

# **Learner Centred Development of a Cross Platform Language Learning Support System**

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## **Abstract**

Interactive television (iTV) is a new media technology that has great potential for supporting second language learning, particularly for independent adult learners. It has many characteristics demanded by modern second language (2L) learning theories and is technologically quite sophisticated. However, in order for it to succeed it needs to fit in with these learners' approaches to media use in language learning. While there is an extensive literature on many other aspects of language learning and teaching, particularly in classroom settings, we know surprisingly little about the independent language learner's attitudes and approaches to learning and to technologies for supporting it. In this paper, we describe a project to develop language learning via interactive television (iTV) where a combination of techniques have been used to elicit the attitudes of potential users, in order to direct the design process.

## **Keywords**

Learner centred design, Language learning, Interactive television (iTV), Mobile phone, Cross-platform technologies, Scenario-based design

## **New technologies and language learning**

Many new media technologies have seemed, at their first appearance, to have potential for assisting in language learning. From the earliest examples of paper-based language technologies such as dictionaries and grammar books, through audio tapes, television programs, CD-ROMS, the Internet and most recently mobile technologies (Sharples, 2000), each emergent technology has been perceived as a potential addition to the language learner's (or more frequently, language teacher's) arsenal. Some of these technologies have fulfilled their promise, while other technology-based applications are now regarded as partial or complete failures (Salaberry, 2001).

The reasons for the failure of a technology to make a mark are varied. For instance, the application may not make best appropriate use of the technology or its pedagogical effectiveness may be questionable (ibid). New language teaching technologies have too often tended to be accompanied by a step backwards in pedagogy, with developers showing a tendency to put too much faith in the novelty factor (Warschauer & Healey, 1998).

Our initial brief was to design technological support systems for language learning using the facilities of interactive television. We see the design process, for learning technologies as much as for other designed artefacts, as a process of creativity under constraints. Two of the constraints on second language teaching technologies are widely accepted and hinted at above. Firstly, designers should take into account the inherent properties of the technology, so that appropriate functionality is designed. For instance, it would be possible, but perverse, to develop an audio language laboratory primarily to support the development of 2L writing: the characteristics or affordances of the audio-tape and headphones approach clearly suit the practice of spoken, not written, language skills. Secondly, many researchers have pointed out the need, when designing such services, to align them with the recommendations of current language learning theories. To take the example of audio language labs again, they went rapidly out of fashion as methods based on communicative theories replaced those based on behaviourism.

However, there is generally less attention paid to the attitudes and behaviours of language learners themselves with regard to new technologies. If the technology is 'new born', as was the case with the Internet, then simply using technological capabilities in a way that conforms to current 2L learning theory may be enough for a successful outcome. There are no ingrained attitudes to take into account. However, when new capabilities are grafted onto existing technologies, a new set of constraints appear that are associated with the established characteristics of the medium or technology itself and to people's relationship with that medium.

In this paper we describe a project to develop a language learning application for interactive television, taking into account not only the capabilities of the technological platform and theories of language learning but also the views and reported behaviour of learners with regard to this technology. We start with a brief overview of the development of iTV and its capabilities. We then summarise current language learning theories and draw out implications for 2L learning technologies. In section 3 we describe the results of studies carried out with 2L users and show how they influenced design. We then explore the use of scenarios to represent the design of the system, which is now in prototype stage.

### **Brief introduction to iTV**

Any design process must take into account the capabilities of the proposed technology to be used. In our case, this consisted of a very familiar object, the domestic television, augmented by new interactive facilities. It is worth considering television itself before looking at interactivity. Conventional television is *already* a powerful learning environment for language learners. Television offers a rich multimedia experience, where learners can immerse themselves in authentic materials from the target language and culture. This material may well be engaging in itself, with up-to-date ever-changing content displaying a range of speakers and contexts. Many

television shows constitute important cultural events in their own right, providing a shared reference for people sharing or aspiring to share a culture. In its non-interactive state, it clearly affords watching, reading and listening, making it an excellent medium for learners to practice comprehension skills and also to acquire background cultural knowledge. Comprehension of spoken material is strongly supported. Sherington (1973), exploring the potential of conventional television for language teaching, notes that a number of listening skills can easily be practised via television, including recognising and understanding:

- segmental and suprasegmental features
- vocabulary items, short phrases and longer segments of speech
- syntactic structures
- varieties of speech, such as registers and dialects
- discourse patterns
- pragmatically determined features

Digital television adds a new dimension to learning from the TV by multiplying available channels (Meinhof, 1998; Moores, 1996). However, this is an increase in the quantity of available material rather than a change in the type of affordance provided by the medium. It is essentially more of the same.

