

# **t-learning Study**

**A study into TV-based interactive learning  
to the home**

## **Final Report**

### **Main Report**

Prepared by

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This study is being conducted by pjb Associates, UK with funding from  
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Note: This report does not represent the opinion of the European Community and the  
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**APPENDIX O**

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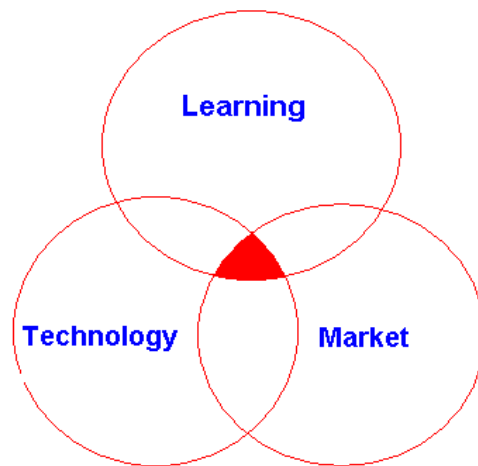
# 1 Introduction

## 1.1 Purpose

The purpose of this Final Report of the t-learning Study is to provide a “state of art” report of the issues concerning the development of TV-based interactive learning in the home. It tackles the issues from three perspectives: -

- Learning in the home
- Technology solutions as enablers
- Market developments

All three of these interlinked components are important as a means of developing a wide range of sustainable and replicable learning services in the home.



**Fig. 1.1 Inter-relationship of the three components**

Large-scale technology enhanced learning in the home will be dependent on the market developing consumer devices that are affordable and are easy to use. Understanding is required, of the type of learning resources and the way people learn in the home, in order for appropriate services to be developed. Services are also dependent on the availability of the technology solutions that facilitate such developments.

This report aims to raise awareness and provide a point of reference for the range of existing developments and future possibilities for TV-based learning - t-learning.

This final report aims to assist and make recommendations for European policy and decision makers in education and training, broadcasters, service providers and other key players as to likely and possible ways forward for the development and utilisation of interactive digital TV solutions for increasing learning opportunities in the home.

## **1.2 Background**

There is increasing recognition that e-learning through an Internet-enabled computer will not solve all the problems of increasing learning opportunities in the home. Although it varies across Europe, the penetration of Internet-enabled computers into the home is beginning to level off at around 40 to 60%. However, the penetration of televisions in European homes is already around 98%.

So the reasoning goes - TV is widely available across Europe. As digital TV develops it could offer various forms of interactivity. Interactivity is considered an important aspect of the process of learning – so TV could create new ways of increasing interactive learning opportunities in the home.

The eEurope 2005 Action Plan<sup>1</sup> states that it: -

“.....puts users at the centre. It will improve participation, open up opportunities for everyone and enhance skills. eEurope contains measures regarding e-inclusion in all action lines. One important tool to achieve this is to ensure multi-platform provision of services. It is generally accepted that not everyone will want to have a PC. Making sure that services, especially online public services, are available over different terminals such as TV sets or mobile phones is crucial to ensuring the inclusion of all citizens.”

One of the key services of the eEurope 2005 Action Plan is e-learning. The use of digital TV for e-learning is not explicitly mentioned, but it does have a role and this study is aimed to help gain a better understanding of how and in what contexts interactive digital TV technologies may contribute to e-learning developments.

However, it is noted that the eEurope 2005 Action Plan states that most developments will be primarily left to develop by the market. This study also considers how the market is developing for interactive digital TV. It explores the implications of such developments and whether there is a need for any form of intervention in order to ensure that interactive digital TV technologies provide solutions to gaps left by the market.

Despite the potential opportunities for increasing learning opportunities, in reality there are a number of complex issues surrounding the development of interactive digital TV that make it very difficult to know in what way this vision can become a reality. Those in education and training do not control the development of the infrastructure and the distribution services. For various reasons the roll out of services capable of bringing new learning opportunities to the home is turning out to be a slow process. The “digital TV landscape” is still rather “misty” making it fairly difficult to decide which way to go. This study

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<sup>1</sup> “eEurope 2005: An information society for all - An Action Plan to be presented in view of the Sevilla European Council”, 21/22 June 2002 Available on web at [http://europa.eu.int/information\\_society/eeurope/news\\_library/documents/eeurope2005/eeurope2005\\_en.pdf](http://europa.eu.int/information_society/eeurope/news_library/documents/eeurope2005/eeurope2005_en.pdf)

tries to clear some of the mist to help identify a way forward but there are likely to be wide variations in speed of development across Europe as well as other parts of the world.

### **1.3 Role of interactive digital TV within an e-learning strategy**

There are a number of very good reasons why it is important to consider the role that interactive digital TV has within a broader e-learning strategy: -

- Most people have access to a television in their home.
- Not every household will have an Internet-enabled computer.
- The TV is an easy to use device.
- People tend to trust the content that is on the TV.
- The TV has the potential for reaching more people and offering learning opportunities than traditional learning institutions can do.

### **1.4 Key Issues to Address**

When looking at the role of interactive digital TV there are some of the key issues that need to be addressed: -

- How to turn a passive viewer into an active learner?
- How can learning opportunities be made more accessible in the home as and when required?
- How to bridge the gap between “edutainment” and “engaged learning”?
- How can learning support systems (human and electronic) that help to enable engaged learning be integrated within a TV-based learning environment?
- What types of interactivity are needed to enhance the learning experience through interactive digital TV?

### **1.5 Timescales**

For the purposes of this study timescales have been divided accordingly: -

- Short Term – over the next two years (2003-04)
- Medium Term – three to five years (2005-07)
- Longer Term – six to ten years (2008-2012)

### **1.6 What is t-learning?**

The term “t-learning” has been adopted as shorthand to mean TV-based interactive learning. t-learning is about having interactive access to video-rich learning materials primarily within the home, through a TV or a device more like a TV than a personal computer. Like the TV, the device would have to be a so-called “consumer” device – which is easy to use and as reliable as a television, a microwave or a refrigerator.

Although the phrase “e-learning” currently tends to be used to mean learning via the Internet using a personal computer, it could be used to mean any form of learning using an electronic digital connected device. Thus t-learning is really a subset of e-learning – with access through a home-based TV or similar device but could significantly enhance the learning experience in a way that Internet-based e-learning cannot currently do.

Of course, t-learning need not take place in the home, but if it is accessible in the home, it could equally be accessible from another fixed location like the school or workplace or a community-learning centre.

M-learning or mobile learning would be another subset of e-learning but accessible through a mobile or wireless device. As t-learning and m-learning develops with new technology solutions, overlaps will increasingly occur.

The development of e-learning has been dependent on computer hardware/software and internet service providers making products standardised and cheap enough for people to buy. Delivery of content is now generally easy but not always very reliable – requiring a reasonable technical knowledge to operate the computer. In a somewhat different way, t-learning is very much dependent on the development of highly reliable, easy to use consumer devices but using proprietary or standards compliant hardware, software and networking infrastructures.

However, t-learning is primarily used as a phrase by analysts to capture the state of the development of the market over a period of time. It is highly unlikely that people will say “I’m doing t-learning” or “I must go t-learning”. However, it is a convenient phrase to use as the market develops.

## **2. Current state of the art**

### **2.1 Introduction**

This chapter describes some examples of how interactive digital TV is currently being used for what could be loosely called learning purposes. Although digital TV as a whole has been developing fairly rapidly across Europe and other parts of the world, the various types of interactive services have tended to develop more slowly. Therefore, only a very limited number of examples are currently available and most examples are best described as “edutainment” (entertaining and educational).

Control over these developments is still primarily in the hands of broadcasters and service providers – who have tended to see their role as informing, entertaining and educating people rather than offering more structured and engaged learning. However, within certain learning contexts these “edutainment” services are generally educationally sound and certainly create interest in using a TV as an active learning medium compared to a passive learning medium – but they are only the very first stages of such developments.

As there are now more than 40% of UK households having access to digital TV, it is not surprising that many pioneering developments with interactive TV have appeared in this country. However, like other pioneering developments, some interactive services have come and gone including some services that were more likely to be much more popular than learning services.

The full potential of interactive digital TV as an active and engaged learning medium has yet to be fully realised. These early examples should not be seen as the best that can be done with interactive digital TV. They just demonstrate the current state of developments. However, a few interesting examples are starting to emerge in a more personalised mode at the leisure learning end of the market, Chapter 5 on Future Scenarios will start to explore what might become possible in the near future.

More examples and further details of these examples including screen shots of each of these case studies can be found at <http://www.pjb.co.uk/t-learning/casestudies.htm>



## 2.2 Some Examples

### **Developing pre-school learning skills – UK**

In the UK the BBC's CBeebies digital channel is aimed at pre-school children and has been designed to develop pre-school learning skills. Pressing the red button on the remote control whilst watching CBeebies takes the viewer to the interactive area, if the interactive icon is displayed on the screen.

The viewer is then able to have access to two games and an interactive story. Sometimes they relate to the programmes being broadcast. One activity is based on popular children's programme, "Bob the Builder", which are aimed at colour recognition and matching colours. Another "hide and seek" activity based around "Bill and Ben" involves the recognition of characters and remembering under which flowerpot they are hidden. A child would use one of the colour-coded buttons on the remote control to select a flowerpot.

Although very simple activities, they can be very engaging for 3-5 year olds and develop important pre-school learning skills.

The same service can also be accessed through the BBCi interactive menu that the BBC provides.

### **Developing early years skills – UK**

On the UK NTL cable Knowledge play there was a interactive TV site there a "Little Monster" series with a character called Sidney consisting of stories and activity game – one of which is the ability to match the appropriate clothes that Sidney wears according to the story line. Using the arrow keys on the remote control the child can select which clothes Sidney should wear. Just like reading a picture book a parent may read out the story whilst the child views the picture stills. At various stages the interactive activities appear for the child to use before the story continues.

### **As a revision tool – UK**

In the UK NTL's digital TV cable service has "NTL: Knowledge" as part of its interactive services. This includes a section from the BBC called BBC Learning with various question and answer activities and revision notes covering different aspects of the English, Maths and Science as required by the National Curriculum. The young person can use the arrow keys on the remote control to select the correct answer to a question.

The same type of information is also available of the BBC's web site. But on a TV it could be used as an individual activity or more likely as a group activity with parents or a group of students revising together.

### **Broadcasting interactive "edutainment" – UK**

When the BBC production "Walking With Beasts" series was broadcast on the UK Sky Digital satellite service, it offered an array of interactive elements, from alternative commentaries and extra video footage to textual information, all using the coloured coded buttons on the remote control. These were available for up to a week after the programme was broadcast live. Alternative solutions are now being experimented with to enable the enhanced TV interactive components to be available in an on-demand situation.

"Walking with Beasts" was a major TV production and it is unlikely that many productions will be produced like this, with all the interactive elements, unless they are aimed at a global market.

### **Interactive Language Learning – Italy**

Stream, an Italian commercial satellite TV service provider has a language learning channel - TVL (TeleVision Language) - that offers various programmes aimed at helping Italians learn English and other languages. In addition there is a separate interactive learning channel - TVL Interactive - that provides learning reinforcement. This consists of text and graphics but with no video or sound. The channel contains a number of modules consisting of various topics each containing questions of different levels of difficulty. Using the remote control a home user can select a module from the menu. The level of difficulty can be chosen and the questions can be answered all using the remote control. The home user is told via the screen whether the answers are correct or not and explanations are also given. The total results are presented on a scorecard. In total there are 200 different exercises available and documentation is also provided in the Stream interactive TV magazine.

### **Accessing an Educational Encyclopaedia – UK**

Within the NTL digital cable franchise area in the UK viewers have been able to access a reference section within the interactive services of NTL Knowledge. The reference section included the Hutchinson Educational Encyclopaedia with a search facility and the Oxford English Reference Dictionary – with an instant word search of 192,000 dictionary definitions.

### **Virtual Magazines – France & Latin America**

In France, on Canal Satellite the French publisher Lagardere has produced a number of interactive video "virtual magazines" like "Elle Cuisine", "Parents" and car reviews in "Auto Moto". Although these are not strictly aimed at being educational they are aimed at being informative and to engage the viewer and encourage the viewer to become active and find out more. They are also examples of how a publisher has taken a commercial opportunity in re-purposing content from printed press or online services onto digital television. In addition the Latin American market Lagardere's services are very similar to those in the French market, although bilingual iTV services are provided both in Spanish and Portuguese. All services are accessed via a portal on the DirecTV satellite

### **Video on demand leisure learning magazines – USA**

New York distributor called Mag Rack that has produced video magazine programmes just like paper magazines each built around a hobby, interest or lifestyle. Subscribers have access to various leisure activity videos on demand that do have some sort of learning component to them. The service is currently available through the cable company – Cablevision in New York and New Jersey. Some examples of video magazines include "The Art of Basketry", "Better Golf" "Cook with the Pros" the "History of Art", "Inside Weddings" and "Let's Go Gardening".



### 3. Interactive TV Developments and Trends

#### 3.1 Introduction

The previous chapter described some examples of what is becoming possible with digital TV. This chapter aims to describe in more detail how the interactive digital TV technologies make this possible. It is also looking at trends and developments as new technology solutions are starting to create new possibilities for t-learning. The implications of this are also discussed.

#### 3.2 What is Digital TV?

Up till about 4-5 years ago most TV signals were broadcast in an analogue format. However, nowadays a large number of TV channels are broadcast in a digital format via satellite, cable and terrestrial (over-the-air). As most TV sets can only receive analogue signals a “set-top box” is required to receive the digital signal using a digital tuner and then convert the signal to an analogue format for viewing on the existing TV. The set-top box is connected between the TV and the source of the signal. Although there are some integrated digital TV sets being used - incorporating the digital tuner and some other features of the set-top box – most households that have digital TV tend to have a separate set-top box. The set-top box is more like a consumer device than a computer and tends to be more reliable although its functionality is more limited.

Digital TV can roughly be divided into two types: -

- Broadcast or Scheduled TV
- Personalised TV

In the short term everyone that has a TV will continue to be receiving broadcast or scheduled TV with a tiny percentage receiving personalised TV. However, increasingly over time personalised TV services will start to become available and eventually most people will receive a hybrid of both types of services in the medium to longer term. In the longer-term it is likely that the majority of people will use their TV most of the time for personalised on-demand services occasionally receiving live broadcasts for major events.

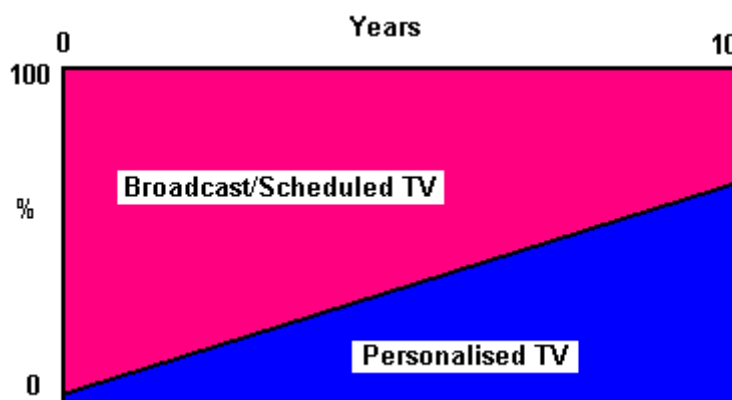


Fig 3.1 Likely Digital TV Trends over the next 10 years

### **3.3 What is interactive TV?**

Interactive television (iTV) is a two-way interactive service provided through television, enabling audiences greater choice, control, and customisation over their viewing experience. Through new digital technologies, interactive television services such as video-on-demand, enhanced television, interactive program guides, and email are just some examples of the next generation of digital programming over cable, satellite and terrestrial broadcast television<sup>2</sup>.

It is the set-top box that tends to be at the core of controlling the various forms of interactivity. Signals are sent from a remote control device or sometimes a remote keyboard to the set-top box where they are processed in various ways. Sometimes, interactivity is only between content held in the set-top box or pulled down from the broadcast stream. If the set-top box is connected using a return channel like an existing telephone line, information can be sent to a central control that could send content back by via the telephone line or via the broadcast stream.

This should not be confused with ITV or instructional TV (ITV) that has often been used to mean a vehicle for learning by linking remote classrooms particularly in the USA - through what is more commonly known as video-conferencing in a European context. Both of these modes are generally outside the scope of this study, although there is one context in which video-conferencing to the home will be described as it could enhance learning opportunities in the home.

### **3.4 Interactivity through digital TV**

Interactivity through digital TV can take place in a number of ways. What follows is an attempt to try to categorise the different forms of interactivity in order to better understand how they work. However, in reality broadcasters or service providers often use a combination of the different types within one interactive service. Lessons are also still being learnt as to how best to make these interactive services accessible to viewers.

#### **3.4.1 Navigation**

Because of the large number of channels available through interactive TV, an electronic programme guide is essential for the viewer to find and select programmes. The service provider is responsible for this guide, which tends to be organised according to different genre. Selecting programmes through an on-screen electronic programme guide is the most commonly used form of interactivity using a remote control.

#### **3.4.2 Enhanced TV**

A number of options are available for enhancing the viewing experience through the use of interactivity of existing TV programmes. Selecting options from a menu to get to additional information can be achieved by pressing one of the four coloured buttons on the remote control. This has been possible when watching the football World Cup in a number of countries that were offering interactive services. Whilst watching a football match, for example, it

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<sup>2</sup> Based on a definition supplied on PBS website at <http://pbskids.org/cyberchase/itv.html>

was possible to select a different angle, see a repeat of the last goal and get additional information about each team and the players. All these are enhancing the existing viewing experience.

In a slightly more educational context the BBC “Walking with Beasts” series<sup>3</sup>, described in Chapter 2, offered an array of interactive elements. These range from alternative commentaries and extra video footage to textual information, by selecting the coloured coded keys on the remote control. The video components are in fact separate video channels that are broadcast at the same time as the main channel. The text and graphics based content are accessed in a similar way to the channel independent interactive services described below but with a link from its associated TV programme.

### **3.4.3 Channel independent interactive services**

Interactive services are also available independent of TV video channels. These services tend to be accessible via the interactive services button on the remote control or an infrared keyboard when the interactive services icon is displayed on the screen. The interactive services on the BBC’s CBeebies<sup>4</sup> described in Chapter 2 are accessed this way. The child is taken to the interactive area with various activities to interact based on a popular children’s programme like “Bob the Builder” or “Bill and Ben”. The arrow keys or the four colour coded buttons on the remote control are used to select items and navigate around the screen. A similar method is also used for accessing the virtual magazines published by Lagardere on Canal Satellite in France and via DirectTV in Latin America as well as the interactive language learning service on Stream in Italy.

The method used is really an advanced form of the method used to access teletext. Upon selecting a particular option, a module is downloaded into the very limited memory of the set-top box. This usually takes a few seconds, as the viewer has to wait until that particular option becomes available from the broadcast carousel.

### **3.4.4 Interacting through the return channel**

Another way of interacting is through the return channel. In the case of satellite and terrestrial this is through a telephone connection to the set-top box. For digital cable this is through the cable network.

Accessing the Hutchinson Educational Encyclopaedia with a search facility and the Oxford English Reference Dictionary – with an instant word search of 192,000 dictionary definitions are examples of such a services that were available on the UK’s NTL digital cable service.

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<sup>3</sup> “Interacting with beasts” BBC News 15 November 2001at

[http://news.bbc.co.uk/1/hi/english/entertainment/tv\\_and\\_radio/newsid\\_1658000/1658575.stm](http://news.bbc.co.uk/1/hi/english/entertainment/tv_and_radio/newsid_1658000/1658575.stm)

<sup>4</sup> See BBC press Releases “Kids Get Stuck in to CBBC - CBBC launches digital services and announces a series of new commissions and initiatives” at

[http://www.bbc.co.uk/print/pressoffice/pressreleases/stories/2002/02\\_february/11/cbbcdigital\\_more.shtml](http://www.bbc.co.uk/print/pressoffice/pressreleases/stories/2002/02_february/11/cbbcdigital_more.shtml) and “CBBC Goes Digital” at

[http://www.bbc.co.uk/print/pressoffice/pressreleases/stories/2002/02\\_february/11/cbbcdigital.shtml](http://www.bbc.co.uk/print/pressoffice/pressreleases/stories/2002/02_february/11/cbbcdigital.shtml)

Utilising the return channel enables viewers to respond to questions through yes or no or multiple choice questions and also enables viewers to vote. One recent example was during a programme about Jack the Ripper broadcast on the Discovery Channel (UK) channel on Sky Digital. Celebrities made trial-style arguments as to who they believed was the real “Jack the Ripper”. Following the first programme, viewers were given the opportunity to vote with their remote controls. The information was sent back via the telephone line connected to the set-top box. After the results were calculated, a panel of viewers had the opportunity to ask further questions interactively before the final “decision” on the infamous serial killer’s true identity was made in the second program.

This same method can provide access to TV Internet – a more limited version of the Internet that has been modified for easier viewing on the TV. It is also possible to send emails usually without the ability to attach documents. An infrared keyboard can be used to type in messages instead of the remote control.

### **3.4.5 Interactivity on “Big Brother”**

The phenomena of the reality TV series “Big Brother” has swept around the world. For many people this has not just become an engaging viewing experience but also one in which they are able to participate by voting who should be the next person to leave the house. The most recent UK series has also probably been the most successful example of the utilisation of the various interactive services on British TV and other platforms like the web and sending SMS messages on mobile phones.

Pressing the red button gave the viewer access to four different streams of video showing the participants in different parts of the house, voting on TV, current news details and eight different text stories as well as details of the website. It was updated a number of times a day and could also be accessed during other programmes<sup>5</sup>.

It appears that 1.4 million people voted through interactive TV during the series<sup>6</sup>. Certainly this provided compelling and engaged viewing. However, the question is whether this could ever be scalable in a learning context – considering the cost – despite generating what is understood to be around 8.52 million euro from the approx. 0.40 euro a vote charged through telephone, text messaging as well as through interactive TV. However, it does show that people are prepared to interact and are prepared to make micro payments for doing so. Some lessons could be gained from this experience when developing a business or sustainable model for interactive learning services.

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<sup>5</sup> Acknowledgements to Terry Marsh, Strategy in digital media for supplying this information.

<sup>6</sup> Broadbandbananas discussion Group email 29 July 2002  
<http://www.broadbandbananas.com/>

### **3.5 Web on the TV**

There have been a few projects that have explored the potential of accessing learning materials from the web by viewing them on a TV, but with very limited success.

Some service providers offer this capability through their set-top box if connected to a telephone line or digital cable. In addition, there are some dedicated web via TV set-top boxes that connect to a TV and to a normal telephone line. Both methods have the same type of limitations.

Relatively simple web sites with limited text per screen and without elaborate graphics and animations can be viewed quite adequately on a TV. However, existing low cost set-top boxes generally can't cope with web sites that require additional software to be downloaded before they can be viewed properly. This includes viewing streaming video.

Unfortunately, current web via TV devices do not appear to really offer a solution for more engaged learning. One recent UK-based project "Learning with 'alternative' internet ready devices,"<sup>7</sup> found that students were generally disappointed with accessing the Web through a TV as it was slow to use, if they had experience of using a computer to access the Internet. The project concluded that low specification laptop computers seemed to be better alternative solution.

