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Interactive television revisited: a case study in home economics

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OPSOMMING

Die reaksie van huishoudkundeleerders tydens 'n interaktiewe televisie-uitsending word in hierdie artikel onder die loep geneem. Drie aspekte, naamlik die vlak van interaksie tydens die uitsending, gelyktydigheid en simmetrie, is tydens hierdie gevallestudie bestudeer.

Tydens interaktiewe televisie-uitsendings kan interaksie varieer van definisioneel-fisiese interaksie tot volle interaksie met al die betrokke partye. Gelyktydigheid kan varieer van direkte interaksie tussen die leerders en die aanbieder tot vooraf opgeneemde uitsendings en terugvoer per pos aan leerders. Simmetrie, daarenteen, wissel van volledig simmetriese videokonferensies tot die pos van voorafvervaardigde videobande met onderrigmateriaal op papier en skriftelike terugvoer.

Hierdie studie het bevind dat alhoewel die leerders verkies het om saam met medeleerders na die televisie-uitsending te kyk, hulle min behoefte uitgespreek het om direk met die aanbieder (dosent) te kommunikeer. Dit wil voorkom asof hulle gelyktydige kommunikasie belangrik ag aangesien hulle eerder met hulle medeleerders in interaksie wou tree as met die aanbieder. Die leerders het ook voorkeur aan voorafvervaardigde videobande gegee, veral met die oog op voorbereiding vir eksamens en die uitvoer van opdragte. Die leerders het 'n lewendige televisie-uitsending as onnodig beskou, sou graag in telefoniese verbinding met die aanbieder wou tree (asimmetriese kommunikasie), maar wanneer dit hulle pas, eerder as byvoorbeeld tydens of direk na 'n uitsending. Daar was weinig voorkeur vir ander kommunikasiewyses soos fakse en elektroniese pos.

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INTRODUCTION

While the educational possibilities of television are widely recognised, one frequently cited shortcoming of the medium is its lack of interactivity. One cannot talk back. One cannot make it stop, wait or answer questions nor argue with it. In terms of programme selection, there are two options, namely to watch or not to watch. The rigidity of this medium, coupled with the fact that the broadcaster has the final (and usually only) say in the choice of programme material, makes television reek of autocratic imposition of ideas. The strong visual emphasis and easy digital control lead to further accusations that television's purpose is to manipulate the viewer (Hunt, 1981:15).

Nevertheless, the same visual emphasis and wide range of possibilities make it a much considered medium to support (and sometimes even carry) education (University of Pretoria, 2000). Unfortunately, in addition to the limitations mentioned in the first paragraph, the fact that one cannot even make it pause presents serious doubts about its effectiveness in facilitating real learning. The rigidity of programming, moreover, makes it difficult to use in schools and institutions of higher learning. Although programmes are broadcast by various institutions, schools find it difficult to fit the broadcast schedule into their timetables (Du Pisani, 1998; University of Pretoria, 2000).

One solution to many of these problems is interactive television, which ranges from unidirectional telebroadcasting with audio feedback to fully interactive video conferencing, either via satellite, telephone lines or computer networks.

The South African Broadcasting Corporation's (SABC) learning channel reaches thousands of learners daily and these broadcasts have contributed to the increasing popularity of educational television in South Africa. Much of this is noninteractive television with broadcast lectures. Various private providers use a similar system. The University of Pretoria has used direct broadcasting, in lecture mode, with telephone, fax and electronic mail feedback since 1995. These telecommunication types are used both for teaching and for research purposes at high school and university level (University of Pretoria, 1999).

COMPONENTS OF INTERACTIVE TELEVISION

Although many more influence the quality of an interactive broadcast, the following aspects were

considered for the purposes of this case study:

- Advantages and disadvantages of interactive television
- Levels of interactivity
- Modes of interactivity.

Advantages of interactive television

Cronjé (1996) listed the following advantages of interactive television:

a. *Instantaneousness*, which means that a geographically dispersed population can be reached immediately, irrespective of location
b. *Simultaneousness,* which allows information to be given to all remote areas at the same time, regardless of distance from the source
c. *Unfiltered information transfer*, which means that all receivers get the same message
d. *Accessibility,* which rests on the ability, particularly of satellite technology, to reach anywhere within its footprint, irrespective of distances or geographic obstacles
e. *Affordability*, which has to do with economies of scale - the larger the target population, the smaller the unit cost.

