Tele-Training for Personnel Development

Evaluators' Report

ST. JOHN'S

OTTAWA

TELE-TRAINING FOR PERSONNEL DEVELOPMENT
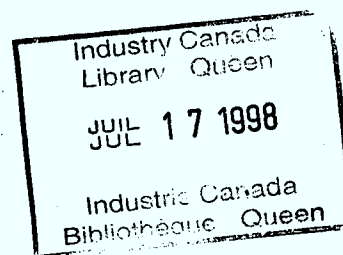
Evaluators' Report

by

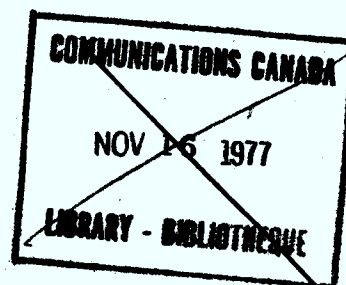Nicole Mendenhall

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PUBLIC SERVICE COMMISSION OF CANADA

The Tele-Training for Personnel Development series is edited and
published by the Satellite Project Office of the Secretariat Services
Branch, Public Service Commission.

The purpose of this series is to document and disseminate information
about the design, implementation and results of the Public Service
Commission's Communications Technology Satellite (CTS) Project:
Staff Training by Satellite. The Communications Technology Satellite
was made available for pilot experimental periods by the Canadian
Department of Communications.

Michael G. Ryan, Ph.D.

Series Editor

Reports in this series are entitled:

Tele-Training for Personnel Development: Staff Training
by Satellite

Téléformation pour le perfectionnement du personnel:
Modèle théorique

Tele-Training for Personnel Development: Course Designers'/
Directors' Report

Tele-Training for Personnel Development: Evaluators' Report

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ACKNOWLEDGEMENTS

Special recognition is extended to those who contributed in so many ways to the success of the project. Their support and co-operation greatly facilitated the work of the project staff.

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* Special acknowledgement goes to Dr. George J. Jull of the Communications Research Center whose early work on interpersonal telecommunications served as the foundation for much of the work in this project.

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FOREWORD

Tele-training for Personnel Development: Evaluation Report reports on
four evaluation studies conducted in the Staff Training by Satellite
Experiment. The first article, by Jerzy Jarmasz, focusses on the impact
of satellite technology and personality on learning and indicates that
people learn as well by satellite as they do in the face-to-face situation.
The second article, by Patricia Grygier and Nicole Mendenhall, indicates
that the learners' preference for a learning style did not have any impact
on learning,satisfaction or participation. The third article, authored
by Nicole Mendenhall and Patricia Grygier, demonstrates that the student
directed teaching method used was satisfactory in both satellite and
face-to-face contexts. It also shows that the technology was well adapted
to the needs of the students. Finally, the cost effectiveness analysis
conducted by Jerzy Jarmasz demonstrates that, within the context of this
project, learning by satellite was more cost effective than learning in
the face-to-face situation. This analysis did not include satellite or
terrestrial system costs: these were covered by the Department of Commu-
nications and such elaborate cost benefit analyses were beyond the scope
of this project.

L'EVALUATION DE L'EXPERIENCE

DE FORMATION MEDIATISEE

Jerzy Wladyslaw Jarmasz
Service d'évaluation
Ottawa, juillet 1977

THE EVALUATION OF A MEDIATED TRAINING
EXPERIMENT

Abstract

This article describes a study which compared learning over the satellite,
Hermes, to learning in the face-to-face context. It also compared the
learning of extroverts and introverts. The hypotheses predicted no signi-
ficant learning difference between satellite mediated and face-to-face
control groups, and no significant learning differences between extroverts
and introverts. The two-by-two analysis of variance showed no significant
differences in terms of main effects or interaction effects. The results
are discussed according to relevant theory and implications are drawn.

