Quality Issues in ICT Integration
Quality Issues in ICT Integration: Third Level Disciplines and Learning Contexts

Edited by

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INTRODUCTION

TRÍONA HOURIGAN, LIAM MURRAY AND ELAINE RIORDAN

With the advent of Web 2.0 technologies, learning environments are undoubtedly changing, and it is now widely acknowledged that the plethora of technological tools available can often be used to foster for example, collaboration, autonomous learning, and the co-construction of knowledge. Many researchers, teachers and indeed institutions are therefore tapping into such resources to enhance the teaching and learning context, but what is of key importance is the evaluation of such tools in terms of the quality they can offer to students and teachers alike. To this end, the aim of this publication is therefore to discuss the very broad question of quality when integrating technology into teaching and learning contexts. The book draws on the experiences of researchers working in different disciplines in order to focus on the commonalities identified when exploiting new technologies within a distinct pedagogical environment. This resource therefore hopes to offer students and teachers an insight into the different applications of technology in teaching and learning. It is hoped that this can be drawn on by undergraduate and postgraduate students; instructional designers; educational managers; teachers; teacher trainers; academics; media technology students in the hope of illuminating some of the quality issues surrounding the exploitation of technology for teaching and learning purposes.

Some of the major recurring themes stemming from this volume include constructivism, active learning, collaboration and reflective practice, and while the contributors are situated in varied teaching and learning contexts, their underlying theories and pedagogies are somewhat similar. In general the contributors pinpoint varied aspects of addressing and improving the issue of integration, including the following:

- ICT and teacher training (second and third level contexts)
- Assessment of the potential of specific ICT tools for potential use within learning environments
Introduction

- Integration of case-studies within subject-specific areas such as: language learning, computer science, business

This book can be dissected into a number of areas, including innovative research currently being undertaken at the fore of this technological revolution in order to support integration; the employment of technologies with a link to facilitating communities of membership; the use of specific RLOs designed for both secondary and tertiary education respectively; the use of e-portfolios for students, teachers and information workers; and the overall evaluation of technology.

The first chapter by Gráinne Conole opens with a discussion pertinent to this volume, as she raises a number of interesting questions in relation to technology and pedagogy. Conole points out one of the main issues concerning technology use which is that although there is a vast array of technologies freely available, the uptake from both teachers and students is still relatively low. In lieu of this, she presents some interesting activities currently being undertaken to tackle this issue of low integration. She argues that we need to take the step forward from the open source movements of freely available resources to a more “open design approach”, so that learners and teachers can take the initiative to uptake, adapt and move forward with such innovations to improve their practice. She also deals with some of the current advancements in this respect, and asks some important questions in relation to the effect of this new wave of technology on traditional education. She uses the notion of mediating artefacts in order to explain how teachers use and appropriate technology in pedagogy, and proposes that new mediating artefacts are necessary in order to support teachers and learners within the integration of new technologies. She focuses on three different areas of research, firstly pedagogical patterns, which holds advantages in that such a concept focuses on building examples of good practice. Secondly, she draws on research based on Open Educational Resources (OERs) with a focus on the use of available resources and how they are adapted by the users, while also building a community of sharing and reflection. Her third area deals with learning design, whereby she mentions some work being undertaken by OUDLI which aims to improve teachers’ learning activities, and enable them to make better use of technologies. The main propositions she therefore makes are the combination of these three different “mediating artefacts” in order to take a step forward to further integration, adaptability and repurposing of the resources available. Therefore she suggests that an OER design could be drawn upon by various resources (e.g. Cloudworks, Pedagogical patterns or OER repositories), and, in a somewhat cyclical
manner, once the design has been created it can then be fed back into the resources from which it drew upon to begin with.

Chapter two by Tony Hall, Sean Duignan and Bonnie Long focuses on the efficacy of technology enhanced learning through discussing animation, virtualisation and a virtual online technology experience with a focus on assuring quality in integration. This chapter therefore outlines the authors’ endeavours to enhance their teaching practice through the exploration, appropriation and evaluation of new technologies, in concert with action and design-based research methods. The principal objective of the authors’ technology-enhanced learning interventions is to exploit the pedagogical potential of new technologies to enhance the quality of learners’ educational experience. They focus on quality as being synonymous with synergy in that the appropriate technology and pedagogy are combined in a fitting context to ensure an optimum learning experience. They use some key themes which they attribute to evaluating the quality of their endeavours, namely, the methodologies used to enhance learning, both individual and group learning are promoted and balanced, the learners are motivated to use the technology, the learners can create artefacts for reflection and discussion among others, the sustainability of the technology, and finally, the exploratory nature of the technology. Social constructivism is a key foundation in the authors’ research and teaching, while they also draw on Laurillard’s (2002) Conversational Framework. Bearing this in mind, the first area of research they tackle is animation, and how animation technologies can facilitate creativity and engagement in teachers in initial education and practising teachers. The second project they refer to relates to the use of computer virtualisation with undergraduate and postgraduate computing students as a means of enhancing the student learning experience, and the third innovation discussed in this chapter is Multi-User Virtual Environments (MUVEs), in this context, Second Life, used with teachers in initial education to create a space for them to interact with each other and share experiences in order to reduce novice teachers’ feelings of isolation. For the three projects in question, the authors gained feedback from a variety of methods and thus employed their aforementioned criteria for a discussion on the technologies employed. The authors conclude with some suggestions for measuring and maintaining quality with regards technology enhanced learning.

