

Post-16 e-learning content production: a synthesis of the literature

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Abstract

This paper provides a metareview of how e-learning content is currently being produced and embedded in the learning practice in further education, work-based learning and community learning contexts. Based upon this metareview, the paper has identified four categories of content production used: (1) learner-authored content, (2) practitioner-authored content, (3) commercial- and public sector-commissioned content and (4) combinations of these categories. The metareview also identifies several well-used, practitioner-based and institutional models for embedding e-learning content into practice, exploring some of the implications of this upon practitioners.

Introduction

The use of e-learning content and resources in our colleges, universities, community centres and other places of adult learning and training are becoming increasingly prevalent (Mackinnon Partnership, 2005). In particular, e-learning content offered via PCs, mobile and web-based technologies supports the opportunities for increasingly interactive, flexible and personalised learning content (de Freitas & Yapp, 2005; Kukulka-Hulme, Evans & Traxler, 2005). Because of this flexibility and pervasiveness, e-learning content is continuing to have a greater strategic social influence through its employment to support the learning requirements of the UK (DfES, 2004, 2005).

However, while significant resources have been applied to supporting the infrastructure and hardware requirements of post-16 learning and for ensuring broadband connectivity to provide access for colleges—which have had a notable impact upon access and provision (DfES, 2005)—there has been significantly less attention paid to content

development and the models used to promote and embed this content into practice. This has broadly led to spare capacity across networks and often to uneven uptake and embedding of digital resources (Davies, 2004). The emphasis upon the technological issues of infrastructure, delivery and support, although important, has conversely led to a rather less emphasis being placed upon the pedagogic and content-related issues of concern to many practitioners (Beetham, 2005b).

Towards redressing this imbalance, this paper aims to provide practitioners and policy makers with the opportunity to obtain an overview both of different approaches to content development being used in post-16 learning and training, and to survey some of the models being used currently to embed e-learning content into institutional contexts. This will allow us to consider current responsibilities for producing e-learning content, alongside models and approaches for effectively embedding content into post-16 learning and training contexts. To achieve this aim, the author undertook a selective metareview of the literature supplemented where necessary by semistructured interviews with selected experts. The following provides a summary of that research, including a synthesis of how these identified approaches to content production and models of embedding content into practice may be applied by practitioners in their teaching practice, and by policy makers and managers for developing supported strategic approaches.

Two main issues present challenges to how 'e-learning content' is considered in the paper. The first issue relates to the use of the term 'content'; the other issue relates to how the notion of electronic 'content' is contextualised against other 'classifications' of e-learning and as part of the general educational practice.

The main problem with defining 'e-learning content' relates to the all-encompassing use of the term. Content can be used to mean 'digital educational materials, software tools and e-resources', and herein lies the main difficulty, that is the use of content can in some contexts mean both Information and Communications Technology (ICT)-based tools and services and the actual content and resources as used and produced by practitioners. This issue becomes increasingly confusing as e-tools evolve that can be used to generate and sequence content Learning Activity Management System (LAMS), Reusable e-Learning Object Authoring and Delivery (RELOAD) and as service-based approaches involving content production evolve. In line with the post-16 content strategy (Becta, forthcoming) I will use the term in this broadest sense to mean learning content: lesson plans, Internet resources, digital library resources and e-learning and interactive content including in-house and bought-in learning materials used for supported learning and training in addition to content development tools (eg, RELOAD), virtual learning environments (VLEs) and learning designs (eg, LAMS). This definition necessitates an understanding of e-learning as a *social process* whereby content is used to facilitate and underpin learning processes and social learning relationships. Admittedly, this constructivist approach to e-learning attempts a broader and less technologically deterministic approach that is not necessarily upheld in all the literature under review.

The second issue relates to the problem of defining e-learning content in relation to an overall educational design process. A previous work has found that 'there are really no models of e-learning *per se*—only e-enhancements of models of learning' (Mayes & de Freitas, 2004, p. 4), and that the 'role to be played by e-learning should be defined within [an] overall educational design process' (ibid, p. 5). We also argued for a need to align pedagogic design to defined learning outcomes (ibid, pp. 5–6; see also Biggs (1999) but recognise the major challenge that this approach implies. Necessarily, therefore, content and learning resources need to be considered as an integral part of that overall educational design process.