1.0   PRESENTATION DU PROBLEME

1.1 Aperçu historique

L'utilisation de la technologie des communications (tels le

téléphone, la radio et la télévision) dans l'enseignement s'est

accrue d'une manière prodigieuse dans le courant des dernières

années. Dans une première monographie canadienne dédiée à la

question (Conger, 1974) il est apparent que la formation des

adultes et l'enseignement en général peut se faire d'une manière

satisfaisante par l'entremise de cette technologie. Tout récem-

ment les governements de plusieurs pays ont entrepris des ex-

périences en formation des adultes par satellite, p. ex.:

Symphonie et Hermès.

Le nombre croissant de rapports sur cette question témoignent

du succès de l'entreprise. Un exemple typique est le document

SRC TR76-596 de l'Educational Policy Research Center préparé

par la Syracuse Research Corporation en novembre 1976.

Avec le lancement du dernier satellite de télécommunication

canadien (Hermès) en janvier 1976, le ministère canadien des

communications entreprit un programme concerté d'expériences

dont un nombre en téléformation. C'est ainsi que la Commission

de la fonction publique du Canada put mettre sur pied un projet

de formation médiatisée, grace au concours apporté par le Ministère

des communications. La Commission de la fonction publique selon

son mandat confia cette tâche en 1975 au Service de la prospective
de l'ancienne Direction générale du perfectionnement. Une équipe
de spécialistes en psychologie des communications, en éducation
des adultes et en évaluation fut constituée. Cette équipe définit
le but de l'expérience sous deux aspects, notamment celui d'inno-
vation didactique et celui d'innovation technique.

En premier lieu, l'expérience allait relier des individus situés
à des endroits différents du pays dans une activité d'apprentissage.
Les participants prospectifs seraient des fonctionnaires fédéraux
invités par voie d'une enquête à exprimer leurs besoins en for-
mation professionnelle. Après l'analyse des réponses,on inviterait
un échantillon des répondants à assister à un stage de formation
par satellite portant sur la matière choisie par les répondants.
La réalisation du contenu, des objectifs, des détails, ferait en-
suite l'objet d'un contrat entre les participants et le chargé de
cours. Donc, du point de vue éducatif, l'approche serait centrée
sur les besoins de l'apprenant et sur son style d'apprentissage.
Du point de vue technique cette expérience relierait plus de deux
points en même temps, grace à la technique de multiplexage. Ceci
permettrait à trois, quatre ou cinq groupes de participants situés
dans des localités distinctes du pays de suivre un cours en même
temps, d'échanger des points de vue à tout moment avec n'importe
quel membre de tout groupe. Le lien permettrait aux individus de
se voir et de se parler, donc en mode audio et vidéo.

Comme il appert de la description ci-haut, l'expérience se prête à un nombre d'hypothèses. Ce rapport se limitera à l'aspect apprentissage seulement.

1.2 Hypothèses

Dans l'évaluation de l'apprentissage, tout en vérifiant l'idée générale de télé-éducation, l'intention fut de vérifier une hypothèse d'Eysenck (1968) selon laquelle le facteur d'extroversion jouerait un rôle principal dans l'apprentissage. Partant d'une théorie biologique de l'équilibre entre l'excitation et l'inhibition du cortex humain, Eysenck postule que cet état de choses se traduit dans le comportement sous la forme de l'extroversion-introversion (p. 6). Une déterminante de l'apprentissage est le conditionnement et il suggère que les extrovertis se conditionnent moins bien. Il cite des études validant sa théorie, témoignant que les introvertis réussissent mieux dans leurs études (p. 21).

Dans cette optique l'on pourrait s'attendre à ce que des individus identifiés comme introvertis dans l'étude proposée obtiennent des résultats supérieurs à ceux des individus identifiés comme extrovertis. De plus, en termes concrets, il serait à espérer que les extrovertis réussissent moins bien à un examen en fin de stage.

Ces considérations fournirent l'hypothèse de travail dans l'étude entreprise par la Direction générale du perfectionnement. Cinq équipes de cinq participants allaient constituer la population expérimentale et une population équivalente allait servir de contrôle. Le nombre de cinq participants par équipe fut imposé par les modalités techniques de l'expérience afin de pouvoir maintenir la qualité de l'image vidéo, et afin d'éviter de surcharger le champ visuel. Une des équipes allait fonctionner à Ottawa et les quatre autres à St-Jean de Terre-Neuve dans le but de simuler l'interaction des locations multiples des bureaux régionaux de la Commission de la fonction publique.