The literature surrounding quality, language and culture is outlined by Florence Le Baron-Earle in the third chapter. She maintains that quality in language learning with a focus on cultural competence, which is heightened though reflection, is something which can be promoted through technology. At the outset of the chapter, the concept of culture itself is defined, and
then the connecting and intertwining relationship between language and culture is discussed. Bennet’s model (1993) of intercultural sensitivity is described in detail as a means of highlighting a journey to heightened cultural awareness, while teaching practices to facilitate this journey are attended to. In the second part of the chapter, the author moves onto a discussion on how to promote quality in language teaching and culture. Some aspects mentioned are those of reflection, deep learning or metacognition, as well as scaffolded or supportive dialogue within a community of practice. These concepts mainly draw on theories of social constructivism and active / autonomous learning, stemming from the work of theorists such as Piaget, and Vygotsky, for example. The notion of cognitive apprenticeship, with learning and culture is explored as this process caters for deep learning. Accordingly, the use of technologies to encourage reflective/deep thinking within communities of practice is explored, in particular focussing on the Community of Inquiry (CoI) framework, as set out by Garrison and Anderson (2003), namely with a focus on cognitive, social and teaching presence. As the author points out, online tools such as blogs, wikis and discussion forums are not only easy to use, but they also promote collaboration, foster long-term retention of content, and promote both active and deep learning, and are therefore advocated as facilitating quality in the learning process. The author then goes on to include six case studies based on the use of technologies (discussion forums, videoconferencing, chatroom and email exchanges, blogging, podcasting and using wikis) to enhance cultural awareness. The author surmises that the tools mentioned have the potential to improve quality in teaching as they are easy to use, promote the development of CoPs, promote collaborative, supportive as well as reflective dialogue, while the successful use and integration of such tools lies in the hands of the teachers/educators. This chapter closes on a discussion of the challenges we are now faced with in light of this technological revolution, as well as some suggestions to deal with such challenges, and some factors for teachers to bear in mind in order to support quality in learning.

In a similar vein, Joe Griffin, in chapter four, deals with the CoI framework in a third level computer science context (Professional Issues in Software Engineering). Due to the increased cohort sizes of the specific module outlined in this chapter, the demands on the teacher were too high, and therefore there was a need to shift from the traditional group-based teaching and assessment to the integration of a VLE, for which data was collected over an 8-year period. At the heart of this project lies the notion of collaborative learning and the benefits it can offer, namely deep learning, reflection and better learning overall. Making the context
authentic to increase motivation was another factor which the author of this chapter was keen to do, and therefore multi-institutional collaboration was implemented. The project being discussed here further aimed to combat plagiarism as the assessment focussed not only on the product but also the process, thus allowing the lecturer/educator to follow a student’s development over time. Creating an enjoyable learning environment as well as drawing on (social)constructivist principles were also important features. The next step therefore was to incorporate the use of ICT to fit the aforementioned attributes, and CMC was the route chosen (though the use of the VLE, Moodle). The constructive dialogue between students plus the assessment of activities were all undertaken within this system, and the CoI framework, in particular cognitive presence, was employed in order to analyse the levels of critical thinking between the students (focussing on triggering, exploration, integration and resolution). Moodle provided a facility enabling the creation of scales which allowed each discussion post to be graded according to the aforementioned criteria, and the students could see their own progress within the system. Furthermore, formative feedback was enabled through data visualisation techniques incorporated into the Moodle platform, therefore allowing both students and lecturers to gain a qualitative and quantitative insight into what was happening in the online platform, while at the same time allowing anonymity to all students. This chapter thus uses an existing framework to provide feedback to large cohorts of students, and the creation of the data visualisation tool allowed the lecturer to investigate student interaction, the class as well as individual student progress, while the students were also able to ascertain their personal progress, and their progress in relation to the rest of the cohort.

In chapter five, Elaine Riordan, points out that E-learning is frequently being integrated into educational contexts, and in particular online tools are being implemented in language teacher education programmes to enhance the learning experience and support novice teachers as they begin their teaching careers. She stresses the importance of giving student teachers the tools they will need in the future, in this case technological expertise or at least familiarity with online tools and applications. It is for this reason that she feels it is a worthwhile endeavour to evaluate the quality and effectiveness of such tools in order to ensure pedagogically sound techniques and benefit from the full potential of online learning. Accordingly, this chapter sets out the approaches taken for implementing online communication tools in an MA in English Language Teaching programme. Some of the key themes recurring within this chapter are communities of practice, and how they can be created and maintained in
an online environment. Furthermore, social and collaborative learning is
dealt with as well as the benefits they offer, namely mentoring, supportive
and scaffolded dialogue, reflective practice, and teacher professional
development. The quality of three different tools, namely blogs, chatrooms
and discussion forums, as well as face-to-face discussions is investigated.
This is done using student teacher feedback on these communication tools,
which derives from questionnaires and interview data, and is situated
around themes of communities of practice, mentoring and the integration
of new technologies in a classroom setting. Quality in this context is
judged by how successful the technology is in fulfilling the aims of the
research project in question, as well as quality issues surrounding how
well the technology suits the tasks used in the study or how appropriate the
technology is for a particular cohort of students. Thus the ability of such
tools to cultivate a community of practice and encourage peer mentoring
within this context is analysed, as well as the participants’ potential
integration of new technologies as a result of their training. Amongst the
other issues of quality this author has judged as being worthy of discussion
are: ease of use, enjoyment or affective factors, the value or benefits
afforded by the technologies, interactivity, the perceived usefulness of the
technology, and the long-term effects of the technology. The chapter
closes with a discussion of the pedagogical implications of such findings
for fostering and maintaining quality in language teacher education.

