iTKNe – Building An Online Environment for Transnational Knowledge Exchange in Teacher Education

Final Report - 2014

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<educationlinx.com>
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# List of acronyms used

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>AI</td>
<td>Artificial Intelligence</td>
</tr>
<tr>
<td>AJAX</td>
<td>Asynchronous JavaScript and XML</td>
</tr>
<tr>
<td>API</td>
<td>Application Program Interface</td>
</tr>
<tr>
<td>CDU</td>
<td>Charles Sturt University</td>
</tr>
<tr>
<td>CQU</td>
<td>Central Queensland University</td>
</tr>
<tr>
<td>CSS</td>
<td>Cascading Style Sheets</td>
</tr>
<tr>
<td>CSU</td>
<td>Charles Sturt University</td>
</tr>
<tr>
<td>HTML</td>
<td>Hypertext Markup Language</td>
</tr>
<tr>
<td>IDE</td>
<td>Integrated Development Environment</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>iTKNe</td>
<td>ICT enabled transnational knowledge network in education</td>
</tr>
<tr>
<td>JPEG</td>
<td>Joint Photographic Expert Group</td>
</tr>
<tr>
<td>PHP</td>
<td>Hypertext Preprocessor</td>
</tr>
<tr>
<td>RC</td>
<td>Release Candidate</td>
</tr>
<tr>
<td>RMIT</td>
<td>Royal Melbourne Institute of Technology</td>
</tr>
<tr>
<td>UI</td>
<td>User Interface</td>
</tr>
<tr>
<td>UNE</td>
<td>University of New England</td>
</tr>
<tr>
<td>UWS</td>
<td>University of Western Sydney</td>
</tr>
<tr>
<td>USQ</td>
<td>University of Southern Queensland</td>
</tr>
<tr>
<td>UQ</td>
<td>The University of Queensland</td>
</tr>
<tr>
<td>WSOD</td>
<td>White Screen of Death</td>
</tr>
<tr>
<td>WYSIWYG</td>
<td>What You See Is What You Get</td>
</tr>
</tbody>
</table>
Executive summary

The iTKNe project (hereafter referred to as Educationlinx.com) commenced as an initiative to facilitate enhanced interaction between domestic teacher education students and international teacher education students in Australian universities. In part this comprised a response to the Bradley Review of Higher Education (2008) which identified room for improvement in domestic students’ engagement with international knowledge and Australian higher education’s engagement with international students. Educationlinx.com was envisaged as a resource that would respond to both of these needs. This concept received the support of eight Australian universities and drew inspiration from the innovative work undertaken by Professor Michael Singh at the University of Western Sydney, where the Research Orientated School-Engaged Teacher Education program (ROSETE) was successfully demonstrating new approaches to engagement with international students in teacher education. Thus the project has provided an ITC solution to enable knowledge exchange links across universities and the world at large.

The principal outcome and deliverable of the project has been the creation of Educationlinx.com, which comprises an online learning management system built upon the Drupal framework. Educationlinx.com provides a new resource in Higher Education which not only overcomes the challenge of distance but also the lack of interoperability between the various Australian university learning management systems. Educationlinx.com is a resource which can be accessed from any location. It has a global reach and exists independently of any one university’s IT and courses production and maintenance infrastructure. It is not constrained by any one university’s course production or reporting timelines. It is not constrained by any one university’s IT usage policy and neither is it constrained by the academic calendar or university operational hours.

While the project did not develop ‘pedagogical’ strategies to facilitate enhanced engagement between domestic and international education students in any substantive way, it has provided a platform that cannot only be used to supplement online learning resources within any one university, it offers students and lectures the capacity to establish links with other students and or lecturers across universities. Beyond this, it has capacity to be used in a range of disciplines in Higher Education beyond Education. Arguably the uses to which Educationlinx.com is put will only be limited by the imagination of both students and lecturers. In the context of teacher education at the Charles Darwin University, for example, Educationlinx.com has been used as a supplementary resource to support student engagement in learning experiences associated with their particular units and programs of study. In this respect students can establish links with others that transcend their particular discipline area. Unlike ‘traditional’ Higher Education learning management systems which tend to ‘switch off’ unit or program participation tracks, associated with the previous semester or year, EducationLinx.com does not. This makes available to students an enduring record of thought, participation and information around a range of topics both specific to a particular unit or program and across units and programs. The increased inclusion of international students in the EducationLinx.com environment will continue to build the international contribution to this archive.

Recommendations

It is recommended that:

- the initial aim of developing pedagogies to support enhanced engagement between domestic and international students continue to be progressed in Educationlinx.com;
- a renewed and planned focus upon the marketing of Educationlinx.com both within Australia and internationally be commenced with the view to expanding buy-in;
• the continued development of Educationlinx.com including its marketing be informed by the literature and best practice from the field of social networking.

The Website - Educationlinx.com is located at: <educationlinx.com>

Objectives:

The project aimed to address OLT (previously ALTC) Priority 4, Internationalisation, and objectives (a) and (d). Objective (a) comprised: promote and support strategic change in higher education for the enhancement of learning and teaching including curriculum development and assessment. Objective (d) comprised: develop effective mechanisms for the identification, development, dissemination and embedding of good individual and institutional practice in learning and teaching in Australian higher education. Conduct of the project, however, resulted in changes to the original objectives as follows:

While the underlying philosophy of the project remained the theory of productive ignorance, a state where students can engage in knowledge production exchange, implementation at each partner institution was rescheduled and subject to alignment within its education program, calendar variation, and organisational variation. The project recognised that to request the standardisation of learning materials (if not experiences) would in fact be counter-productive to the aim of working with productive ignorance.

The project also recognised that in an organic and networked online community with a potentially global reach as enabled by the nature of the technology, the degree of homogeneity in terms of learning materials will always be limited. Rather than seek to “control” the production of the curriculum, Educationlinx.com has automated functions that allow the identification of valuable curriculum material through a “free market” consumer choice model for users. Popular content can be automatically identified. Identification of popular content will allow all users to not only use this content, but to adapt it to their own needs. This content will serve as a model for what works with different cohorts. Hence in addition to working with productive ignorance, the LMS will facilitate working with ‘emergent’ knowledge (revised May 2012).

Outcomes:

The project concluded with the following key outcomes:

• Provision of an online space; namely Educationlinx.com for users (students and teachers) to plan, develop and share learning resources including assessment strategies and tools.
• Comprehensive project evaluation.
• Research outputs into the effectiveness of the pedagogy presented in the resources and complexities in building the network.
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Chapter 1 – Overview

Significance of the Project

Educationlinx.com offers a resource for use in higher education; namely teacher education, which allows academics and teacher education students to engage in educational networking on the basis of their shared interests and needs. The project has worked towards building a solution to the problem of achieving effective communication between students and academics from different universities in the field of teacher education.

Educationlinx.com has a potentially global reach and through this it is able to provide users with access to knowledge, contacts, social and professional links which otherwise would not be available. The circle of knowledge associated with any particular unit of study in Australian teacher education programs and courses is generally limited to that provided by the lecturer, the students and the resources associated with the unit. Educationlinx.com offers the capacity for this circle of knowledge to be greatly expanded beyond the limits of any one unit of study, lecturer, any one cohort of students or any one university to achieve a much more national perspective of teacher education.

Methodology and Design

Phase One – Project Startup and Baseline Data Collection

Project startup included recruiting and appointing project staff, completing a detailed project plan, obtaining ethics approval for each project partner at all partner institutions. It also included developing a detailed evaluation plan.

Phase Two – Second Year Trial (December 2011-June 2012)

The pre-project trial conducted in semester 1 2010 between UNE and UWS was reviewed in semester 2 2010 and formed the basis for the first project trial in 2011.

A fee-for-use enterprise online learning environment was purchased and set up to accommodate the production and exchange of knowledge between domestic and international students in teacher education.

An evaluation of the success of this solution was conducted, while a questionnaire was administered to students which addressed issues relating to their existing knowledge regarding the curriculum and diversity, sources of existing knowledge, understanding of the philosophical perspectives informing existing knowledge, awareness of existing strategies for knowledge production, transfer and engagement, and awareness of gaps in existing knowledge. Analysis of the initial online solution lead to the development of an alternative free and open-source environment, which became Educationlinx.com

Phase Three

All project partners met at The University of Queensland to review the progress of the project. The aim was to demonstrate the website and provide instruction to project team members regarding use of the site. A number of factors militated against a successful demonstration.

Phase Four

The final six months of the project were devoted to continuing to fine tune the website documenting project outcomes. This included receiving final feedback from participants, stakeholders and partners in addition to conduct of the final project evaluation.
Dissemination of project findings is to be made to participants, stakeholders and partners which will also include sharing the formal documentation via reports to Vice-Chancellors at participating universities. A range of mechanisms were established to ensure the sustainability of the key project outcome; namely Educationlinx.com
Chapter Two – Design and Building EducationLinx.com

Let's face it. If your site is not in the Google index then you are not on the web
(Burleson Consulting 2012)

This chapter provides a brief overview of the initial information technology solution installed by the project, and identifies the associated problems with that solution. Discussion identifies Drupal as the framework finally selected for building what would become EducationLinx.com. A more detailed discussion of the complexities of the Drupal environment is presented in Appendix A.