A bank training director could for instance use interactive television to give trainees in all his branches exactly the same product information (unfiltered), regardless of their location (accessibility), at the same time (simultaneousness), immediately before the release of a new product (instantaneousness), without flying them to the same venue and paying for their accommodation (affordability).

Disadvantages of interactive television

While making the most of the advantages, one should also consider disadvantages related to audience size, time constraints and lack of feedback (Berlo, 1960:104; Cronjé, 1996; Kozma, 1994; Johnson & Johnson, 1991:127). Factors such as the instructor/ learner ratio, synchronicity, and symmetry may influence learning in that an increase in the participation ratio and a decrease in synchronicity and symmetry lead to a decrease in interactivity. Lack of visual feedback may also obscure the interactive communication process. The presenter is unable to *see* what is going on at every desk and cannot obtain a "feel" for the audience. A trained facilitator should be present to lean over the shoulders of the learners and to inform the presenter whether the pace is too fast or too slow (Cronjé, 1996).

Levels of interactivity

Berlo (1960:106-121) provides a useful taxonomy of communicative interdependence, of which interaction is at the highest level. He indicates four levels of interactivity:

Definitional physical interdependence Without a sender there is no receiver, and vice versa. This is the lowest form of interdependence, but also the type of interdependence that is most often called interactivity. The broadcasts by the SABC's learning channel fall in this category, with limited feedback by telephone to the studio.

Action/reaction interdependence This refers to the existence of feedback which *… provides the source with information concerning his success in accomplishing his objective. In doing this it exerts control over future messages which the source encodes …"* (Berlo, 1960:111). Berlo explains that if the audience for instance supplies laughter as feedback, future messages will be tailored to evoke more laughter in the same way. Clearly lack of visual feedback impairs action/reaction interdependence.

Interdependence of expectations This involves prediction, such as inferring meaning based on what the communicating party is doing. It requires active participation by the distance learner, but without feedback the instructor is unable to maintain this level of interactivity (Borsook & Higgenbotham-Wheat, 1991).

Interaction *When two people interact, they put themselves into each other's shoes, try to perceive the world as the other perceives, try to predict how the other will respond* (Berlo, 1960:131). Video conferencing or another form of bidirectional communication would be suitable to reach this level of interactivity (Borsook & Higgenbotham-Wheat, 1991).

To encourage interactivity one needs to design very carefully in order to accentuate the "talk back" interaction provided by interactive television (Cronjé, 1996). In addition to the level of interaction, one also has to consider the mode of interaction, in other words how many people participate interactively, in what time frame, and by which devices.

Modes of interactivity

When people interact, it involves the participation of more than one person. A time frame has to be specified, and the interaction has to be mediated through some channel. These aspects of interactivity are referred to as participation ratio, synchronicity and symmetry. The level of interaction is directly affected by each of these variables (Borsook & Higgenbotham-Wheat, 1991).

Participation ratio This ratio describes the number of participants and the way in which they participate. The ratio may vary between one to one, one to many, and group participation. It is essential to distinguish between distance education and mass education when interactive television or interactive broadcasting is discussed. The single pupil at a remote site who is tutored by an individual mentor (for instance a South African surgeon who is coached via interactive television by an American specialist during an operation) is participating in distance education/ training, but not in mass education/training. On the

other hand, thousands of matriculants watching a broadcast on SABC TV's education channel, and then phoning in their questions, are participating in both distance and mass education. Four or five individuals linked to a trainer by video conferencing technology are once again participating in distance education/ training, but not in mass education/training (Cronjé, 1996).

This distinction between distance education and mass education becomes relevant when the participation ratio is considered as a function of interactivity. It is clear that interactivity drops as the participation ratio rises. In a one-to-one situation interaction could be considerable, whereas it would be difficult to reach the same level of interaction when the ratio is high. There are technological solutions to allow reasonable participation, even in this "unfavourable" instance, for example electronic mail, faxes, cellular and wired telephones (Cronjé, 1996).

