

Building bridges across the digital divide: Supporting the development of technological fluency in Adult Basic Education learners

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Abstract:

Practitioners in Adult Basic Education (ABE) are increasingly recognising that Information and Communication Technology (ICT) skills are necessary for full participation in many aspects of our society, and that fostering their development in learners should be an aspect of ABE teaching. However, there are many difficulties associated with the integration of ICT with the ABE curriculum, especially in regard to their effective use as a teaching resource. The authors discuss these, and advocate the adoption of a new attitude toward the use of ICT for teaching and learning in ABE. This involves presenting software and hardware as tools that learners may creatively utilise to facilitate new kinds of learning, rather than as means of more efficiently accomplishing traditional ABE activities, or as ends of study in themselves. This paper offers a case study of how this has been put into practice in an Open Learning Centre in South Wales, UK. We describe the planning and delivery of an intensive course using new media technologies, based on the adaptation of a US project for youth education using ICT in inner-city areas. The project employed a Constructionist approach, involving the development of new types of learning community. Its main features were modified to suit the context of ABE in a region of Europe with high levels of social and economic deprivation. The advantages and disadvantages of adopting this approach are discussed, and a number of key principles that underpinned the development and delivery of the course are described. These include concentration on student-led, project-based, group learning, with the emphasis on problem solving using appropriate technologies. The aim was to foster the development of a technological fluency that can empower students to express, explore and realise *their* ideas and goals, and support their creativity and learning in other, non-technological domains. Student performance and feedback from the course suggest that motivation levels as well as retention and outcomes improve when vocationally relevant skills are developed in tandem with communication and numeracy skills, as they arise in the context of the activities. The paper considers how far this approach concurs with current recommended practice in ABE, the potential value of this approach in the light of the UK government's targets for achieving functional literacy and numeracy in the majority of the adult population, and identifies some barriers that may present difficulties for its widespread implementation. There is a discussion of the contribution that this new attitude to the use of ICT in ABE can make to bridging the 'digital divide', asserting that with its tradition of individual empowerment ABE is well placed to confront the issues of exclusion and marginalisation that accompany the increasing importance to our society of computer-mediated activity.

1. Introduction

Over the past two decades practitioners in Adult Basic Education (ABE) have recognised that Information and Communication Technology (ICT) skills are increasingly necessary for full participation in learning, and that courses incorporating the use of computers are especially effective in attracting new learners into ABE. This awareness has been one of the drivers behind the integration of the Personal Computer (PC) into the ABE classroom, and learning activities involving PCs have become an established feature of the curriculum. However, the meaningful integration of ICT as into teaching and learning activities has often been problematic.

Adult Basic Education is a latecomer to the general debate around the effective use of ICT for teaching and learning. This can be linked to a number of factors. Firstly, economic constraints on Further Education (FE) in the UK have often delayed the introduction of ICT systems. Until the Moser report¹ and subsequent government intervention in recent years, ABE has been the “poor relative” within a generally under funded sector. Secondly, even where funding has been available, FE establishments have sometimes been reluctant to make technology available for direct use by ABE learners – the perception being that ABE learners are less likely to benefit from, and more likely to damage, PCs and networked services. A third factor has been the general unsuitability of available online learning packages for the specific needs of adult basic skills learners². Consequently, ABE staff are less likely to have benefited from training in, or have experience of, the successful use of ICT in the classroom. This points to another significant factor delaying the integration of ICT into ABE teaching and learning activities: the resistance of ABE teaching staff. Already hard-pressed and subject to increasing demands, there is a widespread perception that mastery of the hardware and software tools is a prerequisite of their use, and this is seen as potentially very costly in terms of time and personal commitment. The combination of these factors results in a lack of clear guidelines, founded in practice that can inform the improved use of ICT in ABE.

This history has resulted in a fragmented, *ad hoc* approach to the use of ICT in ABE. Often the impact of the introduction of the networked PC to the ABE classroom has been at best, neutral, at worst, negative. Many ABE practitioners have great difficulty appropriately situating the use of ICT within their overall teaching strategy, and there is a fundamental tension between the recognition in good ABE practice of the socially contextualised and dialogic nature of effective learning, and the model of isolated, single-user activity associated with the use of the personal computer. The result is that in many ABE classrooms where learners are using PCs, it may be much easier to define what is being learnt about ICT than to say how that learning is supporting the development of basic skills. All too often, what is happening when an ABE learner is in front of a computer is, at best, a form of training, at worst a way of filling time. ICT skills that are developed are highly application-specific, and learners are often not supported in the development of transferable skills or more generalised forms of knowledge. Basic communication and numeracy skills development is very difficult to recognise or quantify. This situation has been exacerbated by the adoption of accreditation routes that emphasise the demonstration of familiarity with operations

and procedures rather than understanding. All of these issues above become especially acute in the light of the recent introduction of the National Core Curricula for adult basic skills, and the setting of ambitious targets for the ABE service as a whole. Practitioners must now be able to clearly focus ICT use by learners on specific and demonstrable basic skills learning outcomes, clearly linked to the core curricula.