Initial Approach

The original solution to establishing an online learning and teaching environment was to use a pre-constructed web 2.0 learning environment. This fee-for-service or pay-per-use approach, however, was found to be inadequate:

1. it required a subscription fee which generally increased proportionate to the number of users;
2. the range of functionalities was limited with little room for customisation;
3. the available customisation was only offered on a fee-for-use basis;
4. support was often not timely, or was offered on a fee-for-service basis;
5. the system comprised little more than a blog and forum environment with very few other tools that might encourage knowledge production and exchange; and
6. the user interface was not user-friendly (despite the paucity of features).

The kinds of fees associated with this and similar solutions were simply unsustainable in the long term.

A search for an improved solution revealed that open-source and free content management systems were also available; though perhaps not as many as there presently are. As the grant had not included funding for an ongoing subscription to a fee-based environment, these open-source products became an attractive option.

At the time (late 2010 – early 2011) Google Plus had not been launched and Wordpress was generally represented as little more than a blogging platform. Drupal was chosen. It proved to be a much more difficult solution than envisaged by the team. While Drupal is a powerful system it is not an easy system to learn. The complexities associated with Drupal are explained in Appendix A.

Functionalities and Complexities

To enable knowledge exchange between students and lecturers in teacher education, particularly between international and domestic students would require more than the pre-packaged blog and forum functions that shipped with the Drupal core. Moreover, it became increasingly clear that what we had originally been referring to as a transnational knowledge network in education in fact was a facility for a kind of ‘social’ networking in education, and
in this respect the World Wide Web provided numerous examples of successful social networking sites. Unfortunately this insight occurred relatively late in the project, and with the benefit of hindsight it would have been particularly beneficial to have engaged the literature around social networking as well as (or perhaps instead of) the literature around effective pedagogy in online environments.

Arguably as explained below, Educationlinx.com must be approached as a networking site and not a traditional university learning management system. Table 1 identifies some of the functionalities now included in Educationlinx.com. Functions listed in the table below can be switched on or off.

**Table 1: Functionalities included in Educationlinx.com**

<table>
<thead>
<tr>
<th>Functionality</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forums - with more advanced functions</td>
<td>Enhances functions of the basic core forum</td>
</tr>
<tr>
<td>News reporting</td>
<td>Post, archive, retrieve news stories</td>
</tr>
<tr>
<td>Video playing</td>
<td>Upload videos and play videos</td>
</tr>
<tr>
<td>Text editor with HTML capabilities</td>
<td>A WYSIWYG editor which also enables uploading of shock wave flash, and a range of video and image files</td>
</tr>
<tr>
<td>File management system</td>
<td>Allows users to save files inside a personal folder negating the need for third party cloud file storage Allows users to share files with other users</td>
</tr>
<tr>
<td>Friendship relationship building</td>
<td>Request, accept, reject user-to-user relationships</td>
</tr>
<tr>
<td>Photo albums</td>
<td>Allows the posting and sharing of photos organised into albums</td>
</tr>
<tr>
<td>Real-time video forum</td>
<td>Video chat – this was removed for two reasons 1. Performance impact and 2. Availability of good third party solutions. Where the site needs to check in with an external URL (on another server) then page loads can be limited by the performance status of that other server at that point in time, resulting in a page load waiting for a response from the third party.</td>
</tr>
<tr>
<td>Real-time chat</td>
<td>Text based chat. While this has the potential to suffer from the constraints identified above, text based chatting is central to online communication. As chat functions increase the load on a server, a third party ‘envolve’ API was used. Unfortunately the speed of page reloads is impacted as the site waits for the return on its request to evolve servers. This feature may be disabled in the future if a workaround is not found.</td>
</tr>
<tr>
<td>Messages</td>
<td>Send and receive messages to users Message alerts. Any user can send a message to all users.</td>
</tr>
<tr>
<td>Web forms</td>
<td>Build online forms</td>
</tr>
<tr>
<td>Invites</td>
<td>Users can send an invite to non-members from within EducationLinx.com.</td>
</tr>
<tr>
<td>Education Websites</td>
<td>A List of useful education related links</td>
</tr>
</tbody>
</table>
Chapter Three – Lessons Learned

Construction of Educationlinx.com involved a number of skills sets which at project commencement were not necessarily in existence in the project team. With the benefit of hindsight, however, it can be seen that following lessons have been learned: Information Technology production lessons (see Appendix A), pedagogic lessons and sustainability lessons.

Pedagogic Lessons

*Understanding the technology-pedagogy relationship*

As a site outside of any one university’s IT jurisdiction, the development of Educationlinx.com has by necessity provided a different perspective on the kinds of learning relationships and experiences that are made available through new technologies. Unlike university learning management systems, which reside behind the (fire) walls of their particular institution, Educationlinx.com resides within the global free market of ideas and expression. Indeed questions which are often raised at presentations of the Educationlinx.com to academic staff often concern the issue of ‘control’:

- How do we stop other people entering the discussion?
- What about if people use inappropriate language in the site?

These kinds of questions reveal a degree of inscription by university learning management systems, and working with what might be considered older industrial models of learning and teaching. While it is acknowledged that the knowledge held by any one university is also a for-sale commodity and attached to various intellectual property arrangements (Dixson, 2012), this model of knowledge production and exchange is nonetheless, rather contrary to the view of knowledge within the global open source community from which Drupal or Linux emerge. Although in noting this, we need to be careful not to overly idealise the open-source model (Stam, W. 2009; Ducheneaut, N, 2005). This kind of knowledge can be significantly more organic than that associated with the traditional approach to university courses and units located within university learning management systems. Open-source knowledge production, however, is not always beyond corporate interests as shown in the relationship between a number of popular Linux distributions and large IT corporations; specifically Ubuntu and OpenSUSE, which respectively share a relationship with Canonical and The Attachment Group (and previously Novell). Both for-profit and enterprise based knowledge production and open-source production models can (up to a point) benefit from a mutual relationship (Stam, 2009). In higher education, this relationship has emerged in the form of free online courses or units of study perhaps best represented by ‘edX’:

> EdX is a non-profit created by founding partners Harvard and MIT. We’re bringing the best of higher education to students around the world. EdX offers MOOCs and interactive online classes in subjects including law, history, science, engineering, business, social sciences, computer science, public health, and artificial intelligence (AI)

While issues of infrastructure, cost and other logistics inform the success of open-source learning environments in higher education, along with intellectual property and accreditation related constraints, what has been observed, particularly in relation to massive open online courses (MOOCS) is that participation is particularly fluid. In a non-pay-for-use environment where credit towards an accredited qualification may not be part of the relationship between the student/user and the online platform, the number of students participating as opposed to the number of students registered or enrolled can be disparate (The Economist, 2013). Arguably this lack of participation has characterised the take-up of Educationlinx.com, which is an outcome that will now need to be addressed.
Don’t replicate the constraints imposed by the offline context

Arguably pedagogy is informed by context and the context of schooling and formal knowledge production in higher education has been informed by the premises of social organisation tracing their origins to an earlier period of modernity and industrialisation. Schooling structures the learning experience of students according to age (if not gender and class), year level, subject area and time in addition to performance - as variously measured. In the online environment many of these structuring criteria become redundant with groups able to form in much more organic ways, creating fluid and dynamic learning communities not so much controlled by the ‘teacher’ and their set curriculum, time, room and class, as by the interests of the learner.

Like Facebook and other online facilities, online communities form and coalesce around common interests. Learning in online environments challenges traditional relations of power, traditional ways of learning and traditional understandings about what it is that is taught and learned (Squire, 2008, 2005). Anecdotal feedback from early trial users indicated that the site had a somewhat different feel to the ‘traditional’ university content management system. This feedback supports the finding that rather than only drawing upon literature concerning online pedagogy, continued development of Educationlinx.com will need to learn from the best practice in the field of online social networking.

With the focus upon the site as a resource to be used when ever and how ever users may like, Educationlinx.com has arguably become a much more sustainable product then perhaps originally envisaged.

The challenge with this change in perspective, however, is that Educationlinx.com is not only a resource; it is a product that exists in a free market space comprising a range of enterprise solutions as noted above. Unlike a unit of study located within an accredited degree program at a university, which students undertake by necessity of having to complete the degree, Educationlinx.com will only be used where people see it as useful to fulfilling their needs. Neither lecturers nor students can be compelled to use this resource; such that its ongoing sustainability – at least in terms of use – will be informed by the achievement of what end-users perceive to be its value and quality.
Sustainability Lessons

Site backup system

As noted, Mr Don Parsons managed the backup schedule for the initial site located at the University of New England. With the CPanel site management facility it is now possible to set an automated backup schedule. It is also possible to undertaken manual backups and set the location for storage of these. The now installed Drupal Backup and Migrate module also enables backing up of select components of the site.

