OPPORTUNITIES AND BARRIERS TO THE USE OF BROADBAND IN EDUCATION

2003

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EXECUTIVE SUMMARY

The Broadband Stakeholder Group (BSG) was established to advise Government on the development and implementation of a strategy to enable the UK to meet the Government's target to have the most extensive and competitive broadband market in the G7 by 2005. In its 2002 annual report, the BSG undertook as one of its recommendations, to produce a report on the opportunities and barriers to the use of broadband in education. The purpose of this report is to articulate the case for the widespread use and exploitation of broadband within the education system.

Current broadband policy developments in the education sector

The BSG is encouraged by the Government's commitment to exploiting the full potential of broadband in education. From central government down to the local level, good progress has been made in facilitating access to broadband and many educational institutions are already discovering innovative ways of using broadband to deliver improved educational outcomes and enhanced internal efficiencies. There have also been a number of positive announcements made in relation to the development and use of broadband enabled educational content. The challenge today is to leverage these developments and examples of good practice so that the full benefits of broadband are delivered as widely and quickly as possible across the education sector.

Why broadband? - Educational benefits arising from the use of broadband

The BSG believes that there are many educational benefits that can be derived from the use of broadband within education and has identified at least five areas that demonstrate these benefits. Broadband can help to:

- Enhance the learning experience;
- Improve cooperation between educational institutions;
- Deliver new potentialities;
- Improve efficiencies in existing educational provision; and
- Widen access to education.

In addition, the BSG argues that education has a crucial role to play in the realisation of 'Broadband Britain' as the widespread and systematic use of broadband in education will be a significant driver for residential broadband demand and take-up.

Overcoming barriers to the use of broadband in the education sector

Although considerable progress is being made (examples of which are outlined in this report), the education sector is not yet fully exploiting the potential of ICT. The introduction of ICT, and broadband in particular, represents a major systemic change to traditional methods of teaching, learning and administration and therefore needs to be accompanied by effective change management processes to ensure that all stakeholders feel motivated and reassured to want to use it.

As a part of this change management process, a number of issues will need to be addressed. These include:

- motivating users and decision makers to ensure that the deployment of broadband becomes an educational 'pull' rather than a technology 'push';
- addressing inconsistencies in the use of broadband across the education system, to ensure that benefits are delivered as widely as possible;
- overcoming the fragmentation of funding streams available so that innovative broadband projects can be more easily supported; and
- making sure that broadband projects, which often involve long term infrastructure investments are structured on a more sustainable basis.

Recommendations

To overcome the barriers outlined above, the BSG has developed five recommendations:

1. Government should clearly communicate its vision for the use of broadband within education and the wider learning agenda.

2. The Government and stakeholders should provide a central online resource for the broadband and education sector that would:

   a) Provide guidance and information on how education institutions can fully integrate broadband into their strategic education targets and related processes.

   In addition, the Government should:

   b) Extend the remit of Curriculum Online to catalogue educational content that can be delivered over broadband as opposed to narrowband and make it visible via the portal.

3. Building on the broadband funding guidance currently being developed by OGC, the Government should develop guidelines for RBCs, Local Authorities, LEAs and educational institutions (including higher and further education) on how to aggregate funding streams for individual projects in a sustainable and efficient way. In addition, the UK interpretation of State Aid needs to be re-visited and incorporated within these guidelines.

4. The remit of the Technical Support Advisory Service should be extended to undertake research into ICT support structures with a particular focus on how economies of scales could be achieved for ICT support in smaller institutions. This research will need to address the informal support provided by: LEAs, RBCs, parent/teacher organisations, individuals and small businesses, as well as the formal support offered by regional support centres, RBCs and LA/LEAs.

5. New education "projects" should not be approved without a committed means of sustainable follow through for at least three years and all LEAs should provide case studies to all educational institutions on how to build-in sustainability.

1. INTRODUCTION

Speaking at the e-Summit on 19 November 2002, the Prime Minister argued that the UK faced a fundamental challenge to create a knowledge-driven economy and that education and skills were critical to achieving this transformation. Recognising the potential of broadband to provide "exciting and effective ways of improving the quality of education" and improving the ICT skills base, the Prime Minister announced "that the Government would provide funding to deliver broadband connections to every school by 2006."[1]

This announcement followed the BSG's recommendation the previous year that "The Government should commit to providing broadband access to all points of learning" and marked a significant commitment to the deployment and use of broadband in education. In addition, it also complements the eEurope 2005 Action Plan e-learning objectives[2]. However, in order to seize on this opportunity and deliver the full benefits of broadband across all of the key stages of learning, a number of issues and barriers will need to be addressed.

Given that both local and national Government have committed substantial money and resources to broadband in education, it is important to ensure that the Government achieves full value for money from its investment by using broadband connectivity to support the development of a world class education system, which in turn will positively impact on the UK economy.

The BSG believes that broadband has a significant role to play in strengthening the life-long learning process. In turn, the BSG has also argued that education has a crucial role to play in the realisation of 'Broadband Britain' as the widespread and systematic use of broadband in education will be a significant driver for residential broadband demand and take-up (as has been demonstrated in countries as diverse as South Korea, Canada and Estonia). However, in order to achieve this 'win-win' situation, universal access to broadband in all learning institutions is required and this access needs to be able to deliver a full broadband experience to the end-user.