So the presence of the PC in the ABE classroom continues to offer significant challenges to practitioners. How are we to integrate ICT into teaching and learning activities in ways that fulfil a number of difficult and sometimes conflicting demands? Learners should be able to use ICT to support significant improvements in their basic communication and numeracy skills, while developing ICT skills that are a meaningful contribution to their widening educational, social and economic participation. Relevant skill improvements should be able to be clearly recognised, recorded and accredited, and shown to fulfil the demands of the national core curricula in basic communication and numeracy. ABE teachers should be able to adapt and integrate ICT into their teaching activities in a way that supports and enhances, rather than undermines their experience of good practice. All this must be accomplished within the economic constraints of FE.

This paper outlines an approach that offers a route toward meeting some of these challenges. We describe an ABE course, “Computer Creative”, where the use of ICT for learning was in a situated, socialised context. A flexible accreditation framework to provide clearly demonstrable improvements in Adult Basic Skills supported student-led, project-based activities using new media technologies. The approach embodied in the course was developed out of a tradition of good practice in ABE at one of the UK’s leading Schools of Basic Skills, informed by ideas developed specifically around the use of ICT in teaching and learning activities. We provide some background to the development of the course, outline the main principles embodied in its design, and describe its delivery during the academic year 2000-2001. In conclusion we discuss our initial analysis of its successes and failures, and indicate their implications for future developments in ABE.

2. Background

The setting for the development and delivery of “Computer Creative” was the Pontypridd College School of Basic Skills Open Learning Centre. The Open Learning Centre (OLC) is located in a converted shop premises in the heart of the busy market town of Pontypridd, one of the principal towns of the South Wales Valleys. This post-industrial region of the UK has some of the highest levels of social and economic deprivation in the European Union. In Rhondda Cynon Taff (RCT), the unitary authority area, unemployment runs at around twice the Welsh national norm. Figures on educational attainment show that 31% of all adults in the area have no formal academic qualifications at all; in 1997, research by the UK Basic Skills Agency showed that in RCT 20% of the population had very low numeracy skills, the highest level recorded anywhere in the UK. Current assessments indicate that at least 40% of the population have deficits in literacy and numeracy skills³.

The Open Learning Centre is the flagship of the response to this high level of need. The building is bright, comfortable and well maintained, and within easy reach of

public transport. It has three floors, with a well-equipped teaching and learning workshop on each floor. The building has a network of around 40 IBM-compatible PC's, and numerous printers and scanners. The Centre is staffed by well-qualified and experienced Adult Basic Education (ABE) tutors, and is an exemplar of innovative Basic Skills provision in Wales. The School of Basic Skills, which also has a number of outreach centres, consistently achieves outstanding results as measured by enrolment, attendance, retention, accreditation rates, learner progression and leaving destinations.

The introduction of networked ICT facilities to the Open Learning Centre took place in the late 1990's. There had already been some history of involvement with the use of PCs in the School of Basic Skills, and the opportunity to rapidly expand technology provision at the Centre was welcomed. However, there was only an outline strategy in place for how to make best use of the new facilities, with great reliance being placed on the personal experience and resources of staff members. As is inevitably the case with the deployment of new technologies into organisations, there were a number of immediate and significant impacts on activities at the OLC, many of them unforeseen. By the end of the decade it became possible to take stock of those impacts and identify a number of issues of concern.

It was clear that there had been some fragmentation in provision at the Centre. Essentially, courses had become divided into two groups. The first group consisted of those courses which had traditionally formed the core of the provision by the School of Basic Skills: communication, literacy and numeracy skills being developed through group and individual activities, led by tutors and supported by learning assistants and volunteers. These courses were by 1998 reorganised as 'Combined Studies', with the aim of integrating the learning of basic skills with ICT. This approach was fairly successful where suitably experienced tutors and learning support assistants were available: technology was incorporated into learning programmes in a variety of ways, including use of the Internet and CD ROMs as research resources, creation of documents with text and images using word processing and desktop publishing applications, and use of spreadsheets and chart wizards to interpret numerical data. However, where staff lacked experience, ICT use was often limited to word processing exercises with little basic skills learning outcomes, sometimes with minimal support. Those learners who already had some experience of using the PC, were sometimes encouraged to engage in computing activities of their own choosing. The voluntary isolation of members of a learning group in this way was often accepted *de facto* by tutors as a way of easing the classroom workload, but made whole-group teaching activities more difficult. Overall, the picture for many in this first group of courses was that ICT was making a marginal, and sometimes negative contribution to teaching and learning activity.