In addition to this arrangements the current hosting plan includes an automatic back up schedule, which in the event of not being able to recover the site as a result of either hacking or maintenance work, it will be possible to request the most recent backup from the hosting company.

Archiving

As noted above it has been prudent to:

- document and archive stable modules
- document frequently occurring problems and programming hacks

Performance

At this point the use of a shared server seems reasonably adequate, however, as user load increases a dedicated server may be needed. The Boost module has been installed to improve performance; however, further work will be needed to tune the Boost installation. Aside from the Boost installation there remain other resources for improving the speed of the site. These are no-cost options other than the time it will take the project leader to implement them.

Site Management

At present the project leader remains the sole site manager and is happy to continue in this position. As part of effective succession management it will be prudent to explore possibilities for future site managers who will not only maintain the site, but take the lead role in terms of its continued development. This position will require someone who has experience with Drupal or who is willing to become familiar with Drupal.

A user feedback function has been built into the site, alerting the administrator to site issues. This will provide the opportunity for ongoing site development. Online documentation, including graphics, has been provided for all site users to enhance their familiarity with the functions of EducationLinx.com. This is access through the ‘start’ tab in the main menu.

It will also be valuable to develop a site administrator’s guide. The administrator may not necessarily be the manager. The administrator will be able to respond to user questions around site functionality whereas the manager will be able to fix problems with the site. The production of a site manager’s guide may require funding. It may be possible to seek a small internal grant from the project manager’s university to fund the writing of the guide. Nonetheless, the project manager remains committed to continuing the development of the site and continues to make upgrades to functionality, security and the user-interface on an ongoing basis.
**Buy-In**

With the completion of the site energy now needs to be devoted to securing increased buy-in. Under the conditions of site development, the process of securing buy-in has occurred in a largely ad-hoc fashion, and been largely uniformed by the literature, particularly that pertaining to effective social networking. The lengthy development time to produce a functional site also hampered efforts to secure buy-in. The site has now been in use for one year and has achieved an up-time of 100%. Its stability is proven and there has been positive feedback on its useability, when compared to the ‘traditional’ university learning management system. With the confidence in the ‘product’ gained from a year of end-user engagement, the next step is to develop a more targeted information dissemination campaign. As part of this information EducationLinx.com will also seek to engage education students located in various commonwealth countries which also speak English. Some of these countries might also find EducationLinx.com to be a valuable supplement to their existing university/teacher education learning management systems.
Chapter Four – Conclusions

Educationlinx.com can be considered to have been a project with mixed outcomes, and clearly it achieved less than desirable outcomes with regard to team management. At a reasonably early stage it became clear that the prioritising of technology over pedagogy was not a focus that was well supported by many in the team who were much more passionate about the development of teaching strategies and pedagogies to facilitate curriculum internationalisation. Compounding this challenge was the project leader’s inability to provide more substantive direction to the project, which was a result of time constraints that emerged early in the project’s life-cycle, and which did not relent. Although communications with a number of team members remained supportive of the renewed focus, these tended to be in the minority. If one more lesson learned could be added to those above it would be that the team leader must be well-resourced with regard to time. The importance of this cannot be stressed enough! Arguably, Educationlinx.com must be approached as a longer-term project and one that has very significant opportunities for sustainability in the higher education sector.

Of necessity to achieving this outcome is further work towards increasing buy-in and use by both students and lecturers. The tentative use of the Educationlinx.com by the Virtual Professional Experience program based at CDU and involving other high external enrolment universities will go some way towards achieving this. Achieving this goal will also be supported by more effective promotion of the site, and this aim will need to be supported by a much more robust engagement with the literature relating to what makes (social) networking sites for educational purposes effective. Arguably there are pedagogies involved in the creation of effective social networking sites for educational purposes, just as there are pedagogies associated with news reporting, and thus the notion of ‘pedagogy’ which informs teaching and learning in Educationlinx.com will need to be broadened to encompass the lessons to be drawn from successful social networking facilities. That some universities are just now beginning to include the more common social networking functionalities in their learning management systems does suggest that in some respects EducationLinx.com was ‘ahead of its time’.

Of significance, in terms of outcomes, however, is that the basic product is now in place. While substantial changes occurred from inception of this project to completion, the resulting product is one that was found necessary to enable the networking of students and teachers beyond individual universities. It has become very clear at this project’s conclusion that what has been created is an innovative open-source learning information exchange environment, and thus Educationlinx.com perhaps can be considered akin to the national broadband project in terms of the recognition of its value in the higher education sector.

While there are clearly existing uses to which Educationlinx.com has been put and for which it is a valuable resource, the ways in which it might continue to be used over time will arguably depend upon the needs and imaginations of those involved in higher education. There is every confidence that in drawing from best practice from the field of social networking combined with an effective marketing strategy, Educationlinx.com will achieve the kinds of outcomes and successes initially imagined.
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Yahoo News Centre (2013). *Yahoo! Completes Acquisition of Tumblr.*<pressroom.yahoo.net/pr/ycorp/246926.aspx>
Appendix A – Drupal Complexities

With the benefit of hindsight, the project leader understands that building a website is not the same as building a content management system. Simple websites generally comprise static environments, whereas it was envisaged that EducationLinx.com would provide a more dynamic and interactive environment. Dynamic environments require more than knowledge of HTML. Good web development (if not programing) requires a knowledge of not only HTML, but also CSS, Java scripting, SQL and PHP in addition to familiarity with at least one integrated development environment (IDE). While many of these skill sets are not necessarily required to work at a reasonable level in Drupal, they arguably comprise part of an overall skills package which would have enabled a much more easy initial interaction with Drupal and the production of a much more complex online environment. With the project manager’s lack of knowledge of any of these fundamental aspects of complex web development, Drupal was selected largely upon the basis of reading the promising claims presented on the Drupal homepage, which were not too dissimilar to the current statements below:

Use Drupal to build everything from personal blogs to enterprise applications. Thousands of add-on modules and designs let you build any site you can imagine. Join us! ... Drupal is used by some of the biggest sites on the Web, like The Economist, Examiner.com and The White House. (Drupal, 2013)

While it may have seemed ‘logical’ to seek advice from an expert, such was the unfamiliarity with the field of web development and programming that the project leader was not even in a position to begin to know what questions to ask. Web development (programming) is a specialist field and requires a considerable amount of training.

History of the Drupal Logo

After Drupal was initially developed, thoughts turned to the creation of a logo. Of course the concept would have to include a drop, or water in general. The initial idea was simple: a drop within a circle. It was conceived as an "O" in a fluid "drop". Somewhat later there was an idea to use a cartoon-like drop with a face. Steven Wittens (UnConeD) created a 3D version, but the idea didn't get too far, mainly because 3D is difficult to work with. When the logo issue came up again, Kristjan Jansen (Kika) came up with the idea of putting two sideways drops together to form an infinity symbol. When placed inside a filled circle, it resembled a face. After more work by Steven Wittens, the Druplicon was created: a stylised drop with the “infinity” eyes, a round nose and a mischievous smile. <drupal.org/druplicon>
At the time of deciding to use Drupal these kinds of claims (above) seemed to offer a relatively straightforward solution for developing the appropriate online architecture that would facilitate and enhance knowledge-based interaction between domestic and international students. It seemed that all that was required was to install the core Drupal package and add modules as necessary to build in the functions envisaged to be needed.

At this stage the University of New England (UNE) offered support to the project by making available space within its IT environment to host the iTKNe website. With this support the site was able to go 'live' (though not public). As significant a step as this was, more effective development of the facility was constrained by a lack of access to the Drupal directory and database tables - an understandable consequence of compliance with UNE Information Technology policy.

Had Drupal been as easy to build as initially imagined, this early lack of directory access, or access to the 'backend', would perhaps have been of little consequence. Unknown at the time was that Drupal is considered to be the most complex and challenging content management system (CMS) to learn and work with for 'end-users' and increasingly so developers (Ben.Buckman.nt, 2011). Part of the reason for this is that Drupal has developed from being a CMS to being a CMS Framework. Its development from a largely pre-configured CMS to Framework is succinctly represented by Garfield:

The assumption of Drupal today is that you will build your own recipe out of the smaller, more atomic pieces that Drupal provides, and then use those same atomic pieces to also build your news and event content. That's great if you want your own recipe site. It's not so hot if you're expecting to just download a recipe module and call it a day. That is, for better or worse, not what Drupal is, nor will it ever be again. Sorry. What Drupal is today is a tool for building a content management system for a variety of different needs. That's an important distinction for someone looking to build a Drupal site to understand. Drupal is not a CMS. It is the framework with which you build your own CMS, to your specifications, to suit your needs. It is a Content Management Framework (2012).