Unfortunately, the more successful education institutions are in using broadband the earlier they will need to upgrade to higher levels of bandwidth, particularly as new and innovative interactive educational content applications and services develop. Whilst the current Department for Education and Skills (DfES) definitions of bandwidth provision (2Mbps for primary schools and 8 Mbps for secondary) represent a good starting point, it is likely demand from schools will exceed this level of provision some time in the future, although it is difficult to predict when this will happen.

By caching content that is used regularly at the local or regional level, network performance can be enhanced, and the quality of the end user experience maintained[3]. However, bandwidth requirements will need to be kept under review and where possible a flexible approach should be taken to provision that allows educational institutions to upgrade as their connectivity requirements increase.

The objective of this report is to articulate the case for the widespread use and exploitation of broadband within the education system with a view to building on the positive steps taken by the UK Government. To that end, this report will identify a number of barriers to broadband adoption in the education sector and make specific recommendations to address them. It should be noted that this report primarily focuses on the schools sector as it relatively new to broadband. This report does not cover the training sector.

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[1]The DfES describes "educational broadband" as a minimum 2mb (both ways) for all schools and 8mb for secondaries.

[2] By end 2005, Member States should aim that all schools and universities have Internet access for educational and research purposes over a broadband connection. Museums, libraries, archives and similar institutions that play a key role in e-learning should also be connected to broadband networks.

[3] One accepted model suggests a centralised server that feeds a hierarchy of caches at each appropriate RBC, LEA and school level.

2. CURRENT BROADBAND POLICY DEVELOPMENTS IN THE EDUCATION SECTOR

There has been significant local and national Government investment in broadband and as a result, there are many examples of innovative projects that have used the potential of broadband to enhance learning and teaching throughout the education sector, including schools, further education, higher education and lifelong learning (See Annex 1).

For example, the continued development of JANET (the Joint Academic Network) and its high-speed backbone SuperJANET has resulted in the provision of a world leading broadband network for the higher education and further education sectors. In addition, the Department for Education and Skills (DfES), Learning and Skills Council and United Kingdom Education and Research Networking Association (UKERNA) are currently looking at how to provide access to appropriate levels of connectivity for Adult & Community Learning providers, learners and the Specialist Colleges to SuperJANET.

In relation to schools, and in addition to the Prime Minister's November 19 2002 announcement, the individual Regional Broadband Consortia (RBCs) have implemented and are developing ten regional networks. The RBCs were tasked with ensuring interconnectivity of these networks by March 2003. Contracts have been placed with UKERNA to meet this deadline and provide interconnection through SuperJANET and the first RBC is already connected. This will create for the first time a truly national education network. However, it should be noted, there is more scope for greater connectivity in the adult and community learning sector.

The Government has also made a number of positive announcements regarding funding for content. In January 2003, Curriculum Online for schools was launched and the Secretary of State for Education announced an extra £280m for e-learning credits (giving a total of £100m each year for the next three years). Additionally, the Secretary of State for Education announced funding for a similar initiative (£92m over 3 years) for the Further Education and Lifelong Learning sector – this is in addition to the ongoing investment in National Learning Network Materials. The Government has also recently approved BBC Digital Curriculum as a new digital learning resource aimed at teachers, students and individual learners. In addition, the Department for Culture, Media and Sport is developing an online cultural resource called Culture Online.

Other positive developments include: the development of the People's Network throughout the public library network, the expansion of UK Online Centres and UFI; convergence of regional educational networks run by the RBCs; the development of pioneering projects using broadband television; as well as a number of regional initiatives to link education communities across the sector. In addition, DfES is undertaking ongoing research into broadband and education.

3. WHY BROADBAND? - EDUCATIONAL BENEFITS ARISING FROM THE USE OF BROADBAND

The BSG believes that there are many educational benefits that can be derived from the use of broadband within education and has identified five areas that demonstrate these benefits with related case studies (although this list is by no means exhaustive).

3.1 Transforming the learning experience

Broadband can transform the learning experience for students as it can expose them to a range of exciting and innovative learning content that was previously either inaccessible or unpractical in the narrowband environment. Exposure to new forms of content can have a positive motivational effect and encourage students to want to learn.

Cambridgeshire Schools Broadband Project

The Cambridgeshire Schools Broadband Project[4], provides early evidence of the impact that broadband can have on teaching and learning. The project was based around visits to 42 Cambridgeshire schools in late 2002 where the purpose was to produce a snapshot of the situation in broadband schools and to register any evidence of early impact on teaching and learning. In particular, the following benefits were identified:

- Teachers were quick to locate relevant educational material on the Internet and made much more use of online resources for their lesson planning and incorporated media rich graphics and video content into their teaching.
- Students made more use of the Internet for their own research projects across the whole curriculum.
- Teachers reported clear benefits in terms of saved time, which allowed students to achieve more during their classes (learning activities were no longer subject to 'down time' caused by delays in downloading content etc).
- Teachers reported improvements in achievement, and levels of confidence and self esteem, particularly as students found that their problem solving strategies bore fruit more rapidly.
- Teachers also reported that attention levels increased and that boys in particular showed more tenacity in reading when seeking information from the Internet.

The majority of websites used by schools didn't charge for downloadable materials, however a small number of schools were subscribing to on-line services or were trialling them. Among the primary schools, the most popular of these subscription services were those providing literacy and numeracy material such as Spark Island, Easiteach and Oxford Learning Tree. Many schools expect to investigate such services further before deciding how to spend their e-Learning Credits.