The following two chapters move the discussion onto the integration of
Reusable Learning Objects in classrooms. Chapter six by Oliver McGarr
and Ann Marcus-Quinn, deals with the use of an RLO in secondary
education, and the authors point out that although there are increased
resources in the Irish context, the uptake of technologies is still low, and
confined to certain subject areas. In particular, the use of ICT in the
Humanities was low especially compared to other European countries,
even though research indicates many benefits of ICT for language learners
(Mishan 2005), namely increasing motivation, promoting literacy skills,
fostering independent learning, providing authentic materials, and
promoting communities of practice. Furthermore, the notion of electronic
literacies is discussed, and how familiarity with technologies can increase
such literacies as well as produce autonomous learners. To this end, the
authors discuss the design, development and use of a Reusable Learning
Object (RLO) for the teaching of poetry at Junior Certificate level in Irish
post-primary schools. The courseware was developed, with the assistance
of post-primary teachers, mainly to present material in a motivating way,
to challenge the learners to explore, and to encourage self-directed
learning. This chapter discusses the issues that were considered when
creating this RLO in order to provide a quality piece of software. The authors set out the steps involved in creating this package, and the advantages of the route they chose to take. They discuss, while adhering to the findings and suggestions of previous research and from their usability testing, the choice of authoring tool, the navigation through the courseware, the graphics, the pedagogical agents, and recognition. They then move on to deal with the findings from their evaluation, based on feedback from 24 students between the ages of 12-14. Observation during use, and online questionnaires provided a means of data collection, and the results demonstrate a positive reaction to the software. The authors then use this information to deduce the possible merits of their tool in an educational context, and resonating with previous chapters, the notions of constructivist principles and deep learning are clearly foregrounded. The research raises a number of issues for the development of such tailor-made solutions and highlights opportunities for future developers as well as stressing the need for sharing resources within a community of developers/users.

In the following chapter, Patrick Buckley, reiterates the fact that Griffin makes about increasing class sizes at third level institutions, while at the same time providing quality education to students. To this end, he also proposes the use of ICT to deal with such challenges. He discusses the need for ICT literacy skills as he points out that employers in the digital age require at least some knowledge and literacy in ICT. The case study dealt with in this chapter is based on a business studies course of which one of the course objectives was to develop students’ skills in business application packages such as Microsoft Word, PowerPoint (covered in the first semester), Excel and Access (covered in the second semester). The first semester module is dealt with in this chapter, which was undertaken over a twelve week period, with over 400 students ranging from Business Studies, Law and Accounting, and International Insurance and European Studies degrees who are in their first year of studies, and who have varying degrees of familiarity with ICT. Therefore the design criteria for the module was twofold. Firstly, the module was devised to alleviate pressure on lecturers dealing with large groups, and secondly, to provide students with literacy skills to pursue their studies. A number of RLOs (divided into training units) were thus used which gave the students guidance and practice in relevant tasks in an interactive manner, as well as providing assessment and monitoring progress. In order to overcome the challenges outlined, a number of innovative teaching strategies were used, with information technology playing a key role in enabling them. Pedagogical strategies within the implementation of such RLOs were
based on individualising learning pathways, streamlining processes and procedures, implementing focussed assessment, facilitating autonomous learning, and allowing a funnelling strategy approach, whereby more advanced students could proceed to assessment rather than completing all tasks in the application packages. This chapter therefore evaluates the effectiveness of this approach in terms of student learning as well as investigating the impact of the teaching methodologies on the class as a whole, and on the students as individuals, using three methods of data collection (pre and post-test surveys and student performance). Buckley concludes by highlighting some considerations which warrant further research.