Another project "Viewers to Learners"<sup>8</sup> found that they were unable to easily access the UK LearnDirect<sup>9</sup> web site just to get information as the web site was too sophisticated when viewed through a TV using a low cost set-top box. The box was unable to convert certain graphics into a format that could be viewed on a TV set.

However, there do appear to be signs that recent hardware/software solutions are starting to overcome these earlier problems associated with TV browsers on legacy set-top boxes. So, there is a need to continue to watch developments in this area.

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<sup>7</sup> "Learning with 'alternative' internet ready devices" An 'Innovative ICT Project - Phase II' by Cornwall College funded by the LSDA

[http://www.learningtechnologies.ac.uk/projects/proj2001/reports/cornwall\\_final.pdf](http://www.learningtechnologies.ac.uk/projects/proj2001/reports/cornwall_final.pdf)

<sup>8</sup> "Viewers to Learners" An 'Innovative ICT Project Coleg Menai interim Report March 2001 funded by the Learning and Skills Development Agency

[http://www.learningtechnologies.ac.uk/projects/proj2001wales/reports/intreport\\_cmenai.pdf](http://www.learningtechnologies.ac.uk/projects/proj2001wales/reports/intreport_cmenai.pdf)

<sup>9</sup> LearnDirect is a national one-stop-shop for accessing some online learning opportunities  
Web site <http://www.learndirect.co.uk/>



### **3.6 Personalised TV**

New developments around what could be called personalised TV are starting to emerge, which potentially could offer new ways of enabling high quality interactive engaging learning materials. However, only a few services are currently available across the world. They take the form of: -

- Video or Content-on-demand services from remote servers
- Home storage using personal digital video recorders

Both methods have similar functions to that of a videocassette recorder - stop, start, pause, rewind and fast forward. In some instances it is even possible to stop a live broadcast and start it again at the point the viewer has left off. Programmes can be searched for using menus and in some instances using keyword searching. Sometimes it is even possible for the service/device to learn viewer's preferences and automatically select programmes matching the viewer's interest. It is also likely to be possible very soon to access and interact with multiple-media content in a similar way to interacting with an educational CD-ROM.

Since the beginning of 2003 a hybrid version of these two solutions is beginning to emerge. It is perhaps best described as: -

- Pushing content to local storage and Pulling content from remote servers

#### **3.6.1 Content-on-demand type services from remote servers**

They tend to be more commonly known as "video-on-demand" services, but it is more than just films that can be requested. The critical feature of such services is that they are really "on-demand" and totally independent of time. They are not the same as near video-on-demand services currently on offer via cable or satellite. The content is stored remotely from the home and accessed through an appropriate infrastructure.

These services are sometimes known as "Broadband TV" and could be provided via a digital cable network or through some sort of DSL technology<sup>10</sup>, which involves adapting an existing normal telephone line.

There could be possibly three stages of development. The first stage would be just accessing educational content via a linear video that has been

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<sup>10</sup> DSL - Digital Subscriber Line - is really the family name for a group of related technologies that are used to convert existing telephone lines to enable them to carry data at higher speeds than was possible before conversion. The most commonly used of this family of technologies is ADSL - Asymmetric Digital Subscriber Line – that is used to deliver Broadband. If enabled in this way ADSL provides download speeds of up to 8Mbit/s and upload speeds of up to 1Mbit/s per second – which is ideal for broadband TV services. However, lower speeds are tending to be activated by telecom companies as their current focus is mainly on providing 512k/s per second broadband Internet connections. Distance from the telephone exchange and the quality of the existing telephone lines is also another factor limiting higher speed role out.

demanded by the viewer. A second stage could be the ability to search for video-clips of learning content. A third stage of development could be full interactivity.

The Mag Rack video magazine programmes accessible on Cablevision in New York and New Jersey, USA is an example of this first stage of development. There are also currently two small-scale services in two areas of England. Video-Networks<sup>11</sup> branded as “HomeChoice” operates in London inside an area bounded by the M25 with about 12,000 subscribers and Kingston Interactive TV<sup>12</sup> based in the Hull area has around 8,300 subscribers.

During 2002 it has been observed that these services are now starting to take off more rapidly in North America than in Europe. This appears to be partially due to increased competition between the satellite and the cable service providers who are converting their cable networks from analogue to digital. In addition the telecom companies, particularly the local ones, are also converting existing telephone lines into broadband - utilising DSL technologies. They are also looking for increased revenue streams.

### **3.6.2 Home storage using personal digital video recorders**

Another way for the development of personalised services is through the use of personal digital video recorders (PVRs or DVRs). These are now commercially available in the UK through the Sky +<sup>13</sup> service on satellite TV with 65,000 subscribers as of end of 2002<sup>14</sup> and also the TiVo<sup>15</sup> box that can also be used in conjunction with digital cable and digital terrestrial as well as digital satellite TV.

Television par Satellite (TPS) in France launched a combined PVR and set-top box during the summer of 2002 and its rival Canal Plus plan to offer a box by the end of 2002<sup>16</sup>. InOutTV<sup>17</sup> based in Barcelona, Spain also has plans to offer a Spanish service in April 2003. Other manufacturers and service providers are likely to launch PVR devices and related services in other parts of Europe during 2003.

In the USA there are three companies offering PVR services TiVo<sup>18</sup>, Ultimate TV<sup>19</sup> and ReplayTV<sup>20</sup> and one, Echostar<sup>21</sup> is offering the service combined

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<sup>11</sup> Web site of Video Networks <http://www.videonetworks.com/>

<sup>12</sup> Web site of Kingston Interactive Television <http://www.kitv.co.uk/pc/index.html>

<sup>13</sup> Skt + product details <http://www.sky.com/skycom/article/0,,70043-1046808,00.html>

<sup>14</sup> “British Sky Broadcasting Group Plc Results for the six months ended 31 December 2002”

14 February 2003 [http://media.corporate-ir.net/media\\_files/lse/bsy.uk/interim.pdf](http://media.corporate-ir.net/media_files/lse/bsy.uk/interim.pdf)

<sup>15</sup> TiVo UK web site [http://www.tivo.co.uk/home\\_flash.asp](http://www.tivo.co.uk/home_flash.asp)

<sup>16</sup> “TPS beats Canal Plus to market with PVR” article in New Media Markets 10 May 2002

<sup>17</sup> Website of InOutTV - [http://www.inout.tv/home/web/web\\_ingl/index.php](http://www.inout.tv/home/web/web_ingl/index.php)

<sup>18</sup> TiVo Web site <http://www.tivo.com>

<sup>19</sup> UltimateTV web site <http://www.ultimatetv.com/>

<sup>20</sup> ReplyTV web site <http://www.replaytv.com/>

<sup>21</sup> “DISH Network to Introduce New, Improved Personal Video Recorder: DishPVR 508 Satellite TV Receiver” Press Release 9 January 2002 [http://www.corporate-ir.net/ireye/ir\\_site.zhtml?ticker=dish&script=410&layout=-6&item\\_id=244542](http://www.corporate-ir.net/ireye/ir_site.zhtml?ticker=dish&script=410&layout=-6&item_id=244542)

with its satellite offering. An interesting feature with the latest version of the ReplayTV PVR is the ability to send video recording to another user of a ReplayTV PVR via broadband Internet<sup>22</sup>. It was predicted that by the end of 2002 1.5% of US households would have a PVR but by 2008 this would have increased to 25%<sup>23</sup>.

A PVR is basically a hard-disk with a lot of storage capacity for recording digital TV programmes that can be accessed through a menu with the ability to stop, start, pause fast-forward and rewind at will. Depending on the software in the box there are various ways in which programmes can be recorded and selected for recording. However, this all depends on an electronic programme guide that is either updated in real time via the broadcast channel as in the case of Sky + or is downloaded into the box via a telephone line overnight in the case of TiVo. This electronic programme guide not only contains information about each programme on the various digital channels but it contains additional information about the programme in the form of meta-data. This makes it possible to programme these devices to select a particular genre for recording or in some devices carry out keyword searches on forthcoming programmes. The Sky + PVR combines a digital set-top box receiver with a digital video recorder having a hard-disk capacity of 40 GB (up to 40 hours of programmes) or more.

Later versions of PVRs this year are likely to have more than 80GB hard-disks and be capable of holding video-rich interactive multimedia learning materials that has been broadcast to millions of PVRs or narrowcast to selected PVRs. Within five years 1000GB hard-drives are likely to be available and could be used for interacting with educational content just like CD-ROMs.

It is also very likely that PVRs will contain DVD players and also have the capability of read onto DVD as soon as this technology starts to become fully standardised and various encryption techniques are fully developed to stop people recording and distributing the Hollywood type “blockbuster movies”.

### **3.6.3 Pushing content to local storage and Pulling content from remote servers**

Initially, the various digital TV related solutions emerged independently, but over time some solutions are starting to combine. This “push and pull” method is probably the first of combined solutions to emerge. It utilises the concepts of “in band” and “out of band” - where content needs to be distributed to large numbers of people, it is sent “within the bandwidth” that is the most appropriate to broadcast like satellite or digital terrestrial. However, when content is only required by a few people, it is sent “out of band” via a broadband connection – like DSL, digital cable, a broadband fixed wireless or a two-way broadband satellite connection. This means that the bandwidth available is utilised in the best possible way. Monitoring both methods of

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<sup>22</sup> “SONICblue Unveils ReplayTV 4500 Series; Kicks Off ReplayTV Retail Push” Press Release 3 June 2002 <http://www.replaytv.com/company/press.asp?ID=555>

<sup>23</sup> “DVR Competitive Market Report” 2002 The Carmel Group  
[http://www.carmelgroup.com/publications/reports/dvr\\_report\\_request.cfm](http://www.carmelgroup.com/publications/reports/dvr_report_request.cfm)

distribution enables the provider to switch from “out of band” to “in band” when the demand warrants it.

A personal video recorder could be used in this way. It could store broadcasted programmes and also access more personalised content “out of band”. Two commercial solutions like this have already been announced for making content available for accessing via a TV. Both solutions started by delivering content on a computer.

In February 2003 Europe Online<sup>24</sup> has announced<sup>25</sup> that it will provide video-on-demand services for set-top boxes using the Fujitsu Siemens ACTIVY Media Center<sup>26</sup> PVR/set-top boxes equipped with Datacarga’s Visiongate software<sup>27</sup>. Europe Online claims to have 60,000 registered users for their broadband satellite service that delivers content to a computer. The computer has to be connected to a satellite receiver via a digital video broadcasting (DVB) PC card installed in the computer.

Although no launch date has been announced for the TV-based service yet, it will enable video-rich content to be ordered via a dial-up Internet connection and it will then be broadcast via satellite by a guaranteed time and stored on the PVR/set-top for use at a time convenient to the users. Currently, Europe Online’s main market is Germany.

The second announcement in March 2003 is that of T-Online who plan to launch their “T-online Vision service on TV”<sup>28</sup> probably in September 2003 also using a Fujitsu Siemens ACTIVY Media Center PVR/set-top box.

T-Online describe their forthcoming service as a platform to bring online services into the living room. The ACTIVY Media Center will provide users with a T-Online Internet portal that has been optimised for use with a TV set as the terminal device. This portal will offer the latest news and information from the fields of entertainment, sport, movies, music and games. email communications services will also be available. The digital video recorder that is integrated into the device makes it possible to record programs.

The ACTIVY Media Center can be programmed by remote control using the Electronic Program Guide (EPG). The time-shift function enables users to interrupt the transmission of a live program for a while - and then continue where they left off at any time. The ACTIVY Media Center also has a DVD drive that can handle a range of formats including DVD, audio CD, MP3 or Windows Media, and play them on the TV set or put them through a stereo or Dolby Surround system. In order to access T-Online Vision on TV, the

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<sup>24</sup> Europe Online Web Site <http://www.europeonline.com/en/index.shtml>

<sup>25</sup> Europe Online Press Release “Europe Online and Datacarga Sign Cooperation Agreement for Video on Demand Services on Set-Top Boxes” Luxembourg, 17 February 2003  
[http://www.europeonline.com/en/company/press\\_releases/datacarga.shtml](http://www.europeonline.com/en/company/press_releases/datacarga.shtml)

<sup>26</sup> Details of Fujitsu Siemens Advanced Set-top Boxes can be found at: - <http://www.fujitsu-siemens.com/rl/products/broadband/advancedsettopbox.html>

<sup>27</sup> Datacarga web site <http://www.datacarga.de> (in German)

<sup>28</sup> T-Online Pres Release “T-Online presents 'T-Online Vision on TV at the CeBIT” 12 March 2003 <http://ueber.t-online.de/uebe/pres/ar/CP/ar-030312e-iTV.html>

customer must purchase an ACTIVY Media Center and connect it to the TV set, the antenna cable and T-DSL - or through a different broadband provider.

Fujitsu Siemens will be selling their ACTIVY Media Center directly to customers through specialist retail outlets and depending on the model bought, it is likely to retail initially at around 800-1200 Euro. Obviously the cost will go down particularly when other competitors will start to offer a similar Media Center device. However, currently there is hardly any other competitor.

T-Online is one of the largest Internet service providers with about 12.2 million customers across Europe. As well as being marketed in Germany as T-Online, the group operates in France under the "Club Internet" brand, in Spain under the name "Ya.com" and in Portugal as "Terravista". It also uses the T-Online brand name in Austria and Switzerland.

### **3.6.4 Meta-tagging**

Increasingly important for all these methods of accessing personalised TV is the ability to "label" or meta-tag learning content so that it is more easily accessible. A number of solutions are starting to be commercially available. For example Edit.tv from Edit Technologies<sup>29</sup> in the UK did have plans to launch a service that they call "Event Driven Interactive Technology" which is claimed to be a very cost effective means of tagging content at the publisher end of the chain to enable the consumer (viewer) to easily search for video-clips. Keyword searching is already possible with a TiVo device.

A critical aspect of mega-tagging learning content is the need for developments to be in line with the emerging standards for digital learning objects. The emerging MPEG-7 standard also provides a comprehensive metadata specification<sup>30</sup>.

## **3.7 The emergence of the Home Media Centre in the "networked home".**

Two interrelated trends are starting to emerge. Firstly there is the convergence of devices between the personal computer and the TV. Watching videos on a computer is now just as possible as watching videos on a TV. Live TV broadcasts can be watched on TV and the same live broadcast can be "streamed" via the Internet to watch on a computer screen. Many homes have more than one analogue TV, so viewing TV programmes is possible in a number of different rooms. Wireless devices now make it possible to use a laptop computer anywhere in the home and still have online access to the Internet. Wireless solutions for the distribution of TV-based content are also beginning to emerge.

There tends to be a difference between the quality of video viewed on a computer screen compared to a TV screen, but within certain context this may be perfectly acceptable. However, although still relatively expensive, "flat screens" are starting to be utilised for both computer and TV usage. Up until

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<sup>29</sup> <http://www.edit.tv>

<sup>30</sup> See <http://mpeg.telecomitalia.com/> for more detail

recently the costs of these flat screens has been going down. Whether this trend will continue is now uncertain.

Additionally, the continuing reduction in the cost of digital storage has not only benefited the personal computer, it has also resulted in the emergence of digital video recorders, capable of holding 40-50 hours of video content. This trend towards convergence is now leading towards the wireless networking of all digital devices in the home and linking them up to a home storage device capable of holding 500-1000GB of content. Over the last twelve months this has become easier as “unregulated”<sup>31</sup> wireless solutions have emerged and the cost of storage continues to drop every few months.

At present a major barrier for broadcast digital TV is that most of the current generation of set-top boxes only have one digital TV tuner. This means that only one digital TV programme can be viewed at the same time. However, a combination of wireless networking solutions, home-based digital storage solutions and the remotely accessible video on demand solutions could offer an alternative solution, if putting multiple digital TV tuners into set-top boxes remains too expensive.

One further trend is likely to be the emergence of mobile handheld devices that could be connected wirelessly to other devices in the home, enabling the synchronisation and downloading of video-rich content for use on the move or in an “m-learning” context.

This is all leading towards the development of the “networked home” managed by the “home media centre” that controls all devices like all televisions, Hi Fi Systems, DVD, PVR and all computers with eventually links to mobile devices like personal digital assistants (PDAs), mobile phones, and MP3 players. There is likely to be variations on the “home media centre” depending on circumstances and location. Some devices will have vast amounts of storage locally. Other devices may be more like a “thin client” – where virtually all content including personal content is stored remotely – utilising a “fat” broadband pipe to provide instant access to content. There are also some signs that some manufacturers will adopt a modular interoperable approach to the production of these devices, enabling consumers to “add on” devices when they want or when their budget enables them to do so.

The “thin client” approach would also create opportunities for enabling “social inclusion” and thus reduce the digital divide. There are some interesting developments of this in the Carpenters Estate area of the London Borough of Newham. UK (See Appendix L, Carpenters Connect, Newham, London UK Initiative) and the Speke-Garston Area of Liverpool (See Appendix K, Speke-Garston, Liverpool, UK Initiative).

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<sup>31</sup> Unregulated, in this context, means that individuals do not need to register or licence the device with a regulatory body. However, in most instances these wireless solutions cannot be used for commercial purposes.

### **3.8 Broadband to the home**

Across the world the current trend for bringing broadband to the home has focussed on enabling computer users to have faster access to the Internet. However, it also creates new opportunities for accessing interactive content via a TV set. There is a lot of discussion as to how fast broadband is and as to what speeds are required in the home. Service network providers also tend to use the phrase “broadband” to describe a wide variety of speeds. Continuous advances in compression techniques are also making this difficult to predict.

However, broadband developments to the home can be roughly divided into three types: -

- Lower speed broadband (up to 1.5MB)
- Fast broadband (1.5 – 10MB)
- Very fast broadband (10MB – 54MB)

#### **3.8.1 Lower speed broadband**

Most of the focus of service network providers tends to be towards providing this type of broadband mainly to provide what is often described as “high speed access to the Internet” when compared to speeds available through a dial-up connection. Solutions of various speeds from 128KB to 1.5 MB usually through converting an existing telephone line to ADSL are available if the home is within around 5km to the local telephone exchange. However, distance does vary across Europe and also depends on the quality of the telephone line and type of material used for the wiring. Cable companies can also provide such solutions using either digital cable or upgraded analogue cable.

Mainly for commercial and partially for technical reasons the cable and the telecom companies are gradually offering higher bandwidth for higher prices rather than offering the fastest bandwidth that is technically possible. The strategy of telecom companies who offer ADSL has tended, not surprisingly, to aim to reach the largest number of households with the widest geographical spread. However, for technical reasons this has resulted in the lower bandwidth on offer to consumers. Generally, these lower speeds of broadband, have offered limited opportunities for on-demand video-rich content to the home. However, T-Online Vision’s solution using a personal video recorder (described in 3.6.2 above) does offer a very interesting way of overcoming limited bandwidth.

#### **3.8.2 Fast broadband**

A number of mainly city areas across the world are starting to provide faster broadband between 1.5MB and 10MB. Some are being driven by commercial initiatives but other initiatives are being driven by more local community and socially based initiatives. Critically all these are much more locally based initiatives and generally tend not to be driven by national or international cable or telecom operators. There are some interesting developments that could be loosely called “smart community” initiatives. Some examples are given below.

Kingston Communications who have always owned the telephone network in the Kingston upon Hull area, UK offer through Kingston Interactive TV – a video-on demand services using an ADSL solution at 5MB. Video Networks, London, UK using “Videostream” solution from BT can also provide a video-on-demand service TV-based to the home. The Speke-Garston area of Liverpool described above will also be connecting 350 homes using TV-based set top boxes to an ADSL at around 5MB. South Liverpool Housing – who manages and maintains the social housing in this area, is driving this initiative.

In the Eindhoven area of The Netherlands, as part of the “Kenniswijk Project”<sup>32</sup> 400 homes are being connected by fibre optic. This is the first stage of development. From April 2003 NOB – the Dutch distributor of TV services will be providing video-on-demand MPEG2 content via IP-based set-top boxes to the TV for initiatives like the Kenniswijk Project.

In Northern Italy, FastWeb is providing fibre-optic links to the home with Internet speeds up to 10MB and offering customers TV-on demand. Where fibre-optic is not available to the home they can also offer ADSL at 2MB downstream and 0.5MB upstream.

Monaco Telecom, in partnership with Alcatel and Moviesystem, is launched in mid January 2003 its "SesameTV", video-on-demand (VoD) service on television via ADSL using up to 5MB bandwidth<sup>33</sup>. The viewer can choose three payment options: à la carte (at 5 euros per film), a monthly subscription of 20 euros for 5 films, or a subscription of 52 euros per month for unlimited number of films. The viewer can then choose from a large catalogue of 400 films.

French terrestrial TV channel, TF1 announced plans in March 2003 to roll out VOD-enabled ADSL-based TV service over the next 3 years. The channel has been conducting a 6- month, 200-household trial of the service in Paris.<sup>34</sup>

If fact, it is East Asia that is leading the world in broadband connections to the home like South Korea with more than 70% of households with broadband access.

In Taiwan Chunghwa Telecom are developing a “Multimedia on Demand” (MOD) service<sup>35</sup> They will be using IP, ADSL, and Ethernet technologies on a broadband interactive multimedia service platform to deliver the selected contents to the subscribers who will be able to access the service on their TV in the home using a set-top box. Co-operating with service aggregators or content providers they will offer subscribers live TV channel, movie, games

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<sup>32</sup> Kenniswijk Project web site <http://www.kenniswijk.nl/english/index.jsp?pageid=198695> (in English and Dutch)

<sup>33</sup> “Monaco Telecom selects Alcatel to launch video-on-demand services via DSL streamed television” Alcatel Press Release 13 January 2003  
<http://www.pressi.com/fr/release/58292.html>

<sup>34</sup> Source: itvt Issue 4.97 Part 1

<sup>35</sup> Information supplied in an email from Multimedia Dept. Northern Taiwan Business Group Chunghwa Telecom 6 March 2003



music (including concert and MTV), finance administration (such as stock market analysis) and learning services.

In the first stage Chunghwa Telecom plan to offer the “Multimedia on Demand” service through 20,000 subscriber lines in metropolitan Taipei if they get a license approved in April 2003. Planned learning content is English and Japanese education for infants, children and adults plus other learning contents suitable for infants and children.

A number of local authorities and housing associations have or are thinking of getting Ethernet networks installed particularly around blocks of flats. These networks potentially have the capability of also being used for personalised TV-formats. It is unknown how many such networks exist or are planned, but they should be considered as part of a strategy to provide more personalised learning services to the home via TV.

One such example is in the London Borough of Newham, UK social housing blocks of ten story flats in the Carpenter’s Estate area have also been installed with Ethernet connections at 10BM. All the residents can have a set-top box connected to their TV set and can receive locally produced video-on-demand produced content. Using a remote infrared keyboard they can also use their TV like a computer having access to a Windows desktop environment via an application service provider.

It is very likely that these types of development will be significant when addressing issues like the “digital divide” and “social inclusion”. However, for them to be sustainable it will be necessary for them to be used by a wide variety of services, like healthcare advice and monitoring, e-government (local and national) information and transactional services as well as pay entertainment services like video-on-demand and games.

### **3.8.3 Very fast broadband**

There are already 52MB connections to the home in the Canberra area of Australia. Australian interactive television pioneers Total Television Australia Limited (TTA) in March 2001 launched their television on demand service, Easy Television, which is being deployed over TransACT's broadband network. For \$50 per month, subscribers have access all Easy Television services, including movies on demand, music on demand, home shopping, broadcast pay TV, Internet on TV and email on TV. The service is currently available to about 3000 Canberra subscribers' although original plans to connect 100,000 homes by 2002, now appear to have been scaled down.