As a result of the use of broadband, many schools reported that use of CD-ROMs has declined significantly as many teachers prefer the fact that websites can provide up-to-date information from a wider range of sources than many CD-ROMs provide.

3.2 Improving Inter-institutional Collaboration

One of the real benefits of broadband is that it can facilitate and enhance inter-institutional collaboration. For example, broadband can be used to share scarce teacher resources between schools and colleges via high-speed interactive videoconferencing (previously not practical in a narrowband environment), it can also be used to link different institutions to create innovative joint projects that encourage communication and cooperation. In one innovative project, broadband was used to facilitate the often difficult transition for students when they move from primary to secondary schools as highlighted below.

Virtual Transition Project

The Virtual Transition Project[5] was developed to support transition of pupils from Key Stage 2 in primary schools to Key Stage 3 in secondary schools using a virtual classroom environment on http://www.bgfl.org. Year 8 students were trained as "virtual mentors" to use these classrooms to support the Year 6 pupils.

[4] Cambridgeshire Schools Broadband Project Impact Evaluation Survey: November 2002 – January 2003 www.elhict.co.uk/

[5] http://www.bgfl.org/services/editel/files/virttran.pdf

The virtual transition programme was run in three week blocks with the classrooms being available 24/7 from any computer connected to the Internet. The nine trained peer tutors developed three programmes aimed at supporting transition. The Year 6 learners reported that they felt better about the transfer to their new schools as a result of this project.

3.3 Achieving New Potentialities

Broadband can also facilitate new and innovative e-learning opportunities on a wider scale. For example, broadband has been used to enhance modern language learning through conversational language lessons with native speakers in other countries such as in the Ashcombe case study. It has also been utilised in the Nesta Motivate project to provide school students with access to mathematics experts. On a wider scale, it can also facilitate international collaboration with organisations and institutions outside the education sector as an innovative project involving the Birmingham Ballet has demonstrated.

Ashcombe School

Ashcombe School in Surrey[6] where whole classes of students now use broadband video streaming to support their foreign language GCSE work. Audio and video are combined with an interactive quiz, which can be paused and replayed to cater for individual learning speeds - an exciting and effective way of improving the quality of education in our schools, which was previously not practical in a narrowband environment.

Nesta Motivate Project

The Millennium Maths Project is piloting and extending a project called MOTIVATE that uses video conferencing and broadband technology to give school students contact with brilliant mathematicians. The aim of the project is to inspire pupils to enjoy and get more out of their maths lessons and develop teamwork skills[7].

Still Life' at the Penguin Café

The Birmingham Royal Ballet (BRB) in collaboration with Netmedia developed an on-line education support web site for David Bintley's popular ballet, 'Still Life' at the Penguin Café' (this ballet is a GCSE dance set work for the national exams in 2002 and 2003). The site contains study notes on the ballet, examples of the music, design, style etc; a detailed analysis of some scenes; including choreographic tasks; analysis and interpretation questions. Moreover there is a detailed audio commentary from the director himself on all sections of the web site providing an insight into the underlying themes of the ballet. Video of the ballet is streamed through the web site to all the schools in Birmingham via the Birmingham Grid for Learning.

This resource was the starting point for a collaboration between professional dancers and community dancers in Birmingham and Chicago – Café Atlantic – which culminated in a live dance performance shared across the Atlantic using video conferencing technology, with scenes from each city projected live onto a giant screen in the other. The result in each venue was a single, coherent piece of dance with a finale in which the community dancers in both cities danced together.

The Still Life at the Penguin Café web site was a winner at the 2002 Birmingham Lifelong Learning award ceremony[8]

[6] www.ashcombe.surrey.sch.uk/
[7] http://www.motivate.maths.org/
[8] www.bgfl.org/brb.

3.4 Improving efficiencies in Existing Provision

Broadband can deliver real efficiencies in existing provision by streamlining reporting and administration as well as automating the administration and management of educational institutions (see the Cambridgeshire schools example below). Broadband can also be used to deliver curriculum details and examination results to students in a more efficient way, as has been done through the C2K scheme in Northern Ireland schools.

Cambridgeshire

Broadband has enabled some schools in Cambridgeshire to make management information available in locations outside the school office without compromising security either by connecting teachers' laptops to the administrative network, or by enabling computers in classrooms and staff rooms to run Assessment Manager and similar applications. This is designed to provide teachers with access to up-to-date performance data and is intended to inform target-setting, differentiation and planning generally.

While there is limited growth in the number of teachers using their network to update, analyse or exploit performance data, it is increasingly common for them to acquire other kinds of information in an electronic format. In one of the secondary schools, the staff bulletin is circulated exclusively via e-mail, and in many schools teachers now instinctively refer to DfES and other official websites cutting down dramatically on the volume of paper publications which are ordered. In a narrowband environment, it could be argued that it would be less likely that teachers would seek out information in this way due to the extra time required to download the information.

C2K

C2K[9] is an innovative scheme, which provides an integrated communications infrastructure for all 1,220 schools in Northern Ireland. With over 300,000 pupils and 20,000 teachers, C2K provides a fast and efficient means of delivering and receiving information including curriculum details and examination results as well as offering an on-line learning environment.

3.5 Widening Access to Education

Broadband can also be exploited to widen access to educational material and new learning opportunities by using links from schools to the wider communities, such as libraries, museums, theatres and other cultural institutions as is happening in the Bethnal Green Museum of Childhood.