Digital interactive television offers genuinely new ways of using the television set. Interactivity is a contested term, with some commentators favouring a loose definition that would include video-on-demand and phone-ins, and others adopting a strict definition that admits only *enhanced* television applications, i.e. those that offer more on the screen than a single broadcast stream, typically accessed via the TV handset (Gawlinski, 2003). Some types of interactivity require communication with the platform owner via a return path, typically over a telephone or cable connection. Video on demand is an example of this kind of service. Other types of interactivity do not require this two way connection, but rely instead on a kind of simulation of interactivity via a cache of all the potentially required interactive responses, typically on a set top box. Three broad types of interactivity are being developed (Masthoff & Pemberton, in press):

- Distribution interactivity (DI)

Distribution interactivity that has as its object the entire programme rather than the programme's content. Examples are the Electronic Programme Guide, the reminder function and the popular "now and next" box widely used to allow viewers a brief description of the current and following programme on a specific channel.

- Intra-programme interactivity

Services in this category allow the viewer to interact with content of the broadcast stream, to create what is known as "enhanced television". The great advantage of this is that viewers are not required to abandon watching the broadcast stream while interacting with the programme. It is sometimes useful to distinguish two subcategories, information interactivity, allowing the viewer access to supplementary information and participation interactivity, often via a "voting" function, for instance enabling a viewer to play along with a quiz show.

- Extra-programme

In extra-programme interactivity the focus is neither the programme, nor the content but some other activity available via the television set. Chat and email, already available in some countries, would fall into this category (Quico, 2003).

Despite the fact that current levels of interactivity are limited, constrained by the components of the iTV set up, i.e. the set-top box and its software, the on-screen display and the remote control, all three types of interactivity could be made to serve the 2L learner. Interactive viewers could:

- be informed of programmes with 2L content or facilities
- select from alternative audio and video streams
- make their own choice amongst subtitling or captioning options
- view supplementary information on screen – to access before, during or after a broadcast
- store information of their own choice, e.g. in personal online dictionaries
- use communication tools such as chat and email to communicate with native speakers and/or fellow learners.

## **Theories of Language Learning**

A second input to the design process must come from an understanding of current models of adult second language learning. While many language teaching techniques have evolved with no explicit theoretical underpinning, in other cases there is a fairly clear link between theory and techniques. For instance, behaviourist theories were at the root of the language lab repetition and drill approach.

Reviewing language learning theories is not straightforward, however, since, as Mitchell and Myles point out, “we have not yet arrived at a unified or comprehensive view of how second language are learned [...] No single theoretical position has achieved dominance, and new theoretical orientation continue to appear” (Mitchell & Myles, 1998, pp. ix-x). Language learning itself is not a unified activity, as the separate functions of speaking, listening, reading and writing have to be addressed, each at many levels, from phonetics to discourse and pragmatics. To simplify, we take what we see as the two most popular theories influencing practice today, the constructivist and the constructionist approaches.

The Constructivist approach asserts that learning is an active, creative, and socially interactive process in which learners construct new ideas based upon their current and past knowledge (Bruner, 1990). Knowledge develops via the negotiation of meaning through dialogue with the target language and its many socio-cultural expressions. Successful language learning is therefore achieved through exposure to and interaction with language in authentic contexts. Typically a learner in a Constructivist-inspired programme would be required to perform tasks and solve problems involving listening, reading, writing and speaking in the foreign language, ensuring a high level of interaction. The Constructivist philosophy is closely tied to communicative teaching approaches and indeed is the force behind many initiatives in interactive computer assisted language learning.

Television is difficult to square with the Constructivist approach, which is oriented towards production rather than comprehension. One answer is to advocate, as for instance in [Broady, 1997], that learners should make their own videos. Another option is to develop extra functionality that allows learners to create their own learning space, a concept that comes close to the Constructivist vision of active learners creating their own knowledge model.