Similarly, in a blog titled “Why is Drupal so Hard”, Anna Kalata explains:

Drupal is not a product. I repeat, Drupal is not a product. As these linked posts discuss, it is a development framework -- a programming tool used to create custom content management systems, the way builders use two-by-fours to frame a house. When I'm done building a Drupal site, all the content administrator needs to do to post a new blog post is click Create Content and Add Blog Post, and everything else is handled by the system. An end-user shouldn’t need to know what a Block, View, or Node (and now Entity) is in order to use their website (2012).

Hence to install the kinds of functionalities envisaged to facilitate enhanced engagement between domestic and international students, required by necessity, access to backend including the data bases. It also required a shift from being a largely consumer and end-user of technology into the domain of developer and programmer. Achieving these necessities was facilitated by subsequently migrating iTKNe to a professional web hosting environment and purchasing the domain name – Educationlinx.com.

Building in these kinds of functionalities, and moving beyond what is often referred to as a 'plain vanilla' install exposed the peculiarities and complexities of the Drupal framework for which it is both praised and criticised.
In terms of the criticism, Locke (2011) details in his discussion of "5 Reasons Why Drupal Sucks" that common complaints include:

- it's too complicated
- I have to call my developer to get it to look right
- the one feature I need takes custom code
- Drupal Developers are expensive

By contrast, however, Finklea argues:

Drupal is a great platform for building your website. It is a very powerful system that can be used for large, complex sites like <whitehouse.gov>, <mensa.org>, and <lefigaro.fr>, the oldest and second-largest newspaper in France. Some other sites you may also have heard of include: <The Discovery Channel>, <Warner Bros. Records.com>, <The United Nations>, and <General Motors> (2010).

Arguably the challenge is Drupal’s complexity which paradoxically is also its strength and what ultimately makes it highly extensible and powerful. Although this is not the place to continue the ongoing and drawn out debate around the virtues or otherwise of Drupal (Collier, 2012; Quay, 2012), its steep learning curve is, however, often identified as a barrier to more widespread use (Knutson, 2010). Drupal is a very good framework, but the learning curve is very steep.

A graphic presented in Dries Buytaert’s (the creator of Drupal) website presents the generally accepted representation of the infamous ‘Drupal Learning Curve’:

![Figure 1: Drupal Learning Curve (<buytaert.net/drupal-learning-curve>)](image-url)

iTKNe – ICT enabled transnational knowledge network in education
Others, however, represent the curve thus:

![Learning curve for popular CMS](technopoetic.com/2012/09/drupals-learning-curve/)

**Figure 2**: Learning curve for popular CMS

In the development of Educationlinx.com some of the Drupal learning curve challenges (Buytaert, 2013) include the fact that not all modules work with all versions of Drupal. Modules which would have greatly supported Educatonlinx.com in terms of desired functions had on occasions not been developed past version 6+, whereas Educationlinx.com comprised a version 7+ installation. In addition to this, modules can be in different development stages such as alpha, beta, release candidate (RC), each with associated issues and bugs. Their development issues are categorized by priority from minor to normal, major and critical. Hence familiarity with issues and bugs is essential to productive site development. Installing a module with a particular set of issues can result in a minor loss of functionality at best, a white screen of death (WSOD), or an irrecoverable fatal error at worst. Installing modules without consulting the issue and bug documentation can be likened to playing a game of chance. Unfortunately this ‘game’ becomes tedious if one has invested the past days, weeks and months in site development only to have a ‘fatal’ error returned late on a Sunday evening. When they occur irrecoverable fatal errors require access to the ‘backend’ where the offending module can be manually uninstalled or code can be edited.

In the earlier stage of development when access to the backend of the installation was not available, a system of backups was put in place by the Information Technology liaison officer at UNE. A script was written by Don Parsons to generate back-ups on an hourly basis. When the site crashed as it frequently did, a request could be made to install one of the uncorrupted backup files.
Drupal is based upon the Pre-processor Hypertext language or PHP, which is a server-side scripting language. Arguably some knowledge of PHP, even beginner’s level, will facilitate understanding issue, bug and other error reports, which generally appear in statements such as that below.

```
Fatal error: Call to undefined function date_views_base_tables() in /htdocs/public/www/sites/all/modules/calendar/includes/calendar.views.inc on line 18
```

While the appearance of a white screen with text like that above can mean (for those without a knowledge of PHP) the loss of literacy weeks or months of work, fortunately issues, bugs and errors are well discussed in the open source Drupal community, and this community knowledge bank can help the beginner to implement solutions. This however, does not compensate for those instances where the required functionality is not available in any existing modules. In this circumstance there are two options; either build a custom module or where possible work with a computed field, both of which also require a knowledge of PHP. While the first was not an option for this project, the second (over time) became an option. For example the following script could be built upon to provide the sum of multiple values entered into different fields, enabling automatic calculation functionality in a webform.

```
$entity_field[0]{'value'} = array_pop(array_pop(field_get_items($entity_type, $entity, 'field_hours_a'))) + array_pop(array_pop(field_get_items($entity_type, $entity, 'field_hours_b')));
```

The experience of working with PHP scripts was found to be reasonably similar to the experience of learning a new language, and achieving varying levels of proficiency in the 4 macro-skills (reading, writing, listening and speaking). Development of Educationlinx.com has resulted in a reasonable ability to edit existing scripts which characterises the project leader as a ‘script kiddie’ in the vernacular of programing, which can be likened to the capacity to read in a second language, or consume and, manipulate and ‘understand’ language artifacts produced by others. Producing original scripts remains the much more challenging tasks just as producing texts in a second language is a skill that often lags behind reading comprehension. Thankfully the (open source) Drupal community offers free advice and script examples, whereas in the enterprise model PHP scripts are sold for profit. Codecanyon, for examples, exemplifies the enterprise model.

**Google Plus Would Have Been Easier**

In the light of the time consumed to complete a viable build of Educationlinx.com it might be suggested that perhaps it would have been easier to use Google Plus, which offers the following functionalities: Circles, Hangouts, Games, Search, Upload and messenger. However, in response to this possibility, two issues need noting. The first is that Google Plus was not fully available to the public until September 20, 2011; the project commenced in late 2010. The second emerges more so from a philosophical position with regard to the use of and interaction with ICT in education. The third is the relationship between knowledge production, knowledge engagement and deep learning. Google plus, however, does not allow for the building in of new kinds of dynamic functionalities beyond its core set. As usage of EducationLinx.com increases it will be possible to build in further functionalities to meet user needs. Drupal offers much more than a networking and communication platform.
An Open-Source System for Open-Source Knowledge

Although Google Plus offers a very easy setup process in which a basic site can be established in around ten minutes, its extensive interoperability between the various services in the ever-expanding Google online ecosystem arguably constrains the degree of control (as in management) that a site manager seeks over an online social network. Although it is this functional interoperability which is at the center of its networking and social connection building capabilities, this hydra-headed like quality was considered a constraint in that it increases the porousness of the community’s boundaries. At issue here is the nature of social networks and the construction and limits of the community in the online environment (Kozinets, 2010; Kim, 2006). Anecdotal feedback from presentations of Educationlinx.com where academics have used Google Plus, have often acknowledged that Educationlinx.com affords the creation of a more bounded if not controllable community than Google Plus.

The issue of site management also emerges in relation to ownership, access to and transportability of site content and data. Information stored with Google is subject to a range of international corporate legislation which has not only been the subject of notable court cases regarding its ownership and use, and more recently the PRISM ‘scandal’ (Bilton, 2013; Peckham, 2012), it is virtually impossible to know where content is located and who has access to it. While it is possible to house some of a Google Plus site’s content in Google Drive, beyond a certain capacity, Google Drive becomes a user-pay environment. Google Drive is also a separate Google facility and arguably not well integrated into Google Plus. Other than images, Google Plus does not allow users to upload content; Google Drive being the default facility for a wider range of upload possibilities. Furthermore, in terms of data and content management, the content and structure of a community established in Google Plus is not amenable to site migration beyond the Google ecosystem and therefore, will need to remain located in the Google ‘cloud’ (servers) potentially indefinitely. The alternative is to download all site content for uploading at the new non-Google facility.

While Google has to this point offered an extensive range of ‘free’ services, there is an agenda to increasingly charge consumers for particular kinds of services. This fee-for-service model already exists in the form of Google Drive and for developers in relation to APIs, a number of which have been used in Drupal environments. Not unrelated to this is the image if not power of Google as global corporate entity and the constraints of this paradigm upon the genuinely free exchange of knowledge (Jesiek, 2003). The concerns often expressed by the corporatisation of bottom-up social networking start-ups exemplified in Yahoo’s recent acquisition of Tumblr (Yahoo, 2013) highlight the tension between corporate agendas and the free flow and exchange of information:

If Tumblr goes to Yahoo, I will seriously consider moving my personal blog to Medium, if that’s possible,” Alexia, co-editor over here at TC, told me. She’s had a blog on Tumblr since June 2009, and, while not part of that coveted 18-24 age bracket, is a significant representative of that other cadre of important users: digital influencers. “I don’t know exactly why, but my Tumblr is a part of my identity. And for whatever reason, I don’t want to identify with Yahoo (Lundgren, 2013).

