The Caledonian Academy is a centre for research in Technology-enhanced Professional Learning. Our vision is to bring together leading companies, public sector organisations and professional bodies with leading-edge research to generate new ideas around how people learn. We are already working with companies like Shell, BP International, Conoco Phillips, Centrica and professional organisations such as the Energy Institute, the Chartered Institute for Securities and Investments and the Higher Education Academy and the Joint Information Systems Committees.

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Action Research Partnership with Shell International

Action-Research Partnership
The Caledonian Academy led an Action-Research Partnership with Shell (2008-2010) to advance current approaches to work-based learning. Shell, the international oil and gas company, needed to address key challenges in its approach to work-based learning. The demographic changes in the workforce and the close integration of formal and informal approaches in learning and development were top of its list.

Shell’s central aim was to harness the power of collective intelligence in supporting employees in the transition from education to the workplace.

The research partnership centred on the concept of collective knowledge: that the key knowledge within an organisation is constantly being enhanced and refined through the daily activities of its employees. Social technologies (such as blogs, microblogs, wikis, social bookmarking tools, and virtual worlds) allow the individual employee to access the power of the collective: consuming the knowledge and expertise held throughout the organisation, creating new knowledge based on their own experience, and connecting with others to learn and to pass on new practice.

Blue Skies Research
Alongside action research activity, aimed to improve performance within Shell, the group advanced more conceptual research around the relationship between knowledge building and collective learning that will be of interest to learning experts from education and the corporate sector.

Networked technology tools can empower employees to take control of their development: to chart their own learning pathways, find new resources and people who can help them achieve personal and organisational goals. How best can these new technologies and approaches to workplace learning be deployed to enhance the effectiveness of knowledge workers?

Figure 1: Individuals can consume and create new knowledge, and connect with others to chart their learning pathways

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Timescale: 2008-10
Funded: Shell

The Caledonian Academy
The Caledonian Academy is a research centre in Technology Enhanced and Professional Learning at Glasgow Caledonian University, UK. The Academy works in partnership with leading research centres and industry partners, including Shell, Conoco Phillips & BP.
Learning from Incidents: Research with Shell International & Energy Institute

This industry-academia research project was led by the Caledonian Academy at Glasgow Caledonian University. Industry partners included the Energy Institute, Shell, and Conoco Philips. The project developed new approaches to enhancing learning from health and safety incidents in the workplace. The research was conducted across industrial sites at the Shell Mossmorran Gas Plant and the Conoco Phillips Humber Oil Refinery, both in the UK. The aims were to:

- Find ways of improving learning from incidents in the workplace;
- Transfer learning from incidents to the workplace through a participatory methodology involving key staff;
- Improve HSE results by promoting deep and active learning.

Starting point
We hypothesised that incidents would be reduced in a culture of continuous learning across organisations. By implementing a participatory Change Laboratory Method, employees would improve their understanding of why incidents occurred and how they might be prevented in the future. Connecting organisational learning with practice would help develop safer workplace environments and create generative organisations within the energy sector.

Action research
Through a baseline study, we determined the factors that improved learning from incidents and reduced the number of incidents at each site. We identified key factors that impacted upon Learning from Incidents (LFI) and developed a framework to enable holistic implementation and analysis of LFI initiatives. Based on this baseline data, we redesigned practice in partnership with key staff at each site. We used a method known as the Change Laboratory. Frontline staff were actively involved in diagnosing and solving issues at each site.

Impact
Redesigned practices were implemented as interventions in the testbeds. Cross sectional case studies were developed, together with recommendations on implementing the interventions across the energy sector. The main outputs of the project were the LFI Framework and the LFI Process Model that can be used in companies to guide improvements in LFI processes and practices.

![Figure 1 LFI Framework](http://www.gcu.ac.uk/academy/)

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Timescale: 2008-2011

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Engaging with learning form incidents in the workplace – LFI-Engage - Research with Shell International & Energy Institute

This industry-academia research project is led by the Caledonian Academy at Glasgow Caledonian University. Industry partners include the UK Energy Institute, Shell and Centrica. The research is being conducted across industrial sites at the Shell Scotford Upgrader, Canada and Centrica Killingholme Plant, UK. The aim of the project is to develop an easy to use set of tools that can be used by people in companies to analyse and improve their learning from incident (LFI) processes and practices – the LFI-Engage Toolkit. The LFI-Engage Toolkit is designed to be used by frontline managers, safety officers and employees to guide the implementation of LFI initiatives across industrial sites. The toolkit forms a part of the ‘Hearts & Minds’ tools available from the Energy Institute (for more information, visit http://www.energyinst.org/heartsandminds)

Starting point
Companies have invested heavily in implementing approaches to LFI. However, the return on investment is not optimal. There are three main problems that prevent companies learn from incidents:

- **Problem 1:** LFI activities do not focus on how people use information about incidents
- **Problem 2:** Key opportunities for learning throughout the incident lifecycle are missed
- **Problem 3:** People are given limited scope to make sense of incident information and relate it to their own work

Methodology
The LFI-Engage project is addressing aforementioned problems by developing the LFI-Engage Toolkit in collaboration with worker at the industry sites. The first phase of the project included development and two rounds of validation of the Learning from Incidents Questionnaire (LFIQ). The LFIQ was answered by a total of N=1096 respondents across Shell and Centrica. The second phase of the project included organising two focus group workshops with the employees at the sites in order to collaboratively develop a series of tools that would help companies improve their LFI processes and practices.