Les expériences antérieures en télé-formation eurent toujours lieu entre deux points. Grace au multiplexage (le lecteur est envoyé au Miller 1977a traitant des aspects techniques) il devint possible de relier plus de deux points à la fois. Ainsi, pour tirer avantage de la disponibilité de l'équipement émetteur à St-Jean à une date qui convenait à plus d'un usager, les quatre équipes furent recrutées sur place.

Afin de tirer le plus grand avantage de l'expérience il fut décidé de réaliser une méthodologie d'enseignement appropriée à l'apprenant adulte. Un membre de l'équipe satellite entreprit de mettre au point un modèle basé sur les idées de Knowles, d'Ilich et d'autres théoriciens intéressés à l'éducation des adultes. Ce

modèle implique des comportements spécifiques et de la part de l'apprenant et de la part de l'enseignant. Ainsi, le chargé de cours allait devenir apprenant presqu'au même degré que les participants. Pour cette raison l'équipe des apprenants d'Ottawa dut en comporter quatre et un chargé de cours-apprenant.

C'est ainsi que deux hypothèses de recherche furent formulées:

1. Qu'il n'y aurait pas de différence statistiquement significative entre les résultats des apprenants du groupe expérimental et du groupe contrôle; et

2. Qu'il n'y aurait pas de différence statistiquement significative entre les résultats des apprenants classifiés comme extrovertis et des apprenants classifiés comme introvertis.

L'inventaire de personnalité d'Eysenck (Eysenck Personality Inventory) fut choisi comme instrument de classification.

2.0   SCHEME EXPERIMENTAL

2.1 Les sujets

Il y eut soixante douze candidats inscrits au cours. Par
attrition seulement 41 terminèrent l'expérience. Les sujets
étaient tous des fonctionnaires situées à un niveau intermé-
diaire de gestion. La plupart étaient des fonctionnaires du
gouvernement fédéral. Il y eut deux groupes expérimentaux (qui
suivirent le cours par satellite) et un groupe contrôle (qui
suivit le même cours, selon la même méthode, mais non par
satellite). Dix-neuf participants terminèrent le premier cours
par satellite (Satellite I), et 10 le deuxième cours par satellite
(Satellite II). Le groupe contrôle (12 participants), appelé
ici "face-à-face", suivit le cours en parallèle avec le groupe
Satellite II, à Ottawa.

2.2 Méthode

2.2.1 Le calendrier de l'expérience. Le cours se donna deux fois
par satellite afin de tirer avantage de la disponibilité du
satellite et des sujets. Chaque cours dura quatre semaines avec
des sessions de deux heures deux fois par semaine, d'avril à
juin 1977. Les groupes expérimentaux consistaient en cinq
équipes chacun dont quatre à St-Jean et une à Ottawa. Le nombre
maximum de participants par équipe fut de cinq, mais l'assiduité

varia selon les circonstances. Le groupe contrôle dont le nombre de participants fut au début égal à celui de chaque groupe expérimental, suivit le cours pendant les mêmes quatre semaines que le groupe Satellite II, mais à des jours alternatifs, puisque les mêmes personnes-ressources furent responsables de l'enseignement. Les groupes avaient la possibilité de se rencontrer avant le cours (St-Jean), ou après le cours (Ottawa) les jours du cours.

2.2.2 Méthodologie du cours. La matière du cours: "la planification à long terme", fut suggérée par les candidats au cours dans une enquête sur les besoins en formation. L'enseignement se basait sur les principes d'éducation des adultes et le contenu variait, en partie, selon les besoins des participants. Il en résulta donc que le gros du programme fut commun aux trois groupes.

2.3 Mesures

2.3.1 Instruments. Aux fins de l'évaluation on fit utilisation de deux instruments. L'inventaire de personnalité d'Eysenck (Eysenck Personality Inventory, EPI), formule A, fut administré aux participants au début du cours. A la fin du cours les finissants subirent une épreuve portant sur la matière du cours.

