



How can EdTech support graduate employability?

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Pressure is mounting upon universities to ensure that our graduates are employable. Business and governments increasingly demand that graduates are equipped with skills and competencies that map into labour market needs. But students often struggle to choose courses, subjects and activities that will support their career goals and aspirations. This paper introduces an approach designed at UTS which aims to embed a skills analytics tool at key transition points for our students. The need to support such tools with a well-grounded learning design is discussed, along with the need to move beyond a “one size fits all” model for supporting EdTech tools. A solution that utilises a series of modules in the LMS is introduced.

Keywords: Graduate Employability, Skills Analytics, Learning Analytics

The skills shortage and graduate employability

The modern conceptualisation of employment is rapidly shifting. While our parents planned to work for the same company for life, our children are likely to change career many times. Indeed, estimates are emerging that the current generation of school leavers can expect to have around 17 jobs across 5 careers in their lifetime (McPherson, 2017). At the same time, in the wake of the COVID-19 pandemic and an associated dramatic restructuring of the global workforce (Lund et al., 2021) the shift towards flexible, skills-based learning has gained even more prominence. A wide range of government departments, industry bodies, and employers are increasingly talking of skills shortages and how we might work to rectify them. For example, the Business Council of Australia (BCA) has recently argued that long term growth of the future workforce will need a “skills passport” that recognises short courses and micro-credentials and somehow works like a digital CV (BCA, 2021). Similarly, we see government organisations such as the National Skills Commission (NSC) working to map the skills required in Australian jobs to those taught in the Vocational Education and Training (VET) sector. Notably, the NSC is now commencing a Pilot Project to map the Higher Education (HE) sector, a development that will increasingly affect the way that universities think about their curriculum content and graduate employability. Finally, the Job Ready Graduates policy introduced by the coalition in 2020 (DESE, 2020) sends a very clear message about government expectations that university graduates be immediately job ready upon graduation, while making a number of rather unjustified assumptions about what skills are actually sought in the modern Australian workforce (ABC, 2020), and suffering from a wide number of structural problems that are likely to lead to ongoing inequity for many of our students (Norton, 2022). Despite this emerging interest across the sector, a long undercurrent of work has questioned the assumption that lifelong learning is a purely positive agenda to pursue. For example, Field (2011) sketches out a history of lifelong learning, drawing attention to a series of epochs where different narratives have prevailed, and highlighting a set of critiques that have been tied to the concept around neoliberal agendas and welfare reform. Similarly, Tight (1998) cautions that the economic perspective of lifelong learning can lead to a form of entrapment, where highly stressed and already busy workers are still expected to upskill but provided with very little space to do so. Nonetheless, the current Australian political context suggests that skills based training is here to stay for the foreseeable future. How might we use EdTech to support graduates in meeting this agenda without adding undue stress to teaching teams and students?

This skills dominated narrative often fails to recognise the complexity of the learning required over a lifetime of professional practice. People transition multiple times throughout their career (Poquet et al., 2021), often reframing themselves in new professional contexts (Buckingham Shum et al., 2022). Students need to learn how to think like the professionals that they are trying to become. They need to find a purpose in their studies and connect with it throughout their lifetime, even as it evolves and changes. However, it is very difficult to articulate the specific competencies that a profession requires. Indeed, it is often easier for professionals to recognise mistakes made by someone attempting to learn an epistemic game associated with a profession than it is to explicitly list what people *should* be doing ahead of time (Markauskaite and Goodyear, 2017). Within this

context it becomes vital that we develop methods to help students find appropriate pathways towards career goals that they identify, and to understand the complex skills (Kirschner and Van Merriënboer, 2008) that they need to master in order to achieve those goals. Furthermore, universities need to do more than support our students in developing a rich portfolio of attributes and skills; we also need to help them to *demonstrate* those attributes, in a manner that employers can understand and interpret.

An emerging EdTech Solution

At UTS a large program of work that uses *skills based curriculum analytics* (Kitto et al., 2020) is attempting to improve graduate employability through the development of web based applications that are embedded into the whole of course student experience at key transition points. Tools are designed to provide a scaffold (Reiser, 2004) that helps students to undertake the open ended and complex task of career planning. Students build up a *skills profile* that they can use to: set career goals; explore skills gaps between their skill profile and the skills they will need for an identified goal; and, identify training pathways through the curriculum that we offer. For example, Figure 1 shows two interfaces that help students work to build up a skills profile by explicitly claiming skills from past experiences and then think about possible career goals for which they might be a good fit.

