



Innovations Workshops

**Future TV: involving learners in creating their own
learning environment**

An Insight Paper

by Dan Sutch

CONTENTS

1. Descriptions of interactive TV
2. Terms of use: interactivity
3. Developing/emerging technologies
4. Projects
5. Next steps
6. Further reading

The CeBIT technology show (2005) heralded the 'digital hub' as the next major development of home entertainment, organisation and learning technologies into a cross platform device situated in the home and connected with mobile and peripheral devices. At the heart of this hub is the emergence of a technology that develops the current notion of interactive television into a tool for entertaining, socialising and learning.

Television already plays an important role in many family and home spheres and Kelly et al (1997) highlight the important social nature of watching television as viewers "are participating in a ritual that links [them] to thousands of other citizens", a fact evidenced by the real-world discussion about soap characters and other television activities. With the development of interactive TV, this social participation can be extended as viewers change from receivers and observers to creators, producers, directors, and broadcasters within distributed communication with others.

The Futurelab Innovations Workshop series aims to help pioneer new ways of designing and using ICT to enrich and transform the learning experience by creating a space that brings together experts from the creative, education and technology communities. This Insight paper aims to highlight some of the key issues relating to the role interactive TV can play in enabling learning opportunities. By bringing together these issues, this paper attempts to provide the beginnings of a shared understanding between the participants at the Innovations workshop. In doing so, it aims to help to stimulate discussion and creative thinking about how interactive TV resources can best be developed and used to support and enrich learning experiences in 5, 10 and 15 years' time.

1. DESCRIPTIONS OF INTERACTIVE TV

Traditionally, television has been a broadcast/publishing technology using a one-way communication model as an example of 'mass media', in the same way that newspapers and radio are presented to a 'receiving' audience without opportunities for feedback. Whereas the latter communicated using, for example, letters to the editor and phone calls to broadcasters, television developed its own line for making viewers more active and engaged in their use of TV.

Throughout the 1970s, 80s and 90s major projects in the US (and also in France and Japan) saw developments in television that included: audience feedback; electronic transactions (home banking); video-on-demand (VOD), and information retrieval, all of which enabled a passive viewer to use television in a more active way – providing limited searching, selecting and voting systems for feedback. The late 1990s saw a development that included web access providing the viewer with a greater variety of tools and information sources. During this time, the UK, Germany, Sweden and Italy focused mainly on VOD – a 'search and retrieval' option for selecting desired programs.

From this point interactive TV can be split into two visions or 'imaginaries': interactive TV writ small and interactive TV writ large.

Interactive TV writ small:

Micro level understanding of interactive TV – focusing upon emerging technologies, media projects, markets and the development of regulations.

Interactive TV as an information and communication platform providing channels, VOD, home communication services, shopping, etc.

Interactive TV writ large:

Macro level understanding of interactive TV – organising ICT within broader historical context.

Interactive TV as manifestation of a vision to build a comprehensive domestic communication system for high-tech homes of the future.

Focus upon socio-cultural viewpoint.

Both imaginaries provide a vision of interactive TV as a device for personalising content to meet viewer requirements. Interactive TV writ small is closer to the digital TV/interactive TV that is (beginning to be) available today, with numerous channels, home shopping, e-mail and VOD. Sky+ offers a more advanced version of VOD to include recording of multiple channels, rewinding and replaying live TV with an aim to link more closely to user preferences. Within the definition of interactive TV writ small, the Innovations Workshop looked at:

How can interactive TV (writ small) best be used by learners to tailor content to their own needs at appropriate times?

However, interactive TV writ large provides a more complex aim for interactive TV that imagines a digital hub that links to peripheral and mobile technologies to develop a convergence between tools that aid communication – for entertainment, learning and socialising. It is interactive TV writ large then that provides us with the opportunity to develop our thinking about the role that this digital hub can play in encouraging and developing learning.

Taking this writ large definition of interactive TV, the Innovations Workshop investigated:

How can learners best navigate and interact with interactive TV through a traditional hand-held controller?

What input/control device could develop the possibilities of interactive TV (writ large) as a tool for learning?

2. TERMS OF USE: INTERACTIVITY

Learning contexts and digital tools are widely encouraged if they are deemed to be 'interactive', yet what does this term mean for the development of a tool to aid learning in the home? Kim and Sawhey's (2002) conceptual framework of interactivity consists of:

- **communicability** – various forms and various audiences
- **malleability** – flexible use of medium (voice-data-video)
- **programmability** – informal processing and production platform
- **creativity** – potential to create one's own message.

An important recognition of interactivity is the provision of a "timely and functional feedback circuit" (Newhagen et al 1995 p166) that provides quick, direct and focused feedback to learner actions. Important in this description is the notion of the circuit. For an activity to be termed interactive there must be a loop of related activity: action – reaction – interaction: building directly upon the previous activity or action. This can be highlighted both by looking at the morphological roots of the words and also academic definitions of interactive resources and interactive communication.