2.3.2 Justification. L'EPI servit d'instrument de classification de la dimension indépendante. Seulement l'échelle E (extroversion) fut utilisée. Le but de l'expérience et du

testing fut expliqué aux participants. L'épreuve de planifica-
tion à long terme fut administrée à l'avant-dernière session
du cours. Elle fut mise au point par l'évaluateur après
détermination du contenu éventuel par les participants. Elle
consistait en quinze articles de type à réponses multiples.
Tous les articles représentaient un élément de la matière du
cours, discuté dans le cours.

Les stagiaires eurent à subir plusieurs tests et à répondre
aux multiples questionnaires. Les épreuves autres que l'EPI
et l'épreuve de planification à long terme servirent à obtenir
des données utilisées dans d'autres évaluations décrites dans
les rapports qui suivent.

2.3.3 Procédé statistique. Aux fins d'analyse des données on utilisa
la technique de l'analyse de la variance. Puisque le nombre
de sujets fut inégal dans le traitement statistique, on adopta
l'analyse des moyennes non-pondérées telle que préconisée par Kirk
(1968, p. 202). Cette technique permet d'obtenir des données
fiables dans le cas des cases inégales dans toute combinaison
de traitement.

3.0   LES RESULTATS

Après leur cueillette, les données furent analysé selon les dimensions

prévues, c'est-à-dire en fonction du degré d'extroversion définie

sur l'EPI. La population de chaque groupe fut divisée en deux catégories:

E+ composée d'individus qui ont obtenu un score élevé sur l'échelle E

(extroversion), et E- composée d'individus qui ont obtenu un score bas.

Le point de repère pour le partage fut la moyenne du score E de la popu-

lation totale (N = 41). Les données brutes de l'analyse proviennent

des notes obtenues par les participants à l'épreuve de planification à

long-terme. Les notes furent converties en moyennes pour chaque groupe.

Le Tableau I montre les moyennes des trois groupes en fonction du

niveau d'extroversion.

Tableau I. - Les moyennes des résultats de l'épreuve de contenu des

trois groupes de participants selon le niveau d'extroversion (E)

SAT I		SAT II		FACE-A-FACE	
E+	E-	E+	E-	E+	E -
9,11	8,7	9,6	12,2	9,5	10,33

Sat I - groupe expérimental I

Sat II - groupe expérimental 2

Face-à-face - groupe contrôle

E+ - score élevé sur l'échelle E de l'EPI

E- - score bas sur l'échelle E de l'EPI

Tableau II - Analyse de la variance des résultats de l'épreuve de contenu des trois groupes de participants par le niveau d'extroversion

La source de variance	La somme des carrés	Les degrés de liberté	L'estimation de la variance	F	Significatif aux
A	9,69	1	9,69	1,95	(25 p.c.)
B	25,39	2	12,69	2,56	(10 p.c.)
AB	2,29	2	1,15	0,23	--
Intra	173,83	35	4,96		

A = Niveau d'extroversion selon E P I. (E+, E-)

B = Groupe de participants (Satellite I, Satellite II, Face-à-face)

N = 41

L'analyse des données se fit selon le schème de Kirk mentionné plus haut.
Dans ce procédé, l'analyse de la variance donne des résultats "conser-
vateurs", c'est-à-dire moins élevés mais moins sujets aux effets du
hasard. Comme il appert du Tableau II, les différences observées entre
les résultats des participants n'atteignent pas de seuil de confiance
acceptable.

Il semble que le rôle de l'extroversion dans l'apprentissage ne fut pas
confirmé dans cette expérience. Aussi, les différences observées entre
les groupes des participants sont sujettes à l'effet du hasard et il
semblerait que les résultats obtenus par les participants des cours par
satellite ne diffèrent pas de ceux obtenus par les participants qui
suivirent le cours dans un cadre plus traditionnel, sans l'entremise du
satellite.

4.0   DISCUSSION

Les résultats de l'expérience ne permettent pas de rejeter les hypothèses
nulles formulées avant l'expérience. Nous n'avons pas réussi à prouver
la supériorité d'une approche (p. ex.: enseignement par satellite) sur
une autre, ni à démontrer le besoin de choisir les candidats aux cours
médiatisés selon leur degré d'introversion. Les différences entre les
résultats des groupes expérimentaux et du groupe contrôle ne semblent
pas suffisamment essentielles.