Chapter eight, by Micheal Ó hAodha investigates quality and the student experience by focussing on e-portfolios and enhanced personal “branding” in the Irish workplace. He discusses how the use of e-portfolios is relatively new to education in Ireland, and stresses the importance of e-portfolios to the library and information sectors. To this end, his chapter focuses on the development of e-portfolios in the Irish library/information and educational environments, and on how e-portfolios can provide a better quality for the student and/or library user experience. From his own perspective, he deals with the current situation librarians and librarian administrators are facing in Ireland and how they have to cope with the challenges to maintain a quality profile in such a competitive sphere. Therefore userfriendliness, collaboration, and cost-effectiveness are of utmost importance for the library of the future, and the e-portfolio appears to offer much in terms of meeting such needs. This chapter thus defines an e-portfolio, outlining the three main types thereof (those for developmental, presentation and assessment purposes), and discusses the merits of each type of e-portfolio. Ó hAodha deals with the varied uses and advantages to following the e-portfolio approach, especially with regards the reflective, interactive and possible collaborative nature of such a tool. He also likens the e-portfolio to the traditional CV, whereby a person collects relevant materials, selects from it, then reflects upon the materials and their own worth and finally, uses all of this to make connections and with old and new knowledge. The author then goes on to raise some issues regarding the adoption of an e-portfolio approach, with reference to the notion of “employability” within the Knowledge Society. He also points out that three areas need to be considered in order for the e-portfolio approach to be successful, namely critical mass of use and users, initial social interaction focus, and the inclusion of shallow enquiry-based learning tasks. Additionally, he asks some pertinent questions regarding the storage of e-portfolios, the levels of access for users and potential
employers, the sustained suitability of the information within the life-long learning paradigm, and finally, the protection and archival of the resources. He finally deals with the benefits of the e-portfolio for the 21st century worker in relation to the skills that future employers will be looking for, therefore from his view, for the future library worker, flexibility and adaptability are key, and this therefore needs to be considered within Library 2.0 services. The “Librarian 2.0” thus needs to offer services to all regardless of space, as well as to embrace social networking tools to further collaboration. Ó hAodha believes that the successful libraries of the future will be those who pay attention to staff and students when planning the delivery of their services, and he stipulates that the adoption of the e-portfolio is just one step in this pursuit to provide better quality services.

Moving onto the more evaluative nature of this volume, in chapter nine, Niamh McNamara discusses the impact technology has had on education, and therefore holds that careful consideration needs to be taken when deciding which tools to use in classrooms and for what reasons to use them. This chapter focuses on psychological approaches to measuring the quality of experiences with technology from a user perspective. McNamara discusses the notion of Human Computer Interaction (HCI), and deals firstly with the shift from user-perceived quality in terms of the features the systems offered, or in terms of usability, to quality-in-use, whereby the real-world application of computer systems as tools that support human activity was investigated. Therefore the focus moved beyond usability to the interaction between the user and the product (rather than solely on the product), and three areas were deemed noteworthy to reflect upon, the user, the reason for using the product, and the context in which the product was used. She also highlights a relevant study on quality-in-use testing which was based upon a customer care and billing system used by customer service representatives in a telecommunications company. Quantitative (questionnaires) and qualitative (written comments on specific areas using the Critical Incident Technique (CIT)) modes were used, content analysis was the method of data analysis, and the research study focuses on affect, controllability, efficiency, helpfulness, and learnability. She then moves on to discuss another change in the definition of quality, mainly brought about due to a change in technology, being that there is embedded technology in vast devices nowadays. This change therefore created a need to understand the wider social implications of integrating technology into everyday life, thus evaluating technology from the user experience. To illustrate her point here, she discusses a study undertaken on varied everyday devices, namely mobile phones, and the
issues/aspects of the product that that participants found important. She also mentions that as technology is becoming more widespread that those in HCI need to understand what aspects of use are important to users in order to inform evaluations of quality. She therefore suggests that when evaluating technology functionality (product), usability (interaction) and experience (user experience) are the three aspects that should be investigated, and although these three aspects are interdependent, they should be examined separately using methodologies specific to that domain.

The final chapter by Jonathan Leakey proposes a framework for evaluating the process of Computer-Assisted Language Learning (CALL). He points out that in the field of CALL, there is a lack of an agreed agenda for effectiveness research/quality control, and that it is often evaluated in a more qualitative manner. This chapter describes the author’s research which aimed to develop a more flexible tool for quality control and a model of evaluation for CALL to allow for both depth of analysis and precision. After a brief definition of CALL is offered, he discusses the conflicting philosophical approaches when dealing with quality control, namely positivism and phenomenology, and indeed his underlying aim for his evaluation model is to merge both approaches. Leakey initiated his quality control agenda using Chapelle’s well-known six criteria for evaluating CALL (2001). He then widened the scope to ensure pedagogy, software and digital platforms and their relationships with one another were included for evaluation. He used case studies of languages undergraduates in UK Higher Education, based on platforms, pedagogy and programs, and compares his case studies to previous research findings. In order to do this, he firstly cross-mapped Chapelle with Pederson (1988) and Felix (2005a) on effectiveness research for CALL, and found this exercise useful in terms of providing an overview of adherence to evaluative good practice. Subsequently, drawing from Chapelle and Jamieson (1991) and Felix (2000), a checklist for internal and external validity was combined with a checklist based on Pederson and Felix, and this thus formed a foundation for the implementation of his case studies. Moving on from this, he used the six criteria from Chapelle (2001) with an additional six to create a framework for quality control drawn on from a varied number of researchers in the field. For the extraction of criteria, he compared Chapelle to Mahanna (2004) for evaluation of pedagogy, for digital platform evaluation he mapped Chapelle against Barr et al (2007) and against the Melissi Digital Classroom performance indicators (2005), and finally for software evaluation he mapped Chapelle against Hubbard (1998). Through these cross fertilisations of various frameworks, Leaky
was then able to draw similarities between them, and in turn, create the criteria for CALL evaluation. The model was then tested against the four case studies using both quantitative and qualitative methods. This led to a revised, refined and more holistic model for evaluation including the 12 criteria for qualitative evaluation, the “effectiveness research construct diamond”, and a portfolio of quality control checklists at different levels. While this extensive framework is designed within a CALL context, Leakey, justly points out its relevance and applicability to other disciplines also.