Two key approaches to interaction (within the field of interactive TV)

Communication approach

Interactivity within a communication approach (Rafaeli 1988; Williams et al 1988) relates to the cyclic interplay between two actors. In the case of interactive TV, one actor is the 'viewer',

the other the digitally presented action. The focus though is upon the (at minimum) three-part interplay between actors.

Interactivity is the “[f]eedback that relates both to previous messages and to the way previous messages related to those preceding them.” (Rafaeli 1988, p120)

Williams et al go further in their definition by highlighting the opportunity of the participants to exchange roles, of director and viewer, of encoder and decoder. This definition highlights the way in which the passive viewer must become an active agent in using interactive TV.

The level of interactivity is “[t]he degree to which participants... have control over, and can exchange roles in” the communication process. (Williams et al 1988, p10)

The final definition within the communication approach is that an “interactive medium is a vehicle that enables and constrains multidirectional communication flows among the members of a social unit with two or more members: examples are telephone, paper mail, electronic mail, voice messaging, and computer conferencing” (Markus 1987, p492). Developing the examples to include interactive TV sees a technological tool that provides opportunity for multidirectional communication between individuals and distributed groups.

Media environment approach

A media environment approach to defining interaction falls closer to interactive TV writ small than the communication approach. Steur (1995) suggests that interactivity is a media experience offered by technologies in which “users participate in modifying the form and content of the mediated environment in real time” (Steur 1995, p46). Rather than providing an opportunity to interact with actors, interactive TV then provides an opportunity to refine content to personal taste, times and desires.

Steur goes on to present levels of interactivity that start with simply turning on and off a television and end with a fuller interaction that can occur within computer-mediated environments. The defining feature that equates to the level of interactivity is that “the greater the number of parameters that can be modified, the greater the range of interactivity of a given medium” (Steur 1995, p48). With this in mind, the requirement to develop interactive TV is the expansion of the number of changeable parameters available to the ‘viewer’.

The greatest difference in the definitions of interactivity is that the media environment approach highlights the mediated communicative experience via communication technology systems rather than the communication itself. Interactive TV becomes *truly* interactive when it provides a platform for communication, rather than creating a digitally generated dialogue.

However, we are reminded that the benefits of developing interactive TV are in support of face-to-face communication, rather than as an attempt to replicate or replace it.

“...no matter how many interactive features are incorporated in a technology, it cannot capture the richness of spontaneous face-to-face communication because natural interactivity is irreducible into computable elements.” (Wegner 1997)

In developing interactive TV, learners can be empowered to take different roles within the communication process. Kim and Sawhney highlight that “In contrast to mass media, new interactive media provides a communication platform on which users can become listeners and speakers or consumers and producers” (Kim and Sawhney 2002, p221). The development from passive receiver of information to actor, producer, director and critic can take place through the appropriate use of interactive TV.

How can learning contexts be developed that take into account the learner as producer, editor, creator and critic?

3. DEVELOPING/EMERGING TECHNOLOGIES

This section gives a broad overview of different developing and emerging technologies that may enrich the interactive experience of television 'viewers'.

Two-way HFC

Emergence of two-way HFC (hybrid fiber coaxial), that enables two-way capable cable networks – allowing transmission of video, InternetPacket data and voice signals and also to receive data from subscriber homes.

OLED

Organic Light Emitting Diodes (OLED) can be used to create a more powerful, more energy efficient and lower weight screen that can enable any shape/surface to become a screen, including screens that are portable and roll-up.

Mobile interactive television

Siemens and Vodafone demonstrated a concept device for mobile interactive television at CeBIT this year. The concept features a standard mobile phone, DVB-H receiver, stereo-sound and large VGA touch screen, providing television programmes, access to information and transactional services (using the cellular network as a return path).
informatv.com/articles/2005/03/14/mobileinteractivetelevision/

VEIL toys

Video Encoded Invisible Light www.veilinteractive.com/technology.html enables interaction with TV/Video to develop the interaction with TV. Many applications are being developed to use this technology using mobile phones, PDAs and universal remote controllers.
www.veilinteractive.com/applications.html

A further use of VEIL is in interactive toys. VEIL toys interact with interactive TV to create a new opportunity for interaction. Signals from the interactive TV create representations on the toys' display screen that can link to particular sequences within a broadcast show or that provide new 'virtual gadgets' for the toy.

Interactive toys

Various visions of interactive toys have been suggested that include technologies that support guided play, programme-informed play and 'regenerated' interaction (as toys upload new data from the television).
www.iccave.com/web/site/ResearchApplications/InteractiveToys.asp?MenuLinkID=22&MenuID=3

There are several commercial products that have been designed to develop young children's interaction with television programmes. One such toy is ActiMate Barney, a soft toy in the shape and colour of Barney (a purple dinosaur) that can be connected to the television so that it can sing along to the songs as they are played out. This particular toy also plays various games such as 'hide and seek' and declares pre-programmed emotional statements to the child at regular intervals.