Synchronicity This refers to the time of interaction. Synchronous interactivity takes place simultaneously, in other words both participants are present at the same time. The most obvious example of synchronous interaction is face-to-face contact. Live television broadcasts such as the news are synchronous, but not interactive.

Learners react either orally or via digital tone technology, as is used by modern electronic telephones. Asynchronous interactivity occurs when the participants are not present at the same time. This may be when the viewer sends in a written request and the presenter replies by means of a letter, or by means of a reply on videotape which the viewer sees later. Not both parties need to be on the air at the same time. Gates (1995:66) mentions a general human preference for asynchronous interaction: *It is human nature to find ways to convert synchronous communication into asynchronous forms. Before the invention of writing, 5 000 years ago, the only form of communication was the spoken word and audiences had to be in the presence of the speaker or they missed his message*.

The clearest advantage of asynchronicity is that it makes scheduling easier. Participants often convert synchronous communication to asynchronous communication by means of videotaping, but in doing so they lose interactivity. In the same way as the level of interactivity decreases as the participation ratio rises, it also decreases as participation becomes asynchronous (Borsook & Higgenbotham-Wheat, 1991).

Symmetry This refers to the combination of technologies mediating the interaction. Symmetrical interaction takes place when both parties use the same medium. In video conferencing, for example, each participant sits in front of a camera and watches a screen which displays one or all the other parties. While it would be infinitely preferable to have bidirectional video, this could cost a great deal more. For cost-saving purposes, therefore, most systems are asymmetrical, which means that while video is sent in one direction, feedback usually occurs through audio, fax or electronic mail.

Although the above makes economic sense, it could be educationally suspect. While it may be regarded as essential for the learner to be stimulated visually, it can be argued that the instructor does not need to see all the learners. This is far from ideal since the presenter does not receive valuable feedback cues such as body language and class response. As participation increases, interactivity decreases. (Borsook & Higgenbotham-Wheat, 1991).

EXPERIMENTAL DESIGN OF THE CASE STUDY

The Department of Home Economics at the University of Pretoria used interactive television in its distance-education programme for a group of 76 learners who enrolled for Home Economics in 1998. These learners were in five provinces across the country. Although only about 40 learners had easy access to the learning centres serviced by the University of Pretoria, other students had to travel 200 kilometres to a learning centre. A substantial number of students had access to DSTV in their own homes or in the homes of friends. Lessons pertaining to all the modules for which they enrolled in a specific semester were broadcasted on a Saturday. This meant that, depending on the specific modules learners were enrolled for, each learner received approximately three hours of tuition on a Saturday.

In considering the efficacy of this mode of tuition, two questions were asked and they form the basis of this article:

1. How high was the perceived level of interactivity?
2. How desirable did learners perceive two aspects of interactivity, namely:
   - synchronicity and
   - symmetry?

A questionnaire consisting of 16 questions was compiled to gather information on the three research variables, namely level of interactivity, synchronicity and symmetry. Six questions were posed to determine learners' responses regarding their perception of interactivity during the televised lectures, five questions covered synchronicity, and five symmetry. The questionnaire, with a return envelope, was mailed to 76 part-time learners who enrolled for the B Home Economics (General) course. Thirty-nine completed questionnaires (51%) were returned.

FINDINGS

Levels of interactivity

The learners were asked to respond to statements that were designed to determine the level of interactivity, ranging from definitional-physical