It is one of the largest IP based interactive television platforms in the world. TransACT's single cable is strung from the existing power poles, with optical fibre being taken to within 300 metres of each home or business, and in most cases much less. High quality copper cable has been connected over the last

few metres giving each home or business a dedicated 52-megabit asymmetrical connection<sup>36 37</sup>.

This initiative is using VDSL technologies ahead of standardisation. However, it is very likely that by mid 2003 agreement will be reached on VDSL standards. Towards the end of 2003 it is very likely that there will be a number of announcements concerning the roll out of VDSL services<sup>38</sup>.

#### **3.8.4 Other broadband solutions**

A number of other broadband solutions to the home are starting to emerge in addition to digital cable and DSL solutions. For example in the UK, BT Openworld now offers a two-way broadband satellite solution to the home and Tele2<sup>39</sup> offers a two-way broadband fixed wireless solution.

No personalised TV services appear to be available as yet but such solutions could emerge, even at lower broadband speeds, where content could trickle into a PVR overnight for use the next day via a TV. Interactivity would be with content in the PVR and once a learning module is completed it could automatically request more content or content to address specific learning difficulties encountered. MPEG4 streaming video solutions might be used in this context as interactivity can be embedded into the video-stream.

### **3.9 Live Personal video links to home**

As “fatter” broadband starts to become available to the home, new opportunities for synchronous distance learning are starting to emerge, which could become part of a blended distance learning solution or a value-added service like home tutoring for a student taking a more traditional institution-based course.

This would involve a live but remote tutor providing support and guidance to a learner in their own home on a one-to-one or small group basis. This offers a lot of potential around university campuses for enabling disabled students or mature students with families and limited time to participate in courses at a local college or university. It reduces the difficulties that might be associated with their lifestyle in attending small-group or one-to-one tutorials. When this is linked to a video-lecture-on-demand service - like that planned by Aston

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<sup>36</sup> “Easy Television to be launched in Australia” Yes Television press release 7 March 2001 <http://www.yes.tv/newsroom/20010307.html>

<sup>37</sup> “Concurrent Computer and VOD Pty Ltd Take Video-On-Demand 'Down Under' with Australia's First Commercial Deployment” VOD Pty Ltd press release 27 June 2001 <http://www.vod.net.au/outline.php3?dept=press&&id=8>

<sup>38</sup> Further information about VDSL developments can be found at the Full Service-VDSL web site <http://www.fs-vdsl.net/>

Information about how VDSL works can be found at <http://computer.howstuffworks.com/vdsl.htm>

The VDSL Alliance is composed of a number of companies who are working together to write a specification for VDSL based on the discrete multi-tone (DMT) line code.

<http://www.vdslalliance.com/>

<sup>39</sup> Tele2 web site <http://www.tele2.co.uk/>

Media<sup>40</sup>, at Aston University, UK - the need to attend a campus is considerably reduced.

### 3.9.1 iSeeTV

An interesting solution, which might have some potential for remote home-based tutorials, is a system called iSeeTV, developed by Media Logic<sup>41</sup>. It involves a one-way video link from a remote site directly onto a viewer's TV set via a digital cable network. It was used in a Department of Health trial<sup>42</sup> in the Birmingham, UK area over the Telewest digital cable network. iSeeTV delivers a video signal - unique to each household - direct to the TV, rather than a standard broadcast transmission to many thousands of homes. This means that the patient can actually see and speak to a medically qualified nurse, who is able to present personalised video information, such as pictures of symptoms, diagrams of the body, video of medical procedures or graphs showing statistics about procedures. A normal telephone is used to provide the two-way audio link.

To use iSeeTV, there is no subscription beyond the standard cable tariff and no requirement for a computer or modem. As broadband services such as ADSL become universally available through the public telephone network, iSeeTV will become available to anybody with a TV and telephone. The company is currently exploring its potential for distance learning. (See Appendix J, iSeeTV- an example of a Personal live Video Remote Tutoring Service, for more details)

### 3.9.2 FastWeb TVCam

Another, but a two-way solution is already available and being used by 6000 subscribers in Northern Italy who have fibre-to-home. In October 2002 FastWeb, the e.Biscom Group's broadband telecommunications operator, has announced the launch of its TV-based Videocommunication service. The application, which enables telephone users to see the person at the other end of the line on their TV screen, is available to all residential customers in Milan, Rome, Genoa, Turin, Naples and Bologna who have access to the FastWeb fiber-optic network. The solution makes large-scale use of fibre-optics, which support virtually unlimited bandwidth, with the Internet Protocol (IP), the universal communication protocol for integrated management of large volumes of voice, data and video traffic.

To use the TV-based Videocommunication service<sup>43</sup>, subscribers need a television set, a touch-tone telephone, preferably a cordless model, and a small FastWeb TVcam video camera placed on top of or next to the TV. The TVcam needs to be hooked up to the FastWeb connection, to the telephone

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<sup>40</sup> For more information look at <http://www.pjb.co.uk/t-learning/case19.htm>  
The Aston Media web is <http://www.aston.ac.uk/media/>

Their Education and Training Channel is at <http://www.etcweb.co.uk/>

<sup>41</sup> Web site of Media Logic <http://www.medialogic.co.uk/>

<sup>42</sup> "NHS scores world-first with personal medical advice live on TV" Media Logic Press Release 19 March 2001 [http://www.iseetv.net/press/pr/NHS\\_iSeeTV.pdf](http://www.iseetv.net/press/pr/NHS_iSeeTV.pdf)

<sup>43</sup> "FastWeb Presents the World's First TV-based Videocommunication Service" e.Biscom Press Release, Milan, 15 October 2002

jack and to the television set, via the scart socket. To make the video call, the user presses the asterisk key before keying the telephone number. The TVcam of the person being called rings. When the call is answered on the telephone linked to the TVcam, a normal voice conversation begins. If the person being called wishes to be seen, he or she presses the asterisk key, and the parties can see each other on their TV screen as they speak. If the person being called does not wish to be seen, he or she simply presses the "0" key ("privacy" mode). In this case, the TV screen displays the caller, but not the person being called.

Video calls may be also be made outside the FastWeb network to PCs with WebCams, video telephones or ISDN videoconferencing stations. Calls are charged at 0.25 euro per minute for video calls to FastWeb customers and a monthly rental fee of 11 Euros for the TVcam.

Apart from opening up new opportunities for person-to-person communication, Videocommunication can be used for a host of applications in the public sector. FastWeb technology supports audio/video links between remote government agencies, public bodies, schools and hospitals to permit significant enhancements in the quality of public services as well as improved cost-effectiveness. Possible applications include: tele-education and e-learning, with extra lessons from home, parent-teacher communication and links between geographically distant schools; tele-healthcare and e-health, for remote medical consultations, healthcare services and transmission of patient records, samples and X-rays without involving physical movement between sites; and tele-working; tele-assistance for the elderly and disabled.

### **3.10 Games Consoles**

It is important to mention the potential of games consoles. As they are connected to TV sets and are used for highly engaging games, they do offer a major potential for interactive learning. In addition the hard disk capacity of the devices is almost comparable to that of a PVR. Their networking capability is another major advantage.

However, there appears to be very little interest amongst games hardware manufacturers and software developers in the opportunities for learning at present. The games market is also very competitive and the key players are not keen to give away much information or move beyond their core business.



**Fig 3.2 G-cluster System - an example interactive gaming**

More efforts are needed to encourage them to get involved in the learning business. The potential opportunities are huge for example to reach and engage those with basic skills needs. Use could be made of the on-demand services; a games environment like that those already available on existing interactive TV or a more immersive games environment like that offered by a company called G-Cluster<sup>44</sup>.

### **3.11 Standardisation and Regulatory Issues**

Broadcast services are obviously regulated by the various national broadcast regulatory bodies many of which are reviewing their current regulations in the light of these new developments. The European Commission is currently looking at barriers to widespread access to new services and applications of the information society through open platforms in digital TV<sup>45</sup>

The Multimedia Home Platform (MHP) has become an agreed standard for the development of set-top boxes and Scandinavia and Germany have agreed to adopt it for future developments concerning digital interactive TV. However, the supply of these set-top boxes has been rather limited so this has constrained developments. In other countries including Germany there are large numbers of legacy set-top boxes already being used by consumers that were often supplied free as part of a subscription service. These were already available before MHP was agreed as a standard. Discussions in this area still on-going but it seems unlikely that the European Commission will bring any legislation to enforce MHP. In some markets like the UK it is very unlikely that MHP will be adopted, as there are already 40 of UK households with digital TV set-top boxes of various kinds. (See Appendix H for more details on Multimedia Home Platform)

The global TV-Anytime Forum is an association of organisations, which seeks to develop specifications to enable audio-visual, and other services based on mass-market high volume digital storage in consumer platforms. This includes PVRs.

During its second phase TV-Anytime Forum is moving its focus into a world beyond TV (i.e., beyond audio plus video). This is a world where consumers build their digital entertainment and information-rich lives around a digital hub like a home media centre. This hub will need to accommodate the many and various new services that the market demands: network and standalone games, information and educational packages, entertaining enhanced television, transactional services and utilities such as banking, shopping and smart appliances. (See Appendix I for more details About the TV Anytime Forum)

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<sup>44</sup> G-Cluster web site <http://www.g-cluster.com/product/index.html>

<sup>45</sup> "Barriers to widespread access to new services and applications of the information society through open platforms in digital TV and third generation mobile communications"  
Commission Staff Working Document, European Commission  
[http://europa.eu.int/information\\_society/topics/telecoms/regulatory/publicconsult/documents/21\\_1\\_29\\_en.pdf](http://europa.eu.int/information_society/topics/telecoms/regulatory/publicconsult/documents/21_1_29_en.pdf)

The emerging MPEG-7 standard is also going to provide a comprehensive metadata specification<sup>46</sup>, but it is likely that more work is needed in linking these standards developments to the emerging learning technology standards.

### **3.12 Conclusions**

#### **3.12.1 Broadcast/Scheduled TV**

- a) In the short term, interactive services will be mainly available through or associated with broadcast or scheduled TV and will be dependent on how rapidly broadcasters and service providers will want to deploy such services.
- b) There will be limited opportunities for enhancing learning opportunities to the home through such services.
- c) What services emerge that will be available are better described as “edutainment”.
- d) There will be a few large-scale productions using enhanced TV but these will be limited to content providers who can reach global markets.
- e) There may also be a number of limited educational games and other related exercises.
- f) There will probably be extensive national curriculum related revision exercises using mainly text and graphics but limited sound and video.
- g) There will also be multiple-choices question and answer exercises.
- h) These will form some of the first offerings as interactive digital TV starts to become available in different regions.
- i) In the medium term, such forms of interactive services will become integrated into hybrid developments with more personalised TV, possibly being used as “hooks” to capture interest and pull people towards more engaged learning opportunities.
- j) In the longer term, they will become unrecognisable as more personalised services will start to dominate and form an integrated part of their lives.

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<sup>46</sup> See <http://mpeg.telecomitalia.com/> for more detail

### 3.12.2 Personalised TV

- a) In the short term, a few pioneer developments will start to emerge and assist in the process of the identification and development of sustainable models using the various methods of personalised TV.
- b) In the short term, fast broadband DSL and cable solutions will start to rapidly develop in some markets and will offer leisure learning video-on-demand services. However, in other markets developments will move very slowly. In the medium term, it is likely that there will be widespread services.
- c) Fast broadband will also enable synchronous live video remote tutoring to become possible. There are likely to be a few pioneering developments in the short term but this could take off on a large-scale in the medium term, where the infrastructure is available.
- d) The hybrid solution of using lower speed broadband and a PVR will develop rapidly in the short term where there is already a well-developed lower speed broadband Internet market. In the medium term, this will be a widespread solution offering a lot of opportunities for personalised learning services.
- e) In the short term there may develop a few pioneering projects using very fast broadband, with later adopters “leap-frogging” over fast broadband developments – particularly if standards become agreed and there is local pressure from city operators.
- f) In the short to medium term, combined broadcast and data-casting via satellite combined with local storage through a PVR will provide a good solution for more rural areas that do not have easy access to cable or DSL.
- g) In the medium term, hybrid solutions two-way satellite, VDSL and local wireless solutions will also meet the needs of rural communities outside the range of ADSL and cable.
- h) In the medium to long term, various fast and very fast broadband solutions will be available in both urban and rural areas with users accessing the content that is most appropriate for their needs whether it be with a TV, computer or a mobile device.
- i) Learning services will be only part of a wide range of integrated services available to the home. They will be sustainable because they have been developed in an integrated way.

## **4. Some Insights into Learning in the Home**

### **4.1 Introduction**

This chapter aims to provide some insights into learning and provision for learning in the home. It aims to highlight issues that should be addressed when understanding the context in which it might be appropriate to use interactive digital TV solutions in order to encourage and develop increased and enhanced learning opportunities. This is tackled from a number of different perspectives.

Firstly, consideration is given to what is meant by learning and in particular informal learning. The home as a place of learning is considered next along with the role of the family. This is followed by the use of educational media in the home. Barriers to learning are then considered, particularly for those who have not participated in learning since compulsory school leaving age. This is followed by the role of information and communication technologies (ICT) in terms of overcoming barriers to learning. Reference is made to this being supply-led rather than demand driven.

Some consideration is then given to television viewing habits and how people learn through TV. Finally, despite the limited research on interactivity and learning through TV, an attempt is made to develop a framework that will provide some understanding in this area.

This chapter has not attempted to conduct a comprehensive European wide review of the issues surrounding learning in the home, but it does aim to tease out some of the issues and their complexity as an illustration of what needs to be considered.

### **4.2 Defining learning**

Emphasising the complexity of the process of learning, a wide definition of learning has been put forward by the Campaign for Learning<sup>47</sup> who defines learning as: -

"A process of active engagement with experience. It is what people do when they want to make sense of the world. It may involve an increase in skills, knowledge or understanding, a deepening of values or the capacity to reflect. Effective learning will lead to change, development and a desire to learn more"<sup>48</sup>.

In order to tease out the different aspects of learning, one relatively conventional European and North American way has been to categorise

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<sup>47</sup> Website of Campaign for Learning <http://www.campaign-for-learning.org.uk/index.htm>

<sup>48</sup> 'Understanding Barriers to Learning' a guide to existing research, produced by Peter Maxted for the Campaign for Learning. Summary at <http://www.tmag.co.uk/articles/July99-2.html>



learning activity into three types – formal, non-formal and informal education<sup>49</sup>: -

*Formal education* refers to systems of organised learning that are 'hierarchically structured' and 'chronologically graded' (from first school to higher education).

*Non-formal education* is 'any organised educational activity outside the established formal system' and has identifiable learners and evident learning objectives.

*Informal education* it is argued<sup>50</sup> is “the truly lifelong process that allows individuals to acquire knowledge, skills and values from daily experience” with the principal sources of learning including the home, work, friends and media.

#### 4.2.1 Informal learning

Probing further into informal learning it has been suggested that this can be either intentional or incidental<sup>51</sup>. However, it has also been suggested that informal learning can be planned or unplanned, but it usually involves some degree of conscious awareness that learning is taking place. Whereas incidental learning, on the other hand, is largely unintentional, unexamined and embedded in people's closely held belief systems<sup>52</sup>.

With the exception of specific educational broadcasts for use by schools and broadcasts used by individuals as part of a distance-learning course, TV programmes have tended to be traditionally focused towards the informal end of the learning spectrum. When considering what role interactive digital TV solutions may have in the future, it is perhaps best to start with informal learning end of the spectrum. It is more likely that they could be positioned as being a catalyst for non-formal and informal learning with sometimes a role in formal learning as part of a blended multiple media solution. This helps focus attention on how the technology tools may best help which aspects of learning.

For some informal learning is seen to some extent as being synonymous with widening participation – but in a broader sense than acting as a bridge between conventional education and training, and employability. One study has defined it as<sup>53</sup>: -

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<sup>49</sup> “On formal, non-formal and informal lifelong learning: reconceptualising the boundaries for research, theory and practice” Keith Percy, Lancaster University, UK, 27th Annual SCUTREA conference proceedings 1997 “Crossing borders, breaking boundaries : Research in the education of adults” <http://www.leeds.ac.uk/educol/documents/000000277.doc>

<sup>50</sup> Coombs P H, Prosser R C, and Ahmed M (1973) New paths to learning for rural children and youth. New York: UNICEF International Council for Educational Development.

<sup>51</sup> Peterson, R E , (1979) Present sources of education and learning. In R. E. Peterson and Associates, Lifelong learning in America. San Francisco: Jossey- Bass.

<sup>52</sup> Watkins, K E, and Marsick, V J, (1992) Towards a theory of informal and incidental learning in organisations. International Journal of Lifelong Learning, 11 (4) 287-300

<sup>53</sup> “Informal Learning and Widening Participation” Joe Cullen, Sarah Batterbury, Marta Foresti, Claire Lyons and Elliot Stern The Tavistock Institute ISBN 1 84185 248 1 May 2000 for the

“The active engagement by citizens in the construction, interpretation and, often, re-shaping of their own social identity and social reality.”

The study found, perhaps not unsurprisingly, that people from all walks of life get involved in informal learning; from teenagers to people who are retired; men and women in broadly equal measure; people with very low-income levels to the relatively affluent; people with a very low literacy level to university graduates. The study was looking at a wide variety of informal learning experiences including the use of new technologies in learning.

Moving further along the learning spectrum there may also be a role for “self-directed learning” particularly for adults in which they engage in learning projects made up of identifiable and quantifiable “learning episodes” that could be carried out independently of professional educators or with the assistance of a guide or mentor. The potentially more “ordered” environment that could be offered through interactive digital TV solutions compared to the much more unstructured Internet environment could lead on towards better learning and more satisfying outcomes for the individual.

Some understanding of the different roles of learning can be made when considering an individual adult as a “social actor seeking to function in society”. From this perspective adults may be moving between the so-called 'non-formal' and 'informal' (and even the 'formal') sectors of education and engaging in what can be perceived to be learning activities in order to survive and adapt in ways appropriate to their own sub-culture and fulfil social and vocational roles. How they do this is governed by a wide variety of factors like convenience, circumstance, knowledge of the options and personal abilities as well as by economic position, belief systems, cultural capital and relationship to technological change<sup>54</sup>.

The contribution of informal learning to directly securing more educational qualifications and better jobs is considered to be relatively limited. This is primarily because: informal learning tends to provide ‘generic’ rather than ‘technical’ and marketable outcomes; because it tends to be highly contextualised and unrelated to the real opportunity structures of learners, and because of the negative attitudes of prospective employers towards informal learning, or to those participating. However, the informal learning study found that informal learning can enable people to ‘re-package’ themselves, by improving their meta-cognitive skills (learning to learn); increasing their self-confidence; improving their social skills. The study called for more research into innovative ways of facilitating informal learning.

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UK Department for Education and Employment.

<http://www.dfes.gov.uk/research/data/uploadfiles/ACF318A.doc>

<sup>54</sup> “On formal, non-formal and informal lifelong learning: reconceptualising the boundaries for research, theory and practice” Page 5 Keith Percy, Lancaster University, UK, 27th Annual SCUTREA conference proceedings 1997 “Crossing borders, breaking boundaries : Research in the education of adults” <http://www.leeds.ac.uk/educol/documents/000000277.doc>

However, there is some evidence beginning to emerge that the use of information and communication technologies (ICT) in the form of Internet-enabled computers may not actually be encouraging more participation in learning<sup>55</sup>. This appears to contribute to the argument for the utilisation of a familiar tool like a TV that is generally affordable as well as easily accessible in the home and does have a significant impact on creating the opportunities for engaging in some sort of learning activity. Therefore enhancing this tool, so that it is capable of increasing access to a wider range of information and learning experiences – could be considered to be a good thing.

However, if this was through policy intervention, it is likely to require some form of “measurement of success”. Any measurement must take into account not just learning outcomes based on formal learning but also those that might be achievable from non-formal and informal learning as they form an important component in the process of learning. Further investigation is really needed in this area but is really beyond the scope of this t-learning study other than raising the issue.

### **4.3 Learning in the home**

Three dimensions are highlighted in this section that illustrate some of the dynamics that operate around learning in the home and decisions about what to buy to assist in this process. Consideration is firstly given to how people perceive the home as a place of learning, Secondly, in the context of children’s learning, consideration is given to the role of the family and the aspiration of parents. Thirdly there is a brief look at why parents buy computers for use in the home as this may have an impact on their reasons for buying other media.

#### **4.3.1 Home as a place of learning**

It is difficult to obtain comparative figures covering Europe, but a UK-based study<sup>56</sup> conducted during 1998 of 1043 participants found that when people were asked to choose the three most popular locations where they personally learnt most - the home was the highest (57%), with the workplace second (43%) and in libraries third (36%). Adults also said that to learn something new they would use books / written materials (72%), lectures (42%) and videos and TV programmes (32%). Nearly three-quarters of adults (74%) agreed that advances in new technology are making learning easier.

Another UK-based survey<sup>57</sup> (Fig 1) of 504 adults conducted during the later part of 2000 found that the home was the third most important location for learning after the workplace and college or university. Although it is difficult to compare the results of most of these surveys and on first sight they do appear

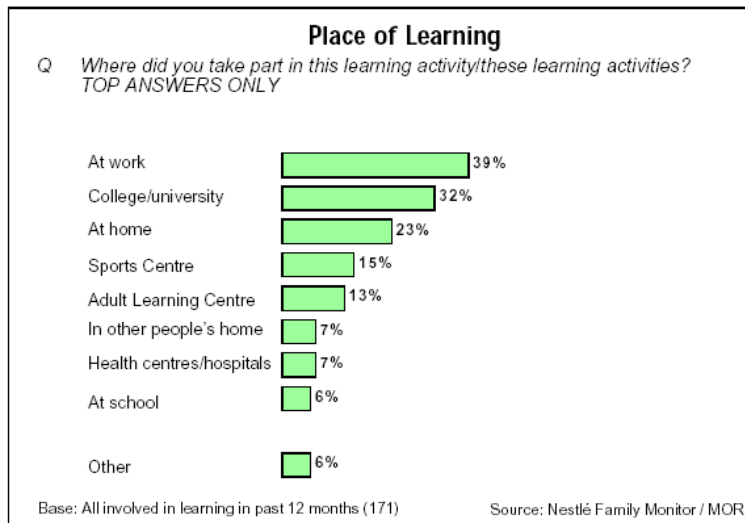
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<sup>55</sup> Selwyn, N. and Brown, P. (2000) ‘Education, Nation States and the Globalisation of Information Networks’ *Journal of Education Policy*, 15, 6, pp.661-682

<sup>56</sup> “Attitudes to Learning '98” Toby Greany (Ed.) MORI State of the Nation Report This MORI survey of adults and young people’s attitudes to learning <http://www.campaign-for-learning.org.uk/resources/pubdbasedetail.asp?id=44&h=Attitudes+to+Learning+%2798>

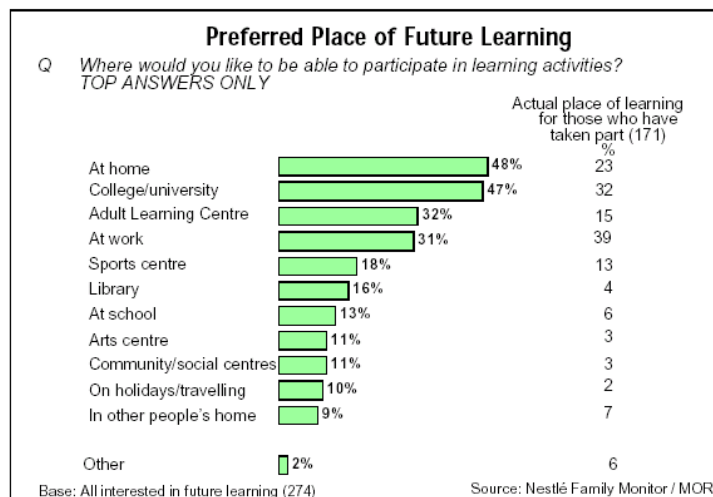
<sup>57</sup> “Lifelong Learning - Nestlé Family Monitor No.11 The Nestlé Family Monitor is a series of research studies undertaken on behalf of Nestlé UK by Mori published April 2001 <http://www.nestle.co.uk/about/familyMonitor/pdfs/report11.pdf>

to show conflicting results – both certainly point to the importance of the home as a place of learning.