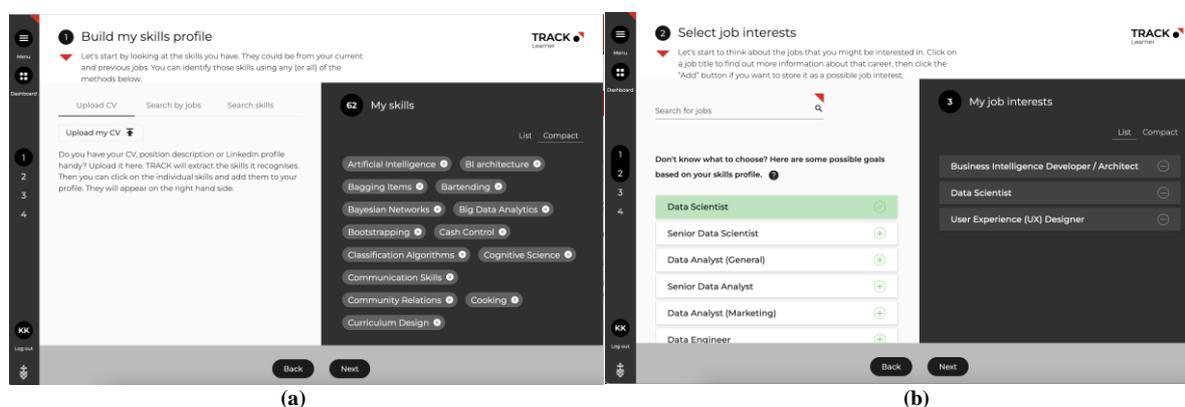


Figure 1: (a) A pilot interface that enables students to build up a skills profile by thinking about past jobs, uploading their CV, or claiming skills manually, (b) and then identify possible career goals.

As discussed in detail by Reiser (2004), EdTech tools have the potential to provide scaffolding by both (i) structuring the task at hand, and (ii) problematising aspects of the subject matter. Our tool supports students in both ways as follows:

1. First, it structures the open ended task of career planning, which can overwhelm students with its complexity. In asking students to explicitly claim skills that they possess, the tool helps them to articulate what they know. It then provides them with a way to think about jobs that they might want to set as goals in the same language of skills, which helps them to articulate what they *need* to know.
2. Second, it problematises the student's mental model of themselves, by highlighting the skills gap between a student's current skills profile and their career goals. This helps to provide impetus for planning a pathway through their studies that will help to close that gap, connecting them more firmly to subject choices by providing an understanding of why they are studying what they are.

The tool is built using data and analytics services provided by Lightcast (the new name for the merged Burning Glass and Emsi companies who have provided labour market data for over a decade). A set of APIs enable us to access data about labour market movements, and skills required for different jobs, as well as providing a number of services grounded in Natural Language Processing (NLP) that perform rankings and similarity evaluations over skills and occupations. Wrapped around these analytics services (many of which we are now building upon and extending) is a web based framework with an Angular front end, GraphQL middle layer which enables us to decouple front end development from the back end, and a Node based back end. This design makes tools accessible from multiple domains (i.e. not just the learning management system, LMS), with various application components reused as appropriate. For example, a decision support tool to help people choose data and analytics microcredentials based upon their skill gap against a competency framework has also been created. While some trials have been run with students and various staff at UTS to date, the development strategy has been largely researcher based. More participatory approaches are planned for future work to upgrade the tools.

Using Learning Design to support usage at key transition points

This is a student facing Learning Analytics (LA) tool, which raises an interesting question about how it can be embedded in a university setting. Its purpose is to help students improve their approach to goal setting about their careers, and their planning as they navigate through course structures that are often quite complex. Career planning is not a task that is often assessed in a university context. However, simply pointing students to an EdTech based tool that they “may want to explore” rarely results in significant uptake of the service (Kitto et al., 2017). Instead, such tools must be embedded in an appropriate learning design which both helps students to understand their purpose and works to contextualise the tool to the specific scenario in which it is being used (Shibani et al., 2019). This tension raises an interesting challenge for a class of EdTech and LA tools that aim to support student learning of skills that related to longer term lifelong learning goals, and less related to the immediate requirements of the specific course in which students are enrolled. How can we embed such tools into a course’s design without disrupting the course structure itself?

Kift’s (2015) transition pedagogy approach proposes that the First Year Experience (FYE) is critical not just for successful transition to university study, but also for building up the academic literacies required for a lifetime of successful professional practice. For example, McIntosh (2016) shows that students at her university were more concerned with career options within the first three months of commencing their studies, with a slight rise again towards the end of first year (which is correlated with course choice). These are two key transition points where it seems likely that an appropriately designed learning activity might lead to better long term career outcomes for students. However, beyond the FYE there are likely to be a number of other key transition points where students are focused upon career goals and employability which provides an opportunity for designing a successful intervention. For example, Maertz et al. (2014) suggest that a success factor for students commencing an internship involves establishing “clear internship work and learning goals that support clear overall academic/career/life goals” (p134). Thus, helping students to think about their career goals more clearly *before* their internship could lead to better outcomes as they transition into the workforce.