The second group was made up of those courses that specifically focused on ICT, such as introductory computing, desktop publishing and Internet technologies. These courses were clearly popular, with waiting lists for enrolment. They were generally based around the use of prepared teaching materials, and followed accreditation routes that measured efficiency at set tasks in order to demonstrate familiarity with the software packages in use. They contained very few specific basic literacy and numeracy activities, other than those inherent in dealing with the course materials. The main rationale behind the provision of these courses was that they were highly

effective in drawing adult learners into the centre, where their basic skills needs could then be assessed and they could be encouraged to go on to more specific basic skills education. This strategy met with success, in terms of increasing student recruitment, but also brought a number of significant difficulties. Learners on these courses were strongly focused on attaining proficiency with software packages, and often actively rejected any non-technical instruction. Course activities were almost exclusively individual, in marked contrast to the mixture of teaching and learning styles in use elsewhere in the centre. Overall, in this second group of courses, studying ICT as an end in itself was the main focus, with basic skills development happening only incidentally.

Thus, after the first introduction of large-scale ICT systems at the Centre, fragmentation of provision and the administrative problems it brought with it (such as the skewing of resource allocation and, especially, problems with learner intake screening⁴) threatened, in a number of ways, to undermine the core mission of the OLC to promote adult literacy and numeracy learning. Management at the centre recognised and responded to this dilemma by instigating the development of a number of experimental courses aimed at achieving a closer integration between ICT and core ABE activities. These were initially based around the use of Internet technologies and WWW publishing. The courses mixed elements of instruction in the use of the technologies involved with student-led exploration of the resources available. This led to learners becoming involved in Email activities and creating their own Websites using basic Hypertext Mark-up Language (HTML). The learners originated all site content, developing literacy and communication skills as part of the process. New approaches to accreditation were tested, the most successful involving building portfolios of evidence for a number of Open College Network (OCN) units.

These experiments pointed the way to potential success in meeting concerns around the integration of ICT into the curriculum. They also served to clearly highlight the practical challenges involved. These included issues of course design and lesson planning, staff development, ensuring appropriate technical support, and adopting suitable accreditation frameworks. It also became clear that some fundamental reorientation on the part of both teachers and learners had to take place, the use of ICT radically affecting the nature of formal and social interactions within the ABE classroom, often in ways that were especially challenging for staff⁵. However, and very positively, experience with these courses also showed that they could be highly successful, both from the points of view of teachers and learners. Recruitment and retention levels were high, and as expertise grew, so were successful outcomes, both subjectively and in terms of accreditation and leaving destinations.

By the closing months of the academic year 1999-2000 the small group of staff involved in the experimental courses had gathered a valuable body of knowledge, and there was emerging consensus on a number of key issues that would set the agenda for future developments. At the heart of this consensus was the need to effectively communicate this knowledge to other practitioners, and to use it to inform the design of new courses. The long-term aim would be to move the majority of the provision at the Centre toward the integrated course model under development, if that development proved successful in practice. A period of focusing on the mechanisms underlying what had been taking place in the classrooms followed, and this in turn

lead to recognition that some broader theoretical concepts were relevant to our experience.

3. Theory

Constructionism builds on the principles of Constructivism, an approach to understanding learning and cognition developed by the Swiss psychologist and philosopher Jean Piaget (1896-1980). Constructivism argues that the learner constructs new knowledge based on the existing knowledge he or she already has. Constructionism builds on this approach by arguing that learning is especially effective when the learner is actively engaged in the process of actually constructing meaningful artifacts. The founder of Constructionism, Seymour Papert, recognised the potential of digital technologies to support this learning principle, and in 1967 he led a team that developed the programming language Logo, an embodiment of constructionist principles in computer software⁶.

Over the past 30 years research and teaching activities in schools, colleges and universities, often based around the use of Logo, have provided input to the development of Constructionism. This development has been spearheaded by the Epistemology and Learning Group at the Massachusetts Institute of Technology (MIT) Media lab. A successful project that involved members of that group provided one of the main sources of inspiration for the development of the Computer Creative course at the OLC. This was the Computer Clubhouse project in inner city Boston, Mass., jointly founded in 1993 by the Boston Computer Museum and MIT. In their 1999 paper, Resnick, Rusk and Cooke⁷ outlined the principles that underpinned their approach to the development of the project, and described the application of those principles to the practical activities of the Computer Clubhouse.

The project history described by Resnick *et al* was strongly resonant with our most recent experiences at the OLC. The positive responses from adult learners at the Centre who were involved in using ICT in a more integrated, creative way to improve their Basic Skills in many ways paralleled that of the younger participants in the US project. It became clear that many elements of the constructionist approach would be fundamental to further developments at the OLC. However, it was also clear that there were significant areas of difficulty. Much constructionist research work has been directed to learning at school, and especially early learning, and was not always relevant to the needs of adult learners. When using a constructionist approach, formal recognition and accreditation of learners' achievements can be problematic, especially so within the UK ABE context which is being redirected towards an outcomes-based, instructionist model. While the very generalised aims of the Computer Clubhouse to increase social participation and widen access to learning were highly relevant to needs at the OLC, much work was needed to focus in on supporting and demonstrating specific gains in communication, literacy and numeracy skills.