**Fig 4.1 Based on a nationally representative sample of 504 UK adults interviewed between 23 September and 8 October 2000.**

Interestingly the second survey also revealed<sup>58</sup> that 60% of respondents are interested in participating in learning activities in the future including 46% of those who have not as yet taken part in such activities. Most would like to undertake this learning at college or university, although the same proportion would also like to undertake learning in the comfort of their own homes (See Fig 4.2). Weekday mornings are the preferred time for most for participating in learning activities. These figures do illustrate demand for learning and in the home, but it is difficult to predicate whether this demand would be mainly met if there were increased learning opportunities through the TV.



**Fig 4.2 Preferred Place of Future Learning**

<sup>58</sup> "Lifelong Learning - Nestlé Family Monitor No.11 The Nestlé Family Monitor is a series of research studies undertaken on behalf of Nestlé UK by Mori published April 2001 Page 6 <http://www.nestle.co.uk/about/familyMonitor/pdfs/report11.pdf>

#### 4.3.2 Role of the family and the aspiration of parents

When looking at the role of the family in the home it is considered that: -

“The family is crucial to providing learning and a positive (or otherwise) learning environment.....50% of a child's intelligence and learning ability develops by the age of four, and 80% by the age of eight. The family is much more important than the school for translating this into measurable achievement. Differences between 'good' and 'bad' schools account for far less than features of the family or home”<sup>59</sup>.

As the home, or homes in some circumstances, tend to be the common location for the family in its various formats single or dual parent or extended family – importance has to be given to the various stimuli that are available in the home.

Work<sup>60</sup> on the aspirations of parents towards the education of their children also gleams some insights into their willingness to buy into additional learning resources into the home. The research found that three 'clusters' of parents were identified: -

*Aspiring* parents were less affluent than average, but highly motivated towards education, which they saw as a means of ensuring upward mobility for their children.

*Anxious* parents had experienced upward mobility themselves, and were keen that their children should not lose the advantages they had gained.

*Comfortable* parents were established professionals, who were confident that their children would succeed, and that they would be able to support them in doing so.

Three key issues emerged that reflect the parents' more general orientations towards education: -

*Home tutoring* - Several 'anxious' parents felt they were being pressured to pay for home tutors for their children, largely as a result of increasing competition at the point of secondary transfer. Many felt they were doing so against their wishes, but that the level of competition was intensifying.

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<sup>59</sup> 'Understanding Barriers to Learning' a guide to existing research, produced by Peter Maxted for the Campaign for Learning. Summary at <http://www.tmag.co.uk/articles/July99-2.html>

<sup>60</sup> "Changing sites of education: educational media and the domestic market" Page 12-14 ESRC-funded research conducted by Prof David Buckingham, University of London: Institute of Education between 01 December 1999 - 30 November 2001. [http://www.regard.ac.uk/research\\_findings/R000238218/report.pdf](http://www.regard.ac.uk/research_findings/R000238218/report.pdf)

*Homework* - Several parents felt that children were being set increasing amounts of homework; and some argued that this was unnecessary. However, some 'anxious' parents were pressurising the schools to increase the amount of homework.

*Supporting homework* - Supporting homework posed particular difficulties for single parents and working parents. Several complained about the demands on their time; while some felt unable to support their children because of a lack of knowledge about the content, or because they did not know how to intervene.

In general, the research found that while some parents were enthusiastic about their role as educators, others insisted that they did not wish to be regarded as teachers. None, however, appeared immune from the feelings of inadequacy and guilt that appeared to surround this issue.

#### **4.3.3 Using educational media**

The research also found that families' uses of educational media were largely dominated by the wish to support schoolwork. However, the children were primarily interested in the 'entertainment' aspects of these materials: 'education' was frequently associated with being 'boring'. Parents were more ambivalent, although ultimately they were pragmatic: they accepted that their children were unlikely to enjoy a didactic approach to education in the home, and that they would often leave materials unused or unread for this reason.

Nearly all the parents cited education as one reason for purchasing a home computer. Nevertheless, some were more enthusiastic than others. Some had resisted the introduction of the computer, arguing that it would lead to the fragmentation of the family. There was some scepticism as to whether computers had fulfilled their educational promise. Few parents bought software on a regular basis, and only a narrow range of titles was in use. This was partly due to cost and also reflected parents' and children's disappointment with the titles they had purchased.

A survey<sup>61</sup> that looked at educational media in the home found that: -

- Home computers and Internet access were more likely to be found in middle social class families. They were significantly less available in single-parent families and in families where parents were unemployed.
- By contrast, ownership of computer games consoles was significantly higher in households where one or more parents worked in manual occupations.

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<sup>61</sup> "Changing sites of education: educational media and the domestic market" Page 11 ESRC' funded research conducted by Prof David Buckingham, University of London: Institute of Education between 01 December 1999 - 30 November 2001.  
[http://www.regard.ac.uk/research\\_findings/R000238218/report.pdf](http://www.regard.ac.uk/research_findings/R000238218/report.pdf)

- Boys were more likely than girls to have access to media in their bedrooms, although these differences were not as large as differences due to age.
- Children with parents in manual occupations were more likely to have VCRs, TVs and (to a lesser extent) computers in their bedrooms.
- Households with non-working parents, and single-parent households, were less likely to buy educational software, to use educational websites, or to buy information books.
- Boys were more likely to play computer games than girls, whereas girls were more inclined to read and listen to music. Parents of younger children were more likely to help with homework, as were middle-class parents.

Research<sup>62</sup> into ICT and home-school links in the UK has also found that supporting learning in the home is a developing market area that will become increasingly important.

A potentially very important research project which started in January 2002 is the UK-based Adults Learning @ Home Project<sup>63</sup> that explores adults' use (and non-use) of information and communications technologies in domestic and community settings and, in particular, examines the impact of new technologies on individuals' participation in formal and informal learning. In doing so the project seeks to increase our understanding of an integral part of the current education policy agenda; the use of information and communications technology (ICT) in facilitating individual access to learning and thereby increasing equalities of educational opportunity amongst the UK adult population. Unfortunately this research is not due to be completed until March 2004.

## **4.4 Barriers to learning**

### **4.4.1 Non-participation in learning**

Before considering the barriers to learning it is important to get some understanding of the size of the issue. Again, it is difficult to get comparable European wide statistics covering the participation rates in all types of learning activity but the following UK example can be used as an indication of the potential size of the issue.

An analysis of data from the UK 2002 National Institute of Adult Continuing Education (NIACE) survey of 5885 households<sup>64</sup>, not only focused on learners' access to technology and the role that technology is playing in facilitating learning, but it also provided some figures on participation rates in

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<sup>62</sup> Taken from "Using ICT to enhance home-school links An evaluation of current practice in England" NGfL Research and Evaluation Series 2001 DfES & Becta Page 15

[http://www.becta.org.uk/homeschoollinks/ngflseries\\_hsl1.pdf](http://www.becta.org.uk/homeschoollinks/ngflseries_hsl1.pdf)

<sup>63</sup> Further details at <http://www.cf.ac.uk/socsi/ict/projectoutline.html>

<sup>64</sup> More details at <http://www.niace.org.uk/news/archives/May02.htm#Survey>

learning generally. The survey found that 42% of cases reported a current or recent learning episode (in the past three years), 22% reported some non-recent post-compulsory education or training, and 36% reported no learning episodes since reaching compulsory school-leaving age. The first group is described here as ‘recent learners’ and the third group is described as ‘non-participants’. The size of the non-participant group appears to be similar to that reported in other studies of lifelong learning<sup>65</sup>.

Therefore, at least in a UK context, more than a third of adults say they have not participated in any form of learning since reaching the compulsory school-leaving age of 16. This figure may not be as high in other European countries but it is likely to be sufficiently high to warrant attention in the development of lifelong learning policies.

#### 4.4.2 Understanding barriers to learning

Traditional barriers to learning have been identified<sup>66</sup> as cultural, structural and personal<sup>67</sup> or situational, institutional, and dispositional<sup>68</sup>. The impact of these barriers will vary depending on the circumstances. But, there appears to be evidence that dispositional and motivational barriers are as much of a hurdle to the establishment of a learning society as structural and institutional barriers<sup>69</sup>.

Studies into lifelong learning and participation rates emphasise the importance of how a person identifies with their learning needs<sup>70</sup>. It has also been argued that decisions about whether or not to participate in post compulsory education tend to reflect ‘deep-seated attitudes towards learning in formal settings, such as educational institutions and work places’<sup>71</sup>.

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<sup>65</sup> Gorard, S. and Rees, G. (2002) ‘Creating a learning society’ Bristol, Policy Press

<sup>66</sup> “Technology and lifelong learning: Are we cutting IT? Stephen Gorard, Neil Selwyn, Louise Madden % John Furlong Cardiff University School of Social Sciences Paper presented to the ‘All-Wales Education Research’ Conference, University of Wales Conference Centre, Gregynog, 3-5 July 2002. <http://www.leeds.ac.uk/educol/documents/00002117.htm>

<sup>67</sup> Maxted, P. (1999) ‘Understanding Barriers to Learning’ *t Magazine*, July 1999 <http://www.tmag.co.uk/articles/July99-2.html>

<sup>68</sup> Harrison R. (1993) ‘Disaffection and Access’ in Calder J. (Ed.) ‘Disaffection and Diversity. Overcoming barriers to adult learning’ London: Falmer

<sup>69</sup> “Inclusiveness for whom? The relevance of creating a demand for ICT based adult learning” Section 4 Sara Williams, Neil Selwyn & Stephen Gorard, School of Social Sciences, Cardiff University, Wales. Paper presented at SCUTREA, 30th Annual Conference, 3-5 July 2000, University of Nottingham <http://www.leeds.ac.uk/educol/documents/00001470.htm>

<sup>70</sup> Further discussion can be found in the following documents. Edwards R., Sieminski S. and Zeldin D. (1993), *Adult Learners, Education and Training*, London, Routledge. Titmus, C. (1994), ‘The scope and characteristics of educational provision for adults’ in Calder, J. (Ed.) ‘Disaffection and Diversity. Overcoming barriers to adult learning’, London, Falmer. Gorard, S., Rees, G., Fevre, R., and Furlong, J. (1998), ‘Learning trajectories: Travelling towards a learning society?’ *International Journal of Lifelong Education*, 17, 6, 400-410

<sup>71</sup> Rees, G., Gorard, S., Fevre, R. and Furlong, J. (2000), ‘Participating in the Learning Society: History, place and biography’ in F. Coffield (ed.) *The Learning Society Programme: Volume 2*, Bristol, Policy Press



Some researchers also doubt the actual role of 'barriers' in preventing access to adult learning opportunities<sup>72</sup>. Evidence appears to be mounting that the traditional barriers such as time, cost, travel and lack of initial qualification do not particularly deter non-participants in formal educational episodes. This evidence comes partly from looking at the role of long-term socio-economic background characteristics, especially the influence of family, in creating a learner identity that does not view current opportunities as appropriate, interesting, or useful<sup>73</sup>.

However, other research<sup>74</sup> has found that a key barrier to learning in today's increasingly hectic, time-pressured age is in fact, finding the time – particularly for parents. Therefore initiatives, which target parents specifically may do well to focus initially on parents of children of school age, or promote learning at home, rather than targeting parents of younger children or promoting traditional evening classes. The findings suggest that the departure of the children to school can be used as a positive 'selling' tool. The research found that approaching eight in ten people feel that their children starting school provides them with a good opportunity to start learning themselves and that doing so can help the children. Six in ten people agreed "most adults who take part in learning do so after their children have started school". Nevertheless, while the opportunity may be there, around a third agreed "people are too pre-occupied with helping their children learn at school to get involved in learning themselves".

Research<sup>75</sup> into informal learning has found that the main barriers and constraints at the societal level included the lack of integration between informal learning and broader societal agendas and programmes; uneven access to opportunities and inadequate funding provision for programmes and initiatives. Although it did not consider the role of TV in this context it might be implying that there should be a need for greater integration. For example, when providing access to healthcare or government information through digital TV consideration should be given to the impact this could have on creating informal learning opportunities – which eventually lead onto more formalised learning.

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<sup>72</sup> Researching the role of digital technology in widening participation Stephen Gorard and Neil Selwyn, School of Social Sciences, Cardiff University, Paper presented at the British Educational Research Association Conference, University of Sussex, at Brighton, 2-5 September, 1999.

<sup>73</sup> Further discussion can be found in Gorard, S., Rees, G. and Fevre, R. (1999a) Two dimensions of time: the changing social context of lifelong learning, *Studies in the Education of Adults*, 31, 1, 35-48 Gorard, S., Rees, G. and Fevre, R. (1999b) Families and their participation in learning over time, *British Educational Research Journal* (awaiting issue#) Gorard, S., Fevre, R. and Rees, G. (1999c) The apparent decline of informal learning, *Oxford Review of Education*, 25, 4

<sup>74</sup> "Lifelong Learning - Nestlé Family Monitor No.11 The Nestlé Family Monitor is a series of research studies undertaken on behalf of Nestlé UK by Mori published April 2001 Page 12 <http://www.nestle.co.uk/about/familyMonitor/pdfs/report11.pdf>

<sup>75</sup> "Informal Learning and Widening Participation" Joe Cullen, Sarah Batterbury, Marta Foresti, Claire Lyons and Elliot Stern The Tavistock Institute ISBN 1 84185 248 1 May 2000 for the UK Department for Education and Employment. <http://www.dfes.gov.uk/research/data/uploadfiles/ACF318A.doc>

This informal learning research also gave consideration to the main barriers to participation at the community level includes mistrust of learning providers; the imposition of ‘top-down’ learning agendas and the lack of integration of informal learning with regeneration strategies. This might be interpreted in the context of interactive digital TV provision in a number ways. Utilising recognised “brand” names like broadcasters or TV service providers might encourage trust, as they may not initially be thought as learning providers. But, they may be perceived as imposing “top-down” learning agendas.

However, within a broader regeneration strategy of a deprived community, provision of broadband and interactive digital TV solutions that also happen to increase opportunities for informal learning as well as meet other social needs - might be considered very appropriate. This could be the equivalent to the physical refurbishing of social housing like the provision of double glazed windows to reduce noise and heat loss.

The informal learning research also found that the main barriers that prevent individuals from participating in informal learning are: negative previous experience of learning; the real and opportunity costs of learning; peer pressure; and issues around the accreditation and application of learning outcomes. These are issues that any form of learning offering needs to consider including provision through interactive digital TV solutions that might actually incur additional costs for the equipment and the service. The main barriers to continuing participation for individuals involved in informal learning, were the real and opportunity costs of continuing learning; peer and family pressures.

#### **4.4.3 Understanding the notion of the “Digital Divide”**

The notion of the “digital divide” often crops up when considering ways of widening participation in learning. However, this notion is often described in a rather simplistic way – “the haves” and the “have-nots”. Often it is also described in a narrow sense – referring to just computer access and access to the Internet. Yet digital TV along with other digital technologies should also be considered.

It is important not to confuse having access to information and communication technologies (ICT) as resulting in the use of ICT. Too many ICT related initiatives have tended to focus on providing access and assuming that this will lead to usage. The same mistake must not be made when considering the use of digital TV technology solutions for learning.

It is also argued<sup>76</sup> that the inequalities related to adoption and use of ICT that could also include digital TV technologies is not necessarily a passing phase in the diffusion of innovations - pointing to an ‘inevitable’ progression from

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<sup>76</sup> Defining the ‘Digital Divide’: Developing a Theoretical Understanding of Inequalities in the Information Age Neil Selwyn, Cardiff University - School of Social Sciences 2002  
<http://www.cf.ac.uk/socsi/ict/definingdigitaldivide.pdf>

'innovators', 'early adopters', 'early majority', 'late majority' to 'laggards' in terms of individual citizens<sup>77</sup>.

#### 4.4.4 The role of ICT in lifelong learning

Increasing importance is being attached to the development of lifelong learning policies throughout the world. It has tended to be around the notion that in order to remain competitive there is a need for people to participate in continuous learning and updating of skills through their lives and also to encourage more people to participate in learning.

Recently, it has been observed<sup>78</sup> in some regions, that the development of lifelong learning has tended to focus on the importance of using information and communication technologies (ICT) for increasing learning opportunities in an information economy. However, ICT continues to be more attractive to those individuals who are most likely to be already engaged in learning<sup>79</sup>. It is suggested this is leading to the situation where technology-based initiatives are appealing to only the 'usual suspects' and *increasing* participation in education but certainly not *widening* participation<sup>80 81</sup>.

A strong argument being put forward<sup>82</sup> based on evidence in a UK context but which could apply in other regions, is that ICT is not likely to be an effective 'carrot' for many of those social groups who currently do not participate in learning.

Another key argument<sup>83</sup> for the impact of ICT on participation is the ability to overcome physical barriers such as travel and place through technology. However, evidence is offering only limited support for this argument. The research also found that the patterns of learning and non-participation reflected their access to the technology as shown in Fig 3 & 4.

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<sup>77</sup> Rogers, E. (1995) 'Diffusion of Innovations' New York, The Free Press

<sup>78</sup> More detailed discussion on these issues in a UK context can be found in "Exploring the 'New' Moral and Technological Imperatives of Lifelong Learning" Neil Selwyn & Stephen Gorard Cardiff University School of Social Sciences Paper presented to 'Demoralisation: Morality, Authority and Power' Conference Cardiff University 5<sup>th</sup> and 6<sup>th</sup> April 2002 <http://www.leeds.ac.uk/educol/documents/00001948.doc>

<sup>79</sup> Gray, D. (1999) 'The Internet in Lifelong Learning: Liberation or Alienation' International Journal of Lifelong Learning, 18, 3,119-126

<sup>80</sup> Selwyn, N. & Gorard, S. (2002) "The information age: Technology, Learning and Exclusion" Cardiff, University of Wales Press

<sup>81</sup> Fryer, R. (1999) 'Practical Implications of the Learning Age in Wales' speech given to the Wales Digital College Network Conference, Cardiff, January 1999

<sup>82</sup> "Exploring the 'New' Moral and Technological Imperatives of Lifelong Learning" Page 13 Neil Selwyn & Stephen Gorard Cardiff University School of Social Sciences Paper presented to 'Demoralisation: Morality, Authority and Power' Conference Cardiff University 5<sup>th</sup> and 6<sup>th</sup> April 2002 <http://www.leeds.ac.uk/educol/documents/00001948.doc>

<sup>83</sup> "Technology and lifelong learning: Are we cutting IT? Page 8 Stephen Gorard, Neil Selwyn, Louise Madden, John Furlong Cardiff University School of Social Sciences Paper presented to the 'All-Wales Education Research' Conference, University of Wales Conference Centre, Gregynog, 3-5 July 2002. <http://www.leeds.ac.uk/educol/documents/00002117.htm>

Total recent learners	42
Digital TV	45
Analogue cable or satellite TV	41
Analogue TV	40
Internet (work only)	71
Internet at home	58
No internet	27
No PC	23
No telephone	33

**Fig 4.3 Pattern of recent learners by regular access to technology (percentage)**

Total non-participants	36
Digital TV	34
Analogue cable or satellite TV	37
Analogue TV	38
Internet (work only)	10
Internet at home	20
No internet	50
No PC	53
No telephone	50

**Fig 4.4 Pattern of non-participants by regular access to technology (percentage)**

Interestingly the figure for access to digital TV for non-participants is not significantly lower compared to recent learners. This does suggest that digital TV might be an appropriate media to encourage wider participation of learning. Certainly, the UK government is now recognising the importance of digital TV (DTV) to provide other government information services as indicated in the following statement: -

“DTV provides a new way of providing government services to a wide range of citizens – particularly those who up to now have been unable or reluctant to use services over the Internet. Through providing interactive access to a wide range of information to the majority of the population, DTV provides a way for much greater participation in the information society – with the attendant economic benefits”<sup>84</sup>.

However, no mention is made of the role of digital TV for widening participation in learning. This still seems to be focused towards access through Internet-enabled computers.

#### **4.4.5 Demand verses Supply for learning opportunities**

There is an emerging view that many of the ICT-based initiatives to encourage widening participation are in fact “supply-led” rather than being “demand driven” and not actually achieving the target of increased participation of people that have opted out of formal learning at an early age. It is argued that many initiatives have been established “on the assumption

<sup>84</sup> Digital television A policy framework for delivering e-government services to the home draft for public consultation October 2002 Office of the e-envoy, Cabinet Office, UK Government

that providing easy access to learning opportunities away from the confines of traditional educational institutions would open up learning resources to all sectors of society; effectively leading to greater social inclusion”<sup>85</sup>.

However, it is considered that the role of technical barriers to participation in adult learning is far more complex than this approach would suggest<sup>86</sup> and neglects another key barrier which also prevents people from engaging with learning opportunities – dispositional (or motivational) barriers. If people don't want to participate in learning removing the barriers like cost and access will only have a limited effect<sup>87</sup>. This is a key point that has to be considered when looking at the role of interactive digital TV for increasing learning opportunities. It seems that mechanisms need to be developed that not only increase affordable access but also stimulate demand and motivation.

Some interesting research has looked at the learning outcomes of adults using different media. College students were asked about the ease with which they could achieve various learning outcomes with different media (interactive video, computer, television, books). It was found that they perceived it to be easier to learn psychomotor skills and attitudes from television and interactive video than from books and computers. By contrast, they perceived it to be more difficult to learn verbal information and cognitive skills from television than from interactive video, computers, and books<sup>88</sup>.

A big question is, what role does television have in increasing participation in learning? In its most traditional mode it is in fact a supply-led medium – although a very popular medium compared to other media and can be motivational. Digital channels are starting to increase the element of choice amongst what a viewer watches. Personalised TV modes will start to create a demand-led mode and increase the supply of a vast number of viewing experiences including learning opportunities. However, the question is how can this be done in a way that might also encourage participation in learning and overcome the motivational, structural and institutional barriers that already exist?