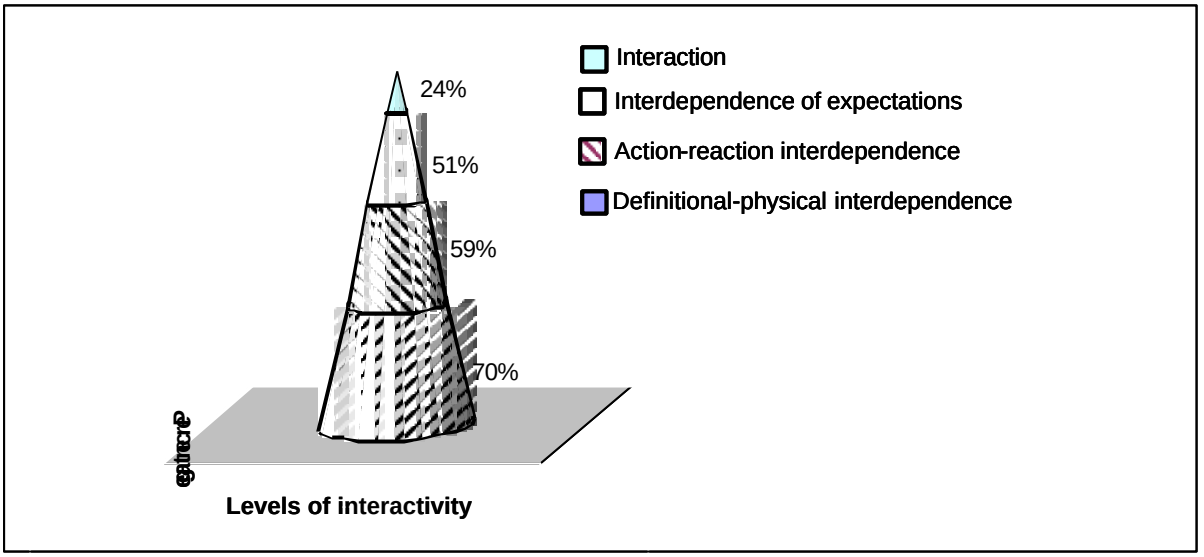

FIGURE 1: LEVELS OF INTERDEPENDENCE EXPERIENCED BY LEARNERS DURING INTERACTIVE TELEVISION BROADCAST

interdependence to full interaction. Seventy per cent of the respondents agreed with the statement, "During the lecture, the lecturer spoke directly to me". This indicates a high level of definitional-physical interdependence (see the lower section of Figure 1). This is hardly surprising, as no communication is possible without definitional-physical interaction.

The learners' desire to react could indicate action/ reaction interdependence, as shown by the 59% of learners who said, "During the lecture I felt the urge to nod in agreement" (see the second section from the bottom of Figure 1).

As it involves prediction and inference, interdependence of expectations would add "life" to a presentation. A 51% *disagreement* with the statement "I found the lecture 'dead' compared to traditional classroom instruction", indicates some interdependence of expectations (see third section from the bottom of Figure 1). The fact that 46% of the learners felt that it was not necessary to travel to Pretoria to attend a contact lecture, plus the fact that 76% enjoyed the availability of immediate feedback by means of technology, would indicate that some degree of interaction was achieved.

Figure 1 indicates that learners experienced interdependence at different levels. The majority of learners (70%) reported simple definitional-physical interdependence (interaction at the lowest level), and a small percentage (24%) felt that real (high-level) interaction was achieved (see the top section of Figure 1).

The questions on interactivity covered learners' preferences in terms of peer interaction. The questionnaires mentioned two modes of reception:

- Reception at a learning centre
- Broadcasting directly to learners' homes.

Eighty per cent of the respondents indicated that a live broadcast in a learning centre with other learners appealed to them, and 70% preferred a live broadcast in the privacy of their own homes. Nevertheless, 78% replied that they would like to watch the lectures with fellow learners and not in isolation, indicating a high preference for peer interaction if not with the instructor.

Synchronicity

This section of the questionnaire focused on the extent of required synchronicity and the preferred time frame for interaction.

Only 51% of the respondents indicated that they would prefer to watch the lectures in their own time and not as a live broadcast. Eighty-one per cent indicated that they would like to use copies of previous lectures when they prepare for exams, and 62% indicated that they would like to own copies of previous lectures. These statements indicate a high preference for asynchronous interaction.

Although 76% liked the fact that they could get immediate feedback on questions, only one question was asked by telephone during the broadcast and none by fax or electronic mail. Seventy-one per cent of the students expressed the wish to be able to press a "pause" button or to "rewind" the lecture. Therefore, although the students indicated a desire for synchronous interaction, they did not seem to use the available technology.

The respondents also indicated a high preference for question-and-answer interaction directly after a broadcast:

- Nine per cent indicated that they would like to pose questions before a broadcast.
- Sixty-three per cent indicated that they would

pose a question during an interactive television lecture broadcast.
- Seventy-five per cent indicated that they would pose a question after a television lecture broadcast.
- Sixty-three per cent indicated that they would pose a question when they were studying the material after viewing a tape of the lecture.