The majority of these chapters are drawn from experiences of those involved and who participated in two events. Firstly, a technology and learning seminar series held in 2009 at the University of Limerick which focussed mainly on quality in education, and secondly, a one-day symposium held at the University of Limerick in May 2009 (supported through Seed Funding from UL). These events, organised by Dr Tríona Hourigan and Dr Liam Murray, were centred on the theme of “Technology and Learning: Defining Quality in Research, Teaching and Practice”. They were concerned with all aspects of technology and learning with a particular emphasis on defining quality in research approaches in this area. As speakers presenting at these events came from different backgrounds and disciplines, but employed technology in their pedagogy, there was a focus on the commonalities which exist in order to underline the importance of unity within this diverse and often controversial subject area, something this volume hopes to emphasise.
CHAPTER ONE

BLUES SKIES THINKING FOR DESIGN AND OPEN EDUCATIONAL RESOURCES

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Introduction

A paradox exists in terms of harnessing new technologies in education. Despite the fact that there is now a wealth of free tools and resources available that could be used to support learning and teaching, in reality technologies are not used extensively in education. Indeed teachers and learners are bewildered by the variety and lack the time and necessary skills to harness them effectively. The focus of this paper is to present Learning Design as a potential solution and in particular to describe the work we are doing as part of the Open University Learning Design Initiative (OULDI), which is developing a suite of tools and resources to support teachers to make more effective design decisions and better use of technologies in the creation of learning activities and resources for their students. The paper will highlight current research on Pedagogical Patterns, Learning Design and Open Educational Resources (OER) and will suggest that together these three areas provide a possible solution to the mismatch between the potential of new technologies and use in practice. It will conclude with an illustrative example being developed as part of a new initiative, Olnet, which is a global network to support users and researchers of OER.

Redefining openness

I argue in this paper that we need to expand the notion of openness, to take account of the affordances of new technologies and the new patterns of user behaviour we are seeing emerge. There has been a growth in recent
years in activities around the open source movement and the development of open tools and services, also the open educational resource movement (Iiyoshi & Kumar 2008). These have a common set of principles and practices: free, shared, collaborative, cumulatively better. The next logical step is a more “open” approach to design (Open Design) – where the inherent designs within learning activities and resources are made more explicit to learners and to other teachers; so that they can be picked up, discussed and adapted.

I argue in this chapter that education is now facing a number of new challenges, precipitated by new technologies. Education today, operates in a context that is increasingly open and abundant:

- **Open** – In terms of free resources, but also privacy implications in light of increased openness.
- **Abundant** - There are now a wealth of tools, services and resources available to support education. If tools and resources are freely available, what is the purpose of formal educational institutions?

Examples of openness include the growth of the open source moment in general and, more specifically in education, the phenomenal success of the open source Learner Management System, Moodle. Moodle is now a major Virtual Learning Environment (VLE)/Learner Management System (LMS) around the world, with a large community of active developers collectively improving the core code and adding extensions and plug-ins. There are increasingly sophisticated free generic tools available - Google apps, free blog and wiki services, communication tools such as Skype and microblogging services, like Twitter. New products are emerging all the time, introducing new concepts and patterns of user behaviour – the latest being Google Wave, which is being hyped as the next generation communication tool, a combination of email, discussion forums and wikis – enabling both synchronous and asynchronous communication.

There has been a noticeable shift in the last few years in terms of the use of technologies. We now have near ubiquitous access with wifi-enabled Internet on demand. New generation phones, such as the iPhone, which are Internet capable and have Sat Nav as standard, make mobile learning genuinely feasible. The number and variety of applications for the iPhone is truly mind blowing; the variety of applications for learning vast; including mindmapping tools, digital books and dictionaries, as well as specific interactive learning tutorials. More and more material for learning is available for free on the Internet. This has been accelerated by the growth of the OER movement, which believes that education should be
free and is a basic right. The OER movement has powerful supporters, especially the Hewlett foundation and UNESCO and include big international players such as MIT. The OpenCourseWare consortium has over 200 worldwide members. A range of different types of OERs and models are available which differ in terms of level of granularity, format and media richness, and type of pedagogy. The Open University launched Openlearn (http://openlearn.open.ac.uk) in 2006 with funding from the William and Flora Hewlett foundation.