While other studies have focused upon the impact of e-learning upon learning and teaching resources in higher education (eg. Issroff & Plewes, 2002), this study examines the approaches to content production relating to the post-16 sectors of: (1) Further Education (FE), (2) Community Learning (CL) and (3) Work-Based Learning (WBL)—'learning that is undertaken in or linked to the workplace' (Mackinnon Partnership, 2005)—thereby keeping a very narrow focus upon the producers of content and models for embedding content into institutions. The study aims to synthesise the existing reviews that consider e-learning content production in these sectors. While there are other related and important issues pertaining to the production of e-learning content, notably the role of reusable learning objects (Littlejohn, 2003), digital intellectual property rights (Eskicloglu, 2003) and digital rights management (Arnab & Hutchison, 2004; Liu, Safavi-Naini & Sheppard, 2003), this paper focuses upon the broader approaches to content development, and models of embedding of content into practice and other significant and wide-ranging issues, while relevant to this debate, are outside the rather narrower scope of this study.

The remainder of this paper is divided into five sections: Section 2 outlines the methodology applied in the study. Section 3 provides a synthesis of the metareview, identifying categories of e-learning content production. Section 4 outlines a selection of strategic and practitioner models used to embed content into post-16 learning contexts. Section 5 outlines how these approaches and models might be used to support practitioners for content development and managers and policy makers embedding e-learning content in their own contexts, and draws together the general conclusions of the metareview.

Methodology

This paper is based upon a metareview undertaken for the British Educational Communications and Technology Agency (Becta) in 2005 to support the strategic planning of content for the post-16 sector on behalf of the UK Department for Education and Skills and Learning and Skills Council (DfES, 2005; Becta, forthcoming). The research work findings are based upon a metareview of the existing literature reviews that focus upon content production and models for embedding digital content into post-16 institutional contexts. Although the research undertaken for Becta had a focus upon England, it is interesting that a number of the key models used for supporting embedding into English institutional contexts draw from European and US models of practice and as such, the findings have significance for the wider UK and international practitioner and policy-

making communities. The metareview conducted was based upon keyword searching across existing literature (see References), including hand searches of subject-specific journals, electronic databases and web searches. The main search terms included: (1) digital content, (2) educational content, (3) electronic content and (4) e-learning resources. The identified reviews were coded according to specific criteria including relevance to the main research aims, proximity in time and applicability to the post-16 sectors. In addition to the available literature reviews identified, and for the areas where the available literature provided too small a sample of material, semistructured telephone interviews were undertaken with experts in the field to supplement the literature findings. This was particularly the case with CL where there was a dearth of literature available. The following sections synthesise the main findings of the selected reviews.

Who is producing e-learning content?

While there were a number of general e-learning reviews found in the searches (eg, Bannan-Ritland, 2002; de Freitas, 2003; Stephenson, 2003), the main reviews identified and used in this study reflected central issues about how practitioners are producing content for supporting e-learning in FE (Davies, 2004; LSDA & Sheffield Hallam, 2004), WBL (Mackinnon Partnership, 2005) and in CL (Rawicka, Arkate & Hussain, 2004). While the post-16 content strategy (Becta, forthcoming) organises content into commercial content, public sector-commissioned/licensed content and practitioner-developed content, this metareview identified two additional types of content, including the learner-authored content and combinations of these categories. Notably, these approaches to content production had a significant link with who was delivering the content to the learner cohort, and were therefore grouped in the following way:

- Learner-authored content;
- Practitioner-authored content;
- Commercial- and public sector-commissioned content;
- Combinations of the above categories.