![Figure 1: LFI-Engage Toolkit overview](image)

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**Timescale:** 2012-2013  
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Learning and Safety Culture: Research with BP International

Learning and Safety Culture
To test the hypothesis that there is a link between the learning culture and safety culture in highly hazardous environments the Caledonian Academy led a desk study for BP.

We wanted to find areas of commonality, abstract key principles of learning and safety culture. We aimed to make recommendations to BP as to if and how measuring aspects of learning culture could also give information about safety culture.

Research Findings
The research surfaced six key principles of learning and safety culture:

1 Open communication - Multiple, open channels of communication should be in place to allow for effective and multi-directional information flow. Effective systems should be implemented to capture and share relevant knowledge across the company.

2 Employee empowerment - Employees should be involved in decision making in relation to safety and learning. They should be encouraged to question practices and make suggestions about improvements in safety and learning.

3 Collaboration - Opportunities should be available for collaboration within and across teams and employees should be supported in developing necessary teamwork skills.

4 Alignment of espoused and enacted priorities - Enacted behaviours should align with espoused policies, procedures and rules.

5 Internal systemic alignment - Policies, procedures and rules should be consistent with each other.

6 Management - Managers should have the commitment and competences to encourage and support learning and safety. In addition, management should create the conditions necessary to implement the learning and safety principles (open communication, employee empowerment, internal systemic alignment and alignment of espoused and enacted priorities).

Figure 1: Aligned learning and safety culture

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Timescale: 2012-2013
Funded: BP International

The Caledonian Academy
The Caledonian Academy is a research centre in Technology Enhanced and Professional Learning at Glasgow Caledonian University, UK. The Academy works in partnership with leading research centres and industry.
Narrating Your Work: Research with Shell International

Narrating your Work
In Shell and other companies, many people in teams are working virtually, collaborating over geographical boundaries and across time zones, without ever meeting each other in real life. This occasionally leads to reduced knowledge sharing and sense of disconnection from colleagues. ‘Narrating Your Work’ (or NYW) approach was designed and trialled within a virtual team at Shell distributed in three locations on three continents - Netherlands, USA and Malaysia - to see if it could provide a lightweight, practical form of enhancing knowledge sharing and sense of connectedness within the team. NYW involves members of a virtual team using an enterprise microblogging tool, Yammer, to post regular daily or weekly updates about their everyday work. The updates are available to all team members and others in the organisation to read and respond to, and they focus on important events workers are experiencing, problems they are facing, solutions they are developing, and useful resources they encounter. Shell wanted to find out whether NYW would create a form of ambient intimacy in virtual teams, increasing connectedness and improving knowledge sharing.
NYW was trialled within Shell for a month, and subsequently evaluated through a questionnaire survey, interviews and analysis of NYW updates in Yammer. A set of recommendations for the implementation of the methodology in other virtual teams and in other organisations were developed.

Research Findings
First, we found that most people can ‘narrate their work’ comfortably in the margins of their day: the average time spent writing NYW updates across the sample was 20.53 minutes per week (SD 20.836). At an average of 24.82 minutes per week (SD 22.883), reading colleagues’ NYW updates is an equally undemanding activity. Participants thought Yammer was easy to use, presenting no barrier to their engagement with NYW.

Second, results suggest that team members valued NYW for its strong business purpose and for helping them feel more connected with their teammates, gaining better insight into colleagues’ work. Specifically, NYW helped participants gain awareness of their peers’ specific expertise areas, bringing about synergy and better utilisation of knowledge, skills and personal networks within a distributed team. It also increased participants’ awareness of what others in their organisation, beyond the team, were doing helping people connect directly with relevant others across the company. Finally, NYW stimulated regular self-reflection; although self-reflection is an essential learning, typically it is difficult for professionals to do as part of their work routine.

All in all, the results suggest that NYW is a practical approach to improving knowledge sharing and sense of connectedness in virtual teams, that is easy to use and to implement. NYW can be used by other distributed teams in other organisations. Guidelines for implementation of NYW approach can be found in the NYW Methodology Toolkit developed by the project team

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Timescale: 2011-12

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Working & Learning at the Boundaries of Knowledge Partnership with Chartered Institute of Securities & Investments

Self-regulated learning in the workplace
Knowledge workers are increasingly asked to generate new knowledge as part of their day to day role, for example in the finance industry where changing regulations and recent failures necessitate process innovation. Established training and development approaches become ineffective in such situations and instead, organisations must move to support their workers to monitor and take control of their own learning.

The study comprises two phases: the first is the development and validation of an SRL questionnaire to detect the participants’ SRL profiles; the second is a mixed method procedure that aims to explore in detail the range and form of SRL strategies exhibited by different professionals. In this phase, an interview and three recalls will be used as research instrument.

Research questions
The study is guided by the following key research questions:
1. How do professionals plan, implement, and reflect on their learning goals in the context of everyday work at the boundaries of knowledge?
2. How do individuals draw upon others (the collective) in self-regulating their learning?
3. How do professionals use technology to support their self-regulated learning?
4. What are the similarities and differences in a) the use of SRL strategies, b) strategies of drawing on the collective, and c) patterns of technology use between professionals who score high and those who score low on self-regulated learning measures?

Method and participants
Participants are 124 employees from CISI organisation partners.

Research Findings
The most interesting finding from this research are:
- Those knowledge workers who have higher self-regulated learning (SRL) scores can better exploit the learning opportunities afforded by their job.
- Particular sub-components of self-regulation (for example a workers ability to rationalise what they need to learn, or have learned into the broader context of their role) seem to be key indicators of workers who are able to learn more effectively (Figure 1).