Today’s students have grown up surrounded by a technologically mediated world. Clearly new technologies offer much in an educational context, with the promise of flexible, personalised and student-centred learning. Indeed research over the past few years, looking at learners’ use of technologies, has given us a rich picture of how learners of all ages are appropriating new tools within their own context, mixing different applications for finding/managing information and for communicating with others (Sharpe and Beetham 2010). They provide a summary of recent research looking at the learner perspective and in particular how learners are using technologies (Sharpe and Beetham 2010). It is evident that today’s learners are immersed in a technologically rich learning environment. They see technologies as an essential part of their tools for learning. They appropriate technologies to suit their own learning styles and use them to support all aspects of their learning. However despite having grown up in a technological environment, not all students are able to use technologies effectively in an academic context. For example they may be comfortable using Google, but not competent at critically evaluating different resources and using them for their learning. Indeed for the weaker students the complexity of the range of digital tools and resources available to them means they are more likely to get confused and lost.

Good sources of further information on current technology trends and the ways in which technologies are being used in education include: a review of learning 2.0 (Ala-Mutka et al 2009), an in-depth study of students’ use of technology across four disciplines (Conole, De Laat et al 2008), the NSF cyberlearning task force report (NSF 2008), and a review of the open source and OER movement (Atkins et al 2007).

Education for free

Theoretically one can now put together totally free course offerings using free tools and resources. George Siemens and Stephen Downes created an ambitious course and delivered it for the first time in 2009 – not
only were the tools and resources they used in the course free, but so was the expertise! See http://ltc.umanitoba.ca/connectivism/?p=182 for a reflection on the experiment by George Siemens. The twelve-week course was called “Connectivism and Connective Knowledge Online Course”.¹ They described the course as a MOOG (Massive Open Online Course). The content, delivery and support for the course was totally free, anyone could join and an impressive 2400 did, although the actual number of very active participants was smaller (ca. 200). The course provides a nice example of an extension of the open movement, moving a step beyond the Open Educational Resource movement to providing a totally free course. Siemens reflecting on the course said the following:

“Did we change the world? No. Not yet. But we (and I mean all course participants, not just Stephen and I) managed to explore what is possible online. People self-organized in their preferred spaces. They etched away at the hallowed plaque of “what it means to be an expert”. They learned in transparent environments, and in the process, became teachers to others. Those that observed (or lurked as is the more common term), hopefully found value in the course as well. Perhaps life circumstances, personal schedule, motivation for participating, confidence, familiarity with the online environment, or numerous other factors, impacted their ability to contribute. While we can’t “measure them” the way I’ve tried to do with blog and moodle participants, their continued subscription to The Daily and the comments encountered in F2F conferences suggest they also found some value in the course”.

George Siemens and Martin Weller delivered something similar in the form of an “un-course” conference (“From Courses to Dis-Course (yes/no? Am I being too cute-sy?”). See http://ltc.umanitoba.ca/blogs/futurecourse/ for further information. Such courses are becoming more commonplace, the immediacy of the Internet and the variety of free tools for creating content and for communicating with others, means these courses can be set up very quickly with an international team designing and delivering. What kind of impact will such courses have on traditional educational offerings? Will they sit alongside them or ultimately replace them?

¹ http://ltc.umanitoba.ca/wiki/Connectivism
Implications and the hidden conundrum

Clearly all this has profound implications for educational institutions and the provision of formal education (Conole 2009). For students in terms of the skills and experiences they come with and their expectations in terms of technologies (Conole et al 2008; Sharpe & Beetham 2010). For teachers in terms of how they design courses for students. For institutions in terms of how they support and assess students.

New technologies give rise to a range of questions: To what extent have all these free tools and resources impacted on mainstream education? To what extent are the majority of teachers capitalising on these? How much are mainstream courses changing as a result?

The reality is that despite the enormous potential new technologies seem to offer for learning, uptake of them and utilisation of free resources has been slow. Indeed there has been very little impact on mainstream education. Where technologies are used, a lot of their employment mirrors existing face-to-face practice, rather than harnessing the powerful affordances associated with them. There is little evidence of major innovations or new forms of pedagogy.

The reasons for the lack of impact of these new technologies are complex and multifaceted. But one of the key ones is that teachers lack the time and expertise to make best use of new tools and resources. Faced with a new tool – say a wiki or twitter - there are a number of questions a teacher (or indeed a learner) needs to consider: What are the special features of the tool? How can it be used to support learning? How have others used the tool? What are the implications in terms of designing and delivering a learning activity using this tool – for the teacher, for the student? Similarly just having freely available OERs is not enough, a series of similar questions arise: What is the quality of the resource? How has it been used elsewhere? How can it be incorporated into my teaching context? Am I able to adapt it; how much do I need to change to suit my teaching context? All of these are non-trivial and time-consuming questions.