The findings of the metareview indicated that while all these approaches have been used to varying degrees, each sector under analysis favoured a particular approach, an approach that reflected: (1) who delivered the content, (2) the specific needs of the learner cohort and (3) the specific context where learning was delivered. Taken together, the factor of who produces the content also has a significant impact upon the pedagogic framework adopted. Content production is not simply a matter of the content and resources used in the learning context, but has an impact upon the learning outcome in a very direct way, therefore affecting the pedagogy, the mode of learning and the context. Alongside broader strategic and policy influences, this finding indicates different favoured models for embedding the content into practice according to sector. This finding may have relevance for effective embedding content into practice in different contexts, including how practitioners from different parts of the world may embed e-learning more effectively in their own contexts. In this way, as has been argued, a greater understanding of the differences in e-learning practice across post-16 learning contexts can provide beneficial insights that can help to inform broader issues of how

to embed e-learning into practice effectively—and how to frame practitioner-based approaches to e-learning research (Beetham, 2005a; Laurillard, 2005).

Learner-authored content

A novel approach that is beginning to emerge is the use of learner-authored content (McAlpine, Koppi, McLean & Pearson, 2004), often using available web-based tools. Examples of this trend are more evident in research projects at present such as the Notschool.net project, which is aimed at excluded school students where learner-authored content includes portfolios and project-based work with an emphasis upon self-assessment (see Notschool.net, 2005). Another indication of this trend is the Making Games project funded by the Department for Trade and Industry (DTI) People @ The Centre of Communications and Information Technologies (PACCIT) initiative. The project aims to provide learners with the tools for developing their own interactive gaming environments to support specific learning objectives (see Making Games Project, 2005).

Although this approach is fairly new, it is thought that with the widening availability of authoring tools, gaming and content development tools, this approach may become a more significant feature of learning in the future. Becta, for example, is developing a number of Content Creation Toolkits for Adult and Community Learning (ACL—a part of CL) which, although aimed at practitioners, can potentially be used by learners to take ownership of their own personalised content (C. Swaine, interview, February 7, 2005; Swaine, 2005). Popular toolkits for practitioners include: (1) WebQuests, (2) blogging and (3) image gallery toolkits and these provide powerful tools that merit further research (A. Wood, interview, February 8, 2005). Learner-authored content has not yet been fully explored within many institutional contexts, although techniques and tools are becoming more widely available to facilitate these more learner-focused approaches that may have particular merits for supporting lifelong and distance learners. In addition, access to distributed e-learning tools and content may facilitate a more sustainable drive towards this model (eg, the Joint Information Systems Committee [JISC] Distributed regional e-learning programme).

Notably, learner-authored content also has implications for collaborative learning approaches where groups develop a learning content that can then be shared amongst a dedicated community of practice, such as a professional group. The use of educational games and simulations may well provide a new model for the self-authoring of immersive and interactive content, being inherently more learner-focused—also having an appeal for work-based learning (Mackinnon Partnership, 2005).

Learner-authored content clearly presents significant challenges as well as opportunities for how formal learning is produced and delivered. Perhaps this is why we see more evidence of this approach in informal learning contexts (eg, in CL) at present. However, these approaches may have a greater role to play in the future for adult learning because of an inherent consistency with lifelong learning, fitting well with andragogic models of learning (Knowles, 1990).

Practitioner-authored content

Practitioner-authored content provides the most commonplace approach to content production in post-16 formal education. The approach has been particularly adopted in FE and CL contexts (as well as in higher education, see Issroff & Plewes, 2002; Wilson, 2003). However, in WBL this model of content development and delivery, although significant, is not so widely employed. Instead, WBL approaches to training are often based upon a training needs analysis of the learner to identify what skills and competencies are needed. Content (text-based or interactive) is then produced or more usually bought in to support those specified training requirements. In the WBL model, the content and the materials are often developed by a team that does not then deliver the content. In this way, trainers are often not involved in the content creation cycle and hence, content creation models are generally not trainer- or tutor-centred in this sector.

The metareview indicated that in FE, many tutors favoured using predeveloped materials, in particular BBC and National Learning Network (NLN) materials. The use of these materials fits well with the time constraints of FE tutors and the budgetary limitations faced. However, there is also evidence that in-house content development is significant in this sector (LSDA & Sheffield Hallam, 2004). College funds are becoming more readily available to support this tutor course development approach, but there is also a need for an institution-wide awareness and support in order to allow 'early adopters' to continue to innovate practice (PriceWaterhouseCoopers LLP, 2004).