What started out as a reasonably quick web search engine with a minimalist UI, offering users access to the then new frontier of the world wide web, has since become the largely default facility for access to the ‘web’ and its capacity to allow social networking. Google is reported to have acquired “on average, more than one company per week since 2010” (Wikipedia, 2013). Duck Duck Go, for example, is a web search engine which is critical of the Google model, draws attention to Google’s tracking of users and Google’s bubble filtering (2013) which is reported to have been subject on increased user interest in the follow-up to the PRISM ‘scandal’ (Web News, 2013).
Whilst the money obtained by small-scale developers when a corporate entity acquires their start-up is certainly an incentive to develop programming skills, the use of Google Plus for Educationlinx.com would have resulted in at least one less teacher educator developing information technology production skills. As a teacher and lecturer who holds that Information Technology literacy will more clearly become as significant as language literacy in the 21st century, the use of a prepackaged solution would have comprised something of an anathema. If the online environment continues to increasingly enmesh with the human cognitive experience, and if Google continues to become the key arbiter of all vehicles for that experience, then arguably a healthy anti-hegemonic response mandates knowing about the production of the experience for which one is increasingly enmeshed, as opposed to passively reproducing it. The Australian Curriculum: Technologies (2012) clearly delineates between 1. the skills sets of knowledge and understanding which are more so associated with the consumption of digital technologies and 2. process and production which is the capacity to create digital artifacts.

Indeed, acquiring skills in the Drupal environment and with PHP programming has subsequently afforded the opportunity to provide solutions to other’s IT problems in higher education. It also placed the project leader in particular in a much stronger position to inform discussion around the content of the teacher education IT curriculum, both in teacher education and more broadly in higher education. While Drupal was not selected as the project’s online architecture with these particular outcomes in mind, upon reflection it was a decision which by default facilitated particularly deep knowledge production. In this respect Google Plus is designed with maximum user-friendliness for the sole purpose of gaining maximum end-user buy-in. And this is just so happens to facilitate substantial advertising revenue. This is a relationship between knowledge and capital which some might question (McMurtry, 2002; 1999).

To conclude this reflection upon the technical aspects of Educationlinx.com perhaps the more salient questions might then be rather than “why wasn’t Google Plus used”: - “Who owns the means of production that facilitates knowledge production and exchange: A free-open source community or a corporation?” and “What skills does education lose when the ‘easy’ corporate product is used and this is represented as an ability to work with information technology?” In relation to such questions, Burleson asks us to “Think about it. If the courts rule that a monopoly does not have an obligation to the public, Google would get unimaginable power” (2012).

Information Technology Lessons

**A basic knowledge of PHP programming**

Drupal is a programmable content management framework which relies mostly upon downloading and installing the modules in order to build in the desired function, although the extent of its modularity is a matter for much discussion in the Drupal community. Mostly this approach works if the end product is to be little more than a blog site without any html text. But as noted above there are instances where a module has not yet been created for the desired function, the existing module will have a ‘bug’, or it may only work with and earlier core version. To get beyond these constraints some knowledge of PHP scripting is needed, and for the project leader this required leaning to code in PHP. By necessity this knowledge was accompanied by developing a working understanding of the relationship between PHP and Hypertext Markup Language (HTML):

- PHP files are just like HTML files, but they can include both HTML and PHP code. The PHP code is parsed (or executed) by the Web server when the page is accessed and the resulting output is written as HTML within the Web page. When a user accesses a PHP page, his Web browser only gets sent the HTML code, since the Web server has processed the PHP code in the background. Most PHP pages are processed so quickly that it does not noticeably slow down
the loading of the Web page ... The .php extension is important, since it tells the Web server that the page may include PHP code. Therefore, it must be run through the server's PHP engine before being sent to a client's Web browser. This allows dynamic content to be generated each time the Web page is loaded, based on the variables included in the PHP code. For example, PHP pages may load objects such as the current date and time, data from form fields submitted by a user, or information from a database. Still, once the page reaches the user's Web browser, everything is formatted as HTML (Christenson, 2005).

An example of embedding HTML into a PHP scripts appears below:

```php
<?php
  echo "<html>
";
  echo "<head>
";
  echo "<title>This is an example of what I am attempting to explain</title>
";
  echo "</head>
";
  echo "<body>
";
  echo "<p>example of HTML inside a PHP script</p>
";
  echo "</body>
";
  echo "</html>
";
?>
```

Note that in this example all HTML code is contained within the <?php and ?> stages in the PHP script.

**Ability to set up a server**

Initial trials with Drupal were undertaken on a 'local' machine (localhost/127.0.0.1) using XAMPP in a windows environment. XAMPP “is an easy to install Apache distribution containing MySQL, PHP and Perl. XAMPP is really very easy to install and to use - just download, extract and start” (XAMPP, 2013). The windows distribution contains “Apache, MySQL, PHP + PEAR, Perl, mod_php, mod_perl, mod_ssl, OpenSSL, phpMyAdmin, Webalizer, Mercury Mail Transport System for Win32 and NetWare Systems v3.32, Ming, FileZilla FTP Server, mcrypt, eAccelerator, SQLite, and WEB-DAV + mod_auth_mysql” (2013). Indeed XAMPP (with Drupal) is now very easy to install, though it was less so at the commencement of the project. Setting up XAMPP with the correct parameters is perhaps the more challenging aspect and reference to this process is also provided in Drupal community discussion. Working with XAMPP and Drupal on a local host provided the opportunity to not only test the initial viability of Drupal, but also to learn the directory structure of the ‘backend’. Without knowledge of the ‘backend’ it is not possible to edit PHP script, create the new directories and libraries required by some modules, or install programs which cannot be installed via the inbuilt mechanism. The HTML WYSIWYG text editor (CKEditor, 2013) is an example of this challenge wherein the Drupal module must first be installed through the Drupal interface, followed by using File Transfer Protocol (FTP) to manually locate the CKEditor program inside the Drupal provided CKEditor module (or the libraries directory). Access to the backend also enables modification of page and theme templates in addition to removing problem modules and uploading a range of content such as images which may need to be resized to suite the slider function in certain theme templates. Much of this work can also be undertaken using Drush, which is a command line shell and scripting interface for Drupal, although this approach is intended more so for those who are somewhat more expert in programing and shell scripting. Drush is:

... a veritable Swiss Army knife designed to make life easier for those of us who spend some of our working hours hacking away at the command prompt (Weitzman, 2006)
**Ability to migrate a website from one server to another if needed**

While it was relatively easy to start with a fresh install in the UNE system after testing the local machine install, the move from the UNE environment to an external web hosting service required engagement with the challenge of data migration. This was undertaken through a number of methods aimed at reducing the possibility of data loss. At one level Mr Don Parsons from UNE packed zip files of all content that had been uploaded to the UNE server and made a copy of the site’ databases. When migrating from one server to another, however, *phpMyAdmin* (2013) which is generally available in the server control panel allows the back up and exporting of databases while tables. The Drupal module called *Backup and Migrate* can also automate much of the migration. A working knowledge of databases and *phpMyAdmin* will, however, make this process much more ‘controllable’.

**Ability to understand and logically work through “problems” in an ICT environment**

Website development and indeed program is in many respects a problem focused endeavour both in the sense that these are activities aimed at providing a solution to a problem (or need), and they are activities which inherently engage with the problems extant in existing solutions or program and those that development process itself releases. Hence the extensive community discussion associated with Drupal and the issue and bug reporting noted above.

Indeed the very notion of source code or the ‘source of truth’ is grounded in acknowledgment that while errors emerge in code at least one copy will be error free. As noted earlier, working in the Drupal environment is seldom as easy as adding new modules. Installation of a new module can negatively impact existing functions. For example installation of the Backup and Migrate Module can result in the following issues which are but three from a list of 63:

> Since upgrading Backup Migrate Files has stopped working and jams up my cron job ... After upgrading from 1.3 to 2.2 "every day" schedule becomes "every second ... Exception thrown without a stack frame in <b>Unknown</b> on line <b>0</b>. (Austintnacious, 2009)

**Ability to record solutions to problems**

Developing the Educationlinx.com environment revealed that a number of the problems encountered began to emerge more than once, particularly so when recommencing from a fresh install. Recording the solution or process working towards the solution became a time saving practice. One of the earliest experiences which prompted this recording process occurred in response to a ‘white screen of death’ (WSOD). When commencing a fresh install it was observed that after a particular point, an error statement was return or the screen presented with hyperlinks and no other content. The problem is related to memory exhaustion and is typically presented in a statement like the one below:

> PHP Fatal error: Allowed memory size of 536870912 bytes exhausted (tried to allocate 32 bytes)

The solution to this problem is to increase the amount of memory devoted to the installation.

Documentation to increase allocated memory was eventually located showing two options to be available: one involving editing a .php file and another editing the .htaccess file:
Increase php Memory Limit

This is the recommended approach if you have access to the server's php.ini. This will not be possible in some shared hosting environments, though your host may be able to adjust it for you. Note that this change will affect all websites and PHP scripts on the server.