Mediating artefacts to support design

Teachers need guidance in understanding how they can appropriate technologies in their teaching. This guidance can be in the form of a range of “Mediating Artefacts” (MAs). I draw on socio-cultural perspectives (Vygotsky 1978; Cole et al 1997; Engeström et al 1999; Daniels et al 2007), in terms of the use of the term “Mediating Artefacts” (MAs). I
believe the concept of Mediating Artefacts can help us describe and understand how technologies are being used in mediating our practice. Figure 1-1 shows a simplified representation derived from Vygostky’s original idea of mediation; a user intent on achieving a particular goal has a range of Mediating Artefacts they can draw on; both in terms of “information” and mechanisms for “communication”. Alongside the established communication channels of the telephone, email, forums and texting, the emergence of web 2.0 technologies in recent years has added blogging (and microblogging), wikis, social networking sites and virtual worlds but also Voice Over Internet Protocol (VOIP) and in particular popular tools such as Skype which enable virtually free, internet-based communication. Similarly information can now be distributed in multiple locations, and packaged and presented using a range of different multimedia and visual representations. Sophisticated repositories now exist for everything from shopping categories to repositories of good practice and free resources. RSS feeds and email alerts enable users to filter and personalise the information they receive. Social bookmarking and tagging means that collective value can be added to digital objects, concept and mind mapping, tag clouds and data-derived maps are only some of the ways in which information can be presented in rich and multifaceted ways.

![Figure 1-1: Mediating artefacts guiding design decisions](image)

I argue in this paper that there is a need for new Mediating Artefacts to support teachers and learners in making best use of these tools and resources. See Conole (2008a) for a description of the use of the term Mediating Artefacts specifically for learning design. These mediating artefacts can guide and support the teacher in making design decisions.
They can provide mechanisms to help teachers answer questions like those posed above, to help them make decisions on which tools and resources to use and in what ways. For example mechanisms to provide them with access to help and advice, expertise and peer support. Mechanisms to enable them to become part of an evolving peer community committed to discussing and sharing learning and teaching ideas.

I argue that this mediation is through more explicit articulation of the inherent designs associated with a particular learning activity and the way in which tools and resources are used in that particular learning activity. If we can abstract these designs and represent them in a meaningful and understandable way there is a greater chance of them being picked up, used and adapted by others, which, in turn, over time is likely to lead to an evolving understanding of how new tools and resources can be used.

Converging schools of thought

I want to focus on three types of Mediating Artefacts and look at how together they can be used to help guide the teacher’s design practice; learning design, pedagogical patterns and OER Mediating Artefacts. A brief introduction to these areas will be provided, followed by a description of how they can be used together to provide a holistic approach to designing for learning.

Pedagogical Patterns

The concept of Pedagogical Patterns derives from Alexander’s work in Architecture, towards pattern languages for buildings. Applied to an educational context, it is concerned with exploring how we generate a set of “patterns for good practice”; i.e. here is a problem and here is a tried and tested solution. There is now a considerable body of research on Pedagogical Patterns, such as the work of Yannis Dimitriadis and colleagues in Spain, Peter Goodyear in Australia and the Planet project in the UK. There are a number of repositories of patterns with surrounding communities of interest, see for example http://lp noe-kaleidoscope.org/ and http://patternlanguage network.org/partners/. Two well-known examples of patterns for collaborative learning are: “Think, Pair, Share” and “Jigsaw”.

The benefits of the Pedagogical Patterns approach is that the “patterns” are derived from known, tried and tested examples, building on existing good practice. They all have the same format of representation – here is a problem and a potential solution, along with powerful visual metaphors.
Open Educational Resources (OER)

The OER movement has concentrated on developing open educational resources and studying the ways in which they are used and/or adapted by learners and teachers (See for example McAndrew and Santos 2009). The benefits of the OER movement is that it is building a worldwide set of high quality free educational resources, along with opportunities to build a community around these resources - to share and critically discuss good practice in learning and teaching.

Learning Design

In our own work as part of the OU Learning Design Initiative (OUDLI) we are developing a suite of tools and methods to help teachers with the design process and in particular to enable them to create more pedagogically informed learning activities and make better use of new technologies. Our work is focusing on three aspects of the design process: ways of representing pedagogy (and in particular visualising it), providing guidance and advice, and mechanisms to enable teachers to share and discuss learning and teaching ideas. In particular we have developed two tools – CompendiumLD for visualising and guiding the design process (Conole et al 2008) and Cloudworks a social networking site for finding, sharing and discussing learning and teaching ideas (Conole and Culver 2009; Conole and Culver 2010) In addition we have been developing new schema for mapping pedagogies and technologies (Conole 2008b).

The benefits of the Learning Design approach are that it provides a range of tools, methods and approaches to help teachers think differently. It helps make the design process more explicit, and provides a mechanism for sharing good practice.

A new understanding of design: an illustrative example

What we can see across these three areas of research are different types of designs. Can we combine these Learning Design tools with the documented good practice, which has been developed in the Pedagogical Pattern community, with the real exemplars available in the OER world? The Pedagogical Patterns describe a learning and teaching activity or strategy according to a predefined template. Whereas the OERs might be considered as “designs in action” and provide actual learning content. Finally, Learning Designs help give us a better understanding of the broad ways in which learning and teaching activities or strategies can be
represented from narrative case studies or descriptions through to visual designs.

