do I find books and articles?

- When are my assessments?

The electronic nature of the roadmap means that, for example, the answers to the first two of these questions link directly to the campus maps and the appropriate website respectively. The last question encourages students to investigate and plan their assessments for each subject/course. The eCommunity site also allows them to download a calendar of their assessments to their preferred app on their mobile phone. Such an approach actively encourages student responsibility in delivering on the assessment deadlines whilst recognising their lack of experience by scaffolding and supporting this process.

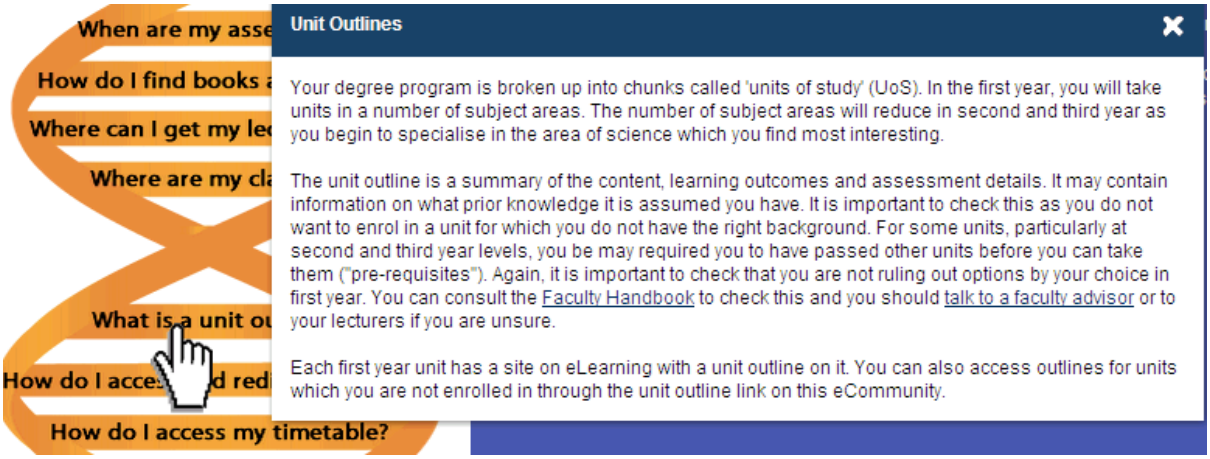

Figure 2: Example of an information pop up for a week 1 task on the roadmap.

The third question, “How do I find books and articles?”, is the first rung on the ladder which seeks to join co-curricular support with the science curriculum (Arndell, 2012). It sends the students to one of the Library’s Research and Information Skills modules. This question and the associated module attempts to steer them to consider the type of resources that are available and most useful in higher education. It is introduced at this stage of the roadmap to coincide with tasks being set in the formal program. If a student missed a formal tour of the Library’s facilities in O-week, this link with the module is invaluable. For all students, it is important to embed the “missing link” between the formal curriculum and support services

In Week 2, only two tasks are suggested and both of them encourage students to proactively build academic skills:

- What is plagiarism?
- What is a ‘scholarly resource’?

These questions actually directly relate to the tasks set in the units taken by the students at this point. They probably also reflect two of the most important differences in the learning skills expected in higher education compared to high school. The answers to both of these questions direct students to complete matching modules on the Library website.

Written assessments are beginning to be set at this point of the semester. An appreciation of what constitutes plagiarism becomes important for these assessments and for the laboratory courses that are also just beginning. Similarly, the question of what is or is not a reliable source of information should be considered *before* they begin assessed work. Developing these academic skills and informing students of their responsibilities on these issues also satisfies policy requirements in a logical and progressive manner.

After finishing these modules, students can download a “certificate of completion”, which may be required across multiple units of study. All students taking a unit of study with a laboratory component, for example, are required to complete the plagiarism module. Rather than having separate, overlapping and possibly conflicting requirements for dealing with this topic, the student is presented with a consistent and short task which they need only complete once, for all first year assessments.

To aid this skill development and the student's individual responsibility for their own learning, the students are also presented with the opportunity and instructions on how to use these certificates in an ePortfolio. At this stage of their first semester, the ePortfolio may well be no more than a convenient place to store these certificates. However, this forms the basis for developing its wider potential at a later stage in the year. The roadmap is updated every 3 weeks, grouping together key dates, such as enrolment variation deadlines and the release of the examination timetable, with links and prompts for information skill resources. Figure 3 shows the complete Roadmap for semester 1 of 2012. Following Johannessen (2004), the information literacy requirements are deliberately scaffolded and organised to provide a pathway from basic library skills, such as finding books, to more challenging academic concepts, such as referencing.