Les différences entre le groupe d'individus identifiés comme extrovertis
et le groupe d'introvertis ne sont pas significatives non plus. On
remarque, toutefois, des tendances suggérant que les dimensions de la
personnalité pourraient être utiles dans le choix des participants. Les
modalités du recrutement des candidats semblent avoir varié au point que
l'on pourrait suggérer l'existence de différences réelles entre les popu-
lations Satellite I et Satellite II. Il y aurait eu plus d'affinité
entre Satellite II et Face-à-face.

Outre les différences de population, il est important de considérer le
manque des données sur les caractéristiques statistiques de l'épreuve
de contenu. Elle fut réalisée ad hoc, c'est-à-dire pour éprouver
l'apprentissage des participants au cours. Par la nature de l'expérience
il ne fut pas possible d'utiliser des épreuves normalisées ou de vérifier
la validité et la fidélité de cette épreuve. Il serait possible à
concevoir que la nature de l'épreuve ait influencé de quelque manière
les résultats.

Le dernier élément limitant la signification des résultats est le nombre restreint des participants. Avec des populations peu nombreuses la probabilité d'obtenir des données représentatives d'un phénomène est moindre.

Tenant compte de la probabilité de circonstances limitantes on peut identifier des éléments utiles. L'expérience confirme que l'enseignement médiatisé fournit des résultats comparables à l'enseignement plus traditionnel. Son application vaut donc d'être étudiée plus spécifiquement, surtout pendant la période où le satellite est disponible, sans frais additionnels,à la Commission de la fonction publique. La rentabilité subséquente serait déterminée par le degré d'utilisation de la technologie et les besoins perçus par l'administration.

De plus, le choix des participants et de la matière peuvent constituer un facteur important du succès de l'utilisation. Les données suggèrent que le succès varierait selon la population. Il est donc essentiel de continuer l'étude des caractéristiques des participants pouvant influencer les résultats.

Les études sur les applications administratives du satellite sembleraient aussi prometteuses mais leur discussion est en dehors du sujet traité ici.

5.0   CONCLUSIONS

L'expérience de téléformation, ou enseignement médiatisé, entreprise

par la Commission de la fonction publique dura huit semaines. Pendant

ce temps,trois groupes de fonctionnaires canadiens situés à Ottawa et

à St-Jean de Terre-Neuve (deux groupes expérimentaux et un groupe

contrôle) suivirent un cours sur la planification à long-terme. L'en-

seignement se fit à partir des principes d'éducation des adultes. Les

résultats des quarante et un participants, pour lesquels on put obtenir

des données complètes, furent analysés selon la technique de l'analyse

de la variance des moyennes non-pondérées. Les hypothèses, que les

extrovertis réussiraient moins bien que les introvertis et qu'il y aurait

des différences dans l'apprentissage des groupes en fonction du procédé,

ne furent pas confirmées.

Les conclusions que l'on peut dégager de l'expérience, tout en tenant

compte des limitations imposées par les circonstances, sont comme suit:

1. L'enseignement médiatisé produit des résultats comparables à l'en-

    seignement du type traditionnel. Il serait donc utile de prévoir un

    échéancier de l'utilisation du satellite par la Commission de la

    fonction publique aux fins de formation, pendant la période de dis-

    ponibilité du satellite sans frais additionnels.

2. Les caractéristiques personnelles des participants peuvent jouer un

    rôle important dans l'apprentissage. Il serait rentable de pour-

    suivre des études sur l'interaction des caractéristiques personnelles,

    des méthodes d'enseignement et des matières à enseigner dans la formation

    des adultes.

