

COMMUNICATION

An Empirical Analysis of Interactivity in Teleconference

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Abstract: *Interactivity has always been considered as an important element in learning, which is basically the end product of a communication system. This communication system is education or distance education. As is the case with any communication system, education is also interactive where some information is sent, received, comprehended and assimilated. Most learning theories suggests that for learning to be effective, it should be active. The interaction component in distance education is done through various modes such as through print materials, contact sessions, use of interactive technologies etc. Amongst various interactive technologies used in distance education, Teleconference is one of the most common but important one. The Indira Gandhi National Open University (IGNOU) has been using one-way video and two-way audio teleconference for delivery of instruction from 1995. This paper reports the nature of interaction during teleconference sessions based on recording of actual interaction and participants' reaction. Based on the results of the study it suggests a design for an ideal teleconference session.*

Introduction

Interactivity has always been considered as an important element in learning, which is basically the end product of a communication system. The communication system employed for effective learning is education or distance education. As is the case with any communication system, education is also interactive, where some information is sent, received, comprehended, assimilated and internalized to develop knowledge and understanding. Most learning theories suggests that for learning to be effective, it should be active. In distance education, interaction facility is provided through "guided didactic conversation" in the print materials. Distance learners interact with the print materials and make sense to gain knowledge, skills and attitude. This is one form of interaction out of the three types of interaction available to distance learners (Moore, 1989). The other two types of interaction are 'learner-instructor' and 'learner-learner' interaction. Mostly these kinds of interaction are provided through occasional face-to-face contact, where the learners can talk to their peer and also can ask questions to tutors and clarify their doubts. With the development of modern information and communication technologies, it is possible to provide higher degree of interaction to the distance learners.

Khan and McWilliams (1998) categorise these technologies into two groups — interactivity in real time and interactivity not in real time mode. The former includes technologies such as video conferencing, interactive televised instruction (one-way video, two-way audio), audiographics, audio-teleconference, etc; whereas, the latter includes computer-mediated communication, voice mail, facsimile etc. However, availability of these new technologies for interaction in itself does not make distance education interactive. It is the decision of an institution to use these technologies that facilitate interactivity. Bates (1995) provides comprehensive criteria for choice of technologies, which is called the ACTIONS in short. However, in developing countries mostly the 'cost considerations' and 'novelty' of the technology becomes the prime factor influencing decisions of media and technology use in distance education. At the same time there has always been an ongoing debate on the appropriateness of a technology for specific conditions. But, experience shows that a technology understood to be inappropriate at the time of introduction has proved to be effective with certain modifications. In this paper, we are concerned with the 'interactivity' criterion of Bates' ACTIONS. Since interaction play a vital role in learning, this paper makes an attempt to investigate the pedagogical usefulness of teleconference from the point of view of interaction.

Objectives

The objectives of the study were to:

- examine the interaction during teleconference session;
- assess the quality and usefulness of teleconference as perceived by the learners; and
- design an ideal interactive teleconference session.

Review of Past Studies

Satellite based interactive teleconferencing is one of the innovations in distance education to increase the possibility of interaction of remote distance learners with their teachers and peer groups. The special features of teleconferencing are instant two-way communication; transmission of right message; removal of misunderstanding and doubts; motivating the learners; delivery of quality education and training; focus on importance of individual learners; and cost effectiveness (Chaudhary, 1995). One of the most important aspects of teleconference is interactivity that facilitates learning in asynchronous mode with benefit of almost being face-to-face (Lampikoski, 1992). Comparative research evidence shows students do not learn more because of interactivity and teleconference imposes time and place barriers to distance learning (Russell, 1994). However, a comprehensive review of American literature on teleconference concludes that use of interactive electronic telecommunication media is effective in teaching and studying (Moore and Thompson, 1992).

Research into interactivity and usefulness of instructional interactive television has shown mixed results. Stone (1992) after an internal evaluation study at Rensselaer

Polytechnic Institute, New York State found that flexibility of recorded material was more important to students than live interaction. Simpson et al (1993) having empirically compared a variety of instructional TV technologies concluded that

The most successful ITV technologies were fully interactive 2V/2A+, 2V/2A, 1V/2A. Student performance was comparable with live and ITV instruction using 2V/2A+, 2V/2A and 1V/2A. Interestingly, 2-way video does not appear to improve student performance as compared to 1-way video (p. 162-3).