![Figure 1: Regression model of SRL](image)

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The Caledonian Academy
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Charting: Supporting Goal Formation and Learning in the Workplace.

Continuous learning is characteristic of knowledge workers, but they can often find it difficult to transfer the new knowledge they have created as it is heavily contextualised within the specific tasks they have performed. Learning also depends on the learning skills of the knowledge worker, which determine how they can initiate and manage their own learning. Effective knowledge workers must be able to take control of their development: self-regulate their learning through goal-setting, self-monitoring and self-reflection.

We have described Charting as the process whereby an individual manages and optimises their interaction with the people and resources who (may) have a role in their learning and development.

Goals as the social object
Goal-setting is a critical component of self-regulated learning as it is the mechanism by which an individual articulates their learning needs and plans a learning strategy. Goal-setting is therefore also at the core of Charting: goals provide a means to organise and manage learning, and connect with other learners. Learning goals provide a purpose for interaction with other people and resources when learning. In other words, learning goals serve as a “social object” around which people interact.

Charting Tool
We have developed a tool focused on this goal-setting component of Charting. The tool is designed to help the individual manage, monitor and optimise their interaction with other people and with knowledge resources by using learning goals (rather than a formal curriculum, predefined content, or organisational competencies), to provide a focus for the sense-making process. Learning goals are individually-set, but influenced heavily by others in the workplace and may be shared with co-workers or with colleagues outside the organisation.

For a knowledge worker, learning is inseparable from work, and therefore charting tools would be closely integrated with the rest of the tools which an individual uses to conduct their work.

Technical Background
The tools are written in Ruby, are open source (search ‘charting’ on github) and can be freely incorporated into existing systems or used as a standalone service. A demonstrator site is available at: http://charting.gcu.ac.uk/

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The Caledonian Academy is a research centre in Technology Enhanced and Professional Learning, Glasgow Caledonian University, UK.
Learning in Massive Open Online Courses (MOOCs)

Massive Open Online Courses aim to open access to online learning. Over the past two years hundreds of MOOCs have been set up by universities around the world. Yet little is known about how people learn in MOOCs.

Some MOOCs do not replicate lecture/tutorials – they are open and there are no boundaries - anyone can join. The instructor’s role is to input expertise, provide structure and catalyse learning. Learners themselves source knowledge and contribute it back to the course which can then be used by other learners on the course.

The way people learn through the MOOC may seem far removed from how we view learning in the classroom, but in an era of surfing, sourcing, splicing and mixing information, it is a natural way to learn. The real power of a MOOC is that participants learn together. Small clusters form, made up of people interested in specific questions, creating learning groups made up of people new to the subject as well as interested experts. In this type of learning environment, MOOC learners have to be able to take control of - to self-regulate - their learning.

MOOCs also have implications for universities, emphasising global competition and bringing to the fore new funding and business models.

Method and Participants
This study focused on Change 11, a ‘connectivist’ MOOC. Twenty-nine participants were recruited for semi-structured interviews exploring their learning behaviour within the course. These participants were also asked to complete an SRL profile questionnaire.

Research Hypothesis
People who exhibit a high degree of Self-Regulation in their learning (as measured by their SRL profile score) will use qualitatively different strategies to plan, monitor and reflect on their learning in the Change 11 MOOC.

Research Findings
To date, our analysis has focused on identifying different patterns of engagement that learners on the MOOC adopted. Three patterns emerged:

- **Active Participants** interacted with others in the course through internal networks through microblogging or blogging. They used a range of connection strategies, such as contacting others or commenting on others’ blogs.

- **Passive participants** tended to be dissatisfied with the ‘connectivist’ approach of the course and would have preferred a formal and more structured course. Factors affecting their engagement with the MOOC included confidence and prior MOOC experience.

- **Lurkers** actively followed the course but did not engage with other learners in the MOOC. They may however interact with others outside the course, and applied what they had learned to improve their own practice.

Ongoing analysis is focused on goal-setting behaviours and has uncovered evidence that learners who score high for their SRL profile are more likely to articulate different types of goals, that are more challenging, and extend beyond the course itself. Together these findings provide an insight into how individuals approach and learn within MOOCs, and can guide MOOC organisers to improve the design of future courses.

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Learning through Networks

This research explores how academics capitalise on their personal learning networks for professional learning. The project identifies authentic learning spaces, identifying critical sources of knowledge and support required for effective teaching.

The study included participants representing three different HE contexts from the UK, Sweden and the Netherlands. This mix of countries and contexts allowed us to examine the role/implication of networks for academics’ learning and support across diverse academic cultures.

This investigation adopts a personal network perspective, which allows us to explore academics’ significant learning and support relationships across multiple settings, whether embedded in formal and informal structures of professional learning, within or beyond institutional boundaries, or in personal acquaintanceships.

Research Findings

When directing their own professional learning, academics draw upon two types of personal networks: interest-driven and task-specific. Resources embedded in these personal networks include expertise, information and guidance, on which academic draw upon to carry out work-related tasks and to solve problems related to teaching and other academic responsibilities.

A high proportion of academics’ significant learning and support relationships are based within and limited to the boundaries of local institutions, representing approximately 63% of all contacts elicited. Results highlight disciplinary differences in terms of the composition of networks.