Based on the above results, the majority would prefer to ask questions once the material has been presented to them. The same number of learners would interrupt a live broadcast as the number who would like to view prerecorded material in their own time.

Symmetry

The interactive lecture utilised broadcast technology with feedback options by telephone, fax, electronic mail or conventional post. It was therefore not presented symmetrically. The researchers wanted to determine to what extent learners were at ease with or frustrated by this mode of tuition.

Fifty-six per cent of the learners were not frustrated because the lecturer could not see them during presentation of the interactive broadcast lecture. In fact, 12% were glad that the lecturer could not see them. Fifty-five per cent indicated that they would pose a question in front of the camera. This means that 45% of the learners would not participate in a symmetrical discussion. Symmetrical feedback therefore does not seem to be a high priority.

When the types of asymmetrical feedback were considered, 82% of the learners indicated that they would pose a question via telephone. Four per cent said they would use a fax after the lecture, and a further 4% would use electronic mail. Fifteen per cent preferred to use the conventional post. The telephone therefore seems to be the preferred option for synchronous feedback. Ironically only one learner provided interaction via any means during and after the broadcast. However, this one phone call was received from a learning centre and could not be taken because of technical difficulties in the television studio!

SUMMARY OF FINDING FROM THE CASE STUDY

Levels of interactivity

The results of this investigation showed that interactive television was in fact much less interactive than it could be, and that most learners perceived the interaction as definitional-physical. However, although the learners seemed to like watching the broadcast with their peers, they indicated very little need for interaction with the instructor during or directly after the broadcasted lecture.

Synchronicity

Although synchronicity was rated highly, there was no clear indication that the learners interacted simultaneously with the broadcast. There was a clear preference for interaction after the broadcast, but again none of the learners exercised this option. They seemed to want synchronous communication more for interaction with their peers than with the presenter. There was a high desire for asynchronous (recorded) material.

Symmetry

The telephone was rated highest as a channel for feedback, and the conventional post came second. The learners seemed to want to phone after the broadcast, at a convenient time.

TABLE 1: SUMMARY OF FINDINGS AND RECOMMENDATIONS FOR FUTURE IMPLEMENTATION OF INTERACTIVE TELEVISION FOR HOME ECONOMICS LEARNERS

Aspect	Conclusion	Recommendation
Levels of interactivity	♦ Learners like peer support ♦ Learners have little need for interaction with the presenter	♦ Organise remote site group work sessions ♦ Arrange regular contact sessions with lecturers
Synchronicity	♦ Learners do not want to react during broadcasts ♦ Learners enjoy watching a broadcast with peers	♦ Video conferencing enables learners and lecturers to hear and see each other, allowing for real-time interactive discussion of the subject matter ♦ Encourage interaction with peers at a remote site
Symmetry	♦ Learners prefer the telephone as an interactive device ♦ Learners prefer to phone at a time that is convenient for them	♦ Agree on a suitable time frame for telephone consultations ♦ Encourage the use of e-mail as a means of communication

DISCUSSION BASED ON THE CASE STUDY

Although interactive television is often enthusiastically welcomed for communication with distance learners, educators should take care to design lectures around the issues of participation ratio, synchronicity and symmetry in order to match the requirements of learners, subject content and media characteristics.

The findings of this case study seem to indicate that the presentation of live television lessons is unnecessary as prerecorded material is preferred. Clearly the lecturer is not needed in the studio during the broadcast, but should be telephonically available after the broadcast to answer questions. If prerecorded material were to be posted to remote learners, lecturers who frequently make use of this type of technology are likely to receive an increased number of telephone calls over an extended period. It could therefore become necessary to develop a means of dealing with a telephone call overload.

Table 1 presents a summary of aspects addressed in this case study as well as recommendations for the future implementation of interactive television for Home Economics learners.

RECOMMENDATIONS BASED ON THE CASE STUDY

- It would appear from the above conclusions that the live presentation of television lectures is unnecessary.
- Prerecorded material may be broadcast, or even mailed to learners.
- Learners favour lectures in the same location as their peers, but they have little need for interaction with the presenter.
- Recordings of lectures are rated highly.
- Learners prefer to make use of prerecorded materials for reviewing purposes.

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