Broadband is also used as a means of widening access in rural areas and providing access to education materials to learners with disabilities or behavioural problems such as in the Notschool.net project identified below.

Bethnal Green Museum of Childhood

The Bethnal Green Museum of Childhood is working with a team of teachers from Lewisham LEA, supported by LGfL, to create a Virtual Bethnal Museum (developed specifically for use with broadband access).

[9] www.redstone-communication.co.uk/pdf/C2K%20AW.pdf.

They are creating a media rich virtual tour of the museum with interactive activities for children that uses content closely linked to the National Curriculum for Key stage 1 and the Foundation Stage. The advantage of such an initiative is that it provides access to the museum without the cost and time involved with planning a formal excursion; without broadband, replicating this user experience would not be possible.

Notschool.net

Notschool.net[10] is an online research project looking at ways of re-engaging young people at school age back into learning. These young people have been out of the more traditional educational systems for a variety of personal and logistical reasons.

They include the phobic, ill, disaffected, sick, pregnant and the excluded. Notschool.net is specifically aimed at those for whom traditional alternatives such as home tutoring had not worked.

During its first phase, Notschool.net established a virtual community of 100 young people who were given the opportunity to develop their self-esteem and be reintroduced to learning. This was achieved through the support of mentors, buddies, experts and the use of new technology.

The success of Notschool exceeded all expectations and is now in its third phase. It is being rolled out to Education Authorities across the UK and overseas, creating a multinational and supportive learning community.

4. OVERCOMING BARRIERS TO THE USE OF BROADBAND IN THE EDUCATION SECTOR

Despite the many good examples of progress being made in the application of broadband within the education sector, most teachers are still not fully exploiting the potential of ICT in the classroom. The introduction of ICT represents a major systemic change to the traditional methods of teaching and learning and therefore needs to be accompanied by effective change management to ensure that all stakeholders feel motivated and reassured to want to use it.

The UK Government has a key role to play in this change management process by ensuring that the benefits of using broadband within education are evangelised, incentivised and supported right throughout the education value chain.

As a part of this change management process, a number of issues will need to be addressed. These include:

- motivating users and decision makers to ensure that the deployment of broadband becomes an educational 'pull' rather than a technology 'push';
- addressing inconsistencies in the use of broadband across the education system, to ensure that benefits are delivered as widely as possible;
- overcoming the fragmentation of funding streams available so that innovative broadband projects can be more easily supported; and
- making sure that broadband projects, which often involve long term infrastructure investments are structured on a more sustainable basis.

[10] http://notschool.ultralab.anglia.ac.uk/

4.1 Lack of motivation to use broadband

Although there are many within the education sector who are supportive of the government's commitment to broadband in education, others remain unconvinced about the benefits that broadband can deliver[11]. Given the broadband infrastructure commitment of the Government, it is appropriate to consider how to motivate people to use broadband.

There are a large number of stakeholders in the education value chain and their motivation for using and implementing broadband will vary depending on their needs, concerns and responsibilities. Outlined below is a summary of the motivational aspects that impact on the deployment and use of broadband in the education sector for each of the stakeholders in the value chain.

4.1.1 Leaders and decision makers

The full support and buy-in of educational leaders and decision makers is critical to ensure the widespread adoption and use of broadband in education. While leaders and decision makers are interested in how broadband can transform the structural and operational performance of their organisations, they are also under pressure to achieve value for money and to meet the targets set by Government and their own governance bodies. They therefore need to be re-assured and motivated before they commit additional resources to broadband within their organisation.

In addition, leaders and decision makers require skills to assist them in implementing broadband across their institution. Whilst initiatives such as NSCL's Strategic Leadership in ICT course, which equips head teachers with skills in leading ICT within their schools is a positive development, clearly more could be done to support them as many schools still do not have broadband strategy plans which clearly articulate how they are going to embed broadband into their teaching and learning strategies.

4.1.2 Educators and learning facilitators

Educators and learning facilitators need to have a clear understanding of how broadband can help them do their job more efficiently and effectively. Whilst many are already using ICT quite extensively, others remain either unaware or unconvinced about the benefits that ICT and broadband in particular can deliver.

Evidence suggests that pupils who use ICT in the classroom get better results than those who don't[12] and there is an emerging range of broadband specific educational content and learning packages that can greatly enhance the learning experience and support the pedagogy.

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[11] A recent internal report commissioned by DfES stated '…a cohesive, persuasive response to the question 'Why does my school need broadband?' is not easily found on the Internet. A publicly available 'argument for broadband' seems to be required for widespread distribution.'

[12] The ImpaCT2 study found that there is a positive "ICT effect" on raising standards in schools. The areas where there was found to be a statistically significant positive relationship were English at KS2, science at KS3, and science and design & technology at KS4 (where high ICT users in the sample outperformed low ICT users by an average of 0.56 of a GCSE grade and 0.41 of a GCSE grade, respectively this can be seen as the equivalent of an additional 250 000 pupils nationwide moving up from a grade D to a grade C at GCSE. Case studies of 15 of the sample schools have also been published to demonstrate how the schools used ICT in the curriculum. This and other research demonstrates the way in which ICT is making a real contribution to some schools' achievements and ways of working and illustrates the true potential of ICT. The ImpaCT2 reports can be found at http://www.becta.org.uk/research/impact2/index.cfm Further research published by Becta shows that this the link between ICT and attainment is an emerging trend and occurs irrespective of geographic or socio-economic location.