Based upon the fact that the majority of CL tutors are part-time, skills development and training has been an important focus for improving the quality in the sector. One programme to support this agenda is the CL e-guides programme (see Community Learning Resource, 2005) developed by the Learning and Skills Council and the National Institute of Adult Continuing Education (NIACE). The programme aims to support e-learning content development through training selected individuals. The e-guides programme focuses upon training individuals within an organisation applying the cascade model, whereby the trained tutor then 'cascades' learned information to other colleagues within their organisation. NIACE found that 1 500 tutors had attended training in this way (A. Wood, interview, February 8, 2005). The model has been effective for raising awareness about e-learning and for building in sustainability for future content development.

Similarly, building upon the 'digital divide' debate and the subsequent work of the Children's Partnership (Lazarus, Lipper, Roberts, Fireman & Rose, 2003) leading to the ContentBank content creation resource (see Content Bank, 2005), the Becta Community Programmes Team found that 'access was not the answer for social inclusion'. They argued instead for the importance of 'content for social inclusion' (F. Garnett, email correspondence March 9, 2005). Therefore, since 2001, the Community Programmes Team has used this approach as the guiding principle, producing a range of tools and services as a result including importantly their content creation toolkits (see Community Learning Resource), as well as supporting the NLN-ACL initiative. The 'content for social inclusion' approach has therefore been a key aspect of the Becta work and is seen

in line with the 'andragogic' approach to learning in CL. This approach may also provide the first step for supporting learners who wish to create their own content.

Teams of practitioners can also be responsible for developing content together—this can take place in the form of sharing lecture notes, or may be a more active engagement between tutors from within the same discipline or across different institutions as in the Open University model.

Practitioner teams for developing content are more commonplace in WBL contexts, although it is thought that in the future team teaching (and content development) may become more prevalent in other teaching contexts, particularly as the line between formal and informal learning begins to blur (Yapp, 2005).

Commercial- and public-commissioned content

At present, a wide range of commercial content is available; producers of commercial content include publishers, e-learning development companies, media-based and training companies. The range of content available is diverse, ranging from CD-ROM-based materials to web-based content and services. Some content maps upon the curriculum with other more generic content aimed more at the informal learning audience. However, because of market forces, much of the content is aimed in areas where there is a significant market, such as for 'A' level provision. Areas such as CL do not attract much provision because of the diversity of provision needs.

In industry, the larger corporations often use team content production approaches outsourcing content development to external specialist training production organisations or developing the content in-house (Mackinnon Partnership, 2005). Proprietary content production is necessary where specific and often specialised skills needs have to be addressed in highly contextual situations. To meet this growing and increasingly specialist set of skills needs, the industry has responded through adopting a range of strategies, such as setting up corporate universities. This trend, which is more advanced in the US at present, has been creating greater competition for formal providers (Meister, 1998). Industry training has also been more ready to adopt the so-called 'blended learning' approaches where online learning and the use of ICT is combined with face-to-face learning (see Bielawski and Metcalf, 2003; Collis and Moonen, 2001), perhaps reflecting the diversity of the work-based skills required.

Public-commissioned content includes materials and resources commissioned by organisations including: University for Industry (UFI)/Learndirect, JISC and Department for Education and Skills (DfES) Standards Unit. This category also applies to content that is being licensed as in the JISC Collection where 50 databases of online content are licensed from third party commercial companies (Becta, forthcoming). Much of this content is produced by teams of commercial developers. The main advantages for practitioners with this form of content are cost-related as they are generally offered free of charge to practitioners. In addition, there is some indication that the content has already gone through a process of quality assurance. This method can also

shorten the time spent on selecting the content. However they are, of course, problems with this approach in terms of challenges for embedding the materials seamlessly into practice, differences of standards used and issues of interoperability as some of this content may not be usable across different platforms and may have accessibility issues.

There are clearly associated issues with offering content in 'bite-sized chunks', in particular the practitioner's concerns about the pedagogic approach taken to embed those chunks or objects into practice, while methods of recommendation from other practitioners may help practitioners to identify relevant learning materials. Tried and tested approaches are often favoured by tutors and difficulties of matching the available content to a specific learning practice may be off-putting for tutors.