It is important to emphasise that the process of adaptation of Constructionist principles to the specific needs and context at the Open Learning Centre was not only informed by our own recent experiences in course delivery but also by the tradition of good practice in ABE. At the OLC this is represented by the collective experience of highly qualified and experienced staff members. As many staff as possible were

engaged in dialogue about these ideas and their application to teaching and learning activities at the Centre. Out of these dialogues points of correspondence with traditional ABE practice were found, while they also served to highlight areas of contrast.

The convergence of theoretical input, practical experience and an awareness of good practice resulted in the formulation of a number of key principles that could be used as a basis for course development activities. These served as reference points throughout the design, development and delivery of the first attempt at a fully integrated ABE/ICT course at the Centre. Broad course aims and objectives were mapped out in advance, while specifics of activities were to be worked out in response to the needs of the learners as their projects progressed, within a structure defined by the underpinning principles and the requirements of the chosen accreditation routes. The approach was intended to allow for flexibility and responsiveness within an overall framework tightly controlled enough to ensure outcomes that match the needs and expectations of learners, teachers and administrators. As the course would combine elements of all the previous ICT provision at the Centre while introducing the use of previously unexplored new media technologies it was given a non-specific title – Computer Creative – that could act as an umbrella for a host of diverse, but related activities.

4. Practice⁸

Computer Creative took place during the academic year September 2000 to June 2001, over a span of 36 weeks. Course sessions ran three times a week: two late afternoon two-hourly sessions and one four-hour morning session. This is an unusually high level of involvement with one course for ABE learners, but attendance at sessions was very good, with an average of 14 at each. The core learning group comprised 18 adults, whose ages ranged from 20 to 70. They were joined in the later stages of the course by 2 sixteen-year-old students from a local school. Visitors were also welcomed, and learners often brought friends on a drop-in basis. At the commencement of the course all of the adult participants lacked any formal academic qualifications, and with the exception of one part-time worker all were unemployed. Basic Skills levels ranged from Entry Level 1 to Level 2 in communication and numeracy.⁹

The main focus of the course was on the new media technologies of digital video, computer graphics and animation, digital audio recording, desktop publishing, multimedia authoring, and 3D graphics and animation. As the course progressed, demand from learners led to the introduction of the use of the Logo computer programming language, and sessions on using HTML for Web publishing. All the work was carried out on moderate specification Pentium 2 & 3 multimedia PCs, connected via an Ethernet network. Peripherals included colour printers, scanners, digital stills cameras and analogue camcorders. The software packages used were all either free or purchased as low-cost multi-user licences. Also available were large worktables, and supplies of pens, paper and modelling materials.

After some introductory activities during the initial registration week learners were immediately introduced to a range of techniques for idea generation and development. These included word storming, discussion and dialogue, researching, and critical reflection on media products. These were put in the context of whole-group activities such as designing logos, posters, and brochures, and served as a framework for group interaction. Tutors provided input on a range of possible projects and conducted brief introductions to the software and hardware tools available to the group. Learners were supported to develop themes that had engaged them during these introductory sessions into plans for group and individual projects. This period was also used for the generation of an Individual Learning Plan (ILP)¹⁰ for each learner in dialogue with the tutors. The use of the ILP offered the opportunity for tutors to form a picture of the aims and needs of individual learners and to establish clearly the course focus on basic skills development through the use of ICT.

Once some clear project ideas had emerged, tutors provided input on media project planning techniques such as synopsis and script writing and there were whole-group activities around team working and successful project management. Learners were then supported to put their project plans into practice, and they responded enthusiastically. A broad range of activities ensued, calling for the use of a variety of techniques and strategies. Stop-motion animation involving the use of models, computer graphics, music and dialogue soundtrack recording all made for an exciting and highly creative atmosphere in the Computer Creative workshop.

By the third month of the course whole-group instruction was becoming much less frequent as learners engaged fully with their projects. The role of tutors became much more focused on supporting individual and small-group activities, and especially on assisting learners to recognise and record their learning achievements. Reflection on learning was encouraged through dialogue and discussion with tutors and group members and supported by the established practice of six-weekly reviews of learning aims and outcomes. The feeling of community was strong within the group, with members becoming highly supportive of each other. Mentors began to emerge from within the group, and by the later stages of the course three members were often wholly engaged in supporting others' learning.

As the course reached its closing months tutors assisted learners in compiling and ordering their portfolios ready for submission to the accreditation procedure, which was through the Open College Network. As of the current writing, a total of 23 credits at Level 1 and 14 at Level 2 have been awarded to the group. Learners have worked with 17 software application packages and completed 6 short digital videos, 9 animations, over 30 computer graphics activities, and 9 presentations. There have been 94 sessions on the course to date¹¹, with attendance running at 87.5%. From a total of 18 students, 2 have left to enter employment, 1 for reasons of ill health, 1 for personal reasons and 2 because they felt the course was unsuitable for their needs. This gives an overall retention rate of 67%, which when those leaving for non-academic reasons are excluded rises to 89%.