These toys have been developed for commercial ends, using technology that was available five years ago to develop young children's allegiance to particular television programmes. With the developments in technology that have been made over the past five years, an opportunity is apparent to develop an interactive 'companion' with a strong pedagogical and learning underpinning that can encourage young children's understanding of a programme, emotional literacy and communication skills.

Gesture as interaction

Developing the role of EyeToy as a games controller, G-speak (www.g-speak.com) attempts to use a gestural interface such as that imagined and simulated in the Hollywood film *Minority Report*. Actions such as panning and zooming around a large panoramic image; scrubbing back and forth through a video clip, zooming in and out while doing so; and navigating a three-dimensional space are soon to be realised.

Searchable TV

Google, Microsoft and Yahoo are all developing new methods of searching and recalling data through television. The concept of tagging data so that it is shareable and searchable becomes a key feature and even more so when the content developed is user-made.

Digital hub

The Microsoft home provides a good example of how interactive TV is an important part of the digital hub. Methods for interacting with TV, with personal images and video, converge the computer and TV to develop many types and quality of interaction. www.jonathansblog.net/
www.microsoft.com/uk/windowsxp/mediacenter/default.mspx

4. PROJECTS

Footprints of Power

Footprints of Power (developed at the Hypermedia Laboratory, University of Tampere, Finland) is a multiplayer game that is founded upon the principles of an auction, but that enables viewers to become participants in the production of an interactive TV game. It has a pre-defined long-term storyline, but short-term storylines that are not necessary for the overall progression of the story are also used. These changeable stories (mostly) affect the supporting characters rather than the dominant characters that are required for the longer term story.

Taking a particular point of view – viewers (and players) take objective views of the program because of their involvement with a particular character.

The framework behind this method is described by Lamkoski and Ekman (2004):

“Highly interactive shows that prompt or even require the user to participate while viewing are undoubtedly a thing we will be seeing in the near future. However, some viewers will assumedly continue ‘just watching’ television, even as it provides possibilities for more and more interaction. We believe that combining familiar forms of interaction, such as games, with traditional television narratives, might act as an introduction to interactive television content. At the same time it allows us to preserve the possibility of broadcasting the show itself, while allowing the viewers to decide freely when and for how long they want to engage in the associated interactive content. The concept allows for multiple people interactive at the same time, without dictating the actual moment of the interaction.”

NM2

A three-year EU-funded project, New Media for a New Millennium (NM2), aims to enable users to personalise the TV/video they watch to their own tastes. Currently, viewers are able to influence plot-lines by SMS messaging, but the overall intention is to enable users to create

their own storylines and sets. This could result in a new media genre where the viewer is both consumer and producer. BT and several UK universities are involved in the project.

www.ist-nm2.org/

RegenTV

Newham Borough Council has been running a trial scheme that lets residents access digital channels, the internet, e-mail and a range of computer applications through an Internet Protocol TV (IPTV) set-top box. The RegenTV project is being run in conjunction with IBM and has had 70% take-up in the trial areas. The service also provides access to e-government services, interactive advice channels, community channels and virtual learning programmes. The latest stage of the project is creating an open source product and service model. It is hoped that the service can help bridge the digital divide and foster community cohesion. The Government hopes other councils will use the technology and the product will be made available through GCAT and SCAT. www.localegov.gov.uk/page.cfm?pageid=839&Language=eng

Interactive TV and video-telephony

Swedish company i3 is developing a system that includes broadcast television, VOD, personal video recorder and video telephony. Demonstrated at CeBIT, the i3 system has been developed in partnership between VCON, i3 and Orca. www.i3micro.com

5. NEXT STEPS

This discussion document has been written to highlight some of the recent developments in interactive TV and to marry them with some of the possibilities that appear with them. Bates (2003) highlights the key reasons why interactive TV needs to be considered within the broader framework of an e-learning strategy:

- "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 TV
- the TV has the potential for reaching more people and offering learning opportunities than traditional learning institutions can do."

Bates 2003, p6

A key opportunity provided by future TV is 'layering' of information so that it becomes available or accessible at appropriate times for the learner. This layering could provide information relevant to parents and young children at the same time, creating shared experiences that then prompt specific social interaction.

'Visual hyperlinks' create a method of navigating such layered information, allowing learners to select characters or background images to interrogate further - at a time that is supportive of their need for the information.

By developing the current capabilities of interactive TV, learners can be provided with a greater choice in dynamically changing storylines and character actions. This choice can be furthered by enabling learners to view scenarios from various perspectives; varying background images to make the scene more personal and understandable, or using 'blue screen' technology to put the learner at the heart of the programme, witnessing events from a first-person perspective.

A further development of the interaction with television is the idea of multiple controllers. This affords various types of interaction, as learners collaborate in navigating and retrieving information, compete in searching or completing, or support through a dual-controlled scaffolded interaction where a more experienced 'co-pilot' supports and challenges the learner's activity.

Future TV could offer learners of all ages the chance to become more active in following their own interests when the need arises, be that through observing, interacting or creating their own content.

How can we use interactive TV to develop learning?

6. FURTHER READING

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