The Creative Construction position on language learning is particularly associated with Krashen (1981). Krashen suggests that language acquirers are not usually aware of the fact that they are learning a language, but acquire the second language by understanding the message or by receiving comprehensible input. Comprehensible input can come from a variety of sources at a level on or slightly above the learner's current level of competence. (There is a clear parallel here with Vygotsky's notion of the Zone of Proximal Development). This input contributes directly to acquisition (incidental and implicit learning) which is largely responsible for developing comprehension and subsequent productive fluency in a second language. According to this theory, the learners are not required to actually speak or write in order to acquire language. Acquisition takes place internally as learners read and hear understandable samples of the language. In other words, after a great deal of listening, speech will emerge spontaneously in a natural order. Motivation to learn also appears to be one of the most important determinants in successful language acquisition (Krashen, 1981, 1982; Trueba, 1987). Krashen suggests that language programs must be highly motivating and designed in ways that cause learners to forget that they are hearing or reading another language.

Television, as a source of authentic second language material, seems an excellent medium for this approach. Motivation can be maintained via the provision of the high quality material already available from conventional TV. Interactive services could then improve the comprehensibility of language input by scaffolding language items according to learners' motivation, interest and knowledge levels, for example by annotating new words with translations, labelling objects in a scene and so on.

### **Attitudes to technologies for language learning**

So far we have suggested that the affordances of interactive television will be a conjunction of those of conventional television, i.e. listening, watching and reading, together with the additional potential of interactivity, i.e. browsing, "voting" and other Internet-like interactions. The possibilities of iTV seem most naturally used in support of learning activities based on the Constructionist model of language acquisition, with its emphasis on the importance of motivation and its foregrounding of comprehension rather than production or manipulation. However, iTV based facilities are unlikely to prove popular if they do not take into account people's acquired attitudes towards television itself. In this section we briefly review some studies of television use before describing a focus group study of language learners and their attitudes to media technologies.

Television is one of the most familiar and popular media technologies. Over 98% of households in the EU and North America have access to television and for many the TV set is the focal point

of the household. People of all educational levels, ages and social classes are already familiar with television and use it comfortably. Conventional TV is a known and trusted technology (Reeves & Naas, 1996), so delivering learning in this way does not involve the introduction of strange or intrusive equipment or the need for the learner to move to a special environment.

Of course the easy familiarity of TV may bring its own problems. Television is perceived as a leisure, rather than a work, technology, so any learning services need to be designed with this in mind. As one teenage respondent quoted in (Ling & Thrane, 2002) eloquently puts it, "I don't watch TV to, like, learn." People have a tendency to do other things - ironing, chatting, reading, eating - while viewing, (Gauntlett & Hill, 1999). They often view in company (Masthoff & Pemberton, 2003) and they may be subject to interruptions of varying frequency and significance. All these factors make it even more important to discover as much as possible about real learners and their lives before undertaking development.

TV has long been co-opted for educational ends, both formally, with syllabus-linked programmes and informally, via the informative documentaries and quiz programmes broadcast every day. In the case of language learning, broadcast TV material in the target language is frequently integrated into formal classroom activities. However we concentrate here not on teaching but on approaches to learning. In particular, we are concerned with "learner acceptance", i.e. the willingness of the learner to use the technology as part of their learning strategy. While "captive learners", such as children in school, may have to accept their teacher's choice of technologies, this is not the case for independent adult learners, who are free to select their own learning methods and technologies.

Where independent adults are the learners, issues of acceptability and "fit" into everyday life become critical. These sorts of issues are best explored as part of the early requirements gathering stage in a user-centred design process. This section reports our attempt to involve language learners from the very start in the project exploring the potential of interactive television as a tool for language learning.

We report on the approaches that a number of independent adult learners have adopted towards their language learning and their attitudes towards a range of language technologies, including television. The aim is to understand their motivations, the methods they find useful and the problems they encounter. This should help us identify opportunities for further matching the capabilities of interactive TV to the real needs of adult language learners, in addition to the directions suggested by the technology and by theories of language acquisition.