5. Principles

As outlined in the introduction, one of the difficulties facing practitioners in Adult Basic Education who wish to develop a closer integration of ICT into the curriculum is the lack of clear guidelines founded in practice. Based on the experience of course

design and delivery at the Open Learning Centre outlined above, we have developed 10 general principles which we hope may serve as usable guidelines for course planning and delivery. The principles are informed by Constructionist ideas and practices, in the awareness that these ideas must be made to work in an educational setting that is measured by learning outcomes, and increasingly dominated by instructionist thinking. The primary aim of the principles is to provide a robust framework that is generalised enough to be adaptable to a wide range of teaching and learning environments, yet specific enough to aid day-to-day decision-making in the ABE classroom.

Principle 1: The use of Information and Communication Technologies in the Adult Basic Education classroom should always be in support of the development of basic skills

This general statement of intent is the foundation on which the other nine principles are based, and should be used to focus each design and development decision before course delivery, and to guide all activity in the ABE classroom. This principle indicates that tutors should develop techniques that allow them to focus learner's awareness and understanding on the basic skills components of whatever tasks they are undertaking using ICT. This may mean drawing attention to the numeracy skills involved in estimating file sizes resulting from the application of different frame sizes and compression rates to a piece of digital video, the close reading skills involved in carefully checking a piece of programming code, or the writing skills involved in composing the text for an online CV. Best practice in ABE finds opportunities for basic skills development in the context of everyday activity; this principle indicates that this equally applies to the use of ICT.

Principle 2: Information and Communication Technologies are tools to use to achieve goals, not objects of study in themselves

It is all too easy for technologies to become an end of study in themselves, obscuring educational goals and resulting in training rather than teaching. Tutors and learners must be continually encouraged to develop and maintain an awareness that *mastery of software and hardware tools develops through their appropriate use in context*, and is not a prerequisite of their use¹². This principle addresses a major concern of tutors: the fact that no single individual can reasonably expect to maintain expertise across a constantly changing array of new technologies. Such an aim is wholly inappropriate in the context of ABE. The focus must always be on how a tool can be used to provide support for the goals of the learner, with a clear emphasis on knowing just enough of a tools' functionality to produce the required result. Tutors and administrators should therefore assess tools much more in terms of usability than extensive functionality, and actively engage with learners in the process of evaluating the usefulness of tools in the context of their own experience and needs¹³.

Principle 3: Learners should construct things that are of significance to them

It is absolutely crucial that projects arise out of, and incorporate, learners' own ideas and interests. In this way they take ownership of their creative work, setting their own goals and benchmarks, effectively driving their own learning. Tutors must provide support for the development of idea-generation and planning skills in learners, both as groups and individuals. Learners should be also be encouraged to develop a sense of audience, specifically visualising how and where their work will be viewed. In the first instance this means a continual sharing and discussing of work in progress and finished pieces with the learning group, but may also mean exhibiting work to friends, family and the public, via the WWW or distribution on CD-ROM. The sense of an audience brings added significance and value to the creative process, and situates classroom activities more clearly in a real-world context. This principle is strongly supported by best practice in ABE, where the emphasis is on activities - such as completing documents (job applications, etc.) - that have real significance in the learner's life, and that are to be read by specified individuals. In addition, it is not only the electronic artifacts that result from projects that can hold great significance for learners, but also the portfolios that contain the records and evidence of their activities, and this can usefully support accreditation strategies.

Principle 4: Learning should be through designing

This principle is at the heart of a Constructionist approach to education: that the creative problem solving engendered by design activity is a crucial part of learning. Engagement in design activities encourages the use and integration of a wide range of tools, techniques and skills within a clearly defined and concrete context, and serves to support ownership and commitment on the part of learners. This principle also indicates that there should always be an equal emphasis on products and processes; design activity need not always result in finished artifacts but can be highly rewarding in and of itself. The careful documenting of design activity by means of sketches, synopses, scripts, storyboards etc. is an excellent means of building student portfolios and providing material for assessment and accreditation. Design activities are generally dialogic, and offer opportunities for work and discussion at whole-group, group and individual levels.

Principle 5: Learners should always be supported to see projects through from conception to completion

Tutors must be constantly aware that learners, once having taken ownership of projects, may react negatively if they are not able to complete them¹⁴. Projects may occupy only a few hours or stretch to months of concerted effort; in all cases it is important that they are seen through to a point of completion that is agreed on and recognised by all involved. Wherever possible, projects, once completed, should be shared with audiences. One of the major challenges involved in creative work is its open-ended nature. Setting and reaching milestones are important features of project planning and execution, and their achievement can underpin a general improvement in learning skills while enhancing self-esteem and a sense of accomplishment. Completion of projects can be broadly interpreted, and in line with the concerns expressed in Principle 4 need not always mean production of artifacts. For example,

in the creation of computer programs the process may be much more significant than the outcome.