However, it will be necessary to make sure that educators buy-in to these benefits if they are to be motivated to incorporate them in to their daily teaching activities. Broadband needs to be an educational 'pull' rather than a technology 'push' if the full benefits of its use are to be achieved.

Explaining how broadband can enable educators and learning facilitators to teach and assess their students more efficiently will be key to the broadband adoption process in education. However, there is also an issue around appropriate technical support in the use of these technologies to ensure that the technology does not impose undue burden on educators and learning facilitators and divert their attention away from teaching. In order to provide appropriate technological support, leaders and decision makers need to consider and plan resourcing ICT support requirements in the context of increasingly sophisticated broadband networks.

4.1.3 Parents and mentors

Parents and mentors who take a strong interest in their children's education are likely to be motivated to embrace a technology if they are convinced of its relevance to their children's education. For example, most parents would agree that a PC is advantageous to their children's education however, in order to motivate parents to embrace broadband they need to be convinced of the real additional value that it brings to the PC i.e. the content and services that it makes available to the learner and the potential to collaborate.

4.1.4 Learners

Generally speaking, most learners are reasonably receptive to new technologies, however they need to feel motivated to want to use them and therefore the expectations of their teachers/ lecturers will influence their level of motivation. For example, as home PCs became more pervasive there was a growing expectation from educators in the higher education sector that student assignments should be submitted in typed format rather than handwritten. This change was significant for many who were not used to typing, let alone used to using the technology. However, the submission of typed assignments quickly became the norm.

There are a variety of reasons why this change took place however, students are clearly strongly motivated to present their assignment in the best possible light and not be disadvantaged compared to his/her fellow students. The same can be said about broadband. The more broadband becomes embedded into the education system the more inclined learners will want (and need) to use it to ensure that they are not disadvantaged compared to their fellow students.

The full educational impact of broadband can only be realised when off campus connectivity (i.e. learners in the home) mirrors that 'on campus'.

This is particularly relevant to learners in the lifelong learning sector. The BSG believes that stimulating availability and use within educational institutions will help to develop a virtuous circle of provision, take-up and use at the residential level.

4.2 Broadband is not fully integrated into the education system

Even where broadband is being used to support the pedagogy or administration, evidence suggests that it is rarely applied strategically to all of the processes (technology, pedagogy, assessment, administration and curriculum etc) within individual institutions. In fact, in a recent sample study, only 13% of primary schools had all five ICT enabling factors in place[13].

For example, broadband may be used for the purposes of research for an assignment but it may not necessarily be linked up with the assessment of these assignments or the administration of the institution.

The failure to fully integrate broadband within educational institutions will impact on the ability to deliver on educational targets, and in fact, even the setting of these targets. By not addressing the issue in a systemic way means that broadband can not be used to address issues that it would clearly have a role in addressing, such as dealing with teacher shortages through high-speed links to other institutions or facilitating the teaching of modern languages where there is no teacher located within the institution.

This report has highlighted some examples of the innovative uses that can be made of broadband in education. The BSG believes that there are many examples where the benefits of broadband can be demonstrated through existing research and that this research can be used to feed into educational targets. The BSG has identified several areas in section 3 where broadband has added value including: transforming the learning experience, further inter-institutional collaboration, achieving new potentialities, improving efficiencies in existing provision and widening access to education.

While the research outlined does indicate some of the benefits of broadband in education, there is a need to rationalise this research both in terms of scalability and integration as much of the research does not focus on the large-scale systemic issues. For example, showing that broadband can help in assessment in a small number of subjects in a few schools may give little insight into the issues of scaling the system for 9 million children and 500,000 teachers. Moreover, much of this research largely focuses on a single benefit to a single part of the education system. Instead, what is needed is information and guidance to assist educational institutions to fully integrate broadband into their strategic education targets and related processes.

It should be noted, broadband represents a new way of doing things, and much of its value will become evident over time as its use becomes more widespread. However, to fully exploit its potential, there is a need to be ambitious from the outset and seek to fully integrate broadband across the education system as quickly as possible, while at the same time recognising that broadband is an educational tool, not an objective.

4.3 Fragmentation of funding

The most frequently cited barrier to broadband take up by Local Authorities and LEAs is that the funding streams available for broadband projects are fragmented and are often controlled at different levels, either regionally, locally or centrally.

[13] http://www.becta.org.uk/news/reports/prim_ict_standards/html/s2i.html

This fragmentation makes the process of identifying and securing appropriate funding to support broadband projects complex and time consuming. Firstly, it is not always clear what resources/funding are available and appropriate to support broadband projects. Secondly, there are often limitations on how different funding streams can be used as some pools of money can only be used to finance certain types of initiatives (for example some require matched funding[14]).

There is currently a lot of work being done to address the issue of fragmentation such as the development of funding guidelines by the Office of Government Commerce (OGC) but despite the moves there remains an overly fragmented funding structure (which has been too disaggregated down to the local level). The result is that Local Authorities and LEAs have experienced difficulties in pooling money in a more appropriate way to finance singular innovative projects that involve many different components. In other words, there is a need to re-aggregate some of this funding.

Another barrier exists with funding in that prospective applicants who wish to apply for European funding are faced with uncertainty with regard to the UK Government's interpretation of the definition of State Aid. This represents a barrier for the funding of specific social needs around technology and learning.