### **Methodology**

We used a focus group approach, with a total of 21 participants spread over three groups. Participants were recruited amongst the staff and student population of a University, using notice boards and a staff email list. An interest in languages was mentioned as a prerequisite for participation. The sample is therefore essentially a self-selecting group. Ten were 21 to 30 years old, four 31 to 50, and seven were over 50. Fourteen were English; the others were Turkish, Chinese (3) and Iranian (3). Participants had reached different levels of foreign language competence, from a professed complete inability to learn any foreign language up to degree level and beyond.

## Results

A large number of desirable attributes for learning environments emerged, some of them contradictory. For instance, while participants appreciated the routine of the language classroom, having to attend classes imposed an inflexible schedule on busy people. It was clear that no single approach would be likely to satisfy all requirements, and participants recognised this, with the majority of those who attended a formal class also using complementary methods. The main results are summarised below.

- Authentic materials

Participants were enthusiastic about authentic materials of all kinds. Reading novels, watching films and listening to the radio were mentioned as ways of getting the brain to "tune in". Some participants reported trying to recreate elements of immersion at home, for instance listening to a foreign language radio station or labelling domestic objects in the foreign language. Participants also recognised the importance of learning about the target culture as well as the language. One native Arabic speaker, for instance, mentioned that he had found it very useful to watch *Coronation Street* (a popular UK soap opera), saying "I could improve my English and understand English culture a bit more". Participants appreciated the fact that the authentic material delivered by television was itself engaging. Television in particular was perceived as more like entertainment than learning: "...you can actually sit back and relax".

- Learning in context

The notion of learning in context was raised by several participants. A particular problem was the difficulty of applying a language item learned in one context to a different one. A solution used by some was the use of a combination of media, with one providing context for the other: for instance, watching the news on television and then reading the same news stories in a newspaper. Foreign language television was seen as a valuable medium here. Although speech might be perceived as fast, with background noise sometimes obscuring the speech soundtrack, participants liked the context provided by the visual information, which made it easier to determine what was being said: "I just watch TV in French, I don't understand everything, but especially with soap operas, there is so much gesture". This success in understanding also makes the experience rewarding even if the language is hard to unravel.

- Scaffolding

Participants used current facilities such as subtitling and closed captions to scaffold their learning. One advantage of target language subtitling was the fact that it anchored speech in written form, making it possible for the learner to find unknown terms to be looked up in a dictionary. The non-UK participants made extensive use of English language closed captions (aimed at deaf viewers) to support their learning of English. However, speed was a problem:

"subtitles ... I found that really difficult for me because I couldn't go that fast." The DVD, providing functionality similar to iTV, was familiar and was valued for its flexibility, its extra material, such as subtitles and extra audio channels, and the user control it affords.

- Usage patterns of (i)TV

None of the participants had used interactive TV for language learning, nor were they particularly impressed with the current state of iTV technology and services. Usability was perceived as a problem: "the remote control is just not usable ... by the time you figure out what button to press you miss the content". This was a particular problem for the less motivated viewer: "if a semi-interested adult decides to use their spare time [to learn a language via TV] and they can't find out what they want to know about getting started, they might just get up and say 'Poof, forget about it'". Participants were anxious about missing part of the TV programme, while looking up additional information: "if information is available during a programme, it is a complete waste of time, because you miss a programme when it has background information". Screen design was also seen as a problem, with text sometimes occluding the picture or banishing it into a small window.

These comments seemed to confirm that scaffolded authentic materials on television, if designed for usability, would be a popular resource for informal learning, in line with our original thinking about technologies and 2L acquisition theories. However, there were clearly reservations amongst our participants about speed and interruption, which made some more permanent resource desirable. There were also other observations that rather militated against iTV and which gave food for thought:

- Sociability

Several participants mentioned the fact that they tended to watch in company. One problem the participants identified for learning with television of any form was that it was normally shared with others, who might well not be interested in language learning: "my two boys would rather watch the Simpsons or something all the time. There is a big fight for the TV". Manipulating the interactive services in a shared living room was seen as intrusive and unfair to other viewers, making participants unwilling to impose aspects such as subtitles or 2L labels on others. One visionary concept offered by a participant was to avoid disturbing the viewing of others in the room by projecting these enhancements onto an augmented reality display, perhaps on a visor or spectacles.