The limited early work in utilising digital TV and personalised TV in an on-demand mode has tended to focus on increasing the supply of learning

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<sup>85</sup> “Inclusiveness for whom? The relevance of creating a demand for ICT based adult learning” Sara Williams, Neil Selwyn & Stephen Gorard, School of Social Sciences, Cardiff University, Wales. Paper presented at SCUTREA, 30th Annual Conference, 3-5 July 2000, University of Nottingham <http://www.leeds.ac.uk/educol/documents/00001470.htm>

<sup>86</sup> Refer to the following Gorard, S., Rees, G. and Fevre, R. (1999a), ‘Two dimensions of time: the changing social context of lifelong learning’, *Studies in the Education of Adults*, 31, 1, 35-48 Gorard, S., Rees, G. and Fevre, R. (1999b), ‘Society is not built by education alone: alternative routes to a Learning Society’, *Research in Post-Compulsory Education*, 3, 1, 25-32

<sup>87</sup> Gorard, S. and Selwyn, N. (1999), ‘Switching on the Learning Society? Questioning the Role of Technology in Widening Participation in Lifelong Learning’, *Journal of Education Policy*, 14, 5, pp.523-534

<sup>88</sup> Cennamo, K. S. (1993). Learning from video: Factors influencing learner's preconceptions and invested mental effort. *Educational Technology Research and Development*, 41(3), 33-46 and Cennamo, K. S., Savenye, W. C., & Smith, P. L. (1991). Mental effort and video-based learning: The relationship of preconceptions and the effects of interactive and covert practice. *Educational Technology Research and Development*, 39(1), 5-16.

opportunities rather than understanding how demand can be created amongst those that have not participated in learning since compulsory education. Future work in this area needs to consider some lessons from the early work in encouraging learning opportunities through computer-based technologies.

## **4.5 Learning through Television**

### **4.5.1 Television viewing habits**

According to research<sup>89</sup> involving 11,000 children and young people in 11 European countries and in Israel, which examined their use of old and new media - television appears to be the major focus for family interaction across Europe, despite many families now owning a number of different sets which may be watched independently. The research also confirmed that the incorporation of television into the routines of daily life is more complete in families of lower socio-economic status compared, for families of high socio-economic status, where television viewing is more selective: the set is turned on for particular programmes, rather than left more or less permanently switched on as it often is in families of lower socio-economic status. With computers, whether used for games or other purposes, there is a very different pattern. Electronic games are much more likely to be played alone.

Some research has found that viewers, particularly children, who perceive television as an easy medium that does not require much mental effort tend to learn less from television programmes than viewers who take television more seriously as an educational medium<sup>90</sup>. There is also some evidence to suggest that to some extent this may vary according cultural background and the type of programme involved<sup>91</sup>.

### **4.5.2 How people learn through TV**

Drawing upon a research review conducted in 1996<sup>92</sup> on learning from television this section provides some insights into this body of research.

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<sup>89</sup> "Media at Home: Interaction and Regulation in European Families" By: Dominique Pasquier in Fathom <http://www.fathom.com/feature/122230> This feature has been adapted from chapter 7 in the book Children and their changing media environment, edited by Sonia Livingstone and Moira Bovill, Lawrence Erlbaum Associates, 2001. Copyright The London School of Economics and Political Science.

<sup>90</sup> Reference should be made to the work of Salomon. See - Salomon, G. (1981). Introducing AIME: The assessment of children's mental involvement with television. In H. Kelly & H. Gardner (Eds.), *New Directions for child development: Viewing children through television* (No. 13). San Francisco, CA: Jossey Bass. Salomon, G. (1983a). The differential investment of mental effort in learning from different sources. *Educational Psychologist*, 18, 42-50. Salomon, G. (1983b). Television watching and mental effort: A social psychological view. In J. Bryant & D. R. Anderson (Eds.), *Children's understanding of television: Research on attention and comprehension*. New York: Academic Press. Salomon, G. (1984). Television is "easy" and print is "tough": The differential investment of mental effort in learning as a function of perceptions and attributions. *Journal of Educational Psychology*, 76(4), 647-658.

<sup>91</sup> Salomon, G. (1983b). Television watching and mental effort: A social psychological view. In J. Bryant & D. R. Anderson (Eds.), *Children's understanding of television: Research on attention and comprehension*. New York: Academic Press.

<sup>92</sup> "Learning from Television: A Research Review" by Babette Moeller CCT Reports, Issue No. 11 October 1996 [http://www.media.mit.edu/explain/papers/10\\_1996b.pdf](http://www.media.mit.edu/explain/papers/10_1996b.pdf)

The research review focused on: -

- Behaviour
- Attitudes
- Beliefs and values
- Knowledge
- Cognitive skills

*Behavioural effects of television* - three major mechanisms for the behavioural effects of television appear to have been identified: - imitation, arousal, and disinhibition, but they should be considered as complementary rather than competing explanations.

Imitation, or learning through observation, is a mechanism that has been proposed by social learning theory derived from Bandura's<sup>93</sup> work. According to this theory, behaviour performed on television is being observed and imitated by the viewers. The concept of arousal has also been used to explain the effect of television on behaviour<sup>94</sup>. Arousal has been defined as "a unitary force that energises or intensifies behaviour that receives direction by independent means"<sup>95</sup>. A third mechanism has been proposed for the behavioural effects of television is disinhibition<sup>96</sup> which considers that repeated exposure to socially sanctioned behaviours may increase the likelihood of viewers to let go of the constraints on their actions and to display such behaviour.

*Attitudes, Beliefs and Values* - There appears to be a large body of research that suggests that television has an important impact on people's attitudes.<sup>97</sup> But exactly how television exerts this influence appears not to be well understood yet.

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<sup>93</sup> Bandura, A. (1973). *Aggression: A social learning analysis*. Englewood Cliffs, NJ: Prentice Hall. Bandura, A. (1986). *Observational learning*. In A. Bandura, *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall. Bandura, A., Ross, D., & Ross, S. (1963). Imitation of film-mediated aggressive models. *Journal of Abnormal and Social Psychology*, 63, 575-582.

<sup>94</sup> Reference should be made to the work of Condry, J. (1989). "The psychology of television" Hillsdale, NJ: Erlbaum.

<sup>95</sup> Zillman, D. (1982). Television viewing and arousal. In D. Pearl, L. Bouthilet, & J. B. Lazar (Eds.), *Television and behavior: Ten years of scientific progress and implications for the 80s (Vol II)*. Washington, DC: Government Printing Office.

<sup>96</sup> Berkowitz, L. (1974). Some determinants of impulsive aggression: The role of mediated associations with reinforcements for aggression. *Psychological Review*, 81, 165-176.

<sup>97</sup> For further details reference should be made to the following documents: - Gerbner, G., Gross, L., Morgan, M., & Signorelli, N. (1980). The "mainstreaming" of America: Violence profile No. 11. *Journal of Communication*, 30(3), 10-27. Gerbner, G., Morgan, M., & Signorelli, N. (1986). Living with television: The dynamics of the cultivation process. In J. Bryant & D. Zillman (Eds.), *Perspectives on media effects*. Hillsdale, NJ: Erlbaum. Signorelli, N., Gross, L., & Morgan, M. (1982). Violence in television programs: Ten years later. In D. Pearl, L. Bouthilet, & J. Lazar (Eds.), *Television and behavior: Ten years of scientific progress and implications for the 80s (Vol II)*. Washington, DC: Government Printing Office.

*Knowledge* - Despite television containing a lot of factual information, there also appears to be little research<sup>98</sup> into the effect that this has on people's knowledge base. However, it has been proposed that television can have an impact on both the formation and organization of viewers' concepts<sup>99</sup> but relevant evidence tends to come from advertising research and research on the effects of social role portrayals.

It is also considered that possible mechanisms for the formation of concepts may include memorising images of category instances encountered on television, or abstracting prototypes or rules from them. Arousal is another mechanism that has been invoked to explain television's impact on information acquisition. Cortical arousal (i.e. those arousal processes that serve attention, perception, and response preparation) is considered in this context<sup>100</sup>, where certain features of television programmes, such as rapid pace or visual effects may produce cortical arousal and thereby create attentiveness in the viewer, which in turn may facilitate his or her acquisition of information.

*Cognitive Skills* - There is evidence to suggest that there are a variety of ways in which television can influence cognitive skills. For example, television appears to have an effect on viewers' spatial abilities, imagination, and task perseverance. It has been demonstrated that watching slow zooms into the detail of a large picture teaches children visual analytic skills<sup>101</sup>. Similarly, watching changes in camera perspectives can enhance children's spatial perspective taking. Research has also demonstrated a relationship between the pacing of television programming and task persistence. Whereas fast-paced programming can make children more impulsive, whereas slower paced programs have been shown to increase their persistence in everyday school activity<sup>102</sup>.

It has been suggested that formal features of television (such as camera movements) can model cognitive processes for the viewer<sup>103</sup>. Another possible mechanism is that television may help to activate already existing mental skills in the viewer. It has also been argued that television may provide viewers with a rich storehouse of visual images that they may draw upon

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<sup>98</sup> Although a bit dated now and not covering any work over the last twenty years, discussion on this can be found in Bryant, J., Alexander, A., & Brown, D. (1983). Learning from educational television programs. In M. J. Howe (Ed.), Learning from television: Psychological and educational research. London: Academic Press.

<sup>99</sup> Anderson, D. R., & Collins, P. A. (1988). The impact on children's education: Television's influence on cognitive development. Washington, DC: U.S. Department of Education.

<sup>100</sup> Zillman, D. (1982). Television viewing and arousal. In D. Pearl, L. Bouthilet, & J. B. Lazar (Eds.), Television and behavior: Ten years of scientific progress and implications for the 80s (Vol II). Washington, DC: Government Printing Office.

<sup>101</sup> Salomon, G. (1979). Interaction of media, cognition, and learning. San Francisco, CA: Jossey Bass.

<sup>102</sup> Friedrich, L. K., & Stein, A. H. (1973). Aggressive and prosocial television programs and the natural behavior of preschool children. Monographs of the Society for Research in Child Development, 38 (Serial No. 151).

<sup>103</sup> Salomon, G. (1979). Interaction of media, cognition, and learning. San Francisco, CA: Jossey Bass.



when engaged in imaginative thought<sup>104</sup>. Therefore, it could be argued that access to “a rich storehouse of visual images” through interactive TV on-demand could help to develop mental skills. This could be a very interesting line of research to develop.

Based on research reviewed<sup>105</sup> mainly about American society it appears that active, effortful processing of television results in better learning outcomes than passive processing. The amount of mental effort expended appears to be related to viewers’ preconceptions about the medium. Generally, viewers seem to perceive television as easier than print, and invest less effort to process information presented through this medium than through print. Viewers also have specific expectations about what they can and cannot learn from television well, and which types of television programs may require more active processing than others. This implies that the amount of mental effort expended and learning outcomes may differ across different types of television programs. However, very little appears to be known yet about how viewers from different cultural backgrounds approach television.

#### **4.5.3 Interactivity and Learning**

Hardly any research has yet been conducted on how people learn with interactive TV. One recent paper referring specifically to t-learning has argued<sup>106</sup> that the high penetration and acceptance of TV has already established a potential market for interactive TV’s acceptance. The work compared the computer and traditional TV with interactive TV – with perhaps the strongest argument in favour of interactive TV being the high quality of the visual and audio experience. Other arguments were less convincing, but it did call for more research in this area.

Although there is limited research in this area, some key insights can be gained from interactivity and learning in general and from understanding gained from other educational media in particular computer-based learning. Building upon this work, a framework can be established for future research into learning with interactive TV solutions. This is important as there has been a lot of hype about the role that interactivity can play in learning through interactive TV with little sound theoretical basis to back this up. In fact, there have even been questions raised about the importance and value of interactivity in computer-based learning environments<sup>107</sup>. It has also been argued that “interactivity” in the majority of “edutainment” software is little more than a marketing promise, or a superficial ornament<sup>108</sup>.

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<sup>104</sup> Brown, L. (1986). What books can do that TV can't. *School Library Journal*, 38-39.

<sup>105</sup> “Learning from Television: A Research Review” by Babette Moeller CCT Reports, Issue No. 11 October 1996 Page 14 [http://www.media.mit.edu/explain/papers/10\\_1996b.pdf](http://www.media.mit.edu/explain/papers/10_1996b.pdf)

<sup>106</sup> Miltiadis Lytras, Chris Lougos, Polyneikis Chozos, Athanasia Pouloudi (2002) "Interactive Television and e-Learning Convergence: Examining the Potential of t-Learning", ECEL 2002, The European Conference on eLEARNING, Brunel University  
<http://www.eltrun.aueb.gr/papers/tlearning.pdf>

<sup>107</sup> See Rose, E. (1999). Deconstructing interactivity in educational computing. *Educational Technology*, 39(1), 43-49

<sup>108</sup> “Changing sites of education: educational media and the domestic market” Page 8-9 ESRC'

Despite this criticism others argue that interactivity in learning is considered "a necessary and fundamental mechanism for knowledge acquisition and the development of both cognitive and physical skills"<sup>109</sup> and that interaction is intrinsic to successful, effective instructional practice as well as individual discovery<sup>110</sup>. It is also argued that "making automated learning environments highly interactive is a multi-disciplinary art ... however, the level of interactivity as measured on anyone's scale does not approach the level of interactivity in a human tutoring situation"<sup>111</sup>. Therefore, the challenge is to make best use of the technology, not to replicate human behaviour and communication, but to enhance human-computer (or TV) communications through a better understanding of the use and implementation of interactive events<sup>112</sup>.

Drawing upon a number of sources of research, interactivity could be separated into "operational interactivity" and "conceptual"<sup>113</sup> <sup>114</sup> or cognitive<sup>115</sup> interactivity". Operational interactivity refers to a functional activity: the entering of information through a keyboard or remote control; the resultant response from the system and the elements that are required to make up that function.

Conceptual or cognitive interactivity refers to the learning processes that take place as a result of carrying out a specific interactive operation. Other work seems to suggest that with a learning activity, a distinction can be made between one in which the learner is learning *from* (instructivist) and one in which the learner will learn *with* (constructivist)<sup>116</sup>. Current pedagogy associated with education reform appears to be based around the concept of "constructivism" that is based on the premise that a person constructs their

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funded research conducted by Prof David Buckingham, University of London: Institute of Education between 01 December 1999 - 30 November 2001.

[http://www.regard.ac.uk/research\\_findings/R000238218/report.pdf](http://www.regard.ac.uk/research_findings/R000238218/report.pdf)

<sup>109</sup> Barker, P. (1994). Designing Interactive Learning, in T. de Jong & L. Sarti (Eds), Design and Production of Multimedia and Simulation-based Learning Material. Dordrecht: Kluwer Academic Publishers.

<sup>110</sup> Sims, Roderick. Interactivity: A Forgotten Art? [Online] 27 January 1997

<http://www.gsu.edu/~wwwitr/docs/interact/>

<sup>111</sup> Spector, M.J. (1995). Integrating and Humanizing the Process of Automating Instructional Design, in R.D. Tennyson & A.E. Barron (Eds), Automating Instructional design: Computer Based Development and Delivery Tools. Berlin: Springer-Verlag.

<sup>112</sup> "Engagement, Control and the Learner: A Theoretical Appraisal of Interactivity" Roderick C. Sims Educational Multimedia Southern Cross University, Australia 1997

<http://www.ascilite.org.au/conferences/adelaide96/papers/40.html>

<sup>113</sup> "The Interactive Educational Content Forum Building a Framework for Interactive Educational Television Content" Summary of Final Session 12 July 2002. Unpublished paper

<sup>114</sup> "Construction and abstraction: contrasting methods of supporting model building in learning science" Rosemary Luckin And Benedict Du Boulay School of Cognitive & Computing Sciences, University of Sussex,

<http://www.cogs.susx.ac.uk/users/bend/papers/clemmasfinal.pdf>

<sup>115</sup> Aldrich, F., Rogers, Y. & Scaife, M. (1998). Getting to grips with "interactivity": Helping teachers assess the educational value of CD-ROMs. British Journal of Educational Technology, 29(4), 321-332.

<sup>116</sup> Reeves, T. C. (1999). A research agenda for interactive learning in the new millenium. In B. Collis & R. Oliver (Eds), Proceedings of EdMedia 1999. Charlottesville, VA: Association for the Advancement of Computing in Education.

own understanding of the world they live in by reflecting on their own experiences. Each person generates his or her own “rules” and “mental models” that they use to make sense of their experiences. Learning, therefore is adapting to mental models to accommodate new experiences<sup>117</sup>. Further work on the relationship of learning theories to interactivity can be found in the work of Sims<sup>118</sup>.

Clearly, operational interactivity is there to support conceptual or cognitive interactivity. Therefore, drawing upon computer-based learning work from the instructional designer’s perspective<sup>119</sup> the following levels of what could be described as operational interactivity have been identified: -

- *Object interactivity* - refers to an application in which objects (buttons, people, things) are activated by using pointing device. When a user "clicks" on the object, there will be some form of audio-visual response. The functionality of such objects can be varied according to consequential factors such as previous objects encountered, previous encounters with the current object or previous instructional performance/activity.
- *Linear interactivity* - refers to applications in which the user is able to move (forwards or backwards) through a predetermined linear sequence of instructional material. Often termed “electronic page turning”, this class of interaction does not provide response-specific feedback to learner actions, but simply provides access to the next (or previous) display in a sequence.
- *Support Interactivity* – ability for user to receive performance support that may range from simple help messages to complex tutorial systems.
- *Update Interactivity* - relates to individual application components or events in which a dialogue is initiated between the learner and computer-generated content. For this concept, the application presents or generates problems (either from a database or as a function of individual performance levels) to which the learner must respond; the analysis of the response results in computer-generated update or feedback. Update interactivity can range from the simple question and answer format to complex conditional responses that may incorporate artificial intelligence components.

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<sup>117</sup> For further discussion on this and an overview of theories of learning that have contributed to the development of constructivism see “Experience-Based Learning Theories” Bob Russell, The Informal Learning Review <http://www.informallearning.com/archive/1999-0304-a.htm>

<sup>118</sup> Sims, R. (2000). An interactive conundrum: Constructs of interactivity and learning theory. Australian Journal of Educational Technology, 16(1), 45-57.  
<http://www.ascilite.org.au/ajet/ajet16/sims.html>

<sup>119</sup> Sims, Roderick. Interactivity: A Forgotten Art? [Online] 27 January 1997  
<http://www.gsu.edu/~wwwitr/docs/interact/>

- *Construct Interactivity* - an extension to update interactivity, and requires the creation of an instructional environment in which the learner is required to manipulate component objects to achieve specific goals. Unless the construction is completed in the correct sequence, the task could not be completed. Construct interactions require significantly more design and strategic effort, as many parameters affect the successful completion of an operation.
- *Reflective Interactivity* - allows the current user to compare their response to that of other users as well as recognised "experts". In this way, learners can reflect on their response and make their own judgement as to its accuracy or correctness.
- *Simulation Interactivity* - extends the role of the learner to that of controller or operator, where individual selections determine the training sequence. For example, setting a range of switches to certain values to enable the functioning of a production plant, with the settings selected determining the presentation or update sequence.
- *Hyperlinked Interactivity* - With hyperlinked interactivity, the learner has access to a wealth of information and may "travel" at will through that knowledge base. The provision of linked information can provide a means to present problems that are solved by correctly navigating through the "maze" of information.
- *Non-Immersive Contextual Interactivity* - This concept combines and extends the various interactive levels into a complete virtual training environment in which the learner is able to work in a meaningful, job-related context.
- *Immersive Virtual Interactivity* - provide an interactive environment in which the learner is projected into a complete computer-generated world which responds to individual movement and actions.

So far most of the learning activities utilising interactive digital TV solutions have tended to be developed by those from the broadcasting world rather than the educational world. It appears that little consideration has been given to the pedagogical issues that need to be addressed when creating interactive learning activities. However, there is a body of knowledge about the various operational ways of achieving interactivity with educational software and in other interactive TV contexts. What is still needed is a greater understanding of how to match operational interactivity with the various ways in which people learn.

With the exception of "immersive virtual interactivity" all the other modes of operational interactivity appear to be possible through one or more current and emerging interactive digital TV solutions. As a starting point Fig 5 has made a preliminary attempt to identify which forms of operational interactivity are perhaps better utilised in an instructivist and a constructivist learning activity. For example, a non-formal learning activity involving a "do it yourself"

(DIY) activity is more likely to require an instructivist mode. Whereas learning about the “history of art” – as a leisure activity or “coping with drugs” is more likely to require a constructivist approach.

Operational interactivity	Conceptual or cognitive interactivity	
	Instructivist	Constructivist
Object	√	√
Linear	√	
Support	√	√
Update	√	√
Construct	√	
Reflective		√
Simulation		√
Hyperlinked		√
Non-Immersive Contextual		√
Immersive Virtual		

**Fig 4.5 Utilising operational interactivity for an instructivist and a constructivist learning activity through an interactive digital TV solution.**

Further consideration and refinement of this framework is still needed, but it could lead onto several related lines of research. One, of which, could be comparing the different modes of operational interactivity with other educational media in order to identify the most appropriate media for achieving a specific learning activity. Usability and cost comparisons could be a further extension of the model – to assist understanding of the most appropriate medium to use.

Understanding interactivity and its role in the learning process is very complex. It can be approached from a large number of different perspectives and this short review has only been able to cover a few perspectives and suggest just one way forward in order to try to gain a better understanding of how interactivity through digital TV solutions could enhance learning opportunities. However, considerable work is still needed in this area to help understanding of the best way forward as to how interactivity helps to motivate learners.

#### **4.6 Conclusions**

This chapter has tended to draw upon and pullout some aspects of research that has touched some issues concerning learning in the home from a number of different perspectives. It is accepted that some European cultural dimensions may have been missed from this rather more limited research. However, it is considered that these insights do point to some important issues that need to be addressed within this study and they do highlight needs for further research into this area.

The following conclusions were reached: -

1. The home is already considered to be an important place of learning, with some evidence to suggest that there is an increasing preference for people wanting to learn in the home.
2. Therefore, within the context of increasing lifelong learning opportunities, more attention should be focused on finding solutions for increasing learning opportunities in the home.
3. Attention is already being directed towards the use of information and communication technologies for increasing learning opportunities – although this has tended to focus more on the use of a computer connected to the Internet.
4. There is evidence to suggest that this will increase participation of those already engaged in learning. However, there is also growing evidence to suggest that this is not encouraging wider participation of those not already active in learning.
5. Some limited evidence seems to suggest that more than a third of adults in certain regions have not participated in what they consider to be any form of learning since compulsory school leaving age.
6. Increasing attention is being given to the role of non-formal or informal learning within a lifelong learning context. Often this takes place without the intervention of professional educators. However, increasing informal learning opportunities could play an important role in widening the participation of people in learning and moving them towards a more formalised learning mode.
7. Traditionally television has tended to be used as an informal mode of learning. Therefore enhancing learning opportunities through the use of interactive digital TV solutions could help in achieving this aim.
8. Unsurprisingly, given the scarcity of developments in this field, there has been little research into using interactive TV for learning purposes.
9. Although it is probably accepted that the television in its traditional format is a very powerful medium, the body of research into its role for learning is rather more limited. It has tended to focus on the impact that TV makes on individuals or on the role of specific educational TV programmes like those used as part of an open university type course.
10. Understanding the role of interactivity is a very complex process with most research focused on interactivity in computer-based environments. Considerably more research is needed into its role within interactive digital TV learning environments.



## 5. Future Scenarios

### 5.1 Introduction

The aim of the following scenarios is to widen horizons as to what might be possible through using a range of interactive digital TV technologies. Most of the technologies are already available but the business model to ensure that these services are sustainable is still missing.