While this report is not specifically focussing on aggregation per se, it is important to note that there are plenty of examples where value for money exists when moving towards the aggregated model. This is true for both the provision of education networks as well of the aggregation of online educational services and content (for an excellent example see the recent SOCITM *Broadband in Local Government – A snapshot in 2002* report[15] on the Telford & Wrekin Local Authority).

The BSG believes that while overall, good groundwork has been achieved in aggregating demand, considerable obstacles still remain. To that end, the DTI's Broadband Task Force has a vital role to play in setting out a clear framework for how aggregation is going to be achieved and implemented at the local and regional level. In addition, the BSG has an Aggregation of Demand group, which is addressing this issue in close collaboration with the DTI Broadband Taskforce.

4.4 Lack of models to enable sustainable private sector investment

Public and Private partnerships are clearly important for developing innovative broadband projects within education. However, the lack of sustainability (i.e. the ability of a project to be self-sufficient once the initial funding has stopped) and replicability (i.e. that it should be possible to replicate elements of the project elsewhere) within project funding models is of paramount concern. For example, the "Living Health" project was widely acclaimed as a very successful initiative but could not be sustained once the initial funding came to an end, and the benefits of the project have therefore not been carried forward.

The allocation of funding on an annual basis often presents a barrier to sustained private sector involvement in public/private partnerships (particularly for projects which require some form of infrastructure investment). Funding programmes therefore need to be of a longer duration (at least 3 years).

[14] The DfES 601b Standards Fund grant for broadband requires LEAs to match-fund in order to be able to draw down the grant. Local Authorities, LEAs and schools are finding that budget pressures elsewhere make it difficult to match fund ICT grants and impossible to add to those funds from other sources.
[15] www.socitm.gov.uk/Public/default.htm

Sustainability is of particular importance considering that the Government has recently committed to a broadband connection to all schools by 2006. The issue however is, once schools have the connection, how is that provision going to be developed and maintained post 2006 both within schools and within the wider life-long learning agenda.

The Government therefore needs to give consideration to sustainability within its broadband for education strategy to ensure that the education sector can continue to benefit from emerging broadband technologies and content.

5. Recommendations

5.1 A need for clear leadership from within top levels of Government

As this report highlights, progress has been made in facilitating the use of broadband within education and life-long learning however, more could be done to articulate the Government's vision to ensure that all stakeholders within the education system have a clear understanding of the relevance of broadband to education. In other words, this vision should be reflected in schools and LEA strategy documents as well as in the working relationship between departments such as DfES and Department for Culture, Media and Sport who both have a role in education and learning.

There is some evidence of this happening, for example in the "Roadshows" the DfES is co-hosting with RBCs around the country, however, further clarification of what educational services are required to deliver educational broadband and content and sending that message to all, especially corporate Local Authorities and other government departments as well as higher education/further education and regional aggregation groups, will get clarity and unity on the situation.

Recommendation 1: Government should clearly communicate its vision for the use of broadband within education and the wider learning agenda.

5.2 Knowledge Dissemination Resource

To support this vision, a central resource should be developed to, provide information and guidance to assist educational institutions to fully integrate broadband into their strategic education targets and related processes. This resource could be deployed in a similar manner to UK Online for Business , Responding to the question "why does my school [or institution] need broadband?" this resource would provide practical advice and guidance based on real experience and evolving best practice.

As a subset of the above, it will also be important to identify educational content that can be delivered over broadband as opposed to narrowband. This content needs to be catalogued and rated by users (teachers, students, librarians and educational administrators etc) in terms of its:

- Target audience;
- Educational benefit;
- Ease-of-use;
- Entertainment value (particularly important for infants);
- Value-for-money; and
- Network requirements.

Recommendation 2: The Government and stakeholders should provide a central online resource for the broadband and education sector that would:

a) Provide guidance and information on how education institutions can fully integrate broadband into their strategic education targets and related processes.

In addition, the Government should:

b) Extend the remit of Curriculum Online to catalogue educational content that can be delivered over broadband as opposed to narrowband and make it visible via the portal.

The development of funding guidelines

Local Authorities sometimes experience difficulties in understanding how best to use Government and EU grants to finance broadband deployment projects. To address this issue, there is a need for the Government to investigate how Local Authorities can aggregate funding models from a variety of departments, agencies and European funding streams to fund these projects. In other words, a set of education "how-to" project guidelines is required on what can and can't be done with mixing and matching to fund individual projects.

Recommendation 3: Building on the broadband funding guidance currently being developed by OGC, the Government should develop guidelines for RBCs, Local Authorities, LEAs and educational institutions (including higher and further education) on how to aggregate funding streams for individual projects in a sustainable and efficient way. In addition, the UK interpretation of State Aid needs to be re-visited and incorporated within these guidelines.

5.3 Provision of ICT Support

If the use of ICT and broadband in education is to increase, the ICT support structures available to education institutions need to be strengthened. Currently, all further educational colleges have access to the Joint Information Systems Committee (JISC www.jisc.ac.uk) and regional support centres funded through the central National Learning Network (NLN) monies. The NLN partners are investigating how this support structure could be extended to the adult and community learning sector. Some schools have access to such structures either directly through their own in-house ICT support unit or indirectly through the de-centralised RBCs and LEAs.
In addition, support is offered through a number of initiatives being undertaken by the DfES (in conjunction with Becta) in the area of Technical Support[16].