Martin and Rainey (1993) also found that neither student achievement nor attitude is adversely affected by the satellite delivery of courses in comparison to face-to-face delivery. In an impact evaluation of teleconference using a mixed model (having a variety of media and activities during sessions) Abusabha et al (1997) found a very high level of satisfaction and beliefs in its effectiveness amongst participants. Bates (1995) while discussing 'interactivity' in instructional television says it is related to student number —

The opportunity for any individual to participate in questioning or discussion decreases in proportion to the number of students viewing a live interactive programme (p.101).

He goes on to advise, if the number of participants in all the location put together is more than 25 to 30, it is better to design interaction outside the programme itself.

In India, research and evaluation of the usefulness and effectiveness of teleconference is at the stage of infancy, though the first of such report was published in 1994. Sahoo (1994) reported the evaluation of the experimental phase of IGNOU's teleconference. He found that learners got fair chance to ask questions to the resource persons. The quality of interaction was also high, which focussed on the immediate presentation. Learners generally asked for clarifications, made observations and reacted to the presentations during teleconference. Raghubanshi and Mishra (1996) conducted a survey to assess the reasons for poor attendance in the teleconference sessions. Their study revealed that though about 70 per cent students were aware of teleconference as a medium, only 31 percent knew the availability of reception facility. Respondents also complained of lack of information or late information about teleconference sessions. Raghubanshi and Mishra suggested home delivery of teleconference as a panacea for most of the problems faced by learners, as 47 percent of the respondents in the survey had access to cable TV.

Dash (1997) reported an evaluative study of interactive television used in training primary school teachers. The result shows that the participants expressed favourable reactions towards interactions between them and the experts. Phutela (1998) reporting a similar study as that of Dash says, "the level of interaction among participating teachers and the expert panelist was found to be quite good" (p.41). Dharam Prakash and Harmesh Lal (1998) too on a similar study noted that teacher participants felt the duration of question-answer session was less and need to be increased. Pandey (1998) reported the NCERT's effort in teleconference, as was the case in the reports of Dash, (1997), Phutela (1998) and Dharm Prakash and Harmesh Lal (1998). Pandey reported that 35 per cent of teleconference time was spent in question-answer and on an average about 56 telephone calls were received every day during the five days programme.

Subhayamma (1998) reported an evaluative study of IGNOU's teleconference and indicated that "many students had apprehensions about their participation in the

interaction sessions and the adequacy of time allotted for interaction compared to usual personal contact sessions" (p.61).

All the Indian studies reported above have used the teleconference facility available at the Indira Gandhi National Open University, New Delhi. Interestingly none of these studies look into the question of interactivity from the viewpoint of their nature, quality and effect on learning. Participants' reaction has always been the major area of concern. But for determining the pedagogical utility of teleconference, it is essential that the nature of interaction be dealt in depth. This paper is an attempt in this direction, besides undertaking an assessment of learners' reaction to various aspects of teleconference.

Research Design

The Indira Gandhi National Open University started experimenting with delivery of instructions through one-way video and two-way audio teleconference in 1993 in collaboration with the Indian Space Research Organization (ISRO). Since 1995, IGNOU and various other agencies like NCERT, AIMA, NOS and State Governments are regularly using the system for tele-counseling and tele-training. The technical set-up has a teaching end studio at the headquarters in its Electronic Media Production Centre (EMPC). The studio is equipped with three cameras, facilities for special effect, tape play back, computer interface, fax machine and three dedicated telephone lines for receiving calls from receiving ends. Recently a toll free local call facility has been added. A voice-mail system has also been installed for learners to ask questions prior to specific sessions. The video and audio signals from the teaching end are transmitted via Transportable Remote Area Communication Terminal (TRACT) in the direction of INSAT2C using extended C-Band frequencies. The receiving end consists of a dish antenna with C-Band LNBC (Low Noise Block Converter), a television set and STD telephone line for interaction. At present receiving centres have been set up at 17 Regional Centres and around 120 Study Centres of IGNOU. Apart from IGNOU, approximately 250 nodes are available at many user organizations, which are regularly using the system (Rama Rao and Khan, 1998).

The School of Education uses teleconferencing for Extended Contact Programme (ECP) in the Postgraduate Diploma in Higher Education. The ECP held in November 1998 has been taken as the sample for this study. Since the objectives were to examine interaction and also assess learners' reaction towards teleconference, the researcher recorded the interactions through in situ arrangement at the studio and sent a questionnaire to one of the Regional Centre for the responses of the participants. The questionnaire included 24 items covering technical quality (1-3), subject matter (4-8), presentation (9-16), interaction (17-19), and administrative arrangements (20-24). Interactions of eight sessions (in two days) were recorded for analysis, and four participants (including one female participant) recorded their reactions to all the eleven sessions of ECP through teleconference. In the foregoing pages, analysis of these data has been made to discuss issues related to design of teleconference sessions.