- Mobility

Participants liked being able to fit learning into odd moments of their day, for instance when travelling. Several listened to language tapes or CD-ROMs when driving, or tuned the car radio to a foreign language station. The fact that the mobile phone could be used on the move, e.g. in a bus or train, was attractive to these participants, who particularly liked the potential of SMS for language learning. One participant had used a Chinese service that sent subscribers text messages with new English words or constructions to learn. However, there was a distinct generation gap where mobiles were concerned. Younger participants were

enthusiastic, but the over 50's were distinctly cool: "I don't use a mobile phone, and I wouldn't use it to learn about a language ... I think it is a terrible idea".

These comments shifted the focus of the project, changing the central concept from one based entirely on interactive television to one based on two complementary devices, iTV and the mobile phone.

## **Design Implications**

The focus group results played a key role in directing the overall development strategy and influenced some major decisions. One such decision concerned the appropriateness of iTV based services for formal learning. Many scenarios for iTV learning have concentrated on formal learning, i.e. where the viewer is explicitly focused on learning as an end in itself, possibly even in the context of a curriculum or class (Bates, 2003; Luckin & du Boulay, 2001). Our focus group results indicate that language learners do not perceive (i)TV as a medium for formal learning, but as a form of entertainment that may have the side effect of incidental learning. Even our most fanatical language learners were not keen to watch TV programmes specifically made for the language student. In addition, they were aware of the tensions that imposing specifically educational material might have on their fellow-viewers. However, the up-to-date authentic material broadcast on TV was very attractive to them and they perceived it as bringing many valuable learning opportunities. Hence, rather than creating interactive TV programmes specifically for language learning, our strategy should be to add interactive enhancements to existing, engaging, programmes, supporting informal rather than formal learning, via programmes the viewer might watch spontaneously even without language learning opportunities.

Second was a decision on the provision of support for viewers. Our participants appreciated any support that helped them obtain more from their foreign language viewing. In particular multimedia presentation of material, with media complementing each other and providing context, was seen to facilitate understanding: subtitles made it easier to follow rapid speech, gestures and other graphical information expressed extra-linguistic meaning, a visual setting anchored the meaning of spoken language and so on. iTV could scaffold understanding even further, by providing a selection of levels of support in appropriate complementary media, either through the television screen or via a separate device such as the mobile phone.

Thirdly, participants indicated that contact with other people - teachers, peers and target language speakers - motivated them to learn. iTV can provide ways of communicating with such people, via chat and email. Research has showed that the authenticity of computer-mediated communication (such as email or chat) made the communication seem more 'real' to learners, increased their motivation and resulted in a high level of learners' satisfaction and perceived improvement (Greenfield 2003). Chat provides valuable opportunities for the negotiation of meaning similar to that provided in oral interaction (Tudini, 2003). The fact of having viewed a programme, whether a news bulletin or a football match, provides rich common ground for such interactions (Quico, 2003).

Fourthly, the general enthusiasm amongst younger participants for learning on the move suggested the incorporation of the mobile phone. This proposed use of phones has the advantage of not imposing educational material on other viewers, and of giving the learner the opportunity for asynchronous engagement with the programme, after, while or even before it is broadcast. The separation of functions that occurs when using the phone to display support material also answers the fears of those participants who were worried about the speed of synchronised subtitles and the problem of missing the programme itself when attempting to access interactive material. Using the mobile phone alone would make it difficult to deliver engaging and authentic material, mainly because of the technological limitations currently associated with the technology, pointing again to a dual device solution. However, there was a clear generation gap, and the mobile phone was not embraced by older participants.

### **Scenarios for design**

The results suggest a broad direction for the project, adopting a dual medium approach that takes advantage of the best aspects of each device. The next stage was to embody the design concept in a scenario, where the focus group had an important spin-off effect. Scenarios, though widely used, have been criticised as a design tool on the grounds that they are one-dimensional and underdeveloped (Nielsen, 2002). The focus group experience allows us to create rounded personas, by grounding them in the characteristics of some of the individuals we talked to. This should give more realism to the scenario and add to its capacity for generating design concepts (ibid.).