While the BSG welcomes the support structures provided, the current approach in the schools sector is overly fragmented and has resulted in a shortfall and disparity in the support provided o some institutions. There is a need to formalise this more indirect support to ensure equity but not necessarily by creating a new body.

[16] A website has been created containing information and advice. This is primarily aimed at schools but is also useful to LEAs and to individuals concerned with delivering support to schools. This can be viewed at www.technicalsupport.ngfl.gov.uk. Technical Support work is also being done in the following areas:

1. Study to explore the impact of Technical Support provision on the total cost of ownership of ICT in schools
2. Improving the quality for schools
3. Accreditation of Technical Support to Education Feasibility Study

The DfES as the central education agency with a "bird's eye view" of support structures in place is therefore in the best position to analyse how some of these informal support structures could achieve economies of scales across smaller institutions. In order to do this, the DfES could extend the remit of the Technical Support Advisory Service[17].

Recommendation 4: The remit of the Technical Support Advisory Service should be extended to undertake research into ICT support structures with a particular focus on how economies of scales could be achieved for ICT support in smaller institutions. This research will need to address the informal support provided by: LEAs, RBCs, parent/teacher organisations, individuals and small businesses, as well as the formal support offered by regional support centres, RBCs and LA/LEAs.

5.4 Ensure that sustainability 'options' are built into broadband project plans from the outset

Sustainability needs to be addressed from a pragmatic point of view. It makes sense to only commit to "projects" that if proved successful, have a sustainability plan for at least three years, otherwise there results in a proliferation of "projects" that may have been labelled as failures but in the long term would have been viable education projects with continued sustainability. To facilitate this, LEAs should provide case studies to all educational institutions on how to build-in sustainability.

Recommendation 5: New education "projects" should not be approved without a committed means of sustainable follow through for at least three years and all LEAs should provide case studies to all educational institutions on how to build-in sustainability.

[17] The Technical Support Advisory Service will pilot work in a number of areas including developing a comprehensive on-line resource of best practice guidance material for schools and LEAs on the effective operational management of the ICT infrastructure, the provision of ICT technical support and the management to resolution of ICT faults.

Report prepared by the BSG Secretariat based on contributions from the BSG Education Working Group.

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ANNEX 1 – CURRENT BROADBAND POLICY DEVELOPMENTS IN THE EDUCATION SECTOR

Higher Education

The UK higher education sector has had a broadband network for some time in JANET (the Joint Academic Network). The high speed backbone of this network, known as SuperJANET, went live in March 2001 at 2.5 Gigabits per second (Gbps) and was upgraded in June 2002 to SuperJANET4, with 10 Gbps core network capacity. In the HE sector the default bandwidth for connection is in the range 100-155 Mbps, although large institutions can have individual connections of up to 2.5 Gbps. The contract for SuperJANET4 runs out in March 2005. Those tendering for the SuperJANET5 contract will be asked to provide a network at hundreds of gigabit or even a terabit level.

Further Education

All 400+ English FE colleges have a guaranteed minimum 2Mbps high speed connection through JANET. Over 80 colleges have bandwidth in excess of 2Mbps or have a connection with a capacity in excess of 2Mbps as supplied through UKERNA. Other colleges may have additional bandwidth but the LSC do not have figures on those who have increased their bandwidth outside of the UKERNA process.

The LSC currently have an intersite connectivity project, which is designed to assist colleges, particularly those with many centres in the inner cities and those with widespread locations in rural areas to improve connectivity between their sites.

The DfES, LSC and UKERNA are currently looking at how to provide access to appropriate levels of connectivity for Adult & Community Learning providers and learners and the Specialist Colleges. Both the Adult and Community Learning and Specialist Colleges ILT sub groups have now submitted their ILT Implementation Plans to the National Learning Network Programme Board. The board gave approval for the plans to be progressed further.

Both of these implementation plans include recommendations for connectivity to SuperJANET.

Schools

By end December 2002, 26% of schools in England were connected to broadband at 2 mbps or faster with 87% of Secondary schools and 16% of Primary schools now having broadband Internet connections.

In November 2002 the PM announced that all schools will have broadband access by 2006.

We are forecasting that 40% of schools will have broadband by end August 2003 doubling broadband availability from August 2002.

The individual Regional Broadband Consortia (RBCs) have implemented and are developing 10 regional networks. The RBCs were tasked with ensuring interconnectivity of these networks by March 2003. Contracts have been placed with UKERNA (UKERNA are the body who administer the SuperJANET network) to meet this deadline and provide interconnection through SuperJANET and the first RBC is already connected. This will create for the first time a truly national education network.

Every LEA has received funding for broadband as part of its NGfL Standards Fund grant allocation, which in 2001-02 was £42million and in 2002-2003 is £70m**.** A further £268m will be made available in 2004-2006. The grant is allocated on a matched funding basis i.e. each LEA is expected to provide 50%.

To increase the sustainability, coverage and speed of this roll-out DfES is content for LEAs to pool this funding with other funding sources (as long as this does not have a detrimental effect on the service received by schools). This aggregation of demand is happening at several levels - in some areas LEAs have worked together with Local Authorities in developing a corporate approach to networking, some LEAs have managed to negotiate more attractive pricing through aggregating demand at a Regional level through the Regional Broadband Consortia (RBCs).