1. Locate the php.ini file used by your web server. You can click the "more information" link on Drupal's status page's PHP section, which shows the phpinfo() page. Locate the Configuration File (php.ini) Path row on that page. During installation Drupal checks the PHP Memory Limit, and if it is less than 32M (16MB for Drupal 6), an error message also provides the path to the php.ini file.

2. Edit the memory_limit parameter in the php.ini file (usually in a section called Resource Limits)
   memory_limit = 64M ; Maximum amount of memory a script may consume (64MB)
   If there is no section already for this, place the above line at the end of the file.

3. Restart Apache.

User-friendliness lessons

Need for an easy account creation process

At one of the first demonstrations of the website, a concern was raised by project partners regarding who would be responsible for creating student accounts. Quite correctly it was highlighted that were lecturers responsible for account creation, this could be particularly time consuming. Moreover, while the site administrator has the capacity to check all requests for new accounts, this would also create a time impost at another level of administration. The solution to this problem involved balancing ease of access against the site's security needs. Unfortunately this was a lesson learned the hard way.
In response to partner feedback concerning the creation of student accounts, all new users were permissioned to create their own accounts. While this removed both the lecturer and administrator from this process it unfortunately opened the site to flooding by false accounts created by spambots. Approximately 4000 false accounts were created, which in many respects were indistinguishable from those created by human users. In response a reCAPTCHA system was implemented. Originating as a project of the School of Computer Science at Carnegie Mellon University, reCAPTCHA is now a Google (2012) product. While spam has not entirely been eliminated, it is now reasonably rare. The use of reCAPTCHA, like a number of API based modules designed to allow Drupal to talk with other programs, required generation of a public and private key, which also required appropriate archiving.

**Need for easy site navigation**

Arguably site users all bring varying degrees of information technology literacy to their interaction with Educationlinx.com. Experience has shown that there will be those for whom a sound understanding of the online environment will allow them to very easily move between various content management systems, and there are those who become anxious when presented with an unfamiliar environment such and Educationlinx.com. In this respect the interface needs to be as intuitive as possible. A key characteristic of a quality technology interface is that it requires very minimal thought in terms of its use, such that it becomes almost ‘invisible’ (Cox, 2013). While acknowledging that even multinational global corporations often fail to achieve this design quality (Bowen, 2010), work will need to continue on improving the interface. To support new users, a frequently asked questions (FAQ) facility is enabled while the Navigation Menu's first link offers a short tutorial about using the site.

**No Errors**

The literature shows that users are particularly impatient with both slow websites and sites with errors. Unfortunately in the earlier to middle stages of site development errors were reasonably common. In other words “things did not work” as intended and a number of presentations to the project partners only functioned to reveal the site's short comings. The perception of brokenness was only compounded in those instances when demonstrations were undertaken using the administrator account which always has error reporting (in red type) activated. Error reporting is useful for the developer as they provide an initial insight into the cause of the problem. For end-users it is simply unnecessary knowledge.
Performance

The website’s speed has continued to be a cause of concern. It is acceptable but could be improved. One of the reasons for the lack of speed is directly related to the site being located on a shared server. A dedicated server would provide improved performance. While a shared server provides a cheaper option, this approach suffers from the server’s performance profile being shared by multiple sites (among other uses) and subsequently the potentially thousands of end-users variously associated with the different sites. While the issue of disc space is not a concern processing and memory load is, such that if the number of end-users, clients or customers is significant, then the shared option possibly provides a false economy.

In this respect while the analytics of Educationlinx.com’s performance show that the site is located within the average performance range, this result seems to be constrained by the end-user’s point of access. Additionally peak load times will result in reduced performance. While there are certainly measures that can be taken to lessen the ‘hit’ on a site’s performance which require varying degrees of knowledge and access privileges including tuning the server, a reasonably simple solution is to reduce the density of graphics which otherwise increases server load and page response times. In exploring the viability of this option, a balance needed to be achieved between user friendliness, overall presentation and performance. The graphic on the front page not only needed to be reduced in terms of the information it carried (in kilobits) but converted to a format which was the least information dense. While each of the popular image formats has its strengths and limitations, the decision was made to use a JPEG image (Joint Photographic Expert Group) due its low information density while retaining reasonable image quality.

Site Logo and Main Page Graphic

User friendliness was also enhanced by making available a default avatar.
Site Name

The capacity for users to locate the site by undertaking a simple web search also emerged as an issue in relation to the site name and thus the site underwent a number of name changes during its development. Table 2 identifies the names used commencing with iTKNe and the associated challenge.

<table>
<thead>
<tr>
<th>Name In Order of Use</th>
<th>Challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>iTKNe</td>
<td>This stood for (internet) Transnational Knowledge Network in Education. The challenge was that very few people could pronounce the site’s name. This name also comprises more so a description of the process and mechanism involved, which in terms of product uptake is not always necessary or helpful. By way of analogy it is like calling a new model car a four wheel Toyota with a steering wheel. As most who drive cars already appreciate that they typically have four wheels and a steering wheel then this information is redundant.</td>
</tr>
<tr>
<td>Drongo</td>
<td>The intent behind this name was to signify the site as ‘Australian’ and work with the notion of productive ignorance. The challenge however, was that this name could too easily be read as holding negative connotations.</td>
</tr>
<tr>
<td>Lao shi guru</td>
<td>This name was used to capture the interest of potential Chinese users. The challenge with this name was that it was difficult for non-Chinese speakers to remember the spelling and it would not return appropriate results in a Google search ... if one could enter the spelling. Consequently the site had to either be bookmarked or the URL manually entered.</td>
</tr>
</tbody>
</table>
| Educationlinx.com    | This name was the first to be registered as an internet domain. Domain names can be either country-specific such as .au, or global such as .com. With the global reach of the site a .com domain was selected. Domain names are in some respects like rights to a gold mine, and clever prospectors will have generally already registered the potentially most profitable domains names. Even when the domain is not used in association with any live site it can accrue in value waiting to be sold to a buyer who is willing to pay the requested amount. The most recent example of this has emerged in relation the Microsoft’s release of the new gaming console XBOXONE. As reported in an article titled: Microsoft said to go after Xbox One domain name squatters: Hot on the heels of Microsoft unveiling its new gaming console, Xbox One, the company reportedly filed the complaint with the NAF. According to Fusible, Microsoft kept the name of its console a secret, presumably to avoid various domain name squatters. However, both xboxone.com and xboxone.net have been registered since 2011. At least one of the domains belongs to a resident in the U.K. and both are hosted by GoDaddy. Microsoft is known for coming down hard on domain name squatters. Lawsuits filed by the software giant go back as far as 2006 for domain names like winowslivemessenger.com and
microsoft.co.uk. A simple search for "Xbox" under the NAF brings up dozens of complaints brought by Microsoft, including for domain names like ... xboxisfree.com, and xboxsafety.com (Kerr, 2013).

Hence while it would have been preferable to register the domain as Educationlinks.com, this option had already been taken. Entering Educationlinx nonetheless returns the project website as the first page of Google search results. Importantly the domain name Educationlinx.com signals to the potential user the purpose of the site, as opposed to its mechanisms or theoretical underpinning, which is to facilitate links in the field of education.

With hindsight the name EducationLinx.com may not be working well in terms of attracting users who have not been directly identified or invited.

While there have been a couple of new members who ‘found’ the site while browsing the Internet, it does seem that the name almost certainly is never entered as a matter of education-related web browsing. In this respect a site name like ‘Education Networking.com’ may have increased casual browsing hit rate, but as noted above, it is difficult to locate a good domain name in education which has not been taken.

**Functionality Lessons**

Initial work on building the site was associated with ‘feature creep’ or the tendency to include all conceivable functionalities simply because they were available. As development of the site progressed this impulse was tempered by the need to only include:

a. those functions that had the potential to facilitate good networked learning opportunities;

b. those functions that were entirely error free, and

c. those functions which did not adversely impact system performance (as indicated above).
Appendix B – Evaluation Report

Evaluation report
This report summarises the independent monitoring and evaluation of the project iTKNe–ict enabled transnational knowledge network in education.

The external monitoring and evaluation covered the project from February 2011 to May 2013. Based on the evidence, the external evaluation shows the project’s original aims were partially met. As well, other possible outcomes were identified resulting from the change in direction (following formative evaluation by all project partners). Significant learning occurred during the project that can be used to inform future projects involving pedagogical approaches that incorporate technology.

The website created for the project using the Drupal open source content management software (CMS), provides the opportunity for both formal and informal learning experiences with students and teachers from any part of the globe able to freely participate based on their individual learning needs. In addition the website provides scope to go beyond the original aim of addressing the needs of pre-service education students in expanding their exposure to transnational knowledge creation. Suggestions made by project partners (September 2012 workshop) included, using the site for the support of Higher Degree Research students, postgraduate students and their supervisors. Other suggestions were the collection of research data and a collaborative space for research and publications between partner institutions, and application of the pedagogy to other disciplines.