Combinations of the above categories

To varying degrees, elements of all of the approaches outlined above are being used in current practice. The learner-authored content is more apparent in informal learning contexts such as in CL and in particular with informal media-based learning approaches (using interactive content) (Rawicka *et al*, 2004). The practitioner-authored content is clearly the most established mode of content production, used widely in FE. It relies upon the tutor producing and delivering the content to the learners (Davies, 2004; Learners First, 2004). However, in the light of a fixed curriculum and recent e-learning developments, this approach has become less straightforward in practice because of the greater rigidity of the parameters for creative content production on the one hand and the need for greater technical skills on the other. Commercial content is more often used to support industry-based training where the link between tutor and content producer is less rigid, and where training needs can be very specific to the context where work is taking place and therefore subject specialism needs to be bought in as and when it is needed (Mackinnon Partnership, 2005). Public-commissioned content can be used in specific contexts, and combinations of the above can be used in all the sectors. In general, these trends lead to a need to review staff development and continuing personal development of tutors and to provide sound technical and strategic infrastructure for the use of e-learning and content development within institutions (Wilson, 2003), which can be challenging particularly for smaller organisations.

There was evidence that all three specific UK sectors considered here: FE, CL and WBL, have used all these categories of content with varying degrees of efficacy. While pre-produced commercial- and public-commissioned content is becoming more readily available (eg, in digital libraries and repositories, see Retalis, 2005), and while the transferable and reusable content production models as exemplified by the learning object approach (see Cook, Boyle, Leeder, Wharrad & Morales, 2005; Littlejohn, 2003; Polsani, 2003) are becoming more widespread, practitioner-authored content is probably still the most widely employed approach, particularly in FE and CL. However, the three sectors vary in the emphasis of their approach with FE using a combination but with particular emphasis upon the practitioner-authored content; CL makes greater

use of learner-authored content and WBL more often adopting content developed commercially.

Models for embedding content into practice

It is clear that the uptake and embedding of e-learning across the post-16 sector is uneven and in the earliest stage of development (Martin, 2006). However, the main formal educational institutions that are embedding e-learning content effectively into practice are exemplified by: (1) a clear e-learning strategy tied to objectives and targets, (2) good technical support structures, (3) support from upper-management, (4) learning technology units for providing technical and pedagogic advice and support, (5) implementation of a college-wide Managed/Virtual Learning Environments (M/VLEs) and (6) available seed funding for developing new content (Beetham, 2001). In industry, the commitment to embedding content is often motivated by keeping competitive edge and work-based learning is regarded as a way of making cost savings or increasing the companies' return on investment. In the public sector, top-down approaches to embedding content are often led by an 'early adopter' in a highly strategic role within the organisation, or as part of a wider institutional strategy (de Freitas & Oliver, 2005).

While considerable amounts of content—particularly commercial and public—are available, post-16 practitioners need more support for identifying, selecting and using this content. This section aims to review several of the models used to embed content into post-16 learning and training contexts that have been identified in the literature. However, it should be noted as in the introduction that content has often been considered jointly with ICT, and as such has been regarded as part of a structural and institutional process often facilitated by government-led initiatives. More recently, and with greater emphasis upon the social process of e-learning, this has begun to change—as reflected in the more practitioner-led approaches to e-learning (Beetham, 2005a) and action research approaches taken (Laurillard, 2005).

Institution-wide models for the uptake of e-learning content

The top-down strategic approaches are perhaps typified in practice by the conceptual models for the institutional development of ICT in formal tertiary education. In formal learning contexts, one such popular model is Allen and Morton's (1994) the transformational model derived from the work conducted at Massachusetts Institute of Technology. The model includes three phases: (1) evolutionary, (2) transformative and (3) revolutionary. Since this earlier work, the model has been developed into a Citscapes Development Tool for helping post-16 institutions to position their own progress in relation to embedding ICT practice (including content development) (see Figure 1).