As part of the consultation and consensus forming process, experts and others who had a specific interest in this area were invited to complete an online survey for each of the scenarios. Although the number of responses (between 6 and 19) was rather lower than had been hoped for, they do give some indication of how valid and realistic each scenario is considered to have been. A short analysis of the results is given after each scenario. (Further details can be found in the Appendix B - Consultation and Consensus Forming Process)

### 5.2 Scenarios

#### 5.2.1 Continuous professional development for teachers

Marcello returns home from teaching science at his secondary school. Like most teachers his work does not finish when he leaves through the school gates. Most of his preparation and marking of assignments tends to be done at home. In addition, he needs to keep himself updated of developments in his own subject area as well as changes in the curriculum. Fortunately, he now has a new tool to help him keep up to date with developments and find out how fellow science teachers are using the latest teaching techniques to improve their science lessons.

As Marcello lives in a rural area of Italy it is difficult for him to travel to the nearest Teachers' Resource Centre to meet his colleagues and discuss some new approaches to teaching science. The round trip would take him nearly three hours. However, like many people living in rural areas he does receive satellite digital TV in his own home. Therefore, the local education authority has provided Marcello with a personal digital video recorder (PVR) free of charge. His existing satellite receiver has been connected into the PVR which is has been connected to his television. The PVR is also connected to his existing normal telephone line. Connecting the equipment took Marcello a few minutes with the aid of a colour-coded guide. Once switched-on the PVR automatically sets itself up. Programmes can be automatically recorded onto the PVR for viewing at any time without the need for Marcello to set the time to record.

At regular intervals programmes from the local and national education authorities are broadcast overnight and recorded automatically on the PVR. This is very convenient for Marcello as he is able to watch the programmes at his convenience when he does not have any other family commitments.

This early evening Marcello's children are out with his wife visiting relations so it is an ideal opportunity for him to watch the weekly science update programme already recorded on his PVR. He enters his identify number and selects the appropriate programme from his personal menu using his remote control. The focus this week is on human genetics and starts off with an explanation from a senior government education advisor as to why it now been included in the national curriculum. The programme then demonstrates, using real teachers, various



lesson techniques for teaching the topic. Using his remote control Marcello can easily stop, start, rewind and fast-forward the programme with hardly any loss of video quality.

In order to help his understanding of the topic and the techniques required to teach it, Marcello has to fill in various multiple choice questions at various points during the programme. He has to take these seriously as all the answers are sent back via the telephone line and recorded centrally on his continuous professional development (CPD) profile. As part of his teaching contract he needs to successfully complete a certain number of hours of CPD each year. This is taken into account when he might be seeking promotion and certainly is a condition of him receiving his annual salary increase. It also counts towards an "Advanced Teaching Certificate in Science Education" accredited by the nearby university.

Marcello's mind then turns towards the rather difficult class of 13 year olds he has to teach later in the week. He recalls that there was a serious of programmes dealing with difficult classes a few weeks ago. Unfortunately they are no longer stored on his PVR but he is able to find them in the catalogue of available programmes and send a request to have them to be delivered to his PVR. Times of delivery of programmes vary according to the demand from other teachers. The higher the demand the quicker they are broadcast via satellite. Marcello receives a message saying that the programme will be delivered in about 45 minutes. He smiles, obviously he is not the only one having problems with a class of 13 year olds. In some city areas with broadband TV connections the programme can be made available immediately to his teaching colleagues.

He then settles down to watch the various five to ten minute news clips about "Science in the News". He gets excited about the news clip referring to a wobbly footbridge over the River Thames in London. This is ideal for his Physics class of 15 year olds so he presses a button so the recording can be saved on videotape with his videocassette recorder. Next day he can take the tape into school to use.

A message pops up on the TV telling him that his requested programmes have now been delivered to his PVR. So Marcello settles down to watching how to deal with a difficult class of 13 year olds. However, unlike a linear programme various "What would you do if.....?" options are available to him at stages during the programme. This enables him to see the potential consequences of his actions. By going through the programme again and choosing various other options Marcello is able to gradually work out a strategy that would be most appropriate for his own class. Feeling better now he decides to finish his work for the day. How he can settle down to watching the latest football match of his favourite team that was recorded onto his PVR a couple of hours earlier.

### ***Results of Survey***

A total of 19 responses were received from the online survey. 49% considered that the scenario was portrayed as very or generally realistic, with another 38% agreeing that it was quite realistic. Only 11% considered that it was not realistic at all.

When asked how realistic the learning solution was from an educational perspective, 52% considered that it was very or generally realistic with another 26% saying it was quite realistic. Only 21% considered that it was not realistic at all.

A total of 78% considered that the solution was likely or very likely from a technology perspective with the rest considering it to be quite likely.

When asked as to whether they think the solutions are likely to be viable or sustainable 46% considered this to be likely or very likely with another 31%

considering that it was quite likely. Only 21% considered that it was not likely at all.

### 5.2.2 Home-school links

Fas, aged nine, has just returned from school. His mother Pam asks him what he has been doing today. Feeling rather tired, Fas throws his coat on the nearest chair, shrugs his shoulders and just says “Oh, lots of things!”

Later that evening, once Fas is in bed, his mother goes to the TV set and just before she watches her favourite “soap”, she selects to the local services on her broadband TV service. From there she can go the video diary of Fas’s teacher - Steve Pearson.

Once a week just before Steve finishes for the day he records his weekly video diary for the parents of his class of nine year olds. He includes a few video-clips taken earlier during the week using the school’s hand-held digital video recorder. All these video-clips can be easily inserted into a standard template making them easy to assemble. The quality is not as high as someone presenting the news but it will be highly relevant for the parents of the children that he teaches. The broadband connection from the school enables Steve to easily upload the video diary onto the local learning utility network, which forms part of a larger community utility carrying healthcare, local and central government information.

The Netcom Company runs the service in the form of a public-private partnership that has successfully installed video-quality broadband links to every home and flat in the neighbourhood by various means. This enables any person in every household to access and interact with video-rich content on demand.

Steve describes how they have been making bridges out of paper and testing them as part of the Design and Technology National Curriculum. For further information for parents, Steve adds a link to another video that he prepared at the beginning of term describing in more detail the concepts, skills and tasks that have been planned for the term. This in turn has been linked to video-clips describing various learning journeys prepared by the central government education department to help parents better understand different aspects of the national curriculum.

Before Steve finishes his video diary he reminds parents to complete the form for next week’s school visit and to pay electronically through their TV sets. This saves Steve a lot of time having to collect in money and process the forms. He can devote more of his teaching time to being a learning facilitator.

Before Pam settles down to watching her favourite “soap” she checks the school events diary for full details of the school trip and pays for it through the TV set by entering her debit card number.

### ***Results of survey***

A total of 15 responses were received from the online survey. Only 1% considered that the scenario was portrayed as very realistic. However, 40% considered it to be generally realistic, with another 40% agreeing that it was quite realistic. Only 13% considered that it was not realistic at all.

When asked how realistic the learning solution was from an educational perspective, the responses were split evenly between generally realistic, quite realistic and not realistic at all.

A total of 60% considered that the solution was likely from a technology perspective, 20% considered it to be quite likely and another 13% not likely at all.

When asked as to whether they think the solutions are likely to be viable or sustainable 40% considered this to be likely with another 40% considering that it was quite likely. Only 20% considered that it was not likely at all.

### 5.2.3 Remote Mathematics Tutor

Sixteen-year-old Alessandra is working hard revising for her national school exams. Generally she is not having too many difficulties with most of her subjects but she does have a few problems with some aspects of mathematics. Despite the wide range of revision guides that are available in a paper-format or even online she still has a few problems. Alessandra complains to her mother that all her friends have lessons with an individual tutor paid for by their parents.

Unfortunately, most tutors tend to insist on a block of ten or more lessons costing 35-60 Euro per hour. This is rather expensive for Alessandra's parents. However, Alessandra's father has seen an advertisement about a private company who will provide remote tutorial support almost on-demand through their digital cable TV service.

With her parent's permission Alessandra rings a telephone number that takes her through to the call centre of the company called "Easylearning". She explains the nature of her problem to the call centre receptionist. Before the receptionist puts Alessandra through to a Maths Tutor she asks to speak to a parent. Alessandra's father agrees to give Alessandra a credit limit of up to 150 Euro for remote lessons and gives his credit card details. Alessandra is then supplied with a special PIN number to use every time she needs the remote tutor or wants to use other learning resources supplied by the company through the TV and also online using a computer.

Just before Alessandra is put through to the Maths Tutor she is asked to select Channel 69 on her TV. This then means she can then see her tutor - Dave - on the TV whilst talking to her by telephone. Alessandra explains that she has a problem with quadratic equations. Dave is able to talk her through the problem and explain with diagrams or an on-screen whiteboard how to solve the problem. At the end of the session details are given of the length of the consultation and how many credits are left. In addition, there is an option to access the archived video-clips of the frequently asked questions in this subject area. These can be accessed at any time on-demand and are cheaper than using the live tutor. The presentations have also been "polished-up" so they are clear and concise.

As Dave, the tutor, waits for his next client in the call centre, he wonders whether he should apply for a position of Maths Tutor in the new national free Maths Direct service that is due to start next year with funding from the national education department as part of a national target to improve the nation's maths skills.

### **Results of survey**

A total of 15 responses were received from the online survey. Most people - 79% - considered that the scenario was portrayed as very realistic or generally realistic. Only 13% considered that it was not realistic at all.

When asked how realistic the learning solution was from an educational perspective, the 59% of responses considered that it was very or generally realistic with another 33% considering it to be quite realistic.

A total of 52% considered that the solution was very likely or likely from a technology perspective with another 40% considering it to be quite likely.

When asked as to whether they think the solutions are likely to be viable or sustainable 33% considered this to be very likely or likely with another 33% considering that it was quite likely but 26% considered that it was not likely at all.

#### **5.2.4 How do I? Do it yourself (DIY)**

Janice is fed up with the sight of the wallpaper in her living room, but she can't really afford to get a decorator and even if she did it would take months for one to come. She sighed as she watched the TV programme "Changing Rooms." She really wished her house could be chosen for a "makeover" just like those on the TV programme.

However, towards the end of the programme the presenter starts describing about a new service that enables people to order their own DIY programmes or ask various "how do I?" questions about decorating or on other topics. The service varies according to how the viewer is receiving digital television and whether they can record programmes on a digital video recorder.

For viewers using a satellite TV service and having a personal video recorder (PVR), viewers can press the red interactive button on their remote control to take them to a menu of various DIY programmes that they can order for later viewing. Once a programme has been ordered payment is debited to their satellite TV bill at the end of the month and the viewer is advised when the programme will be delivered to their PVR. This will vary depending on the demand for the programme. The higher the demand the quicker it will be broadcast via satellite to those that have ordered it and stored on their PVR often overnight when the PVR may not be used for other purposes. It is much more efficient for the broadcaster to aggregate all the orders and then broadcast on one occasion. The programme then may be used off and on for several days before it is automatically erased from the PVR. During this time the programme could be stopped, started, fast-forwarded and rewound at will.

For viewers with digital cable TV or another two-way broadband connection, they can request a DIY programme on-demand or ask the question for example - "How do I start to redecorate my bedroom"? After an introductory video the viewer is given a number of options to select depending on the skills they need to learn. Depending on the options that are chosen a new video-clip appears. If there is a problem with understanding how to do a particular task the viewer can rewind the video-clip and move it slowly forward or request another explanation from a different angle. In effect various video-clips are being called-up depending on the personal needs of the viewer.

Janice is fortunate in having digital cable TV so the rest of her evening is devoted to learning how she should set about changing the wallpaper in her living room. Armed with this new knowledge she sets off with confidence to buy everything she needs from the local DIY shop. Janice was able to access the programmes free of charge because they were sponsored by the DIY chain and to ensure that her loyalty with the company is maintained the TV presented her with a special code that she was able to give to the shop in order to get a discount.

#### ***Results of survey***

A total of 13 responses were received from the online survey. Most people - 76% - considered that the scenario was portrayed as very realistic or generally realistic with another 15% saying it was quite realistic. Only 7% considered that it was not realistic at all.

When asked how realistic the learning solution was from an educational perspective, the 68% of responses considered that it was very or generally realistic with another 33% considering it to be quite realistic.

A total of 83% considered that the solution was very likely or likely from a technology perspective with another 7% considering it to be quite likely and 7% not likely at all.

When asked as to whether they think the solutions are likely to be viable or sustainable 76% considered this to be very likely or likely with another 15% considering that it was quite likely and only 7% considered that it was not likely at all.

### **5.2.5 Developing basic numeracy skills from TV soap operas**

Soap operas provide compelling viewing from many millions of people, portraying many issues that many people easily relate to.

Annie is sitting watching her favourite soap opera at home in between her early morning and late shift as a cleaner in the local supermarket. One of the characters - John, a trainee carpenter- in the drama has difficulties with taking measurements and making calculations to estimate how much wood is needed and how much he would get in change when he buys something in a shop. Annie is having very similar problems and relates very much to John's problems.

A particular feature of this soap opera is the ability to access additional information and video diaries by the characters through pressing the interactive TV button on the remote control of the digital TV service. After pressing the interactive TV button Annie selects John's picture to access his video diary. Annie watches and listens as John describes the problems that he has had with numbers and the ways he is now starting to overcome his problems. He then describes some of the exercises that he has been doing to start to overcome his problems. These same exercises are available on the interactive services that are accessible from the video-diary.

Anne tries out some of the exercises that involve addition, subtraction, multiplication and estimation. She gets an immediate response if they are correct and helpful guidance if they are wrong. Some of the exercises are in a game-show format and learners are invited to submit their results. In addition, learners are invited to submit their mobile telephone number. A various intervals during the day a SMS message is sent to their mobile phones with a simple exercise for them to complete and return the result. Participation rates are shown on the TV in the interactive services area.

For Annie this starts to become very engaging. She increasingly starts to get very excited by her successes and also realises that she is not the only person trying to overcome her numeracy problems. The numeracy theme continues to be touched upon over the following weeks in the soap opera but for Annie it is really John's video-diaries that keep her going. For her he has almost become a personal mentor describing how he overcomes his problems. Annie also does not suffer the embarrassment she has had in the past, as no one really knows what she is doing. The messages she gets on her mobile telephone are only read by her and she looks at John's video diaries and completes the exercises when she is on her own at home.

Over time she starts to trust the messages on her mobile telephone - that are always friendly, encouraging her and pointing her to new exercises that she can find on her TV. Every so often she is also given a telephone number if she needs further help. One day she decides to call the number on the SMS message. A friendly person from the national learning call centre answers the call. Although, the call centre operator does not know Annie's name she does

know that the owner of the mobile phone has been completing various numeracy exercises over the last few weeks so she has some knowledge of what Annie has been achieving. This becomes the starting point for a conversation that eventually results in Annie agreeing to a home visit by a numeracy tutor who can further assess her learning needs and encourage her to join a small group in a local learning centre – something that Annie would have never considered doing since her negative experiences she had during her sporadic attendances at school when she was younger.

This scenario illustrates the potential of watching TV in a passive mode but to be able to gradually encourage a person to become an active learner without them having the negative experiences that they may have had when in formal education.

### **Results of the survey**

A total of 15 responses were received from the online survey. Most people - 66% - considered that the scenario was portrayed as very realistic or generally realistic with another 20% saying it was quite realistic. 13% considered that it was not realistic at all.

When asked how realistic the learning solution was from an educational perspective, 53% of responses considered that it was very or generally realistic with another 13% considering it to be quite realistic. However, 26% considered it not realistic at all.

A total of 72% considered that the solution was very likely or likely from a technology perspective with another 13% considering it to be quite likely and 13% not likely at all.

However, when asked as to whether they think the solutions are likely to be viable or sustainable 28% considered this to be very likely or likely with another 26% considering that it was quite likely and 26% considered that it was not likely at all.

### **5.2.6 New employment opportunities and learning needs analysis**

Fabrizio De Carlo has just returned home from work having just been told by his employer, in the automotive industry, that he is going to be made redundant in three months time. Very depressed, he switches on his TV to the Employment Opportunities Channel to see what is available within his region.

The programmes have been prepared by the regional TV Company in conjunction with the regional employment agency who has reallocated their resources away from physical offices scattered across their region to utilising mass-media for advertising jobs. They have also established a 24 hours a day call centre for dealing with enquiries about employment opportunities and learning needs. Other income comes from the employment “flashes” or advertisements paid for by employers who urgently need to fill vacancies.

As Fabrizio views the programmes passively he becomes interested in an item about the owner of a rural vehicle repair service. The owner is getting too old to run his business and he cannot persuade his sons to run it for him. However, the local community is very dependent on his business, as it is the only one in the area. The programme describes what regional development grants are available for taking over or starting new businesses in the region and also highlights skills that would be required for running a business.

At this point the information icon appears on the screen. Fabrizio presses the interactive button on the remote control and the screen displays in a graphical format (high quality

teletext) various options for further information. Fabrizio is able to move an arrow around the screen to point on a map where he lives. He is able to display a list of skills that may be required for running a business. He is able to “bookmark” that page and return to it later. By selecting further options he is able to find out what courses are available locally and also what job vacancies exist relating to the automotive industry. He is also able to find out what existing businesses require new partners.

An additional service on offer is a learning needs analysis where Fabrizio is able to answer various questions by selecting options using his remote control. He is then presented with a diagnosis of his learning needs and suggestions as to what to do next. He is also given a unique identification number. At all points during this information service there is an option to receive further information via email or ring up the helpline with a freephone number. As Fabrizio does not have email he rings up the helpline and asks for the information to be sent through the post by giving the ID number to the call centre operator. He is also given the immediate opportunity to discuss with a personal adviser, a strategy to get him back into full employment. As they talk she can point him to information available on the TV screen and produce a personal development plan that is displays on the TV screen as they talk. This is achieved by linking the unique ID to the address of Fabrizio’s set-top box.

### **Results of survey**

A total of 11 responses were received from the online survey. Most people - 72% - considered that the scenario was portrayed as very realistic or generally realistic. However, 27% considered that it was not realistic at all.

When asked how realistic the learning solution was from an educational perspective, the 72% of responses considered that it was very or generally realistic with another 18% considering it to be quite realistic. Only, 9% considered it not realistic at all.

A total of 63% considered that the solution was very likely or likely from a technology perspective with another 36% considering it to be quite likely.

When asked as to whether they think the solutions are likely to be viable or sustainable 50% considered this to be very likely or likely with another 30% considering that it was quite likely and only 20% considered that it was not likely at all.

### **5.2.7 A life specific episode stimulates skills updating**

On the family life style channel, Naomi and Dmitri have just been watching a TV programme about how young children learn to talk. This is of particular interest to them as they have a six-month-old son - their first child.

Although an independent producer supported by the National Health Council has produced the programme, it is actually sponsored by a baby food supplier. This private-public partnership also consists of a national training organisation that is keen to utilise the interest created by the programme. They want to encourage people to train to become child-care assistants for nurseries and playgroups and teacher’s assistants in primary and secondary schools. The national training organisation has received a grant from the government to do this but it must meet certain targets for training people up to a specific level of qualifications.

During the TV programme, the interactive icon is displayed on the screen. This means more information is available. Naomi presses the interactive button to find out what else is available. Dmitri requests a fact sheet about the programme, which can be sent via email or post. All their contact details have already been pre-programmed into their set-top box so they don’t have to enter the details again. Before their request is sent off they are asked if they

have any children under three years and also asked whether they would object to receiving any news about young children's products. (This is the opportunity for the baby food supplier to capture information about parents with young children.)

Naomi also notices that a TV-based course is available leading to an introductory qualification in child-care. She selects this option from the interactive menu and a two-minute video-clip is shown about the course. It involves receiving a booklet via email, watching various programmes that are broadcast on the learning channel and completing various exercises based around various observations on young children that are submitted for assessment by selecting various options in a form on the TV. The course is divided into various modules that can be taken individually. There is also an opportunity to do a taster module at no charge.

With encouragement from Dmitri, Naomi decides to have a go on the course, which costs around 50 euro per module with four modules leading to basic-level recognised national qualification. She is even able to charge this to her individual learning account - an initiative from national government to encourage people back into work through learning.

After selecting and paying for the first module of the course through entering a PIN number on the remote control, Naomi almost immediately receives details about the course via email. She gets a welcome letter, the course booklet to print out, details of her online tutor should she require help and the timetable for the TV programmes. In fact this timetable has also been programmed into the set-top box so Naomi can be alerted when her programmes are due to be viewed. The set-top box can also be programmed to record the programmes on their videotape recorder. If they had a later version of their set-top box the programmes would have been automatically recorded on the set-top box for up to forty-eight hours. Each programme for the course is regularly repeated on the learning channel so it will only be a few days before the first programme is shown.

The next day Naomi also receives an email from her online tutor who happens to be based at her regional college 70 km away. Her tutor informs her that they organise monthly meetings at the college for those taking the child-care course and crèche facilities are also available. She looks forward to the day away from her home and the college hopes that they will eventually be able to persuade Naomi to follow one of their other courses.

### **Results of survey**

Only 6 responses were received from the online survey. A total 42% considered that the scenario was portrayed as very realistic or generally realistic with another 57% considering that it was quite realistic.

When asked how realistic the learning solution was from an educational perspective, 42% of responses considered that it was very or generally realistic with another 42% considering it to be quite realistic. 14% considered it not realistic at all.

A total of 71% considered that the solution was very likely or likely from a technology perspective with another 28% considering it to be quite realistic.

When asked as to whether they think the solutions are likely to be viable or sustainable 56% considered this to be very likely or likely with another 42% considering that it was quite likely.



## 5.2.8 A Virtual Professional Channel

### **A Virtual Professional Channel**

Helmut is working in the mobile telephone industry and needs to regularly keep up to date the future developments in this field. His employer also needs to be assured that Helmut is regularly upskilling himself as this is vital for the company to remain competitive. The demands of the working day increasingly make it difficult to offer professional upskilling during work time. Sending people away on courses is also time consuming and expensive for the employer.

However, a satellite broadcaster has approached the company with a deal that involves giving its professional employees a free set-top box and satellite receiver if the company subscribes to the pan-European professional learning channel.

This learning channel offers regular professional updating for science and engineers across Europe who are involved in the IT, Telecom, multimedia and broadcasting industry. Known as the Convergence Channel, it is in fact not a viewing channel but purely a digital distribution channel. An advanced set-top box is used, which can be programmed to receive specific programmes. These programmes are transmitted in a compressed format and stored on the set-top box for viewing anytime over a limited period. The set-top box is able to decompress the programmes when they are viewed which means they take up limited storage space.

Should the professional home user wish to do so, they can also take out a subscription for any of the other satellite TV offerings made available by the satellite broadcaster. This is a good deal for the broadcaster as they not only receive revenue from the company for subscribing to the Convergence Channel - a high value premium service, but they are also able to reach professional people who have tended to buy higher value subscription services. In addition they are also able to take advantage of the higher incomes of the professionals and target specific interactive home shopping and other interactive services.

From the point of view of the mobile telephone company its an ideal way of keeping their professionals updated in their own time at home. In addition employees like Helmut can also take part in interactive quizzes to ensure that they have acquired the additional skills and knowledge. This information is also relied back to the employer. Helmut is also able to subscribe to specific interactive training courses. The convergence channel also offers other related interactive services like asynchronous discussion groups enabling people from across Europe to discuss specific issues of professional issue by submitting textual, audio or video comments which are transmitted by the Convergence Channel. These comments can be submitted via email and translated into multiple languages.