Scenarios are a well-established representation in user-centred design for embodying user requirements and early design concepts (Carroll, 2000). Using scenarios can help achieve the goal of creating truly useful and usable products by encouraging designers “to explore the larger design space of many possible design challenges, to review the technical feasibility and likely payoffs of the different approaches and only then begin considering the normal design issues” (Twidale & Cheverst, 2000). This is particularly important in designing applications for relatively novel activities that need to be embedded in complex social contexts. Researchers designing for ubiquitous technologies such as mobile phones and interactive television have frequently taken a scenario-building approach. For instance, scenarios have been used for conceptualising learning applications in mobile devices (Roibas & Sanchez, 2002; Sharples, 2000) and interactive television (iTV) (Bates, 2003; Luckin & du Boulay, 2001), including language learning (Pemberton, 2002; Underwood, 2002). To achieve realism, scenarios need to be grounded in the results of other forms of requirements work, such as observational studies or surveys. This allows the scenario builders to have confidence in their assumptions and provides access to real-life models allowing personas to be richly represented (Nielsen, 2002). In this paper we use the results of the focus group study to generate a rich scenario for informal language learning via a combination of two technologies, mobile phone and iTV.

Martha, 48, lectures in the English department of the University of the South Coast. She has always been interested in languages, mainly because of her life experiences. After a degree in English and French in Bristol, UK, she spent three years living in Quebec, where her hydro-engineer husband’s job had sent him. She kept up her French there via reading and conversation

but also by watching popular soap operas, which also gave her some conversational material when chatting to neighbours.

She and the family spend many holidays in France - a good reason for keeping her French up to scratch. She has a subscription to a monthly CD magazine in French which she listens to in the car. She likes the songs and poetry that are included and tries to learn them by heart, talking and singing along to herself in the privacy of the car. She also has her car radio tuned to a local French radio station.

Her Quebec experience has taught her just how effective television can be for getting used to other languages and learning about foreign cultures, and this was at the back of her mind when she took out a subscription to satellite TV. She knew that French TV channels were available and harbours a hope of interesting her son Tom (13) and daughter Emma (15) in French. Tom shows no interest in languages: for him French means boring weeks in the French countryside. Emma, however, is keen on French and is hoping to shine in her GCSE exam next term.

Martha has discovered a French TV station that broadcasts with subtitles (in French), which she finds give just the right level of help to allow her to understand the news and dramas without too much concentration. It's useful, as it enables her to see word spelling and also increases word and phrase recognition. However, she finds it difficult to keep up with the speed of subtitles, especially as she's typically doing something else as she watches, whether preparing a meal or talking to the children. The subtitles are usually displayed very fast and it would be helpful if she could adjust them according to her own pace. She can also manage some types of programme without subtitles, but finds it hard to ignore them if they're on the screen. She often finds herself reading the subtitles rather than trying to make out the speech.

Watching television with her children represents precious "quality time" for Martha, and she certainly doesn't want to make it a chore by insisting they watch educational programmes together. However, she'd like to watch with them while learning some extra odd French words or phrases. She has just read that a new service has become available via cable and satellite, enabling viewers to watch subtitles in the language of their choice and to learn new vocabulary via a personal vocabulary service displayable on the television screen or mobile phone. Viewers can also use their mobile phone to interact with the TV set and learn individually while watching in company. Martha is not a fan of mobile phones, though. She has one just for emergencies, unlike the children who are constant SMS users.

Martha has managed to persuade Tom and Emma that an episode of the police drama Maigret on French TV will be fun to watch. She uses the interactive service to set up English subtitles on the screen for Tom and Emma. Tom enjoys Maigret, and even recognises a few French words, but the prospect of the news in French is too much for him and he disappears to his room. Martha is happy to watch the news and understands almost everything. Emma is keen to try, with her exams looming, but less confident, so she tries the new service by clicking the red button. The service is on its default setting, which displays numbers and proper names. As the news item is broadcast, the newscaster tells viewers about the tense new situation between Havana and Washington. On the semi-transparent overlay on the screen, the name "La Havane" and its translation, "Havana," are displayed, allowing Emma to grasp this unknown term (see Fig 1.).

Emma's quite impressed, especially since the vocabulary she's just seen will also be sent to her mobile, where it will be accessible in her individual learning area (see Fig. 2). She can also change the settings to deliver filtered vocabulary on one of several other themes, e.g. social language, travel and so on. Emma could also use her mobile phone to review the programme sound track on the way to school.