The Citscapes tool has extended the original three categories to include: (1) localised, (2) co-ordinated, (3) transforming, (4) embedded and (5) innovative phases (see Citscapes Development Tool) (see Figure 2). This model may not have such focused relevance for the embedding of content and rather focuses upon internal reflections upon evolving institution-wide development. However, it still remains as a useful tool for institutions seeking to adopt e-learning across their institution, and has been used

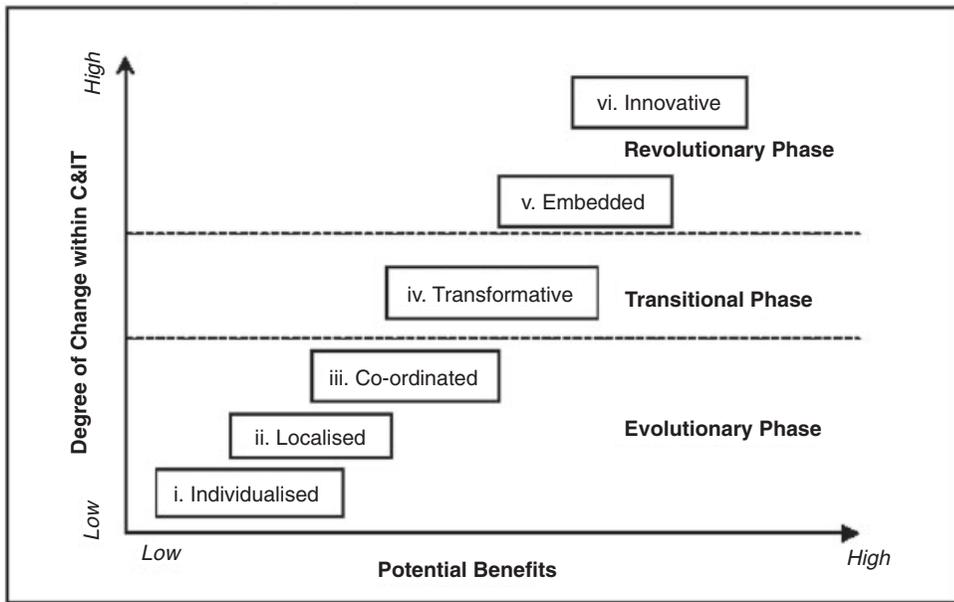


Figure 1: Citscapes development tool
(Source: Citscapes website).

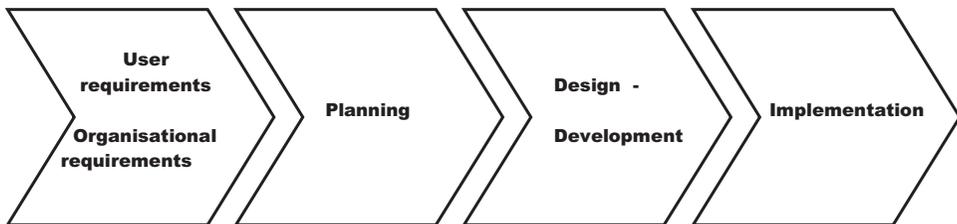


Figure 2: Model for developing e-learning resources in ACL
(Source: Hussein, 2005).

as a planning tool for supporting internal strategy development and evaluation as well as for institution-wide auditing.

Models for supporting embedding content in CL

In CL, the institutional models for embedding content are more precarious because of less access to equipment and ICT connectivity. However, the recent decision to extend NLN materials to the CL sector may help promote embedding content within the sector (National Learning Network, 2003; Rawicka *et al.*, 2004). However, there are still concerns that governmental top-down support is needed in order to substantially support e-learning practice in this sector, which has been underrepresented in terms of funding.

strategy and infrastructure especially when compared to the other two sectors reviewed in this article.

Hussein (2005) has recently developed a 4-stage model for helping CL practitioners to develop and embed e-learning resources into their practice (see Figure 1). The model has been adopted from the well-known human-computer interaction modelling work developed by Jakob Nielsen (see Nielsen, 1994; S. Hussein, interview, February 8, 2005). The model aims to provide a framework for a content development from concept to implementation.

The 4-stage model, designed to support practitioners in the field of CL, includes: (1) a consideration of user and organisational needs, (2) identification of learning objectives, learning theory and usability, (3) development of a prototype/pilot with an evaluation process, development of fully functional version, and (4) training and support for staff, usage and evaluation of the resources with tutors and learners. The model can be used cyclically, although it is represented in a linear way in Figure 1 and does aim to align learning outcomes with pedagogic design (Mayes & de Freitas, 2004). Another well-known and used model that is advocated for CL and has similarities with the 4-stage model is the ADDIE model, which is a 5-stage model that includes the following categories: (1) Analysis, (2) Design, (3) Development, (4) Implementation and (5) Evaluation (A. Wood interview, February 8, 2005).