Personal networks facilitate the acquisition and development of different types of knowledge and skills. Knowledge was in the domains of pedagogical, instructional, curricular knowledge, as well as enhancing self-appraisal, curriculum planning and technology skills.

Professional learning activities commonly used by academics included informal discussions, making inquiries, sharing experiences/resources, collaborating, and following peers’ postings in social media.

The changes academics applied to their teaching practices tended to relate to modifications of teaching strategies.

The findings show that Academics personal networks have hallmarks of homophily, physical proximity and density, marked by closely-knit learning and support relationships. Even if such network structure promotes trust and common values, it inhibits flow of novel ideas, a diverse array of knowledge, expertise and insights, thus limiting opportunities for learning, change and innovation.

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The Caledonian Academy

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Open Educational Resources: Research with JISC & Higher Education Academy

Starting point: professional learning
The Caledonian Academy led an evaluation and synthesis study of the £15M Open Educational Resources programme funded by the joint Information Systems Committee (JISC) and Higher Education Academy (HEA). Widespread involvement of faculty and support staff within the programme was assumed to lead to sustainable change in culture from focusing on content ownership, to focusing on open sharing. Also, building a critical mass of OER would bring about sustainable change in professional practice.

Communities and trust
How professional practice is transformed to support activities underpinning the release of OER, sometimes called open educational practice (OEP), is not well understood. Communities of practice provide a positive environment for changing professional practice. Communities are important if the benefits of a culture of open resources, open knowledge, sharing and peer collaboration in education are to be realised.

Analysis
Data was drawn from the programme-wide synthesis and evaluation using project reports and focus group discussions to analyse the contradictions evident in OER release by UKOER project teams. The analysis surfaced 1) common barriers and enablers around OER release and 2) cultural differences across the sector, detailing evidence of norms, roles, rules and reward structures that foster effective professional practice. Analysis was through mapping the actions of project team members against an activity framework.

Findings
OER projects made best progress where project team were within existing communities. However, release within communities limits open release.

Impact
Our research into practices around learning resources has had an impact on the direction and decisions of funding bodies, on learner support in other institutions in the UK and internationally, has contributed to public policy on transparent government. Our emphasis on socio-cultural factors has changed culture, leading to richer policy, by moving debate on from technology and a view of resources as objects, to practices. Through shaping the UK Joint Information Systems Committee (JISC) and Higher Education Academy (HEA) programmes in Open Educational Resources (UKOER) and Digital Literacies, our research has had impact on practitioners and professional services around open learning practices in over 90 higher education institutions in the UK. Findings have informed a report to the UK Cabinet Office on ‘Transparent Government’.

Figure 1: The OER Impact Model illustrating the relationship between OER and OEP

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Open Educational Resources in Adult Education and Lifelong Learning: Research with the EC Institute for Prospective Technological Studies (IPTS)

Starting point: open educational resources in lifelong learning

The Europe 2020 strategy acknowledges that a fundamental transformation of education and training is needed if Europe is to remain competitive, overcome the current economic crisis and grasp new opportunities. Open Educational Resources (OER) are perceived as providing a strategic opportunity to improve the quality of education as well as facilitating policy dialogue, knowledge sharing and capacity building. Yet was a lack of evidence on how OER can be, or are, used to promote lifelong learning and adult education.

Data collection

An inventory of over 150 initiatives that develop, promote, or use OER was compiled and they were categorised into types, based on their primary activity. The initiatives were surveyed on their experiences. At the same time, we surveyed adult learners across Europe on their practices with internet resources, and interviewed five OER experts.

Analysis

Responses from the surveys were judged against key themes from 15 vision papers for lifelong learning in 2030 commissioned by IPTS. These were remarkably coherent in envisaging a future in which there is:

- Control by the learner
- Teachers as mentors or facilitators of learning rather than directors
- Open access to information
- Provision of OER by individuals as well as institutions
- Recognition for sharing OER

Conclusions

OER, and the practices associated with them, are an immensely powerful idea that potentially makes a significant difference to education systems, but under-estimating the degree of cultural change needed to optimise their value, and the power of vested interests endangers realising this potential. Most OER aimed at adults are provided by universities with a traditional teaching context in mind and little knowledge of the ways in which resources are actually used by adult learners.

Impact

EC policy makers have taken on our findings that little is known about OER provision that is not linked to formal higher or school level education, which has significant implications for policy (given the 75 million low-skilled in Europe; the lack of access to ICT for many etc). OER in Europe are dominated by resources in English and French and that much should be done to make OER available in smaller language groups. They have also agreed the need to be clearer about what is meant by “adult learning” to provide better focus for ongoing research and policies.

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Timescale: 2012-2013
Funded: European Commission

The Caledonian Academy

The Caledonian Academy is a research centre in Technology Enhanced and Professional Learning at Glasgow Caledonian University.
Community Dimensions of Learning Object Repositories – funded by JISC

Globally, public & private sector organisations have been setting up digital repositories to support sharing of resources for learning. The educational rationale is that resources can be restructured to support different pedagogical approaches and to achieve economies of scale. A key problem is that these learning object repositories (LORs), like many other learning technology innovations, are often designed to exploit the capabilities of technology rather than to meet learners’ needs. This research explored whether the nature and organization of a community is likely to impact the way a LOR is used.

Research hypothesis
The way repositories are used will vary according to the needs of individual communities; therefore the issues associated with the implementation and use of repositories will differ across communities, although some will also be common across communities. For example geographically dispersed teaching and learning communities are often loosely knit. In such communities, members will communicate and interact in different ways as compared with locally based, tightly knit communities.