Principle 6: Cultivate emergent community

In the sense in which it is used here, community emerges when a group of people interact over time, in a shared environment, while engaged in meaningful activities. At the practice level, our experience has been that when ICT forms a major component of the environment, the type of community that emerges differs markedly from the more traditional ABE classroom situation, typically flattening the hierarchical division between tutor and learners. This emergent community can be recognised and managed to the advantage of the learning group by a few simple techniques. The most important of these is to encourage and support the development of mentors from within the group. As individual expertise grows, learners should be continually encouraged to share their knowledge in dialogue with individuals, the group as a whole, and tutors. This serves to enhance individual self-esteem while strengthening social bonds as the community moves from being a group of novices to one that commands a shared experience of learning. The mentor-based approach to knowledge sharing should also be applied to individuals who come in from outside the group to communicate special expertise; they should demonstrate their working practices and processes rather than deliver lectures. It also implies that relations between group members must be firmly based on mutual respect and equal opportunity, and it is a key role of the tutor to establish the framework for this, and reiterate its importance to the group.

Another important aspect of the cultivation of emergent community is the recognition of the validity of legitimate peripheral participation¹⁵. This means that learners must be free to take part in others' projects, or none at all, until they develop their own agenda. This is often crucial in helping the less self-assured or socially skilled members of learning groups to come to terms with the challenges of project-based learning in a social environment, and is fundamental to the successful functioning of the group as a whole. Those who initially participate only peripherally, providing useful "spare hands" may move through full engagement with their own project to mentoring others in the skills they have developed.

Principle 7: Use ICT to facilitate new kinds of learning

This principle serves as a reminder that one of the greatest opportunities afforded by the meaningful integration of ICT into the ABE curriculum is the ability to foster and explore new kinds of adult basic skills learning. The symbolic logic processing power of the computer can open the door to the exploration of higher-level concepts in language and number through simulation and graphic representation¹⁶. For example, learners using Logo during Computer Creative sessions were able to program and execute recursive graphics procedures, and then demonstrate and explain what they had done to other group members. The use of the macro-level concept of iterative recursion supported a more basic numeracy activity of writing and understanding the addition, subtraction and multiplication procedures involved; communicating the outcomes and meanings of these activities supported growth in speaking and listening skills. Possibilities for the development of new kinds of learning continue to expand as more tools for design and representation become available to educators.

Principle 8: The role of the tutor is to enable and focus learning

The principles outlined above imply a role for the tutor that, while remaining connected to the tradition of best practice in ABE, requires a shift in viewpoint. Experience at the OLC has shown us that there are two major aspects to the tutor's contribution to the delivery of integrated courses, once they have been designed following the guidelines described here. Initially, the tutor's main role is to establish the basis on which the course will proceed, and to introduce the learning group to a range of appropriate tools and techniques. Tutors will typically give brief demonstrations of hardware tools and software packages, and organise idea-generation sessions and group discussions. Once learners have become involved with projects, the tutor will concentrate on focusing in on the basic skills aspects of activities. Tutors will encourage active reflection on, and recording of, basic skills components of activities: spelling, grammar, reading, numeracy and communication. At the same time, tutors will act as enablers, responding to the demands generated by students' self-directed learning by procuring and providing resources and offering direction and help with finding information sources.

This principle also clearly points to the fact that the tutor is *not* an instructor; tutors should emphasise that new technologies require us all to become lifelong learners, and be seen to be engaging with their own learning during group activities. Generally, tutors should demonstrate those tools with which they are familiar by accomplishing meaningful and useful tasks with them. Tutors should always be happy to accept help and instruction from other learning group members who have developed expertise in specific areas. This approach to the role of the tutor goes some way to answering difficulties around experience with ICT, and offers tutors the chance for personal skills gains while generally greatly enriching their relationships with learners. It must be noted, however, that some learners may be uncomfortable with what can be seen as an abdication of authority¹⁷.

Principle 9: Provide and support an appropriate accreditation framework

An important aspect of tutors fulfilling their role as focusers and enablers within the learning group is the provision of appropriate routes to recognition of learners' achievements. Once learners have taken ownership of a project, it is essential that they be supported in recording their activities in such a way as to enable clear mapping to an appropriate accreditation framework. This recording may be done through computer printouts, video recording, records of tutor observation, etc., and does not preclude more formal activities such as the completion of work sheets demonstrating ability with techniques and packages. The Computer Creative course used a mixture of approaches to build up student portfolios that provided evidence for a range of accreditation. Adult basic Education in the UK is fortunate in having a number of well-established accreditation routes that have been proven in practice. Computer Creative made extensive use of the Open College Network (OCN), which has the advantage of having an established database of ICT related accreditation units. OCN also offers the opportunity for tutors to develop their own accreditation units, which can then be submitted to an approval process and added to the database. This allowed us to develop a number of units that were especially appropriate to the range of activities covered by the course.