The Convergence Channel is successful because it is a high value premium service that can be offered to a specific community of 100,000s of professionals across Europe in multiple languages.

### ***Results of survey***

A total of 13 responses were received from the online survey. 68% considered that the scenario was portrayed as very realistic or generally realistic with another 25% considering that it was quite realistic. Only 6% considered it not realistic at all.

When asked how realistic the learning solution was from an educational perspective, 49% of responses considered that it was very or generally realistic with another 31% considering it to be quite realistic. 18% considered it not realistic at all.

A total of 68% considered that the solution was very likely or likely from a technology perspective with another 31% considering it to be quite realistic.

When asked as to whether they think the solutions are likely to be viable or sustainable 49% considered this to be very likely or likely with another 25% considering that it was quite realistic. However, 25% considered that this was not likely at all.

### **5.2.9 From holidays to language learning**

Luis and Maria have been trying to decide where to take their holidays during the summer. As they watch the TV Travel Channel they get inspired to visit the English Lake District. Although they know that they won't get as much sun as where they live in southern Spain, Maria has always had a love for the poet - William Wordsworth and Luis likes the idea of being able to go for long mountain walks. So they press the interactive button on the remote control and are guided through various screens that enable them to select their various travel options and make a firm booking using their credit card.

Once all this has been done they are then invited to learn more about the area and improve their English language skills. Some videos are available free of charge because they are in fact promotional videos supplied by the Lake District Tourist Board. But, there is also an opportunity of subscribing to a distance learning course in English literature supplied by the UK eUniversity in based in England and in English or a course on English Poets in Spanish supplied by their local university.

Maria, who already has a good understanding of English, decides to register for the English literature course through her TV set. In fact she only has to enter her personal PIN number and it brings up all her contact details that have been previous entered. She then gives her credit card details to complete her registration to the course. Maria is then asked how she would like to receive the course. If she is using broadband TV the video components of the course can be made available on demand by entering her PIN number and the course code. This gives her the ability to start the course straight away. If she has a personal digital video recorder (PVR) the first video module can be made available to her the next morning, otherwise she has the option of receiving video-cassettes by post but they can take up to fourteen days to be delivered. Maria also has a choice of receiving text-based materials and assignments by post or via email.

Luis decides that he needs to improve his English so he registers for the English language course in a similar way to Maria. As they do have broadband TV he is able to immediately access some short video clips and text-based questions that are aimed at assessing his English language level. Over the next few weeks he can dip into his language-learning course whenever it is convenient for him. However, he also receives prompts at regular intervals on his TV set - encouraging and reminding him to move to the next module. This is aimed at motivating him to continue with the course. In addition he also has access to a remote tutor via telephone at an appointed time. The combination of the tutor and the TV-based assessment enables Luis to always have access the learning module that is most appropriate to his learning needs.

### ***Results of survey***

A total of 13 responses were received from the online survey. 68% - considered that the scenario was portrayed as very realistic or generally realistic with another 30% considering that it was quite realistic.

When asked how realistic the learning solution was from an educational perspective, 61% of responses considered that this was very or generally

realistic with another 30% considering it to be quite realistic. Only 7% considered it not realistic at all.

A total of 68% considered that the solution was very likely or likely from a technology perspective with another 30% considering it to be quite realistic.

When asked as to whether they think the solutions are likely to be viable or sustainable 53% considered this to be very likely or likely with another 38% considering that it was quite realistic. Only 7% considered that this was not likely at all.

### **5.2.10 Revising for National School Exams**

National School examinations are approaching for sixteen-year-old Hans. However unlike his elder sister Gaba, he can now make use of a new service that has been made available by the public service broadcaster on their recently installed broadband TV network.

Two years earlier, when Gaba was revising for her exams, she could make use of the revision web site run by the public service broadcaster. She would pick a subject area and answer a number of multiple-choice questions to test her knowledge. She also had access to text-based and graphics to help explain certain concepts. It tended to be a rather lonely experience.

However, Hans can now make use of an enhanced service that is now available on TV. He selects, the interactive services button on his remote control and uses the menus to get to the revision area in the learning zone. Initially the service looks similar to what Gaba viewed when on the web site – although there is less text on the screen. The same format of multiple-choice questions is available, but, in addition, Hans also has access to video-clips that explain in more detail specific concepts. The animated diagrams also have a person's voice explaining different aspects of the diagram. The big advantage with both the animations and the video-clips is they can be stopped, started, fast-forwarded and rewound at will, thus making it much easier to go over a specific point that may not have been understood the first time.

Compared to the computer, using the TV has enabled revision to become a group activity. Hans sits down with his father and sister Gaba and they can discuss various points as they are going through the various exercises. Over the weeks before the exams this has become a daily routine for the family just before they watch their favourite soap opera. Hans has control of the remote control until the soap begins.

Hans has also brought his friends home and they have used the TV as a focal point for their revision all together. In addition, they can also refer to the frequented answered questions section that is updated every few minutes with answers to questions that have been sent in via SMS messages from mobile phones or using the TV email facility.

### ***Results of survey***

A total of 10 responses were received from the online survey. 60% - considered that the scenario was portrayed as very realistic or generally realistic with another 30% considering that it was quite realistic. Only 10% considered that it was not realistic at all.

When asked how realistic the learning solution was from an educational perspective, 60% of responses considered that this was very or generally realistic with another 30% considering it to be quite realistic. Only 10% considered it not realistic at all.

A total of 80% considered that the solution was very likely or likely from a technology perspective with another 10% considering it to be quite realistic and 10% not likely at all.

When asked as to whether they think the solutions are likely to be viable or sustainable 60% considered this to be very likely or likely with another 30% considering that it was quite realistic. Only 10% considered that this was not likely at all.

### **5.3 Analysis and conclusions of scenario survey**

The results of the online surveys for each of the scenarios should be used with some caution, as the number of responses was relatively small.

However, they are useful as an indicator as to how realistic and sustainable each scenario might be. The scenarios are useful as a tool to raise awareness and understanding of the potential of the range of interactive TV solutions for increasing learning opportunities in the home. They also help to form the basis for sustainable models described in the next chapter.

Based on the results received, an attempt has been made to categorise each scenario according to the likelihood of the scenario developing into a sustainable service. Using a qualitative approach each scenario was put into one of the following categories: -

- Very likely
- Likely
- Quite likely
- Not likely at all

The criteria used to select the category were based on the results from how: -

- Realistic the scenario was considered to be
- Realistic the scenario was considered to be from a learning solution perspective
- Realistic the scenario was from a technology perspective
- Viable or sustainable the scenario was likely to be

The table below shows the results of this analysis: -

Scenario	Very likely	Likely	Quite Likely	Not likely at all
Continuous professional development of teachers		√		
Home-school links			√	
Remote Maths Tutor	√			
How do I? Do it yourself (DIY)		√		
Developing basic numeracy skills from TV soap operas			√	
New employment opportunities and learning needs analysis		√		
A life specific episode stimulates skills updating			√	
A Virtual Professional Channel		√		
From holidays to language learning			√	
Revising for National School Exams		√		

Although care does need to be taken before drawing too many conclusions from the very small number of respondents, it does seem that all the scenarios could possibly be developed. Changes to the technology configurations or the learning context could, of course, increase the possibilities of such services developing.

It is interesting that the remote live human being seems to be the most likely scenario to develop. However, remote home tutoring might only be part of a blended learning experience – but it can also be a big market in some regions of Europe.

The overall conclusion is that these results on the future scenarios could provide a useful base-line for further work into exploring the potential of learning through interactive TV solutions.

## 6. Markets and towards Sustainable Models for Learning through Interactive TV

### 6.1 Introduction

Previous chapters have covered the current state of the art of services and trends and developments of technology solutions concerning interactive TV. Another chapter has aimed to provide some insights that help understanding of barriers to learning and how people might be stimulated to want to learn in the home. The consensus forming and consultation process (See Appendix B) conducted during this study with the aid of a learning opportunity in the home survey (Appendix C) and future scenarios survey has helped understanding of what might be wanted if the learning service was available.

This chapter aims to provide a deeper understanding of European and other market developments and suggest some possible sustainable and replicable models for learning services through interactive TV.

Because education and training services are funded by both the commercial and the public sector, “sustainability” can occur when funded: -

- By *mainstream* public sector funding
- As a commercial business where there is a return on investment (ROI)
- As a public/private partnership

Note the emphasis on “mainstream” public sector funding. This does not mean “pilot project” funding. An activity becomes “mainstream” when it is accepted by the policy and decision-makers that the method used is the most appropriate one to fund from existing budget line rather special funds for development work.

So far, there are hardly any sustainable learning services utilising various interactive TV solutions, from either the public or commercial sector. In fact, many of the commercial infrastructure and service providers have yet to see any return on investment concerning interactive TV and broadband developments. The section on market developments describes some of the complexities surrounding such developments.

A critical factor when developing a sustainable service is its ability to be replicated, perhaps with some modifications, into other regions or markets. This provides an indicator to how “strong” the sustainable model actually is. Easy replication of a sustainable model in other areas or markets enables a more rapid return on investment whether it is for a commercial enterprise or a public sector organisation. The section on sustainable models aims to offer some possible solutions.

In order to gain some understanding of the way different European markets are likely to develop the third section covering the differentiated European and

other markets provides a qualitative analysis of possible trends and developments based on the country-by-country Analysis (See Appendix A)

## 6.2 Market Developments

There are a number of complexities surrounding the evolution of interactive digital TV from both a technical perspective as well as from a market development perspective. Unfortunately, the education and training world has little control over how technological solutions will emerge and how the market for interactive TV and related solutions will develop within the broader consumer market.

The latest available comparative figures<sup>120</sup> for the end of 2001 (Fig 3.1) showed that 37% of UK households had digital TV compared to a European average of 16.3%. By contrast, only 8.2% of German households could watch digital TV. As of mid 2002 around 40% of British households or 43% of British adults now have digital TV.<sup>121</sup>

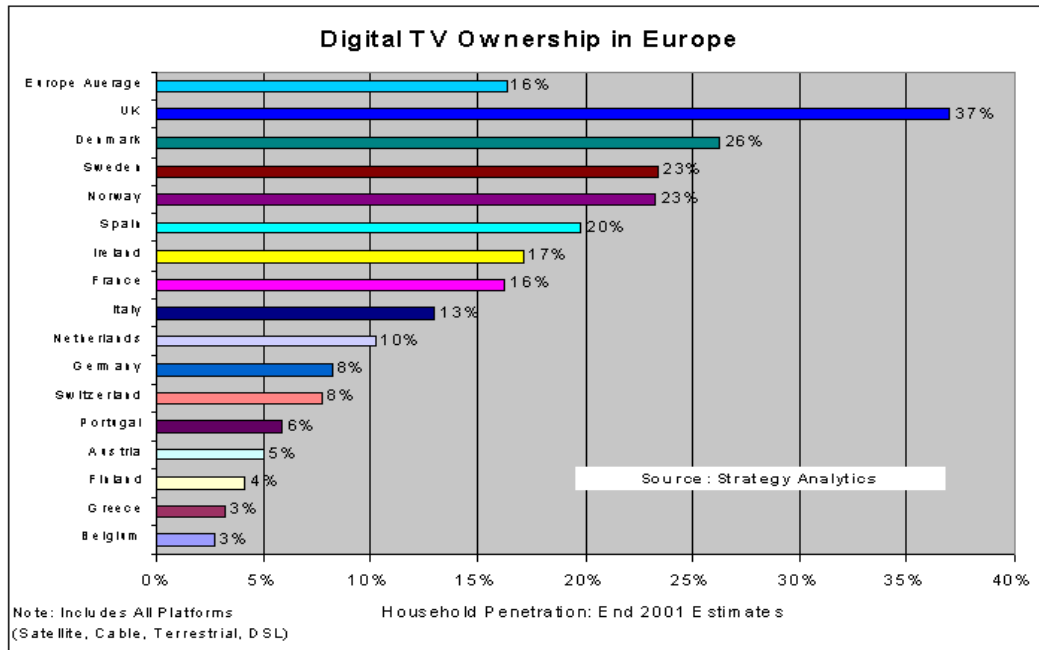


Fig 6.1 Digital TV ownership in Europe end of 2001

However, in February 2003, Datamonitor<sup>122</sup> are estimating that Digital TV will reach 80 million European households by the end of 2007. They consider that satellite will remain the prominent digital platform in 2007, accounting for 41% of the European digital TV market. They also consider that the small multi-

<sup>120</sup> "UK dominates European Digital TV" Strategy Analytics Press Release 15 January 2002 <http://www.strategyanalytics.com/press/PRDM032.htm>

<sup>121</sup> Digital Television 2002 Mori survey for the UK Department of Culture, Media and Sport, May 2002 [http://www.digitaltelevision.gov.uk/pdfs/mori\\_2002\\_dtvsurvey.PDF](http://www.digitaltelevision.gov.uk/pdfs/mori_2002_dtvsurvey.PDF)

<sup>122</sup> "Digital and Interactive TV markets in Europe to 2006: Summary of Contents" Datamonitor 5 February 2003 <http://www.datamonitor.com/~e100cb78ac664916b15b48ae84a37381~//Products/DMV/Free/Report/DMTC0866/020dmtc0866.htm>

platform markets of Portugal and Nordic countries will experience rapid growth, reaching the highest levels of digital development by 2007. Conversely, they consider the advanced pay-TV markets of France, Italy, Spain and the UK will experience the slowest growth rates to 2007.

Interestingly, Datamonitor consider that although the pay-TV services have been a key driver of the digital TV market, free-to-air offerings will become increasingly crucial over the next five years. This could create new opportunities for free-to-air learning services.

When analysing interactive digital TV developments Forrester Research, in March 2003<sup>123</sup>, consider that Interactive digital TV (iDTV) will not generate the large revenues that had been expected. This may have an impact on any development of learning services, however, as has been stated earlier the opportunities are more likely to be on personalised TV developments compared to the interactive services offered alongside broadcast or scheduled TV.

This does tend to highlight the complexity of developments of interactive TV across Europe. To summarise, Datamonitor reported in February 2003<sup>124</sup>: -

“After several years of rapid growth following the launch of digital services across Europe in the late 1990s, growth of the Digital TV market has slowed considerably and market development has been delayed. Although the last 12 months have been difficult for the European digital TV market, issues are now being resolved. As a result, accelerated growth is expected by the end of 2007, at which point over half of the European TV market will have made the transition to digital.”

In addition a number of different levels of development are required before any market for interactive digital TV for learning in the home will emerge. These levels are best shown in the following diagram below (Fig 6.2). The higher the level, the more dependent it is on the lower levels. A number of different options or standards are also available at each level – which can delay the development of sustainable services at higher levels.

These complexities are making it difficult for existing educational broadcasters to decide how best to utilise interactive digital TV services when they are available. Only a few well resourced and generally public service broadcasters have started to make some offerings. Existing players who are already established in the “learning business” are very reluctant to enter this market due to the potential high costs of developing for multiple platforms and the uncertainty of getting any return on investments. Only very recently have

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<sup>123</sup> “European IDTV will generate only 18 billion Euros in Interactive Service Revenues by 2007, Forrester advises” Forrester Research 5 March 2003

<http://www.forrester.com/ER/Research/Report/Summary/0,1338,15272,00.html>

<sup>124</sup> “Digital and Interactive TV markets in Europe to 2006: Summary of Contents” Datamonitor 5 February 2003

<http://www.datamonitor.com/~e100cb78ac664916b15b48ae84a37381~//Products/DMV/Free/Report/DMTC0866/020dmtc0866.htm>



there been signs that a few new players have started to enter the leisure learning end of the market – initially with video-on-demand offerings.

Levels	Availability of the following service and product providers
8	Publishers of video-rich interactive learning content willing to work in co-operation with education and training service providers, in order to provide more localised or personalised interactive learning experiences.
7	Publishers of video-rich interactive learning content in the form of broadcast "edutainment" or personalised learning content.
6	Publishers of video-rich interactive content.
5	Distributor of an interactive enabled service.
4	Distributor of video-rich of digital content through many TV channels (broadcaster) or through a personalised on demand service.
3	Devices that are capable of some form of interactivity – often software dependent.
2	Devices to convert the digital signal for viewing on analogue TV – hardware manufacturers.
1	Service carriers who operate broadband digital transportation infrastructure to the home that could be in the form of delivery via satellite, cable, and terrestrial wireless "over the air" or existing but modified and enhanced telephone lines (xDSL).

**Fig 6.2 Different levels of development are required before any market for interactive digital TV for learning in the home will emerge**

Therefore, against this background of uncertainty, it is important for those in education and training to reach a consensus as to what really is needed in terms of increasing learning opportunities in the home that cannot be met by existing means. Any analysis needs to take into account the different populations that might use t-learning services.

### **6.3 Towards Sustainable Models**

#### **6.3.1 Introduction**

This section aims to identify sustainable models for using the various interactive TV solutions for different types of learning, primarily in the home. Some models exist now and others are potential models that might become possible in the medium to longer term.

#### **6.3.2 Timescales**

It is difficult to estimate timescales when the interactive digital TV industry is still in its infancy and for the last four or five years has been going through a cycle of acceleration, slowing down, starting up again and slowing down again. However, for the purposes of this study timescales have been divided accordingly: -

- Short Term – Over the next two years (2003-04)
- Medium Term – three to five years (2005-07)
- Longer Term – six to ten years (2008-2012)

Clearly, it becomes more difficult to predict developments the further into the future. Earlier switching off of analogue TV services might have an impact on timescales and so would any government intervention aimed at stimulating the growth of fast and very fast broadband.

### **6.3.3 Initiators of learning**

For the purposes of understanding the role that interactive digital TV may have for increasing learning opportunities in the home is also useful to divide learning into three different types or initiators of learning<sup>125</sup>.

- Curiosity-led learning
- Problem-led learning
- Curriculum-led learning

#### ***Curiosity-led learning***

The interactive services that are available or are becoming available for associated with broadcast/scheduled TV are ideal for what can be described as curiosity-led learning. There appears to be a real opportunity, ranging from trivia quizzes for the family and friends, through collaborative educational games, to learning journeys from TV programmes.

It is very likely this will lead onto other forms of more engaged learning and when available personalised TV services will take the viewer onto a different mode of learning. The interactive services will provide a “hook” to take a person from being a “passive viewer” to an “active learning” – from just watching and absorbing television towards becoming engaged in some sort of learning activity.

Programme makers in general and educational broadcasters will be the main drivers of such developments as an extension to their existing service provision. Public service broadcasters and perhaps occasionally commercial service providers may join up with other stakeholders to launch national campaigns aimed at awareness raising - like those aimed at improving numeracy and literacy. There will also be opportunities for TV advertisers not only to increase knowledge of their products but also to assist in knowledge and understanding on campaigns like the environment and poverty.

#### ***Problem-led learning***

The interactive services associated with broadcast/scheduled TV could offer some limited mainly text or graphics-based opportunities for problem-led learning but personalised TV services could widely increase the opportunities.

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<sup>125</sup> The “Initiators of learning” idea was suggested by Prof. Mike Sharples, Kodak/Royal Academy of Engineering Chair in Educational Technology at the University of Birmingham, UK during the consultation process of the t-learning Study. (2003)

For example, access to video-on-demand services could increase knowledge and assist in solving problems in the home concerning health issues, cooking, hobbies and skills development in sports. The demand particularly for leisure learning is likely to be large.

There is also likely to be a high demand for access to a personal tutor or advisor who can be seen on the TV via one-way or two way video.

### ***Curriculum-led learning***

Actively engaged learners following a specific distance learning course or curriculum in their own homes tend to work in isolation compared to campus-based students and they may have limited access to resources. Although e-learning as offered through an Internet-enabled computer is widely increasing the opportunities it tends to be currently weak in video-rich offerings. This was identified by the learning opportunities in the home survey (See Appendix C & D). In addition, a computer does also require a certain level of skills before it can be used. This is where TV-based personalised learning services could offer new opportunities with the potential option of remote but live tutorial support.

Over time personalised TV-based learning services could become quite sophisticated ranging from simple video-on-demand of recorded classroom-based lectures to problem-solving video-clips that dynamically become available dependent upon responses received from the learners. Using TV-based email it would also be possible for asynchronous collaborative learning to take place.

However, the TV may be used widely within some learning context and in conjunction with computer-based learning in other contexts dependent upon the availability of a computer and whether a video-rich learning resource is being used or not. There will certainly be a mixed use of available tools in the home and of course other depends on the usage of a TV.

### **6.3.4 Potential Sustainable Models**

Potential sustainable models are dependent on two factors: -

- Development of the infrastructure to carry the service
- Provision of the Service

#### ***Infrastructure Development***

Infrastructures could develop by: -

- Market forces as a purely commercial venture
- Market forces as primarily a commercial venture and public sector broadcasters but stimulated by government intervention in terms of setting deadlines
- More community-based initiatives stimulated by local development but in partnership with commercial enterprises

Developments in digital satellite and digital cable have tended to follow the purely commercial venture although in some markets public sector broadcasters have provided many free-to-air channels.

Digital Terrestrial infrastructure developments have tended to follow the second mode strongly influenced by government but left to commercial ventures or public sector broadcasters. Some commercial models have tended not to become sustainable, but the free-to-view model appears to be gaining strength and likely to be sustainable.

The early Broadband TV/ Personal TV/Video-on-demand developments using a purely commercial model are having a lot of difficulties becoming sustainable. It seems that the way forward for such developments is likely to more local community-based public-private partnerships. Aggregation of services seems to be a critical factor enabling them to become sustainable. A social inclusion dimension is also very important. (See Appendix K & L for examples of this)

When looking more closely at the personalised TV modes of delivery: -

- **Video or Content-on-demand services from remote servers** - are likely to become more sustainable as a community-based public-private partnership with freely available public sector services and content and chargeable commercially produced content and services.
- **Home storage using personal digital video recorders** – will develop as a purely commercial venture dependent on the consumer uptake of such devices.
- **Pushing content to local storage and pulling content from remote servers** – this is likely to develop in some markets as purely commercial venture and in other markets as a public-private partnership.

In terms of provision of service potential sustainable models can be divided up into the different initiators of learning.

### **Curiosity-led learning**

This is likely to take the following forms: -

- a) **Enhanced TV model** - for example like the BBC's "Walking with Beasts". This will involve major often joint productions aimed at global markets
- b) **Enhanced TV on-demand model** - an extension of the enhanced TV model is where the same production may be re-purposed for an on-demand serviced. TV and then later as a video-on-demand service
- c) **Broadcast TV with Interactive Services** - in the form of trivia quizzes and multiple-choice questions – closely linked to TV programmes and produced as part of a TV produced.
- d) **Video-on-demand – nationally or internationally produced materials** - like aid charities or environmental groups – some material

may be free and other material might request a donation. Advertisers are also likely to sponsor materials informing viewers about baby-care, or sexual issues for example. Advertisers could also use this medium to inform a viewer about their own products or the issues to address when buying a particular product.

- e) **Video-on demand locally produced materials** - perhaps with the assistance of local specific interest group like a history society.