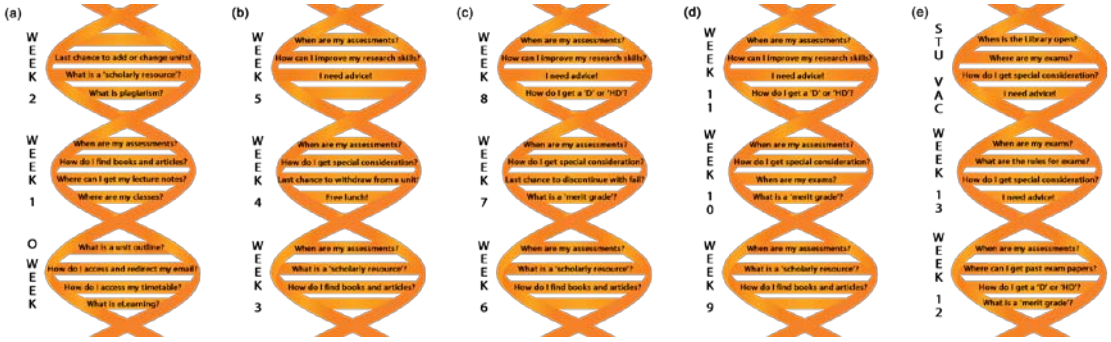

Figure 3: Roadmap for (a) orientation week and weeks 1-2, (b) weeks 3,4 and 5, (c) weeks 6, 7 and 8, (d), weeks 9, 10 and 11 and (e) weeks 12 and 13 and the study vacation.

ENGAGING STUDENTS WITH THE ROADMAP

As outlined above, the transition workshop represents our key interaction with many new students and the roadmap and the eCommunity now form a key part and background resource for this event. In the part of the day in which the current students and academic staff are facilitating a discussion of the steps for success, the process for logging on to the eCommunity site is introduced and the front page, shown in Figure 1, is then displayed for the remainder of the session. A slightly modified version of this page, shown in Figure 4(a), is then included as a leaflet in the "showbag". This version of the page contains step-by-step information on how to log on. The reverse of this leaflet, shown in Figure 4(b), lists the key aspects of a successful first semester.

The front of the leaflet is also printed out as an A0 poster for displaying in the First Year Laboratories, Enquiry Offices etc so that students who miss the transition workshop can also access the site. Finally, the lecturers in the Week 1 classes are all encouraged to show and talk through the roadmap as part of their course induction activities.

SUMMARY

The roadmap is an organising device to aid a smooth transition for new first year students. It uses the transition pedagogy (Kift *et al.*, 2010) to build on and extend our successful transition workshop into a semester long sequence of prompts and resources, which are presented in parallel and in support of mentoring program events. It is a practical and efficient means of providing an ongoing as well as a just-in-time approach for a large and diverse cohort of new students. By linking administration, curricular and support services, it answers and prompts frequently asked questions, inducts students into the broader culture of the faculty and integrates information and activities about a range of skills which will be taught, practised and assessed during their first semester at university.

(a)

(b)

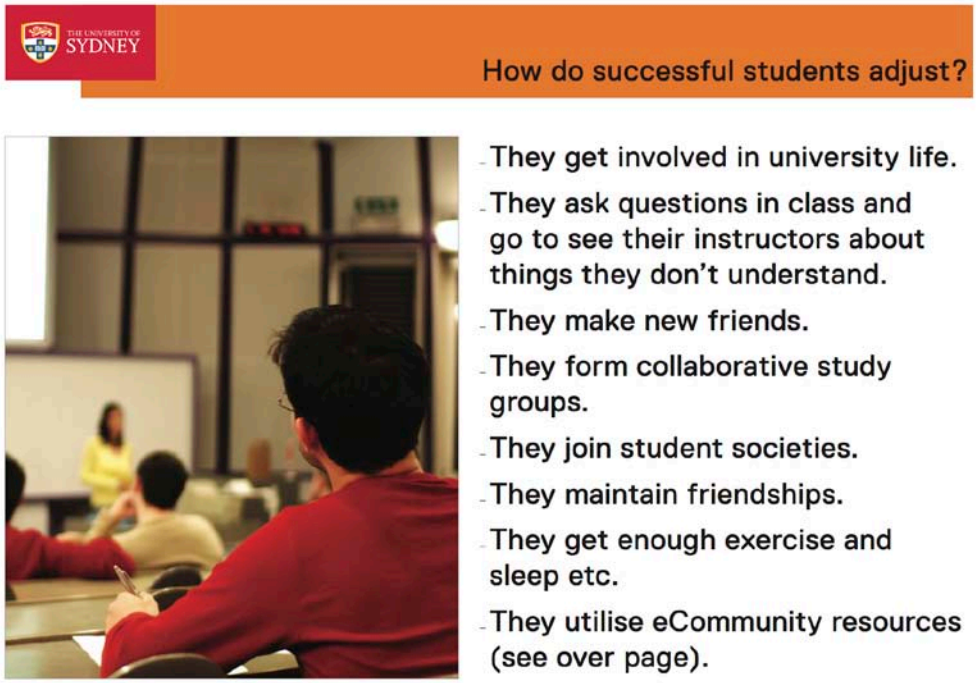

Figure 4: Flyer for transition workshop showing (a) instructions for locating eCommunity site and (b) tips for a successful semester. Side (a) is also used as an A0 poster for the enquiry offices and laboratories of each discipline in the Faculty of Science.

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