Accreditation of learners' achievements provides vital feedback to them on the progress of their learning, and is an essential legitimisation when courses are not following a conventional model. Accreditation forms a bridge between the constructionist and instructionist approaches, supporting course providers and developers in their interactions with funding providers and administrative bodies.

Principle 10: Support the Development of Technological Fluency

This last key principle recognises that learning does not take place in isolation, but affects, and is affected by, all areas of the learners' life. For many adult learners with basic skills deficits, an inability to be fluent in a way that is officially sanctioned has been a major barrier to their personal development, and recognising this fact has often been one of the factors bringing them back into education. The idea of technological fluency is analogous to that of natural language fluency – a very broad concept that acts as a useful marker for a cluster of concepts rather than providing an approach to measurement¹⁸. In the same way that language fluency is best developed by immersion in the host culture, technological fluency is developed from immersion on an environment where ICT activities are ubiquitous. Time is an important factor in fostering the growth of technological fluency; our experience shows that learners will enthusiastically make use of as much access to technology as institutions are able to offer them.

Technological fluency is an open-ended concept, and this has the advantage of allowing it to be non-divisive among members of a learning group, where different individuals (including the tutor) will display different aspects of fluency, depending upon the context provided by the activity in hand. Learners will become able to use technologies fluently in pursuit of goals that are *meaningful to them*, and this key point re-emphasises the use of ICT as a toolkit for achieving student-centred outcomes – not as an end of study in itself. This principle indicates that tutors should support learners to develop levels of fluency that may often far surpass their own in certain areas, making the focusing role of the tutor even more vital. The meaningful use of ICT offers learners a route to the rapid and enjoyable development of a level of fluency that may be both socially admired and officially recognised by accreditation, leading to improved prospects for academic progression or employability. This results in enhanced self-esteem, and may encourage the pursuit of fluency in other life areas and knowledge domains.

6. Discussion

The approach described here allows for the emergence of student-centred learning activities within a structured framework based on clear principles. We believe that it addresses some of the key issues around the impact of new technologies on Adult Basic Education and offers a route toward positive and useful integration of ICT into the ABE curriculum. The emphasis on learning by problem-solving design activities in an immersive technological environment supports the development of technological fluency, and this contributes to meaningful learning experiences, both for learners and tutors. The flattening of traditional classroom hierarchies by the introduction of new technologies is turned to positive account by the emphasis on

mentoring and the sharing of knowledge, and this goes some way toward addressing staff development issues.

However, there are still many difficulties that remain to be resolved. The two students who dropped out of the course because it was “not for them” remind us that learning styles differ, and that this approach may not be suitable for those learners who prefer clear-cut course outlines and traditional classroom relationships. The reduction of the role of tutor as “expert” or “authority” may be uncomfortable and challenging for both staff and students. This approach to the integration of ICT with ABE is especially challenging for staff who are themselves having difficulty embracing the digital revolution. Resources, especially for technical support and staff training, continue to be a problem throughout the FE sector.

At the course delivery level, we feel that this approach generally concurs with current recommended practice in ABE, although there are obvious tensions with the increasingly instructionist trend that is discernible in the national core curricula for adult literacy and numeracy. However, we feel that the entirely valid emphasis on clearly demonstrable learning outcomes in those curricula strengthens the case for teaching and learning approaches that fully engage the commitment of students. We further assert that in order to attain the ambitious targets of achieving functional literacy and numeracy in the majority of the adult population, practitioners will need to adopt radical solutions that fully exploit the tremendous potential of ICT to support learning.

Adult Basic Education is founded on a tradition of personal empowerment through individual development, and is firmly based on principles of inclusivity and access. The links between basic skills difficulties and issues of social exclusion, such as unemployment, are well documented¹⁹. The increasing importance to our society of computer-mediated activity, both in work and leisure, creates demands for new skills and competences, and those who lack them risk being on the wrong side of the “digital divide”. The approach outlined here has supported learners in gaining highly accomplished and potentially marketable ICT skills while making genuine progress in the improvement of their basic literacy and numeracy. Barriers to its wider implementation include funding and support issues, and difficulties with staff recruitment and development. Additionally, it may become increasingly difficult to argue the case for a constructionist approach in the context of a general swing toward the adoption of a more traditional instructionist model for education in the UK. These barriers and difficulties must be overcome if Adult Basic Education is to rise to the challenge of accomplishing the meaningful integration of ICT into the curriculum.