Analysis and Discussion

Interactions

During the eight sessions in which interactions were recorded, receiving ends from 14

regional centres interacted with the resource persons at the headquarters using telephone and fax. Table 1 depicts the number of fax messages and telephone calls received. In all 63 fax messages and 91 telephone calls were received. On an average each session received around eleven calls. The resource persons replied/commented almost all the questions asked by the participants through telephone. Table 2 shows the interaction from various receiving centres. Only 32 out of the 63 facsimiles received were attended to. In fact, fax messages were less responded in comparison to telephone calls due to paucity of time. Shillong regional centre accounted highest number of telephone calls. However, in terms of both telephone calls and facsimile, Bangalore regional centre tops the list in interacting with the resource persons. Table 3 indicates that a total of 220 questions/comments came through telephone and fax, of which only 21 were related to general information about number of students participating in the teleconference or about administrative issues not immediately related to the sessions concerned. Around 90 percent of the interactions are related to respective sessions. This indicates the rich quality of interaction during the teleconference. However, sometimes the participants repeated the questions/comments. Table 4 shows the participation of students, local resource persons and IGNOU officials in interactions with the resource persons at the headquarters. Through the 91 telephone calls received, 110 persons participated in interactions. Of these 110 persons, 85 were students. This again shows the high opportunity received by the learners to interact, clarify their doubts, put forward their viewpoint, and discuss issues presented by the resource persons. Table-5 depicts the duration of telephone calls received. The range of duration of telephone calls was between 9 seconds to 115 seconds. Table-5 shows, a large number of call (35) were in the range of 16-30 seconds followed by 31-45 minutes (23 calls). The mean duration of calls is 34.5 seconds. The total duration of the interaction calls is little less than one-tenth of the total teleconference time. In all the eight sessions, the resource persons took around 230 minutes (25+20+25+45+20+30+ 30+35) to present the main theme of discussion. Of the total 10 hours teleconference, a little less than 4 hours were consumed in presentation, a little less than one hour in putting questions, and therefore this show that more than 50 percent time was devoted to discussion arising out of interaction. As such, we can say 40% of teleconference time was devoted to presentation and 60% to discussion. This is indeed a very right approach, as teleconference is a medium of sharing rather than lecturing.

Table 1: Method of interaction

Day/Session	No. of telephone calls	No. of fax messages
Day 1		
Session I	8	5
Session II	13	7
Session III	12	14
Session IV	5	12
Day 2		
Session I	15	5
Session II	14	13
Session III	14	6
Session IV	10	1
Total	91	63

Table 2: Interaction from various centres

Receiving Centres	No. of telephone calls	No. of fax messages
Ahmedabad	12	—
Bangalore	7	21
Bhubaneswar	3	1
Calcutta	4	3
Chennai	1	2
Cochin	9	1
Guwahati	2	—
Hyderabad	—	1
Jaipur	—	13
Lucknow	—	2
Patna	6	—
Pune	15	—
Shillong	19	—
Shimla	—	1
Total	91	32

Table 3: Nature of questions/comments

Day/Session	Academic questions/comments related to session	Administrative/information type questions/comments
Day 1		
Session I	19	3
Session II	31	6
Session III	28	3
Session IV	13	—
Day 2		
Session I	32	—
Session II	29	2
Session III	26	5
Session IV	21	2
Total = 220	199	21

Table 4: Participants during interaction (only telephone)

Day/Session	Local Resource Person	Students	Officials
Day 1			
Session I	3	6	2
Session II	2	8	4
Session III	2	12	—
Session IV	—	6	1
Day 2			
Session I	2	16	1
Session II	3	14	1
Session III	1	13	2
Session IV	—	10	1
Total = 110	13	85	12

Table 5: Duration of telephone interaction

Range of telephone calls (in seconds)	Frequency
1-15	12
16-30	35
31- 45	23
46-60	10
61-75	8
76- 90	1
91-105	1
106-120	1
Mean = 34.5 sec.	Total = 91

Learners' Assessment of Teleconference

The analysis of learners' assessment is based on the 44 response sheets returned by four participants. Since, the sample is very small, the results could only be considered indicative. However, for analysis purpose 44 are a good number and the results show some significant points. Table-6 gives a detailed frequency count of each of the items in the questionnaire. As such the total quality of teleconference can be said to be between good to very good. Group-wise analysis of various items reveal that technical quality of teleconference was very high, so also the arrangements at the receiving end. Subject matter and interaction received almost similar reaction with little variations. However, presentation received highest number of frequencies on 'fair' in comparison to other

groups. The total of 'good' and 'very good' responses in this category is also the lowest among all the groups (Table-7). This indicates that there is a scope for improvement on the quality of presentations by the resource persons during teleconference. The resource persons need to be trained on the use of graphics and presentation skills on live telecast programmes.