After the news, Martha spots that a classic Truffaut film is on the following evening. Some time during the day she'll make some time to read through the synopsis on the interactive pages so that she won't need to use the subtitles at all (Meinhof, 1998, pp. 14-15). If Emma wants to join in, she can access the synopsis beforehand on her phone, and receive subtitles on the phone as she watches. She normally has her mobile with her on the sofa anyway, to text her friends. The unobtrusiveness of the mobile phone approach enables both to enjoy watching the TV as well as giving the sense that they have achieved something worthwhile.



Figure 1. iTV display screenshot



Figure 2. Mobile phone display screenshot

## Conclusions

The dual device scenario presented here responds to many of the requirements from the focus group. Television, unlike its rival technology DVD, provides a constantly refreshed, up to date stream of authentic and engaging materials that are of intrinsic interest. Learning in context is made possible, with rich multimedia content providing a comprehensible setting for the new language. Learning on the move is supported, while leisure use of television is respected. Learners can also choose to take advantage of one device without the other, and scaffolded learning opportunities can be provided to suit learner motivation and knowledge level.

The scenario raises a number of questions to be addressed in further work. A first question is the extent to which the services we have sketched answer the needs articulated by language professionals. While they correspond to pedagogically sound principles insofar as they support learning in context using authentic materials (Meinhof, 1998) they are not a complete solution

and will need to be supplemented by other material. In particular, as Sherrington pointed out many years ago, TV does not present obvious opportunities for employing speaking and writing skills (1973), although the potential is there with mobile phones. In addition, formally structured materials will be needed, particularly for beginners. Details of pedagogy will need to be developed in collaboration with language teaching experts.

A second set of issues concerns the technical feasibility of the dual device approach. We are currently investigating two possible end-to-end solutions based on a multi-tier client/server architecture consisting of the broadcast-end tier, the back-end tier and front-end tier for developing the language learning service (Fallahkhair, 2004).

A final set of issues concerns the design of the on-screen and mobile interactions. Despite Robertson et al's pioneering CHI paper discussing co-ordinated iTV and PDA interaction (1996), little is known about interacting devices and this will be a further focus for the project. Usability evaluation of iTV poses its own difficulties (Pemberton & Griffiths, 2003). We are also exploring the use of personalisation techniques for iTV learning (Masthoff & Pemberton, 2003).

## References

- Bates, P. J. (2003). *T-Learning Study. A study into TV-based interactive learning to the home*, retrieved September 1, 2003 from <http://www.pjb.co.uk/t-learning/contents.htm>.
- Broady, E. (1997). Old technology, new technology: Video makes a come-back. In A. Korsvold & B. Ruschhoff (eds). *New technologies in language learning and teaching*. Council of Europe.
- Bruner, J. (1990). *Act of Meaning*. Cambridge, MA: Harvard University Press.
- Carroll, J.M. (2000). Five Reasons for scenario-based design. *Interacting with Computers*, 13, 43 – 60.
- Fallahkhair, S., Masthoff, J. & Pemberton, L. (2004a). Learning Languages from Interactive Television: Language Learners Reflect on Techniques and Technologies. In Cantoni, L. & McLoughlin, C. (Eds.) *World Conference on Educational Multimedia, Hypermedia & Telecommunications EdMedia 2004*. 4336- 4343
- Fallahkhair, S., Pemberton, L. & Masthoff, J. (2004b). A dual device scenario for informal language learning: interactive television meets the mobile phone. In Kinshuk, Looi, C., Sutinen, E., Sampson, D., Aedo, I., Uden, L., and Kahkonen, E. (Eds.). *The 4<sup>th</sup> IEEE International Conference on Advanced Learning Technologies ICALT 2004*. 16-20.
- Fallahkhair, S. (2004). Media convergence: An architecture for iTV and mobile phone based interactive language learning. In Masthoff, J., Griffiths, R. and Pemberton, L. (Eds.) *European conference on Interactive Television: Enhancing the Experience EuroiTV 2004*. 177-182.