Dimensions of LORs
Six dimensions of LORs were identified.
1. The purpose of the repository;
2. The subject discipline the LORs has been created to support. Although some LORs are mono-disciplinary, many are multidisciplinary;
3. The scope, for example some LORs support single departments or institutions, while others operate at a regional, national, or international level;
4. The sector, LORs are used in schools, higher and further education institutions as well as hobby-based or work-based communities;
5. Contributors may include teachers, students, publishers, institutions, employees or hobby enthusiasts, depending on the scope and sector;
6. The business model that governs the trading, and management framework underpinning the repository.

These six dimensions draw out important aspects of the context within which the LORs operate within and across communities.

Dimensions of communities
Our starting point was that the way repositories are used depends not only on the dimensions of repositories, but also on key characteristics of communities. Dimensions of communities include:
1. Purpose, the shared goal/interest of the community; the reason why the community was formed in the first place;
2. Dialogue, modes of participation and communication (online, face-to-face, or mixed) adopted by the community;
3. Roles and responsibilities;
4. Coherence, whether the community is close-knit or loosely confederated/transient;
5. Context, the broader ecology within which the community exists;
6. Rules, implicit and explicit rules that govern the functioning of community;
7. Pedagogy, predominant T&L approaches used in the community.

Findings
From these dimensions, guidelines for repository development were devised. [http://www.gcu.ac.uk/cd-lor/]. These guidelines have been used by key national organisations in the UK, Australia and the Netherlands to establish international Learning Object Repositories.

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Timescale: 2006-2008
Website: [http://www.gcu.ac.uk/cd-lor](http://www.gcu.ac.uk/cd-lor)
Scoping Sustainable eLearning (SelSCOPE): Research with the Higher Education Academy

Starting point: professional learning
Many e-learning initiatives fail. Transient as they are, ‘innovative projects’ often exhaust the resources and degrade in their impact - destined to be unsustainable. The lasting success of e-learning initiatives is a growing concern for educational initiatives around the world that rely on governmental funding or commercial benefits. Austerity measures have led to a renewed interest toward the concepts of sustainability and sustainable practice in e-learning. This study investigates the viability of integrated e-learning services and their cost-effectiveness, aiming to inform policy and strategic decision making.

Background
The education sector has to adapt continually to external drivers, including societal and technological and economic changes. Hence, institutions have to anticipate, withstand and, where possible, capitalise on the current and future waves of change. Consequently, e-learning attracts the attention of administrators and policy makers. Many universities have introduced e-learning to improve cost-effectiveness and enhance innovation. However, e-learning initiatives are often not sustained.

Method
This research is based on a scoping review of the sustainability of e-learning practice in Higher Education. The scoping review allowed identification of themes and trends in sustainable e-learning emerging from diverse bodies of scientific knowledge. Key themes associated with sustainable e-learning were identified, coded, categorised and synthesised into a set of broad domains: Resource Management, Educational Attainment and, Professional Development and Innovation. Although each domain is distinct, there is overlap across the domains as illustrated in Fig 1. The numbers in each section correspond to the number of papers reviewed and categorised in each domain.

Key findings
1 Sustainable e-learning must be framed within broader, fundamental societal issues related to learning. These issues include globalisation, economic transformations, changes in employment & lifelong learning.
2 Therefore sustainable development of e-learning must draw on knowledge dispersed across the three key domains (Fig 1).
3 There is also scope to develop meta-level analysis, combining and synthesising empirical work to inform the sustainable development of e-learning.
4 Tensions between the concepts of cost-efficiency, effective pedagogy, and continuous innovative practice must be considered.
5 There is an need for education business models based on sustainable e-learning.

Project team
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Learning from Digital Natives - Research with the Higher Education Academy

Starting point
An idea that gained currency is that the generation born after 1980 grew up with the Internet and they are inherently technology-savvy. This generation has been termed Digital Natives, Millennials, or Net Generation. Proponents claim that, not only does this generation have sophisticated skills in using digital technologies, but that, through exposure to these tools, they have developed radically new cognitive capacities and learning styles (Prensky, 2001). The idea is that the education system is not equipped to accommodate the needs of this new generation of learners. These arguments have been well-publicised and (largely) accepted with limited empirical basis.

This study provided empirical evidence to improve our understanding of the nature and extent of technology uptake by students. In parallel to understanding what tools students use and how they use them, the aim of this study was to build an accurate picture of the patterns and the contexts of technology adoption by students.

Method
The method combined quantitative and qualitative data collection across Social Work and Engineering students at two different universities. 160 students completed an online questionnaire. This quantitative data collection was followed by interviews of 8 students and 8 teaching and support staff.

Research Findings
Compared to ‘digital immigrants’, ‘natives’ used a wider range of technologies for learning. However, students have limited understanding of what tools they could adopt and how to support their own learning. Although students generally have expertise in the use of some (largely conventional) technologies that sometimes exceed lecturers’ abilities, their understanding of how to use these tools for learning is limited by their knowledge of the potential affordances and applications of these tools and by their narrow expectations of learning in higher education. Students in the sample favoured conventional, passive and linear forms of learning and teaching. Their expectations of integration of digital technologies in teaching focus around the use of established tools within conventional pedagogies. These findings challenge the proposition that young people have sophisticated technology skills, providing empirically-based insights into the validity of this assertion.