In a new project, OLnet, we are attempting to put these three areas together, specifically to enable better use of OER. OLnet is creating a global network to help researchers and users of OER to work together – so that research outputs inform practice and vice versa (see Conole and McAndrew 2010). We are interested in exploring how explicit designs might be used to help learners and teachers and how the different tools and resources from across OER, Learning Design and Pedagogical Patterns research might be used together. In a recent book chapter we identify four types of Mediating Artefacts from across these research domains: Learning Design visualisation tools, Learning Design methods, Pedagogical Patterns and Web 2.0 sharing and discussion tools (Figure 1-2).

**Mediating artefacts**
1. Learning design visualisation tools – CompendiumLD
2. Learning design methods
3. Pedagogical patterns – CSCL patterns
4. Web 2.0 sharing and discussion – Cloudworks

![Diagram of Mediating Artefacts](Image)

The following scenario provides an example of how this might work (Figure 1-3). It describes the creation of an OER and an associated design for the OER and shows how this can be repurposed in three different ways. Tools and resources from OER, Learning Design and Pedagogical Patterns research are used to help design the original OER and then to share and repurpose it.
The scenario begins with “Teacher A”. The context is that Teacher A is putting together her beginners’ level Spanish material for the OU course L194. She makes the material available as an OER online in the Openlearn repository (http://openlearn.open.ac.uk). She uses the CompendiumLD tool for visualising to articulate different ways in which she thinks the materials can be used. Figure 1-4 shows part of the visual design, including the branching sequence to enable a beginner and more advanced route through the learning materials. In particular she is interested in showing how the materials can be used as both a revision exercise for an individual student and at a more advanced level for a group of students working collaboratively. Whilst developing her design in CompendiumLD she has access to ideas and tips and hints from the Cloudworks social networking site for learning and teaching site, as well as from a range of OER and Pedagogical Pattern repositories. These help her to refine her design thinking, to get ideas about how to structure activities in the sequences and suggestions of tools that be used for example for supporting a diagnostic e-assessment test or to enable students to communicate synchronously.
Learner A: Use scenario 1 – beginners’ route

“Learner A” is doing Spanish. She is a few weeks into the intermediate level Spanish course. The topic she is currently working on is “describing places”, she is looking for freely available tools or resources that might help her, she is also interested in finding study buddies to work with, who are at a similar level.

1. She explores the openlearn site.
2. She finds the set of OERs for a beginners’ Spanish course – L194 – Portales from the Open University, UK, developed by Teacher A.
3. She finds alongside these resources a visual design – which provides an example of how these resources might be used. The design consists of the following aspects:
   a. A diagnostic e-assessment test to assess her level of understanding of the topics covered in the course.
   b. Two potential pathways: a) a beginners route where the learner works individually through the L194 OER material, b) an advanced route where the learner is assigned to a study group to work collaboratively around one aspects of the L194 OER material, Activity 2.1. In
this advanced route, the existing activity (categorise 3 pictures of buildings as Latin American or Spanish) is replaced with one where the learner has to describe and compare the buildings, working collaboratively with other students and interrogating an expert for information. The activity exploits the jigsaw Pedagogical Pattern and also uses a free video conferencing tool to enable the study group to speak with a Spanish cultural expert.

4. She takes the diagnostic tests and the advice is that she takes the beginners’ route and completes the L194 OER material.

**Learner B: Use scenario 2 – advanced route**

Learner B is also a student a few weeks into an intermediate level Spanish course. She works through a similar set of activities to Learner A but in this case after taking the diagnostic test the advice is that she takes the advanced route and focuses in on the adapted activity 2.1 as a collaborative exercise with other students.

**Teacher B: Use scenario 3 – repurposes**

Teacher B is an Associate Lecturer teaching on the intermediate level Spanish course at the Open University, En Rumbo – L140, preparing for a face-to-face tutorial with his students. The topic is describing places. He finds the design described above and adapts it to produce two new variants of the design.

1. A classroom-based activity where the students describe the pictures using the Think-Pair-Share pattern. 2. A similar exercise in terms of comparing three buildings but the students are asked to describe buildings from their town and then talk with an expert (a student in Spain) who then describes their home town. The activity is set as a precursor to the first assignment exercise for the course.

Figure 1-5 provides a conceptual overview and generalisation of this scenario – showing how an initial design can query existing resources such as Cloudworks, Pedagogical Pattern repositories and OER repositories such as Openlearn, use these to help create and populate an OER, along with an associated design, both of which can then be deposited back into sites such as Cloudworks and OpenLearn for reuse.
In order to test our approach a number of workshops were held between May – June 2009. Evaluation of these indicates that while determining the pattern of an OER by considering the end product is difficult, the adoption of these collaborative patterns is relatively simple and leads to new views on how OER content can be used. Typically this extends the likely effort of the user and increases the potential for learning from the content without rewriting the core material. This paper has shown how design presentations along with a small number of collaborative patterns can be used to guide rethinking how an OER works and help repurpose the OER to incorporate more collaboration and adaptability. Further aspects of evaluation of these workshops and analysis of the results is reported elsewhere (Dimitriadis et al 2009; Conole et al 2010.)

The mismatch between the potential of technologies and actual use in practice is I would argue one of the most important key challenges facing modern education. The areas of Pedagogical Patterns, Learning Design and OER research have developed a range of valuable tools and resources