An additional model for CL, developed by Fred Garnett (Becta), is designed to support practitioners. The Community Development Model of Learning has two stages: the *attractor* stage focuses upon open, welcoming locations for learning (drop-in, learn at your own pace in your own way). The second stage is a stage of *engagement* relying upon: (1) Timely Interventions, (2) Goal Articulation, (3) Discussion (Learner and Animateur), (4) Counselling and (5) Course Advice. Learners follow their interests with a self-supporting learning community. The model relies upon trusted intermediaries or 'animateurs' engaging and supporting the learner.

Models for embedding content in FE

While the practitioner has been identified as central to the content creation in FE, more focus has therefore been applied to developing the models that centre upon the staff training and continuing professional development of tutors.

One past example of this model was the NLN Information and Learning Technology (ILT) subject mentors who aimed to support tutors. Their role included college visits, promotion of awareness and good practice in using electronic materials. There were 23 subject mentors who supported subject communities from hair and beauty therapy to mathematics and science.

Another example of this model are the 'Further Education Resources for Learning (FERL) ILT Champions' who also provide an encouraging and supporting role for tutors. Based within the FE college, their mentoring role is designed to encourage other col-

leagues to use ICT in the delivery of the curriculum. Their role also includes commissioning new e-learning content and maintaining existing materials within the college M/VLEs. A key aspect of the ILT Champions' role is to support staff development through training activities which are normally action-oriented and project-based to facilitate the greatest impact upon the learning organisation. The project aimed to build in sustainability into organisations through developing the existing staff and providing the necessary support for spreading good practice between institutions and centres upon developing e-competencies of key staff through training and access to specially designed resources. While this model received initial funding it was found to be sustainable in practice and the communities of practice are now supported by the colleges.

The third support-based model are the JISC Regional Support Centres (RSCs), which are set up to provide advice for learning providers seeking to deploy ICT effectively. These regional centres provide a supporting role for development and link into JISC's national ICT priorities, thereby providing a link between national and regional plans, projects and strategies. An example of this advice is provided by the information available from RSCs about programmes such as the FERL Practitioners' Programme (FPP), by the setting up of practitioner forums to support the sharing of good practice and college visits. The network of 13 regional centres also works in partnership with regional and national agencies to support the initiatives.

Models for supporting the embedding of e-learning content in industry

There were a number of different models for supporting the embedding of content available for the business sector identified by the metareview. One maturity model specifically supports e-adoption in e-business with five stages for development identified (see Figure 3). While this model is primarily targeted at e-business development, the model could also be used to support the uptake of content in WBL contexts, with an emphasis upon the increasing complexity of communications and digital processes used in practice.

The Mackinnon Partnership report on work-based learning (2005) found that the provision of tutor support and the increasing use of 'blended learning' approaches (Balance Learning, 2004; Bielawski & Metcalf, 2003; Collis & Moonen, 2001) were having a positive impact upon the embedding of e-learning content in workplace learning contexts. Although not a model, this provides an indication of the importance of social processes for supporting industry training materials (Collis & Moonen, 2001).

While the increase in the use of ICT has been widely welcomed and has to varying degrees effected a transformation not only in how content is delivered but in terms of the pedagogic approaches and strategies that are being employed, some tutors still feel resistant about adopting it into their own teaching and learning practice as it would mean changing from tried and tested traditional methods. However, learner expectations, a move towards constructivist approaches and an increasing availability of high-quality web-based resources for supporting post-16 learning, are acting as