Recommendations
1. Encourage the use of social technologies in formal learning contexts
When using tools for social networking outside the classroom, students engage in sophisticated information-seeking behaviours, in peer group collaboration and in the self-generation and the sharing of information and resources. The informal domain appears to be characterised by a world-view that emphasises decentralisation of authority (independence in learning), active participation, contribution and collective wisdom. HE institutions should embrace the idea that learning is about ‘social participation’ and ‘meaning construction’ and not just about delivery and acquisition. The starting point is a change in culture.

2. Support students’ skills in social networking
Students who use social technologies for socialising may not have applied these skills in ways that support formal learning. It would be useful to build students capabilities in this area. One approach would be to redesign modules and programmes so that the use of social technologies and associated networking activities are integrated into classroom practices. This would require that members of academic staff are always up-to-date with technological developments. Another approach is to develop students’ ability to apply social networking processes with digital technologies in formal educational settings:
for example, the skills to set up and use discussion fora, mobile devices, wikis, blogs and other social software for educational purposes. In this scenario, students themselves would choose which software and tools best suit the objectives defined by their academic programmes. The advantages of this approach would be students have control and it does not require that academic staff be experts across all areas of technology use and development.

3. **Rethink induction processes in relation to social technologies and formal learning**

Universities often offer induction courses where students are trained in IT use. As each new cohort entering higher education came with more sophisticated skills, universities found less need for these courses. However, if students are to use social technologies for formal learning there may be a need to reinstate such induction courses but in a new guise. This is true whatever approach is adopted: i.e. whether staff integrate new technologies and social networking methods into courses and programmes or create opportunities for students to use their own tools. Students will need to be able to select the most appropriate technology/software for the learning task they are required to undertake. In rethinking induction, we need to reconsider whose task it is to provide programmes that foster these skills. It might require collaboration across support staff and academic teaching staff.

4. **Devise assessment practices for ‘learning as collaboration and participation’**.

Effective use of social technologies requires that learning is viewed as a process of collaboration and participation rather than ‘delivery of content’. This shift will raise specific issues for assessment. One concern is the responsibility for assessment. In this new context, students share responsibility for assessment with their teachers: they evidence their learning against criteria that have been agreed with the teacher rather than receive a score against predefined learning outcomes. Another issue is that, as assessment methods become more innovative (e.g. a wiki rather than an essay), marking and grading will become more complex.

5. **Build a campus culture rich in social networking opportunities**

A campus environment rich in social networking requires a cultural shift by both staff and students. One way to cultivate this shift is to foster communities both within and across stakeholders in higher education. Communities of academics could explore new pedagogies and technologies, communities of technologists might support developments in the technological environment, communities of students will learn and share knowledge but there should also be opportunities for these communities to interact and build new cross-interest communities. A cultural change of this kind will require support across different levels of the organisation (see next section). A starting point would be greater use of social technologies within the day-to-day work of institutions.

6. **Build capacity in the use of social tools**

Academic staff and students will require support in using social technologies. Staff development initiatives should bring together teachers, learners, and people with expertise in participative learning and digital media.

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**Timescale:** 2008-2010

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Literacies in the Digital Age
Research with JISC and the ESRC

The study surfaced a range of literacy support models implemented in universities. Digital literacy is now central to what higher and vocational (further) education can offer. By 'digital literacy' we mean the capabilities required to thrive in and beyond education, in an age when digital forms of information and communication predominate.

Starting point
Digital forms of information and communication are transforming what it means to work, study, research, express oneself, perhaps even to think. These transformations challenge the core business of universities – to produce and disseminate knowledge through research and teaching – and could have a profound impact on learning. The requirement to learn is now a lifelong and increasingly also a life-wide imperative, with learning opportunities integrated into work and leisure. Important questions around whether universities and colleges can support learners' development of digital literacies, how literacy development be supported and under what conditions remain. In this study we aimed to assess the digital literacies and capabilities required by learners, identify support provision required for literacy development, and surface current shortfalls in support. making recommendations for the future.

Method
Data was collected over four phases: literature review; competence framework review; analysis of 40+ case examples of digital literacy support; 15 audits of digital literacy in universities across the UK.

Research Findings
Viewing literacies as situated knowledge practices has real implications for learner support. There is a tension between two perspectives on literacy development; literacies as social practices and as competency development. Although competency frameworks are being used as a guide for embedding literacies within programmes, their application is effective only when learners develop digital literacies through immersion in diverse knowledge practices that are constitutive of identity. Literacy development is most effective when embedded as authentic tasks in programmes of study; explicit exploration of academic and professional practice in digital environments; when academic and support staff have opportunity to explore the changing modes of scholarship and professionalism; consideration of how academic communication is constructed and how different media are used; through recognition of learners' existing knowledge practices as resources for learning. Shortfalls in literacy support are due to cultural and organisational constraints that inhibit the embedding of digital literacy practices. To better prepare students for future challenges, university staff should be prepared to radically change their own practices. More information is at [www.editlib.org/p/89791](http://www.editlib.org/p/89791)

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Funding: JISC (LiDA) and ESRC (LiDU)
Timescale: 2008-2011

The Caledonian Academy is a research centre in Technology Enhanced and Professional Learning, Glasgow Caledonian University, UK.
**Practice Models for Learning**

**Starting point: practice models**
Practice models describe a range of learning designs that are found to be effective, and offer guidance on their use. They support sharing, reuse and adaptation of learning designs by teachers, and also the development of tools, standards and systems for planning, editing and running the designs.