The major advantage of the website is the ability for any interested scholar to register free of institutional requirements and enterprise level systems or location. The project leader believes a significant strength of the site is that it is ‘not a corporate driven model but a bottom up model evolving from what the end user wants’. Users can suggest additional functions.

Evaluation methodology
The main stakeholders considered in the evaluation process were students, teaching staff of the eight partner institutions, project leader/executive group, reference group and the funding body in terms of sustainability and application to other contexts.

Monitoring and evaluation were guided by the evaluation plan approved in November 2011 which used the recommended organizational framework for Australian Learning and Teaching Council, now Office for Learning and Teaching (OLT) projects developed by the University of Tasmania (2003). A mixed methods pragmatic approach was used given the diversity of the needs of the project. Pre and post questionnaires of students and partners were planned and conducted, although due to circumstances, the pre-questionnaires for students were unable to be implemented and post-questionnaires for students were minimal due to the small number of students in either formal or informal trials. Planned interviews with students were unable to be carried out due to timing logistics in their study period or the lack of trials. A weakness of the project evaluation is the level of student involvement and feedback especially for educational outcomes, given that this was the major stakeholder group.
Partners decided to await the results of the University of Southern Queensland (USQ) trial before they were willing to trial the site. It is uncertain whether all partners were aware of the outcomes of the trial. Those that were felt the website did not provide ample evidence that domestic and international students would be readily available for online interactions.

Both qualitative and quantitative approaches were used for analysis with an emphasis on the former.

Other methods of evaluation data collection included questionnaires following partner activities and the student trial; semi-structured interviews with partner institutions; semi-structured interviews with three teachers involved in proposed trials with students (telephone and face-to-face) at the University of Southern Queensland and at the University of New England; interviews with one of the lead project partners and with the project leader. Formal evaluation questionnaires were conducted with trial teachers, the project leader and all partner institutions (attached).

Documentation and communications within the project were analysed (apart from budget matters), including minutes of meetings, email communications amongst partner institutions and the project executive, regular newsletters and the website created specifically to achieve the aims of the project. Video conferences between some partners and the project executive were observed, but not teleconferences between individual partners and the project leader.

The two face-to-face meetings of the project partners were attended and provided a major source of information for the external evaluator. Discussions at these meetings highlighted the willingness of all partners to share resources and collaborate. What added value the Educationlinx site and technology could give over other systems was a major point of discussion at the September workshop.

Periodic meetings were held with the project manager to ensure gaps in the monitoring process were minimised. It should be noted that the project manager’s efforts were commendable in keeping project partners informed and able to contribute through regular newsletters and emails. ‘Behind the scenes’ issues with website security and development (apart from the major issues with user registration and hosting) were not reported to the evaluator. A comprehensive list of lessons learnt and challenges met appeared in the January 2013 Progress Report. No judgement or comment is therefore provided in this area.

OLT progress reports gave an opportunity for the external evaluator to provide formative feedback to the project’s executive and were a valuable tool for improving communication processes and highlighting other needs of the project. Strategies were suggested for issues raised where appropriate.

The Educationlinx website was reviewed for functionality, ease of use and as a content management system, and for evidence of student collaboration for transnational knowledge exchange.

Reference Group members contributed comments for inclusion in this report.

Recommendations related to the project outcomes from the analysis of all data are provided under the heading Conclusions and recommendations.
Project Modification

Following formative feedback, a planned change in focus was considered and adopted midway through the project timeframe. This resulted from a consensus amongst partner institutions that the emphasis on formal teaching courses was not practical given the differing requirements of each institution in terms of required content, assessment approaches and other institutional course related requirements. Accreditation of pre-service education programs by AITSL and AQF was an additional issue. An alternative was to allow institutions to create learning materials specifically for any partnership activity they planned and for these to be openly shared.

Including an online international learning experience of two to three weeks duration as a teaching activity or as part of formative or summative assessment tasks was still achievable with the new focus providing more flexibility to achieve the same aims. The website in its current form facilitates the opportunity for both formal and informal learning experiences for education students and teachers from any part of the globe assuming groups can be created and linked.

Technical difficulties delayed the establishment of a stable website and necessitated an extension of the project’s finishing date. This impeded the ability of willing partners to trial the website adequately in the remaining project timeframe and contributed to an inability to collect feedback from students.

Alignment of the knowledge exchanges with course learning outcomes and assessment tasks was an important evaluation point for both students and teachers in the original evaluation plan. Due to technical difficulties mentioned above evaluation of the value of the learning experiences in achieving transnational knowledge exchange afforded by Educationlinx has yet to be achieved but is necessary for a reliable judgement to be made about project outcomes in terms of ‘ensuring all students graduate with the international perspectives needed to effectively teach in culturally diverse local and international contexts’ (Project Abstract OLT website). The project leader has suggested it will be the responsibility of teachers to evaluate the quality of learning experiences. Awarding marks for assessment based on student participation would facilitate evaluation (partner suggestion).

Project success criteria

The project’s success criteria along with results are summarised below. Those that became irrelevant after the approved change in focus for the project are listed with a strikethrough.

Success criteria for the project as listed in the Evaluation Management Plan

<table>
<thead>
<tr>
<th>Successful implementation in partner institutions, with ITKNE related activities/assessment embedded in existing units connecting roughly equal cohorts of international and local students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result: three courses attempted this. Technical difficulties prevented these and other partners from participating in the timeframe remaining once the website was finalised. The website was not formally used for student interaction due to delays and technical difficulties. In the first USQ trial in October/November 2012 in the course EDO3211 Teaching in Global Context (a course that ‘looked custom-made for the project’ in the teacher’s opinion) email was used instead and pairing of students was established through the teacher’s own contacts or by the students using Moodle Chat and their own resources to find a learning partner.</td>
</tr>
</tbody>
</table>

In the proposed trial between University of New England and Monash University students
stimulus video and three discussion starter questions were loaded onto the website in readiness for semester 1 2013. Logon difficulties proved ‘a major disincentive’ for both partners and implementation was put on hold. Again the learning outcomes of these courses were extremely relevant to those of the project and especially for the graduate attribute of global perspective.

In the third proposed trial by USQ with the course EDP4140 Second Language Learning and Pedagogy important learning outcomes related to cultural awareness fitted well with the project aims. This trial was delayed and had not occurred by the end of the evaluation period.

Other partners had resolved at the September workshop 2012 to await the results of the USQ trial before using the site for their own teaching. This was because they were reluctant to use the project website until it was demonstrated reliable, due to personal preference, or due to directives from their institution. Further comments on this point appear on page 7.

One partner commented that the probable reason for non-interaction was ‘partly due to potential users not knowing how the site can be used for teaching and learning purposes and how the site can be embedded into an existing course.’

One partner said they would have been more proactive in integrating the Educationlinx network into their unit if they felt suitable interaction was available. Another indicated that they and others ‘were able to organise local/international student educational interactions using video-conferencing and face-to-face conferencing.’

A number of partners mentioned that interaction is available through other institutional Learning Management Systems (LMS) and their own international contacts. A point raised strongly at the September 2012 workshop was that the site ‘not be used as replicating what is already offered at each university’ (workshop minutes). One partner commented positively about the potential of the site saying ‘what is special about this site is the fact that it can be accessed by anyone. It allows us to use the world out there as a resource for our teaching and learning…the ease with which cross-institutional interactions can be achieved in this site is very special’. There was overwhelming agreement at the September workshop that a positive advantage of Educationlinx was cross-institutional enrolment.

Expressions of interest in buying into the network from other Australian and international institutions

Result: No official responses were received. Registrations on the Educationlinx site indicate a number of education institutions outside the project partners joined the site at the time the invitations were issued in February and March 2013. Formal invitations were extended to all Australian tertiary institutions’ Schools of Education, Australian Language and IELTS centres and Northern Territory schools. A selection of overseas institutions also received an invitation. It is understood that project partners sent invitations to their own international contacts as well. It was conceded that ‘branding and advertising should have been attended to earlier to capitalise on other opportunities (e.g. ELICOS student inclusion)’. This would have helped to ensure adequate numbers of international student participants. Both the reference group and the project leader have made points relating to the definition of an ‘international’ student given that global networking makes all students international. A method to recruit students from a diverse range of cultural and educational backgrounds is an issue to be addressed in the future if the network is to be sustainable.

Positive feedback from students, staff about social/welfare and reduced sense of isolation resulting from participation in iTKNe [Educationlinx] learning modules [now learning experiences]

Result: analysis of comments from three USQ students and on the website indicates students are keen to use the site and join the conversations. There appeared to be no public interaction in the forums, all comments coming through the ‘Chat’ facility. It is unknown if private groups are operating. Logs for Chat sessions were not available for evaluation. Of the
140 registered users on Educationlinx (April 30, 2013), seven identified themselves as international students and one Japanese academic. This statistic is not reliable as many students have just identified as ‘student’ and email addresses do not always indicate their country of origin or nationality. Thirty two users identified as lecturers representing at least eleven different institutions. A small number of users gave no indication of their role. All users have English as their default language. It should be noted that a strength of the website would be that approximately 50 languages are supported by the software. No judgement can be made specifically about social/welfare and reduced isolation.