There are 10 RBCs: Cumbria and Lancashire Online, East of England Broadband Network, East Midlands Broadband Consortium, Northern Grid for Learning, North West Learning Grid, South East Grid for Learning, South West Grid for Learning, Yorkshire and Humberside Regional Broadband Consortia, London Grid for Learning, West Midlands Grid for Learning.

JANET

SuperJANET offers a high capacity (10Gb/s) national backbone in addition to which there are eighteen Metropolitan Area Networks (MANs) connecting to the national backbone. The MANs are managed by regional bodies, which are established as legal entities in their own right.

JANET is an example of successful aggregation in that it is a model that reflects objectives, motives and culture shared across the higher and further education sectors. The network seeks to meet the particular needs of both sectors by, for example, providing leading-edge technology and supporting a large volume of international traffic. Meanwhile aggregating demand across the sectors has maximised the scale and value of the requirement to help ensure value for money from a competitive supply market.

More recently, there have been examples of closer working ties with other parts of the education sector and with libraries where there is a "natural affinity". However, their experience suggests that more broadly based collaboration is not straightforward. As an illustration, Further Education institutions may wish to establish links with Small and Medium Enterprises (SMEs) for learning purposes. However, the desire of SMEs to use network links for other, commercial purposes creates conflicts with the educational purposes behind the publicly funded network.

UK online centres

UK online centres have to conform to the guidelines for Internet access as laid out in the UK online prospectus but this did not include any specific requirements for broadband.

3000 of the 6000 UK online centres are in libraries and broadband was planned for 90% of these by end 2002. To date, 85% are now broadband connected with the majority of the remainder ASDL connected.

The People's Network

The People's Network is a major Government-led initiative to bring Internet access and online services to the whole UK population. By installing PCs and broadband connections throughout the public library network, ordinary people – young or old and from every kind of background – are being given the opportunity to participate actively in the information society.

The People's Network is lottery funded by the New Opportunities Fund. It is new, additional investment to that provided by local authorities and represents the largest ever investment in the 150 years of the public library service.

It is estimated that by the end of December 2002, 68.5 million hours of Internet access per annum will be available through the People's Network. In most cases the access is free, and all library staff have either embarked upon or completed a training programme to ensure that help and support is available to users.

Ufi

Ufi are strongly committed to broadband and already have connections from the learndirect servers to the BT Openworld broadband network. They are also seeking negotiations with other broadband providers, including cable and satellite, to provide a comprehensive range of learndirect broadband routes able to reach all regions of the country. Broadband will allow Ufi to produce more ambitious learndirect learning materials, which would be available through a wider range of media.

Wired up Communities

Four of the Wired up Community projects are providing access to broadband in some people's homes - all charging at slightly below market rate.

Home/business broadband take up

According to Oftel figures released in early 2003, take-up of broadband in the UK is growing substantially – the number of broadband end users has more than tripled since the end of 2001. At the end of 2002 there were around 590,000 ADSL end-users (around 580,000 based on BT networks and 10,000 on Kingston Communications) and there were over 769,000 cable modem end-users. In addition there were around 2500 broadband fixed wireless end-users and an estimated 400-plus homes and businesses with satellite access.

As at the end of December 2002: Around 10% of homes with Internet access used an ADSL or cable modem broadband connection, according to recent subscriber figures.
13% of SMEs with Internet access were using a DSL or cable modem connection.

UK residential broadband prices compare well with elsewhere, similar to the US and Germany, cheaper than in France and only in Sweden are prices lower than in the UK.

Despite the massive growth in digital TV access, Internet access through the TV is still not widely used at the moment. However, a number of early pioneering projects are addressing this issue using broadband TV. Although these initiatives are still small-scale and have yet to develop sustainable and replicable models, they are showing that they can involve and engage local people in a way that is likely to create new learning opportunities through broadband TV.

Broadband content

Curriculum Online for schools was launched in January 2003 and the Secretary of State for Education announced an extra £280m for e-learning credits (giving a total of £100m each year for the next three years). The Secretary of State for Education also announced funding for a similar initiative (£92m over 3 years) for the Further Education and lifelong learning sector – this is in addition to the ongoing investment in National Learning Network Materials.

Culture Online's aim is to deliver the riches and know-how of our museums and galleries, libraries and archives, theatre companies and orchestras, into classrooms and living rooms across the country to enrich opportunities for learning for all people of all ages. The primary goal would be to support and enrich the national curriculum with materials that could be used by teachers and children in the classroom and at home.

There are currently 906 learndirect courses on offer in IT skills; business skills; the basics of reading, writing and numbers; retail and distribution; environmental services; automotive components; and multimedia. More than 85 per cent of these courses are online and delivered through the learndirect website at www.learndirect.co.uk. The courses offer a total of 13,885 indicative learner hours.

Research activity

The DfES is actively commissioning research into broadband and education.

- An independent team of researchers has been commissioned to deliver a report into the preparedness of schools to adopt and make effective use of broadband in the teaching and learning process. This will supplement existing research into the institutional deployment of broadband in the lifelong learning and HE sectors. The report is due at the end of March 2003.

- Later this year a significant piece of research will be commissioned into the educational effectiveness of broadband. The specification for this research is currently being designed in partnership with BECTa.

- The College Online (working title only) scoping exercise will identify the broadband levels needed to deliver and support this major expansion (£92m over 3 years) in content provision and use in the lifelong learning sector.