However effective a learning design may be, it can only be shared with others through a representation. They must convey the information that teachers need in a form that the teachers can understand. Thus practice models should be both *representations of effective practice*, and *effective representations of practice*.

**Method and Data Collection**
The project took a practitioner-centred approach, working in close collaboration with a focus group of 12 teachers recruited across a range of disciplines and from both further and higher education. Information was gathered from the focus group through two face-to-face workshops, and through their contributions to discussions on the project wiki. This was supplemented by an activities with teachers at two conferences in the autumn of 2006. Through these we gathered the information requirements of representations that support sharing and reuse, and evaluated nine types of representation against these requirements, mapping them also against four different stages of sharing and reuse.

**Conclusions**
The use of taxonomies, ontologies and controlled vocabularies in conjunction with visual representations such as concept maps or the AUTC temporal sequence was suggested as a potential way forward which might bring together the needs of teachers and technical developers. However a problem emerged with the recognised definition of practice models. Practice models were expected to do at least three things:

- Be generic
- Detail sequence and orchestration
- Inspire teachers to implement them and hence change practice

While we found plenty of examples to show that any two of these requirements can be realised together, achieving all three at once appears to be a holy grail. We developed a conceptual understanding of why this proves so difficult, viewing design for learning as a process, or as loosely coupled processes, rather than as a static blueprint.

![Process model through which we analysed the conflicting requirements of practice models.](image)

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Employability Development in the Context of PhD Studies

The past few decades have seen a period of constant transformation of doctoral education. This transformation has included greater emphasis on employability and the development of work-related skills, knowledge, attitudes and experiences by doctoral candidates during their PhD studies.

Research questions
This PhD study was guided by the following key research questions:
1. How is the concept of employability understood by social science doctoral candidates and key stakeholders (supervisors, researcher developers)?
2. What are the activities that contribute to development of employability of doctoral candidates?
3. How does the external environment (rules, community and task division within it) influence development of employability of social science doctoral researchers?
4. What are the views of key stakeholders and doctoral researchers on the ways development of employability can be enhanced during candidature?

Method and participants
This thesis addresses the issue of employability development during candidature through exploration of the views of doctoral candidates supervisors and researcher developers, using both qualitative and quantitative methods.

A socio-cultural perspective and Cultural Historical Activity Theory were adopted for this study in order to explore the key components of the employability development process and the interaction between them.

Research Findings
The main findings of this study are as follows:
1. There are key mismatches between the perceptions of the participants and the requirements of the labour market as well as highlighting the impact of previous experience, motivation and disciplinary orientation on their understanding of employability.
2. While policy-led initiatives focus on provision of formal support for employability development, there is a need for a more nuanced approach to the employability development process: shaped by a range of formal, non-formal and workplace learning activities.
3. Environment plays an important role: the community that is involved in supporting the employability development process and the rules and regulations mediating the relations between the community members.
4. The study identifies and discusses key tensions that inhibit but also stimulate the processes of employability development during candidature.

The study develops our understanding of employability development during candidature as a set of complex interacting processes, and sheds light on the perceptions of doctoral candidates and key stakeholders whose views are poorly represented in the existing research literature

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The Caledonian Academy is a research centre in Technology Enhanced and Professional Learning, Glasgow Caledonian University, UK.
Creativity in design education: research with Creative Industries
The Role of Knowledge Sharing

Creativity in design education is considered to be the ability to generate new ideas and to combine existing ideas in new ways in order to find novel solutions to problems. Creativity is often enhanced by a free flow of knowledge and through social contact.

In this research project, an analysis of the knowledge-sharing practices of experts in the Creative Industries in Scotland has been conducted in order to inform novel approaches to design education which support creativity.

Methodology
The methodology in this study is design-based research; this approach advocates a rigorous framework, with cycles of design and evaluation, in which objectivity, reliability and validity are carefully considered.

Data has been gathered by structured questionnaire and in-depth interviews with participants from a wide range of Creative Industries. Data has also been gathered from final year students in design programmes.

Research Findings
In practice, employees in the creative industries consume and create knowledge by making use of a wide range of distributed resources. Creativity is an important aspect of practice for both students and experts. All respondents in this study believe that creativity is enhanced by knowledge-sharing collaborative practices.

However differences between the practices and knowledge-sharing patterns of students and experts have been identified. This evidence has been used to develop an authentic industry-based learning and teaching intervention which supports creative design. The learning and teaching outcomes have been evaluated and the evidence suggests that authentic knowledge-sharing interventions support the development of creative solutions to design problems. A number of key principles have been deduced that are considered central to this outcome.

These are to:

- provide students with learning opportunities which allow them to work collaboratively with industry experts and clients.
- provide students with authentic learning tasks which prepare them for the complexity of real-world design environments.
- reward learners (through assessment) for meaningful collaboration and the open sharing of creative ideas over cooperation in content creation.
- provide students with feedback which is meaningful to them and used in learning.
- encourage students to self-regulate their learning, by setting their own goals and reflecting on their motivations.

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The Caledonian Academy
The Caledonian Academy is a research centre in Technology Enhanced and Professional Learning at Glasgow Caledonian University, UK. The Academy works in partnership with leading research centres and industry.
Overview of Impact of Research on Policy, Practitioners & Services around Open Learning Practices

Caledonian Academy research into practices around learning resources has had an impact on the direction and decisions of funding bodies, on learner support in other institutions in the UK and internationally, has been embedded in environmental design, and contributed to public policy on transparent government.