Depending upon a course’s structure, some key transition points for supporting students in thinking about their future employability include: orientation; at the end of first semester; when choosing majors and other optional subjects; before, during and after an internship-like experience; and, towards the end of a degree as they actively start looking for employment. At each of these transition points a cohort of students is likely to be thinking about their future, and open to activities to support this. However, as Shibani et al. (2019) argue, in attempting to build tools that are scalable it is all too common to adopt a one size fits all mentality, which fails to contextualise their use to the different problems that students are likely to be facing throughout this whole of course journey. For this reason, at UTS we are working to construct learning activities that can be assembled to support student learning in a way that is contextualised to student needs across each of the above key transition points. This helps course teams to adopt tools off the shelf as required, while providing the flexibility necessary to contextualise activities to a variety of different student needs. This facilitates tool reuse across the institution, but with different learning designs that reflect the different transition points that students are undergoing.

At present, this contextualization process is managed using a set of reusable Canvas pages. These are labelled such that they can be flexibly assembled in a way that supports student goal setting and development at the various transition points listed above. A basic set of “how to” pages support the use of the tool itself, but these are then framed by “activity” pages that scaffold the use of the tool within the context of the transition that they are designed for. Course teams that decide to embed a skills related employability activity using this suite of tools will be able to browse the existing learning resources, and then import and modify the ones that suit their context.

The how-to pages

A basic set of how-to pages are provided in all modules. They work to:

1. Introduce the tool and what it is for.
2. Provide a step by step guide to logging onto it and then using it to construct a skill profile and set some employability related goals.
3. Answer a set of FAQs about the tool and queries that students are likely to have while using it.

As such these pages provide a minimal set of help style resources that get students up and running with using the tool. However, they do not provide any motivation as to *why* students might want to use the tool, or what they might gain in doing so. This motivation is provided through the choice of a relevant activity module.

The activity pages

Activity pages provide scaffolding for the use of the tool, contextualised to the transition that students are currently experiencing. Their modular design makes it easy for course teams to identify activities that might be relevant for their subject, and to export them to their specific subject ready for extension and modification. As new transition scenarios are identified they can be created and added to the collection of activities, so building up a library of common resources that can be adapted by course teams as required.

Activity pages are designed to lead students through a sequence of challenges that provoke reflection about the transition that they are currently undergoing, problematising their skill gap and asking them to plan how they might address it during that transition. Students undertake activities that encourage them to think about why they are studying and what they hope to achieve during the transition. They are then supported in building up their skills profile (or extending an existing one if they have already used the tool), and explicitly setting some career or capability goals, which are stated in terms of occupations that they are interested in pursuing. At this point students are directed to different activities in the tool depending upon which transition they are undergoing:

- **At the end of first semester, when choosing majors and other optional subjects.** These activity modules encourage students to think about how their choices will help them to fill the skills gap that they identify between their existing skills and their employability related goals. They are encouraged to think about which skills are most transferrable between their different goals, and to be more strategic about identifying subject selections that will provide them with the skills that occur frequently in the labour market.
- **When undertaking an internship-like experience.** Students are guided through a sequence of activities that help them to think about what types of skills they most need to enhance their skills profile and reduce their skills gap. They are encouraged to plan out what types of activities are most likely to provide them with these skills, and to think about how they might take a more intentional approach towards undertaking these activities through negotiation with their mentors and supervisors. During the internship itself students are guided in thinking about the skills that they are acquiring, and updating their skills profile accordingly. After the internship students are then encouraged to rethink their career goals, removing ones they no longer want to prioritise and adding new goals that they have identified. They can work through activities where they link the skills that they consider most important for their career goals with artifacts from their internship that provide evidence of them having that skill.
- **Towards the end of a degree.** As students start looking for employment, they are supported in identifying the skills that they consider most important for the jobs that they are planning to apply for. They explore recent ads for those jobs and store selection criteria that appear in them. They are then encouraged to link skills to those criteria, again linking them to evidence that they possess those skills.

Next steps and future work

Trials are underway with various classes and student cohorts which will serve to further extend and develop both the tool itself and the learning design in which it is embedded. A number of upgrades to the tool itself are also underway, and participatory methods are being planned for some of this work.

We note that the current functionality of Canvas Commons does not really support the type of structure we would like to enable for sharing these resources. Firstly, we would like to ensure that certain pages are imported (e.g. the “how-to” pages), while leaving others as more optional. At present this is not possible. This is an issue, as the creation of reusable learning objects is likely to require that the object can be structured beyond simple pages. Similarly, it is not currently possible to control which activity is imported into a subject. This is problematic as it is possible that students might be provided with the same activity across multiple subjects with the current shareable structure. This could be handled in the curriculum information system at UTS as this is modernized, but it could also be tracked in a tool like Canvas commons which would enable course teams to see which subjects had already imported an activity and so discourage repetition. Finally, we would like to enable course teams to create new activity pages and export them to an institutionally shared library of activity pages for this tool, but that is not currently possible in modern LMS environments. We encourage LMS vendors to think about how these types of extensions might be enabled in their systems to support reusable learning objects.

Despite these limitations, this paper has attempted to demonstrate how EdTech tools can help connect students to the workforce, but only through an appropriate use of learning design. As higher education attempts to train students in complex competencies like career planning it becomes increasingly important that we adopt a whole of course approach, and this paper has taken one small step in that direction.

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