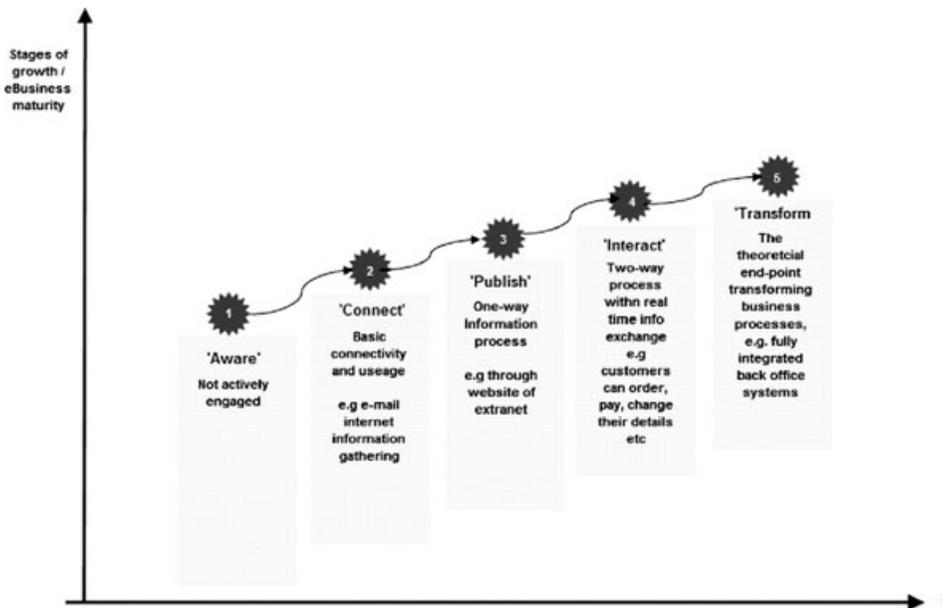


Figure 3: *e-Adoption ladder maturity model*
(Source: *European Regional Information Society Association, 2005*).

powerful change agents across all of the sectors. At the same time, a more integrated approach to staff training, including ICT skills and e-learning development, may begin to engage a greater numbers of tutors, helping to embed e-learning content into practice.

Conclusions: what can practitioners learn from this study?

While the approach to content production varies according to the post-16 sector, there are valuable lessons that can be learnt and indications for future research. Becoming more reflective about who and how e-learning content is developed may allow our communities of practice to utilise the emerging tools and services.

Laurillard has expressed a greater interest in closing the gaps between theory and practice by promoting action research on the part of the practitioners and more evidence and practice-based studies on the part of the research community (Laurillard, 2005). Certainly, this may help in providing better service-based systems that may support more flexible uses of interactive content, as well as providing greater opportunities for self- and collaborative authoring of content using content creation tools and approaches.

In addition, it will be important to continue evaluating models used to embed content in practice, clearly the top-down strategic approaches need to connect with bottom-up practitioner activities, both supported by e-learning tools and services. However, it is

critical that these tools do not get in the way of the central processes of learning, and it is essential that design comes second to defining the learning outcomes. While e-learning content offers the learner the potential of more enriched and contextualised learning experiences, the need to reflect upon the social processes at the heart of learning and the need to evaluate and interrogate the existing models of embedding e-learning in practice need to be emphasised.

Based upon the findings of the metareview, future research will need to focus upon developing an improved evidential base that can assess content requirements of the sector, provide evaluative methods for assessing quality content and tools and present new production models (Becta, forthcoming). To support these, the objectives focus of new research may need to centre upon a range of content production features and practices, including:

- The processes of selection, management and embedding into practice of content, content creation tools and services by practitioners;
- The need to consider pedagogic as well as associated technical challenges (interoperability, metadata standards and digital intellectual property rights management) for supporting content development;
- The development and use of new tools for sequencing learning activities, design and content by practitioner communities (eg, LAMS);
- The support structures for the content production of practitioners, including technical as well as pedagogic support considerations such as staff training and continuing professional development.

Learner-authored content may provide a significant category for future content production and would merit further research, particularly as its adoption would create significant challenges for traditional and formal institutional infrastructures. Similarly, the effective embedding of commercial- and public-commissioned content presents the post-16 learning and training sector with significant challenges to the formal learning infrastructure and the practitioner-led approaches to learning. Therefore, despite the differences between the sectors, practitioner-authored content may well remain as the most popular approach for content development, although it is thought that this may change over the next 5–10 years as the drive to personalise learning experiences and embed e-learning into practice matures, and as learner-focused approaches become more significant.

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