Notes

¹ Sir Claus Moser, then Chairman of the Basic Skills Agency chaired the working group on post-school basic skills. Its members included experts from adult further education, industry, national and local government and those with direct experience of adult learning. Its terms of reference stated clear objectives for improving adult basic skills. *A Fresh Start* is the report of the Working Group and it proposes a National Strategy - complementary to the strategies now in place for schools - that is intended to succeed in attracting potential learners into study schemes. Full text of the report can be found at <http://www.lifelonglearning.co.uk/mosergroup/rep.htm>

² A growing repertoire of specialist learning software designed to instruct and provide practice in various aspects of numeracy and literacy is now becoming available on-line and on CD ROM. It is hoped by some agencies and practitioners that these products will greatly widen participation by facilitating distance learning of basic skills. This opens up a much wider debate, beyond the scope of this paper. Our experience at the Open Learning Centre is that basic skills learning is most successful when there are opportunities for face-to-face social interaction and group work while engaged in meaningful, student-centred activities. Well-designed and attractive CBL and distance learning products may prove to be useful as additional resources.

³ Recent research conducted by The Opinion Research Business (O.R.B) revealed that on average 28% of Adults in Wales have literacy levels below a functional level and 32% have numeracy levels below a functional level. Some areas have levels significantly higher than this. This represents more than one in four adults who have difficulty with reading and writing and 1 in 3 who struggle with day-to-day tasks involving numbers. From a survey conducted by the Basic Skills Agency, see <http://www.basic-skills.co.uk/>

⁴ It was sometimes the case that those learners enrolling on computer-based courses were subsequently found to have inappropriately high levels of basic skills, as far as the targeting of provision was concerned. This had a number of resource implications, although it could be argued that these were balanced by the positive impacts brought to learning groups by increased heterogeneity.

⁵ The flattening of hierarchies that is fostered by the development of in-group technological expertise has implications for classroom social relationships, especially in adult education where tutor/student divisions are not based on age distinctions. Encouraging the development of mentors from within learning groups turns this potentially negative situation to the advantage of the teaching and learning process.

⁶ For an overview of Constructionism see Yasmin B. Kafai and Mitchel Resnick (1996, eds.) *Constructionism in Practice: Designing, Thinking, and Learning in a Digital World* New York: Lawrence Erlbaum Associates.

⁷ Resnick, Mitchel, Natalie Rusk and Stina Cooke, (1999) 'The Computer Clubhouse: Technological Fluency in the Inner City' in Schön, Donald, Sanyal, Bish and William. J Mitchell, (eds.) *High Technology and Low Income Communities: Prospects for the Positive Use of Advanced Information Technology* Cambridge, Mass: MIT Press

⁸ A paper offering a fuller account and analysis of the design, conduct, successes and failures of the Computer Creative course is in preparation by the authors. Examples of work created on the course, and some photographs of the activities are online at <http://www.comp.glam.ac.uk/pages/staff/srharris/pages/cc.htm>

⁹ Entry Level 1 indicates serious difficulties, while Level 2 is competent pre-GCSE.

¹⁰ The use of the Individual Learning Plan is standard practice in ABE. It generally consists of a paper-based record that is completed by learner and tutor together. It will contain personal contact information, statements of strengths and needs in specific basic skills areas, and records of progress and attainment.

¹¹ At the time of last revision (June 2001) the course still has a number of weeks left to run so figures are provisional.

¹² The need to feel that they are an “expert” in a particular package or technique can be a major barrier to tutors engaging with technology, although this is much less often the case for learners.

¹³ One of the great advantages of digital technologies is that most data manipulation tasks can be accomplished in a variety of ways and with a choice of tools. Many effective and highly usable software packages for creative work are widely available via the Internet, sometimes even free of charge, so that there is no longer a need to be tied to proprietary tools that are costly or difficult to use.

¹⁴ This principle has arisen directly from our own observation, supported by (highly vocal) feedback from students who have been inadvertently blocked from completing projects.

¹⁵ This term is derived from Lave, Jean and Etienne Wenger (1991) *Situated Learning: Legitimate Peripheral Participation* Cambridge: Cambridge University Press. It is important to note that peripherality is seen as a positive term in relation to communities of learning, implying a relationship to the centre that can be transformed as the dynamics of situated learning take place.

¹⁶ For a stimulating and entertaining exploration of some of these new opportunities for learning see Mitchel Resnick (1994) *Turtles, Termites and Traffic Jams: Explorations in massively parallel microworlds* Cambridge, Ma. MIT Press

¹⁷ This can be an especial problem with older age groups, whose ideas of education have been moulded by school. For these learners, the approach outlined here may appear disorganised and lacking in substance, as was the case with one of the participants in the Computer Creative course. How best to deal with these attitudes in this context remains a subject for further research.

¹⁸ For a recent overview of Constructionist principles and practices, including a discussion of technological fluency, see David Cavallo (2000) ‘Emergent Design and

learning environments: Building on indigenous knowledge' *IBM Systems Journal* 39: 3&4: 768-781

¹⁹ For a recent restatement of the issues see the introduction to the Basic Skills Agency *Adult Numeracy Core Curriculum* (2001), available for free download at <http://www.basic-skills.co.uk/resources>