- Gauntlett, D. & Hill, A. (1999). *TV living: Television, culture and everyday life*. London: Routledge.
- Gawlinksi, M. (2003). *Interactive television production*. London: Focal Press.
- Greenfield, R. (2003). Collaborative Email exchange for teaching secondary ESL: A case study in Hong Kong. *Language Learning and Technology*, 7(1), 46-47.
- Krashen, S. (1981). *Second Language Acquisition and Second Language Learning*. Oxford: Pergamon Institute of English
- Krashen, S., 1982. *Principles and practice in second language acquisition*. New York: Pergamon.
- Ling, R. & Thrane, K. (2002). "I don't watch television to like learn anything": the leisure use of TV and the Internet. *First Monday*, 7, 1 (January 2002)  
[http://firstmonday.org/issues/issue7\\_1/ling/](http://firstmonday.org/issues/issue7_1/ling/)
- Luckin, R. & du Boulay, B. (2001). Imbedding AIED in ie-TV through broadband user modeling. AIED Proceedings.
- Masthoff, J. & Pemberton, L. (2003). Adaptive learning via interactive television. *In Proceedings of PEG 03 conference*, St Petersburg.
- Masthoff, J., and Pemberton, L. (in press) Adaptive Hypermedia for Personalized TV???
- Mitchell, R. & Myles, F. (1998). *Second Language Learning Theories*. Oxford University Press.
- Meinhof, U. (1998). *Language learning in the age of satellite television*. Oxford University Press.
- Moore, S. (1996). *Satellite television and everyday life*. Luton: Luton University Press.
- Nielsen, L. (2002). From user to character—an investigation into user-descriptions in scenarios. *Proceedings of DIS 2002*.
- Pemberton, L. (2002). The Potential of Interactive Television for Delivering Individualised Language Learning, *Proceedings of the Future TV: Adaptive Instruction In Your Living Room (Workshop for ITS 2002)*.
- Pemberton, L., Fallahkhair, S., Masthoff, J. (2004). Towards a Theoretical Framework for Informal Language via Interactive Television. In Kinshuk, Sampson, D.G. and Isaias, P. (Eds.) *Proceedings of IADIS International Conference of Cognition and Exploratory Learning in Digital Age (CELDA)*, 27-34

- Pemberton, L. & Griffiths, R. (2003). Usability evaluation techniques for interactive television. *Proceeding of HCI International*.
- Quico, C. (2003). Are communication services the killer application for interactive TV? Or: "I left my wife because I am in love with the TV set". In Masthoff, J., Griffiths, R. and Pemberton, L., (Eds.) *Proceedings of EuroITV 2003*, Brighton, UK.
- Reeves, B. & Naas, C. (1996). *The media equation: How people treat computers and new media like real people and places*. Cambridge: CUP.
- Robertson, S., Wharton, C., Ashworth, C. and Franske, M. (1996). Dual Device User Interface Design: PDA and interactive Television, *In Proceedings of CHI 1996*.
- Roibas, A.C. & Sanchez, I.A. (2002). Pathways to M-Learning. In Anastopoulou et al (Eds) *Proceedings of the European Workshop on Mobile and Contextual Learning*, Birmingham, 53 – 56.
- Salaberry, M. R. (2001). The use of technology for second language learning and teaching: A retrospective. *The Modern Language Journal*, 85 (1), 39 - 56.
- Sharples, M. (2000). The design of personal mobile technologies for lifelong learning. *Computers and Education*, 34, 177 - 193.
- Sherrington, R. (1973). *Television and Language Skills*. Oxford: Oxford U.P.
- Trueba, H.T. (1987). *Success or failure*. Cambridge, MA: Newbury House Publishers.
- Tudini, V. (2003). *Using native speakers in chat*. *Language Learning & Technology*, 7, 3, 141-159.
- Twidale, M., & Chervest, K. (2000). Exploring the design space of networked technologies. *Proceeding of International Workshop on Technologies that Cross Boundaries: Exploring the Gap between Wireless Networks, Bits, Interface and Work Practices, CSCW'00*.
- Ultralab. (2003). *m-learn project*, retrieved October 8, 2003 from <http://www.ultralab.ac.uk/project/m-learning>
- Underwood, J. (2002). Language Learning and Interactive TV. *Proceedings of the Future TV: Adaptive Instruction In Your Living Room (Workshop for ITS 2002)*
- Vygotsky, L.S. (1978). *Mind in Society*. Cambridge, MA: Harvard University Press.
- Warschauer, M., and Healey, D. (1998). Computers and language learning: An overview. *Language Teaching*, 31, 57-71