Table 6: Quality of teleconference

Assessment Criteria	Frequencies				
	Very poor	Poor	Fair	Good	Very good
1. Quality of audio	—	—	3	35	5
2. Quality of video	—	—	2	34	8
3. Quality of telephone query	—	—	7	31	6
4. Introduction of the topic	—	—	2	33	9
5. Logical sequencing of the concepts	—	—	7	30	7
6. Examples/illustrations	—	—	10	29	5
7. Summing up	—	—	9	27	8
8. Relevance of the session to understand the course material	—	3	6	23	12
9. Use of graphics	1	2	19	20	2
10. Quality of graphics used	—	2	21	18	3
11. Time given to copy graphics	—	2	26	15	1
12. Use of computers, video clipping, etc.	—	2	28	13	1
13. Presenter's communication skills	—	1	5	24	14
14. Presenter's organisation and preparation	1	1	6	22	14
15. Presenter's perception of the level of knowledge of the participants	—	—	8	26	10
16. Overall presentation	—	2	5	28	9
17. Response to queries	—	1	5	28	10
18. Understanding of queries by the presenter(s)	—	—	8	28	8
19. Relevance of response to queries	—	—	7	33	4
20. Sitting and viewing arrangement	—	—	2	28	14
21. Viewing without distractions from nearby rooms	—	—	2	30	12
22. Encouragement to raise questions	—	—	—	15	29
23. Freedom to use telephone/fax	—	—	—	10	34
24. Overall arrangement at reception centre	—	—	—	12	32
Total	2 (0.18)	17 (1.6)	188 (17.8)	592 (56.06)	257 (24.33)

Figures in bracket indicates percentage

Table 7: Category-wise quality analysis

Groups	Very poor	Poor	Fair	Good	Very good
Technical Quality	—	1 (0.75)	12 (9.09)	100 (75.75)	19 (14.39)
Subject Matter Quality	—	3 (1.36)	34 (15.45)	142 (64.5)	41 (18.63)
Presentation Quality	2 (0.56)	12 (3.4)	118 (33.52)	166 (47.15)	54 (15.34)
Interaction Quality	—	1 (0.75)	20 (15.15)	89 (67.42)	22 (16.66)
Administrative arrangement Quality	—	—	4 (1.81)	95 (43.18)	121 (55.0)

Percentage in bracket refers to respective groups.

The participants were also asked to indicate the usefulness of the teleconference sessions. They indicated that the sessions were useful to understand the topic ($n = 15$), useful to gain more knowledge on the topic ($n = 23$) and waste of time ($n = 06$). Overall, we can say, the sessions were very useful for the learners.

Conclusion

This short study on the quality of 'interaction' in teleconference reiterated the high level of interaction opportunity provided by the one-way video and two-way audio technology, if planned properly. To facilitate interaction, each session must be planned as follows:

1. Limit presentations to 40% of the total time of the session.
2. Tell the audience prior to your presentation, that you will be giving enough time for a meaningful discussion.
3. During presentation, encourage participants to put questions after your presentation.
4. Use properly designed graphics to illustrate your point.
5. Give sufficient time to the learners to copy the graphics.

There is clear need for training resource persons on using teleconference as an effective medium for teaching. The participants also need to be oriented towards this technology; especially they need to be trained to put questions/comments correctly over telephone. Some of the participants either fumble or ask questions not related to the session. This could be avoided by encouraging the use of fax. But, results show that most of the faxes were not attended due to paucity of time. Moreover, a telephone call usually takes importance over a fax or mail, which could be replied later on. The use of fax also distracts the presenter. Therefore, the use of fax should be minimized and participants are encouraged to use the telephone to put their questions.

This study revealed that teleconference could be used as an appropriate technology for distance education and increase the learners' interaction with their instructors as well as peer group. From the pedagogic point of interaction, learners are satisfied with the technology. However, research must go on in this direction continuously to cover a wide range of population. Further research is also required in establishing the technology's influence on student learning, especially achievement and attitude.

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