Our emphasis on socio-cultural factors has changed culture, leading to richer policy, by moving debate on from technology and a view of resources as objects, to practices. Through shaping the UK Joint Information Systems Committee (JISC) and Higher Education Academy (HEA) programmes in Open Educational Resources (UKOER) and Digital Literacies, our research has had impact on practitioners and professional services around open learning practices in over 90 UK higher education institutions, and direct impact on digital literacy support in at least six.

Our findings have informed a report to the Cabinet Office on ‘Transparent Government’. Internationally, major repositories of resources in the USA, Estonia and the Netherlands have been prompted by our work to take a user-centred social focus in repository design.

Underpinning research

Our research is distinctive for its socio-cultural, user-focused approach to learning with open educational resources (OER). In a field often dominated by technical and organisational considerations, we emphasise a broader understanding of “open learning practices” that encompasses all activities that open up access to education in a context where freely available online content and services are becoming the norm.

A key issue in developing sustainable approaches to learning practice was to identify characteristics of resources that have proved effective in changing learning and teaching. Falconer and Littlejohn’s research on Effective Learning Resources achieved this, relating the characteristics to existing frameworks for understanding resources. Their work highlighted the significance of the relationship between a resource and the user, and informed design of a major programme of work funded by the UK Government (JISC/HEA UKOER, £15m).

Learning resources are typically collected into repositories for ease of management and to promote discovery and use. Previous work on repository development frequently focused on the technical requirements of repository managers. In our Community Dimensions of Learning Object Repositories project (CD-LOR, JISC, £250k, 2005-7) Margaryan, Littlejohn and Milligan demonstrated the significance of cultural practices in repository use. They proposed a new framework for repository development that addressed key socio-cultural issues, that has influenced repositories internationally.

Since 2001 promotion of OER in many nations’ programmes and policies has highlighted the need to understand the socio-cultural factors surrounding OER use. In our Learning from Digital Natives project (LDN, Higher Education Academy, £25k, 2007-08) Littlejohn and Margaryan, studied user adoption of technologies for accessing resources. Littlejohn, Beetham and McGill investigated the digital literacies required for effective resource use, and the ways in which universities support learners to acquire them, in our Learning Literacies in a Digital Age (LLIDA, JISC,2008-09, £60k) project. Their findings are embedded in support for digital literacy at universities across the UK. Learning resources are increasingly released under open licence as OER. The open licence has profound implications for the ways in which these resources are used. Littlejohn, Falconer, McGill and Beetham [5,6] explored these implications in the practices of adult
learners and educators within and outside formal education, drawing on the rich data they gathered during our UKOER Evaluation and Synthesis (JISC UKOER 1, 2 & 3, £200k, 2009-12) and OER4Adults (European Commission Joint Research Centre, £50k, 2012-13) projects. Findings have guided development of the UKOER funding programme and are being embedded into a European Commission Roadmap for Open Education for Lifelong Learning in 2030.

Impact
Our insistence on socio-cultural issues surrounding OER practice has impacted on the culture of funding bodies nationally and internationally, on the practice and provision of professional services in open learning practices nationally and internationally, and on public policy on transparent government in the UK and beyond.

Selected evidence of impact
The Community Dimensions of Learning Objects Repositories (CD_LOR) research provided some of the seminal research from the UK on the use and design of learning object repositories. When the Australasian Society for Computers in Learning in Tertiary Education (ascilite) was contracted by the government funded Carrick Institute (later Australian Learning and Teaching Council) to develop design principles for an online repository we drew on the well-developed outcomes of CDLOR to focus on the development of an engaged community of learners rather than a repository alone. The researchers in the CDLOR team were invited and valued members of the reference group and provided a well-received keynote at the annual conference as part of this process, as well as key information sessions for the Directors of the Carrick Institute (ALTC). The research outcomes from CD-LOR greatly influenced the design based research process throughout the project and its influence is highlighted in the related papers.

Associate Professor Geraldine Lefoe, Head, Academic development Unit, University of Wollongong, Australia; Co-leader, Carrick

Exchange-ALTC Exchange Project, Former Vice-president (ascilite)

The synthesis and evaluation of the c£15m UKOER programme was used iteratively to improve the programme as it ran, and stands in its own right as the world-leading resource concerning the implementation of open practices in institutions. The work of the research team is consistently referred to internationally. As a new and fast moving field, OER literature is generally "grey", and citations by leading organisations (eg the Open CourseWare Consortium) and at leading conferences (eg the Open Education Conference) is an excellent measure of the impact of the evaluation. The work is also incorporated in a practitioner-focused resource, the OER infokit. The UKOER programme was not developed in isolation and drew on [related research] including LLIDA and CDLOR.

David Kernohan, JISC Programme Manager

The team at the Caledonian Academy, expertly led by Prof. Allison Littlejohn, has made significant contributions to our understanding of professional learning, particularly in organisational settings. They are also well-known for their work on Open Educational Resources, for which they have received wide recognition from their academic peers and national and international funders.

Professor Peter Sloep, Professor of Technology Enhanced Learning, CELSTEC, Open Universiteit Nederland

Work and thinking around Learning From Incidents has changed at Shell Scotford site as a result of participating in LFI Engage. There has been an immediate impact with regards to initial learning’s drawn from the survey and our engagements that have showed us areas where we may approve. Long term Shell are currently considering implementing LFI Engage fully and influencing change broadly. The outcomes will impact on practice longterm through enhanced learning from incidents and modification of current work practices.

Steve Mousseau, Incident Investigator, Shell (Scotford, Alberta) Canada