### **Problem-led learning**

This is likely to take the following forms: -

- a) **Broadcast TV with Interactive Services** – useful information provided through multiple menus but mainly in the form of text and graphics. The content will be produced by a wide variety of stakeholders who want a relatively simple way of widely making information available to households via the TV as well as via the web.
- b) **Video-on-demand services** – particularly in the area of leisure learning like cooking, hobbies and improving skills in sports - that will be as a purely commercial venture and in areas like healthcare that could be funded by the public sector.
- c) **Live Personal Adviser** – a new commercial personal adviser market is also likely to develop for a wide variety of services particularly in the area of financial advice and other higher value services or “do it yourself” (DIY). Some personal adviser services like healthcare and local government services are also likely to emerge - funded by the public sector.

### **Curriculum-led learning**

- a) **Distance learning Courses** – Some providers of distance learning courses are likely to move towards offering on-demand learning content particularly when it can be enriched with high quality video-content or widen participation to learning if accessible through TV. The providers of such services are likely have national and international markets for such services – some may be funded entirely or partially by the public sector and other courses may be part of a continuous professional development package (CPD) – subsidised or not subsidised.
- b) **Curriculum enhanced learning resources** – might emerge funded by the public sector and perhaps by educational broadcasters – mainly public sector and a few commercial providers. Some material may be free and others may be chargeable. They would be used to enhance the national curriculum in schools or colleges and meet specific adult educational needs.
- c) **Live Personal Tutor** – some personal tutor services are likely to be a replacement to the private paid home tutor that is thriving in some markets. Other commercial personal tutor services will emerge particularly in the area of language learning and support services for institutional-based courses. Other live personal tutor services could

form part of a blended learning offering either as distance learning or a campus-based course.

- d) **Locally produced learning materials** – are also likely to develop by existing locally based learning institutions as part of a blended learning on and off campus solution.

Some of these services may be sustainable on their own, but others may need the aggregation of education and other services to enable them to be sustainable.

#### 6.4 Differentiated European and Other Markets

In the 1999 study<sup>126</sup> an attempt (Figure 1) was made to predict the prospects for the development of interactive Digital TV learning services within EU countries.

Country	Prospects		
	High	Medium	Low
Austria			x
Belgium			x
Denmark			x
Finland		x	
France		x	
Germany		x	
Greece			x
Ireland		x	
Italy	x		
Luxembourg			x
Netherlands		x	
Portugal			x
Spain		x	
Sweden	x		
United Kingdom	x		

**Figure 6.3 Prospects for development of interactive digital TV learning services with EU Countries (shaded area indicates the level of prospect)**

An attempt is now made to predict developments in the short, medium and longer term within the EU and other selected countries around the World. This macro qualitative assessment is made based on the information in the country-by-country survey (Appendix A). As has been argued in Chapter 3 personalised TV developments are more likely to offer new opportunities than the interactively offered alongside broadcast/scheduled TV.

<sup>126</sup> "Development of Satellite and Terrestrial Digital Broadcasting Systems and Services and Implications for Education and Training – Final Report" A Study for DGXIII C3 Telematics Applications Programme Education and Training Sector, Prepared by pjb Associates, UK July 1999

Therefore this qualitative assessment is made when looking at the following technology solutions: -

- Video or Content-on-demand services from remote servers
- Home storage using personal digital video recorders
- Pushing content to local storage and Pulling content from remote servers

They have been aggregated together as it is very likely that other related “mix and match” solutions will also appear.

Obviously, as we go further into the future the clear distinction between broadcast/scheduled TV is likely to disappear and it is likely that the limited interactivity offered by broadcast/scheduled TV will provide “hooks” or “links” to bring people into the more personalised TV mode.

A number of factors have been taken into consideration when making this assessment on the likely adoption a more personalised TV service. They include: -

- Numbers of households in each country
- The predominant type of housing in the country and the ease with which homes can be provided with fast broadband
- Current state of development of digital TV services
- Initiatives that might stimulate the uptake of personalised TV services
- Penetration of DSL connections

<b>Fig 6.4 Short Term (2003-04) Prospects for Adoption of Personalised TV Services</b>					
<b>Country</b>	<b>Widespread usage</b>	<b>Some usage</b>	<b>Limited usage</b>	<b>Very limited Usage</b>	<b>None</b>
Austria					
Belgium					
Cyprus					
Denmark					
Finland					
France					
Germany					
Greece					
Ireland					
Italy					
Luxembourg					
Monaco					
Netherlands					
Portugal					
Poland					
Spain					
Sweden					
United Kingdom					
Australia					
China					
Japan					
Malaysia					
Singapore					
South Korea					
Taiwan					
USA					
Canada					
Brazil					



**Fig. 6.5 Medium Term (2005-07) Prospects for Adoption of Personalised TV Services**

Country	Widespread usage	Some usage	Limited usage	Very limited Usage	None
Austria					
Belgium					
Cyprus					
Denmark					
Finland					
France					
Germany					
Greece					
Ireland					
Italy					
Luxembourg					
Monaco					
Netherlands					
Portugal					
Poland					
Spain					
Sweden					
United Kingdom					
Australia					
China					
Japan					
Malaysia					
Singapore					
South Korea					
Taiwan					
USA					
Canada					
Brazil					

**Fig 6.6 Longer Term (2008-12) Prospects for Adoption of Personalised TV Services**

Country	Widespread usage	Some usage	Limited usage	Very limited Usage	None
Austria					
Belgium					
Cyprus					
Denmark					
Finland					
France					
Germany					
Greece					
Ireland					
Italy					
Luxembourg					
Monaco					
Netherlands					
Portugal					
Poland					
Spain					
Sweden					
United Kingdom					
Australia					
China					
Japan					
Malaysia					
Singapore					
South Korea					
Taiwan					
USA					
Canada					
Brazil					

## 6.5 Conclusions

1. It is likely that increasing usage will be made of the TV for informal and leisure learning activities that will lead on towards more active and engaged learning.
2. Personalised TV developments will enable a wide variety of services to become available including learning services.
3. However, over this ten-year period the computer will remain an important tool for accessing learning content as well as increasingly personal mobile devices, which are also likely to become widespread.
4. Learners will use a mixture of these tools depending on what is most appropriate for the task in hand.

5. Therefore learning content and support systems will need to be accessible in various formats for these multiple platforms.
6. The widespread adoption of these types of learning services will be increasingly dependent on the development and availability of multiple platform learning content.
7. The role of location-based learning institutions will increasingly become questioned as learning opportunities are increasingly becoming available to the home.
8. A number of potential sustainable models are beginning to emerge, but some may require the aggregation of services to become sustainable.
9. Some infrastructure developments particularly those will enable broadband TV and personalised TV services may need to operate as public-private more community-based initiatives in order for them to become fully sustainable and replicable.

## **7. Overall Conclusions and Recommendations**

### **7.1 Key Conclusions**

1. Overall, the study has identified that there is a big potential for utilising the various interactive digital TV solutions for increasing learning opportunities in the home, particularly as an alternative solution to utilising an Internet-enabled computer.
2. Once policy and decision-makers have become aware of the potential that such solutions might offer, consideration is starting to be given to their utilisation when addressing issues like widening participation to learning and overcoming the digital divide.
3. The biggest potential for utilising interactive digital TV solutions in the medium to long term is likely to be through personalised TV developments as sustainable and replicable models emerge from early pioneering developments.
4. Unfortunately, despite there being more than 25 years of experience using educational broadcasting there is still limited pedagogical research for early pioneering developments to draw upon to help understand how best learners may learn through this medium. There is also limited research addressing interactivity and learning to draw upon from other e-learning developments.
5. Creating a demand for interactive digital TV learning service has to be based around the development of a sustainable model particularly when the service utilises consumer-based devices.
6. The study has established a framework for a number of potential sustainable models, that when developed must also be assessed as to whether they are also pedagogically sound.
7. The development of any learning service must consider jointly - technology solutions, the development of sustainable models and pedagogical issues.
8. This study has identified many existing and emerging consumer-based interactive digital TV technology solutions. It has also identified potential sustainable models for the development of learning services, but there is still a need for further market research.
9. However, the study has found limited existing pedagogical research to draw upon. This does need to be addressed as services develop, but, cannot be done in isolation as there is little point in identifying pedagogical sound services that are just unsustainable within the consumer-orientated market-place.

## **7.2 Specific Conclusions**

### **7.2.1 Strategic learning issues**

1. In the emerging era of lifelong learning - learning will take place in wide variety of context and locations in which informal and non-formal learning will increasingly become as important as the more traditional forms of formalised learning.
2. Some limited evidence seems to suggest that around a third of adults in certain regions have not participated in what they consider to be any form of learning since compulsory school leaving age.
3. Policies are already being directed towards the use of information and communication technologies for increasing learning opportunities – although this has tended to focus more on the use of a computer connected to the Internet.
4. There is evidence to suggest that this will increase participation of those *already* engaged in learning. However, there is also growing evidence to suggest that this is *not* encouraging wider participation of those not already active in learning.
5. The penetration of internet-enabled computers in European households also appears to be levelling out at around 40-60%.
6. Even specific initiatives that encourage a community to get “wired-up” and offer low cost computers and training – appear not to be increasing uptake beyond around 70% of households.
7. Therefore consideration needs to be given to a variety of alternative solutions to overcome the emerging so-called “digital divide” and find alternative ways of encouraging more people to become more active in learning.
8. This means looking towards solutions and devices that people are familiar with, and feel comfortable in using, whether, in their own homes or on the move.
9. Increasing the opportunities for informal learning can also be a means to encourage and draw people into active and engaged learning that might lead onto more formalised learning.
10. Television, plus other future personal devices developing from mobile telephones; and games consoles are all familiar tools that have the potential to also offer new learning opportunities in this way.
11. The home is already considered to be an important place of learning, with some evidence to suggest that there is an increasing preference for people wanting to learn in the home.

12. The television is a familiar and reliable consumer device with around 95-99% penetration in European households. It is also perceived to be a source of learning although in its more traditional role it has tended to be used in a passive viewing mode and perhaps not encouraged active and engaged learning.
13. Traditionally television has tended to be used as an informal mode of learning. Therefore enhancing learning opportunities through the use of interactive digital TV solutions could help in achieving this aim.
14. However, new interactive digital TV services are starting to emerge and change the way the viewer interacts with the TV from a passive to a more active mode. This is creating new opportunities for increasing its role in learning.
15. Therefore, ICT policies that are aimed at encouraging increased and widening participation in learning should consider the role that interactive digital TV solutions have in creating new learning opportunities in the home.

### **7.2.2 Role of interactive TV in learning**

1. When available, current interactive TV offerings through broadcast/scheduled TV do offer a few appropriate learning experiences for some groups of learners but these tend to be very limited or very expensive to produce.
2. They tend to have been produced by broadcasters often with the aim of adding some value to existing broadcasts. The focus tends to be on “edutainment” rather than encouraging active and engaged learning.
3. Broadcasters and service providers are still experimenting with the interactive services.
4. Enhanced TV productions like “Walking with Beasts” with various options to select during the programme are mainly aimed as entertainment and because of their costs have to be marketed globally
5. However, value can be added to the learning experience when these programmes are available in a video-on-demand mode rather than in a broadcast mode – assuming that all the enhanced features are available.
6. The Interactive “learning” services that are available independent of the broadcast channel tend to make use of limited graphics and text – rarely utilising video or audio – which are the best features of TV. Their interactive functions are limited and can be slow at times.

7. Unless there are some significant advances in the technology, broadcast or scheduled TV interactive learning opportunities are likely to be always limited.
8. However, developments with interactivity are raising awareness that the TV can start to be used in an active mode rather than just a passive mode.
9. Despite, slow developments towards personalised TV, the time is right to start focusing attention on this area as a means of creating new, more personalised learning opportunities in the home.
10. This is likely to be a more fruitful way of widening access and participation in learning in the medium term (within the next five years) than focusing on just the interactive TV offerings available through "Broadcast TV".

### **7.2.3 Technical Issues**

#### ***General***

1. Overall, technical issues appear to be less of a problem than market-orientated issues. Many technical solutions are available but are not being rolled out as the market conditions are not favourable or appropriate sustainable business models have yet to be developed.
2. A common European-wide standard is beginning to emerge for future set-top boxes with the Multimedia Home Platform (MHP). However, regions that have been early adopters of digital TV services will have many legacy set-top boxes and service providers may take many years or may never adopt MHP. Market forces are more likely to determine the speed and direction of such developments. There is likely to be resistance to intervention in this area.
3. Standards determining the distribution and delivery of multimedia to the TV are likely to be reached sometime during 2003 through the efforts of the TV Anytime Forum.
4. Decisions concerning the provision of an appropriate broadband network to the home are primarily being driven by the market - rather than being held back by technical difficulties particularly in urban areas.
5. Although there are some technical difficulties concerning provision of appropriate bandwidth in rural areas, solutions to these problems are beginning to emerge. There may be a need for some government intervention to ensure universal access.
6. The broadcast industry is starting to add metadata to its content to enable specific items to be more easily retrievable. There are also parallel developments concerning the standardisation of learning

objects. Both of these developments need to work more closely together in order to ensure that appropriate learning content will be easily retrievable through interactive TV solutions.

### ***Broadcast or scheduled TV***

7. In the short term, interactive services will be mainly available through or associated with broadcast or scheduled TV and will be dependent on how rapidly broadcasters and service providers will want to deploy such services.
8. In the medium term, such forms of interactive services will become integrated into hybrid developments with more personalised TV, possibly being used as “hooks” to capture interest and pull people towards more engaged learning opportunities.
9. In the longer term, they will become unrecognisable as more personalised services will start to dominate and form an integrated part of their lives.

### ***Personalised TV***

10. In the short term, a few pioneer developments will start to emerge and assist in the process of the identification and development of sustainable models using the various methods of personalised TV.
11. In the medium term, hybrid solutions two-way satellite, VDSL and local wireless solutions will also meet the needs of rural communities outside the range of ADSL and cable.
12. In the medium to long term, various fast and very fast broadband solutions will be available in both urban and rural areas with users accessing the content that is most appropriate for their needs whether it be with a TV, computer or a mobile device.
13. Learning services will be only part of a wide range of integrated services available to the home. They will be sustainable because they have been developed in an integrated way.

## **7.2.4 Market issues related to development of learning services**

1. The media industry is currently slowly moving out of a global recession and to a large extent so is the telecom industry. In fact, for the last 4-5 years, it has been very difficult to predict the development of interactive digital TV market, which is starting to show a regular pattern of slowing down then showing signs of speeding up before slowing down again.
2. The education and training business generally has little control of these developments and is dependent upon a relatively small number of players in the interactive digital TV industry.



3. The barriers to entry into the interactive digital TV market are high for the learning business compared to utilising the web. A number of different levels of development are required before any market for interactive digital TV for learning in the home will emerge. All are potential barriers to such developments.
4. Market opportunities for the development of interactive learning services linked to broadcast TV are likely to be very limited. It is likely that broadcasters will still control this area and offer “edutainment” and some value added services linked to their main broadcast programme.
5. The biggest opportunity for the development of learning services is likely to be through personalised TV – as content on-demand or through “personal” delivery services.
6. However, existing on-demand services in Europe are still trying to identify the appropriate sustainable business models. This will slow down development.
7. However, it is predicted that within ten years the majority (around 60%) of users in the developed world will be using their TV primarily in a personalised TV mode rather than the traditional scheduled TV mode.
8. There is potentially a big market for leisure learning services that will develop through market forces without the need for intervention. There are signs that this market is now beginning to develop in North America and may start to develop in some parts of Europe by the end of 2003.
9. This may stimulate the development towards a sustainable market for the provision of other learning services utilising interactive TV solutions.
10. It is likely that content on-demand and “personal” delivery services will develop focused on specialist target audiences aimed at up-skilling or re-skilling professionals. These might involve public-private partnerships.
11. Within the e-government agenda there is a drive to make local and national government services accessible over multiple platforms including interactive TV. This could create new opportunities for offering informal and formal learning. It might involve the public service and perhaps the commercial broadcasters. However, large-scale trials are needed in order to identify how best to implement and develop a sustainable model.
12. A number of potential sustainable models are beginning to emerge, but some may require the aggregation of services to become sustainable.

13. Some infrastructure developments particularly those that enable broadband TV and personalised TV services may need to operate as public-private more community-based initiatives in order for them to become fully sustainable and replicable.

### **7.2.5 Potential learning services through interactive digital TV**

Although based on limited feedback from a small-scale survey using potential scenarios, the research identified the likelihood of each scenario being “realistic and sustainable” using the categories of very likely; likely; quite likely and not likely at all.

#### ***Personalised TV mode***

1. A scenario based around having access to a remote tutor via a TV in the home was considered to be *very likely* to be a realistic and sustainable.
2. Other scenarios that were considered to be *likely* to be realistic and sustainable, included the “Continuous Professional development of teachers”; the “Revising for National School Exams”; the “Virtual Professional Channel” and the “How do I? Do it yourself (DIY)” scenarios.
3. Scenarios utilising a personalised TV mode based on “Home-School links” and “From holidays to language learning” were considered to be *quite likely* to be a realistic and sustainable.

#### ***Broadcast/Scheduled TV mode***

4. The “New employment opportunities and learning needs analysis” scenario that is based around interactive services in a more broadcast/scheduled TV mode was also considered *likely* to be a realistic and sustainable scenario.
5. A scenario focusing on “Developing basic numeracy from TV soap operas” using the interactive services associated with broadcast/scheduled TV and SMS messaging using mobile telephones was considered *quite likely* to be a realistic and sustainable.

#### ***Hybrid mode – combining both scheduled TV and Personalised TV***

6. A scenario based on “A life specific episode stimulates skills updating” using a mixture of modes was considered to be *quite likely* to be realistic and sustainable.

### **7.2.6 Costs of accessing learning through interactive digital TV**

1. Given, the very immature state of market developments it is still very difficult to predict likely costs of accessing learning through the various forms of interactive digital TV for individuals and households.
2. As the provision of education and training is funded by both the public and private sector, normal market forces and therefore consumer costs, often don't apply to certain sectors of the learning market.
3. Some learning resources are likely to be offered free particularly by public service broadcasters.
4. Some on-demand services – particularly in the leisure learning market will be competitively priced depending on the demand for such services.
5. Where there is a national or regional strategy to improve skills like numeracy and literacy - interactive services are likely to be free to the end user, but the digital TV industry may be subsidised by national or regional education and training government departments and agencies to provide such services.
6. In some instances they may be aimed at widening participation to learning but using the home-accessed component via interactive TV as a “hook” to bring a learner into a “campus” or “learning centre” based environment. Such services may be free to the end user, as they will form part of public sector funded learning provision.
7. Other learning services like those for continuous professional development may utilise the video-rich component of interactive TV particularly the on-demand capabilities as part of a blended distance learning solution that also utilises computer-based and text-based learning. The cost to the user of interactive TV component would be bundled up with the rest of the product/service.

### **7.2.7 Differentiated European and Other Markets**

1. Within the different regions of Europe and across other parts of the world interactive digital TV is developing in a number of different ways. This will have an impact in how such developments may be utilised for learning purposes.
2. When looking at the prospects for the adoption of personalised TV services South Korea is likely to develop most rapidly in the short term up till end of 2004 with some usage.
3. By the end of the medium term (end 2007), Singapore, South Korea and Canada are likely to have widespread usage with some smaller countries like Cyprus, Monaco, Portugal and Sweden also having

widespread usage. Many other European and other developed countries in the world are likely to have some usage. Greece, Poland and the smaller Central European countries are likely to have limited usage. Brazil would also probably have very limited usage.

4. During the longer term period up to end of 2012 most developed countries in the world are likely to be making use widespread use of personalised TV services. Greece and Brazil may still be behind in such developments although some usage is likely to be made in both of these countries.
5. These predications have generally been made on the basis normal market developments of consumer services, however, some governments may decide intervene to stimulate developments in order meet policy needs of social inclusion, other coming the digital divide and widening participation to learning.

### **7.2.8 Learning and pedagogical Issues**

1. Although it is probably accepted that the television in its traditional format is a very powerful medium, the body of research into its role for learning is rather more limited. Research has tended to focus on the impact that TV makes on individuals.
2. There appears to be limited research into the importance of informal learning as a means of drawing people into be formalised learning.
3. Despite some evidence to suggest that more people wish to learn from home, there appears to be limited work into understanding the conditions and requirements that are needed in order to make the home a conducive learning environment.
4. Understanding the role of interactivity is a very complex process with most, but limited, research focused on interactivity in computer-based environments. Unsurprisingly, there has been little research into using interactive TV for learning purposes.

### **7.2.9 Awareness-raising issues**

1. The research has shown that awareness of the potential of using interactive digital TV for learning purposes even amongst those involved in educational technology is generally very low.
2. However, once decision-makers and practitioners have been made aware of the range of possibilities that are now emerging – they become more positive towards the potential that digital TV could offer.

## **7.3 Recommendations**

### **7.3.1 Strategic Recommendations**

1. When developing a broadband strategy, governments should include interactive digital TV within a strategy.
2. When developing an e-learning strategy governments and other agencies should consider the role of interactive digital TV solutions within that strategy.
3. Traditional educational broadcasters and those in mainstream education and training need to work more closely in order to decide the most appropriate way forward for the utilisation of the range of interactive digital TV technology solutions that are starting to emerge.
4. Generally the focus should be on solutions that offer more personalised TV rather than broadcast/scheduled TV. There appear to be more opportunities for more personalised learning through these developments.

### **7.3.2 Market Development Needs**

1. There is a need to establish a number of pilot projects utilising personal video recorders and content-on-demand type services through Broadband TV to order to test out how these means could increase access to learning opportunities in the home.

### **7.3.3 Content Development Needs**

1. Encouragement should be given to content developers to produce digital content that will work with the full range of digital delivery technologies.

### **7.3.4 Pedagogical Research**

1. There is a need for the educational research community to look at and present evidence as to how people learn in their home environments and how they may relate to learning through TV compared to other means (i.e. when people have access and can take advantage of learning opportunities in their home)
2. Socio-pedagogic research should be conducted into better understanding the sociological dynamics that operate in the home, how these relate to the television and what impact this may make on creating learning opportunities in the home (i.e. social barriers to preventing access to learning opportunities in the home).
3. There is also a need to gain a better understanding as to what aspects of interactivity are needed for different learning contexts and how it can motivate learners.

### **7.3.4 Socio-economic Research**

1. There is a need to better understand the social and economic issues concerning whether broadband to the home should be considered as a universal service just like water.
2. Consideration should be given as to what impact market forces act as a barrier or a constraint to such developments and whether there is a need for government intervention to ensure social inclusion.

### **7.3.5 Learning Technology Research**

4. Pilot projects should be established in order to better understand how to best utilise the limited interactivity of broadcast TV to engage groups of people that are difficult to reach by more traditional educational routes i.e. turning them from being a passive viewer into an active learner.
5. There is a need to develop appropriate personalisation systems and tools that will enable learning content to be easily retrievable through Personal TV systems.
6. There is a need for an ongoing observatory to monitor developments in broadband and interactive digital TV and games plus consumer devices to keep up to date with such developments for those involved in technology-enhanced learning.
7. Future research should not consider learning in the home in isolation to other types of learning.
8. Future learning technology research into learning in the home needs to consider the home environment as a whole and the range and impact of devices that are becoming available – PDA, 2.5 and 3G phones, games consoles, Tablet PC, desktop and laptop PCs – local digital storage devices, access to remote storage devices, wireless communications, home servers.
1. In addition, consideration needs to be given concerning the inter-relationship between the different geographical locations for learning in the home; the workplace; learning centre (school, college, training centre, university and more informal local community learning centres); on the move and at leisure centres (sports, theatre, museum, cinema, countryside)