**Positive feedback from staff and other stakeholders about participation in and functioning of the iTKNe [Educationlinx] network.**

**Result:** teaching staff who responded stated the potential for positive results were apparent but as yet untested. The functioning of the network for knowledge exchange is untested. Several project participants mentioned existing communication networks that could be used for the same purpose and asked whether the Educationlinx site is replicating such networks. Two partners commented that there were issues raised at the workshops that still needed attention (IP and what Educationlinx offered over existing systems). Further comment appears under the heading *Evaluation of major products: 2. Network.*

### Evaluation of major products

Criteria for judgements and suggestions by the external evaluator were based on the educational value, effectiveness and efficiency of the outcomes for users. Educational value and effectiveness were tied to the notion of the integrated curriculum through alignment of learning outcomes, teaching and learning activities and assessment activities. Efficiency was related to ease of use of the technology, student and teacher support, and sustainability of both the user network and the technology in the long-term. The major products evaluated were pre-determined by the Evaluation Management Plan. Those with a strikethrough are no longer relevant to the modified version of the project.

#### 1. Teaching program:

- Usability of technology
- Ease of navigation
- Quality of teaching materials
- Quality of website functionality and resources included
- Quality of teacher facilitation
- Quality of interaction and exchange of knowledge

**Result: awaiting user feedback.** Partners varied in their feelings about the usability and functionality. Several said the site did not provide anything extra over existing systems or products provided. Comments were made about the information and guidance provided for new users as to the use of the site with one comment being ‘the website and its pages are very minimalistic’.

No evaluation could be made about the quality of interaction and exchange of knowledge. ‘The project did not engage with the educational issues’ (partner comment).
### 2. Network

**Result: not fully developed.** 140 users (April 30, 2013) registered following two intensive national and international launches in February and March 2013: 77% are students of which seven (6.5%) identified themselves as international students. Thirty two users identified as lecturers (22%), plus one Japanese academic, representing at least eleven different institutions apart from the partners. The website affords international interaction in that the software supports approximately 50 languages. More users from diverse cultural and educational backgrounds are required to achieve adequate networking.

A point raised by a partner at the September 2012 workshop was the relationship the Educationlinx site had ‘to social media with other linkages and networks (i.e. Facebook)’. This point was also raised by all three members of the Reference Group. One commented that there ‘already exist group-talk or group share online environments...well known and in use by large numbers of students of all varieties’. A second commented ‘it could be said that several other ICT systems or web 2.0 services currently on the market could serve a similar purpose, e.g., Google Communities / Hangouts, Edmodo, or even Facebook. But what differentiates your system, as far as I can tell, is that it is advertising free, and not censored or banned within countries that are concerned with the more open social networking services and perceived risks inherent in those systems’. The third comment was ‘I suspect people’s capacity/desire to embrace another social and professional networking, for example, through Facebook, LinkedIn, Twitter and sundry other sites, may be really limited.’ Two partners said that using another LMS involved an additional learning burden.

The time frame available to establish a viable network since the site was completed has been quite short and was after the start of 2013 tertiary study periods. There is scope for networking to increase as corroborated by one of the Reference Group who commented ‘I think this [the network] takes time to develop and promote and the project time frame, even with the extension, might not have been long enough to really get this established as well as we would have hoped for.’

Apart from unavailability of the site at the start of various teaching periods during the timeframe, project partners did not engage in the teaching program because they were not teaching undergraduate pre-service teaching students, were on study leave, or because their own LMS was mandated to use and provided high levels of reliability and support for teachers and students (see comments on page 4).

### 3. Administrative procedures

**Result: Partially in place.** Registration is automated. Students can choose to respond to any other member via real time interaction or to respond to any open forums or blogs. Lecturers must set up groups for formal and private interactions. The website lacks comprehensive guidance for students and lecturers/teachers. This is being provided as a need is demonstrated. The ‘Offers’ and ‘Wants’ tabs give no indication of their purpose. A User Guide is recommended (how to set up groups, private spaces, add resources). The need for additional user support appears to have been recognised by the project leader who has also identified the need to have a back-up person for his role as well as another administrator for the long-term.

### 4. Drupal CMS hosting and administration [maintenance]

**Result: Partially in place.** After testing several CMS programs (*Big Blue Button, Edu2.0*) the open source *Drupal* software was chosen as the most cost effective program providing independence from particular institutional systems and extensive functionality for interaction and sharing. The ‘trial and error’ search caused delays in implementing the project aims, most notably student trials. The project leader commented ‘while the employment of an expert developer would have expedited the achievement of outcomes, it would have also significantly increased the
Organic open source learning materials will be part of the site including a rating system to identify particularly good content.

The lesson learnt was that expert CMS development assistance was required earlier in the project to avoid the substantial energy required to identify and develop a suitable low cost CMS through trial and error. The evaluator feels this would have allowed the project leader to focus on motivating institutional partners to participate and contribute resources, attracting a diverse range of students and additional partners, and dissemination of the project in general to a wider audience. This should be noted by future projects wanting to employ leading edge technology.

The Educationlinx website was professionally hosted in November 2012 and a secure system of registration added, addressing the maintenance and stability of the site for sustainable use. Several website name changes were an unfortunate but necessary outcome. The original name —ITKNE —‘was changed because the majority of users could not pronounce it and because it would mean nothing to student users’. A Chinese name with Chinese characters, was not found by search engines. Another had inappropriate colloquial connotations. The final domain name is an easily understood name and relates directly to the aims of the project and will be more easily captured through search engines.

The migration of the server to a professional webhosting company Webcity has contributed to the sustainability of the project beyond completion. Server capacity for an increasing user base has been secured.

The new domain name Educationlinx.com, the stability of the CMS and website and self-registration appears to have resulted in an increase in user registrations. More user help and guidance has been noted.

**Dissemination**

Dissemination was achieved through partners’ seminars at their own institutions. An NBN presentation was made simultaneously in Armidale and Sydney. A wiki educator page was set up for the first half of the project. A marketing flyer and invitations to join the network via email, journal publications and conference and seminar presentations Australia wide and at international venues were also part of the process.

**Conclusions and recommendations**

The major project outcome of the Educationlinx website is a potentially valuable resource and tool for educational collaboration and transnational knowledge exchange through cross-institutional enrolment. The site can be used for individual learning or for structured learning experiences. The latter relies heavily on acquiring enough diversity in cultural background of users joining the network to produce the ‘robust’ network aimed for. Further evaluation of the site and its aims is required of all users both in and outside of Australia.

The project leader stated in the January 2013 progress report ‘The need to specifically identify cohorts as “international students” is arguably redundant in a global context where all participants are potentially international. This raises questions around what comprises “international”’. The evaluator feels it also raises the question of what is ‘transnational’ knowledge exchange. Both questions need to be resolved to confirm the value of the Educationlinx network.

Partnership formation for interaction was identified as a key challenge by partners and even ‘critical’ according to one with a large cohort of students. The project leader stated (project report January 2013) ‘the CMS has now provided a viable mechanism that will allow partnership formation. The site contains an “offers and wants” function which allows site users to advertise the learning experiences that they can offer others and/or the learning experiences that they need. Users can set an expiry date on their advertisements and identify the nature of the partnership (individual one-on-one or
groups of varying sizes’). The effectiveness of this approach is yet to be tested and, as mentioned, partnership formation for large cohorts requires the development of administrative protocols.

Technology issues were paramount in the progress of this project and overtook pedagogical outcomes. Critical factors related to technical sustainability have been addressed. Further effort is recommended for achieving ease of usability, maintenance and monitoring the network through:

- the establishment of protocols for pairing students or student groups for ‘structured’ learning experiences and large student cohorts
- an administrator to respond to requests to ensure the site continues to grow organically to meet student and teacher needs and to grow with emerging technology
- comprehensive support beyond the basic ‘Frequently Asked Questions’ facility
- addition of an overview of the purpose and ways to use the site on the homepage so that potential users will know immediately what the site is about
- professional web design services to eliminate ‘on-the-fly’ changes to the website’s functionality, interface and content to ensure consistency and stability of the site for returning users.

Additional potential project outcomes raised by partners (resource sharing, linking HDR students, data collection, and publication collaboration) along with additional site functions are yet to be formalised. The Educationlinx website is clearly focused on education students and the education community and this is hence the focus of interaction. The concept of transnational knowledge exchange has a ‘wider applicability across other disciplines as it is not the technology but the pedagogy that is developed which will be of more lasting value’ (partner comment).

The project aimed to determine the educational value of the site for interaction promoting learning in the field of education between local and international students. This remains to be confirmed.

The potential for website registrations and networking is poised for a second stage of promotion through more high-profile marketing and dissemination.

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