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The Effects of Learning-Style Preference

on learning, satisfaction, participants' interaction

and attitudes to the medium

Pat Grygier and Nicole Mendenhall
Public Service Commission
August, 1977

SOMMAIRE

Cet article décrit une étude qui porte sur les effets d'un style d'apprentissage préféré, sur les résultats de l'apprentissage, sur la satisfaction, sur l'interaction, et sur l'attitude envers le médium de communication. Les apprenants étaient divisés en deux groupes selon leur style d'apprentissage préféré. L'hypothèse était que les apprenants qui préfèrent un style d'apprentissage centré sur l'apprenant feraient mieux dans l'apprentissage, seraient plus actifs, seraient plus satisfaits et auraient une attitude plus positive envers le médium. Les résultats de l'analyse ne supportent pas les prévisions; la conclusion discute les implications de ces résultats.

Summary

Purpose

This paper is the first of a series of reports on the evaluation component of the <u>Staff Training by Satellite</u> project, a field experiment conducted to determine the effectiveness of an audio-video interactive system as a means of providing professional training to middle managers.

Method

Two satellite educational sessions, combining groups in Ottawa and St. John's, Newfoundland, were compared to a face-to-face control group in Ottawa. A total of 61 participants took part in the three sessions. The same teaching/learning method (a student-centred approach), course content (Long-range Planning) and course directors were used for the three sessions.

A number of studies were conducted simultaneously on the effects of the medium, personality, and learning-style preference on such factors as participants' learning, satisfaction and on-course behavior.

This paper reports on the effects of learning style preference. Participants were classified into two groups on the basis of their responses to a pre-course questionnaire defining their preferences regarding the role of a learner and the role of an educator. It was hypothesized that participants with a preference for a student-centred approach (in terms of the roles ascribed to learners and educators) would:

    (1) do better on a learning test at the end of the course,

    (2) be more interactive (i.e. speak more frequently) during

the course sessions,

(3)   be more satisfied with the sessions and with the medium, than would participants with a preference for a teacher-centred approach.

Results

Only two out of 20 comparisons showed significant differences between the groups, insufficient to uphold the hyptheses.

Conclusions

Learning-style preference was found to have had little bearing on learning, satisfaction or participant interaction on this course.

Recommendations

If preference in learning style is considered important for other reasons to professional or management training, further study will be necessary to clarify its effects.

1. Introduction

Two major objectives of the Public Service Commission "Staff Training by Satellite" project were:

1) to explore new methods of professional training through the development of a mediated learning methodology;

2) to study aspects of interactive human telecommunication which facilitate or hinder learning.

This paper is one of a series of reports on the results of a field experiment conducted to determine the effectiveness of an audio-video interactive system as a means of providing professional training to middle managers located in both regional (St. John's, Nfld.) and central (Ottawa) areas. This field experiment also explored the use of a student-centred learning approach in mediated and nonmediated conditions. The experiment was carried out as part of the Communications Technology Satellite tele-education projects during the months of April, May and June of 1977. The location and timing of the experiment were determined by the fact that a satellite earth station was to be shared between the Public Service Commission and Memorial University in St. John's for a particular period of eight weeks.

Two satellite educational sessions were compared to a face-to-face control group. Satellite session I occurred four weeks prior to satellite session II and the face-to-face session.

This report is concerned with the effects of learning style preference on the learning acquisition, the amount of participant interaction,

the satisfaction and the attitudes to the medium of the learners. Learning style preference is operationally defined as a learner's predisposition for a teaching/learning method which is in accordance with what he assumes to be his role and responsibilities in an educational setting. This learning style preference is seen as a single dimension ranging from student-centred on the one hand to teacher-centred on the other. It is paralleled by a similar division of teaching approaches into primarily student-centred versus mainly teacher-centred.

The student-centred approach referred to in this study, attempts to individualize the content and the processes of learning. The student as a member of the group defines the learning objectives, and the activities which will be undertaken to achieve these objectives. The content is designed by the instructor to meet the specific needs of the learners. Emphasis is placed on student-to-student interaction. The student is called upon to play an active role.

The teacher-centred approach is instructor dominated. He determines the content, activities and evaluation to be undertaken. This approach is more subject oriented that people oriented. Interactive exists mostly between teacher and student.

Since the educational method developed as part of this experiment focuses on the student-centred approach, it was predicted that learners' predisposition for this particular approach would be a factor which would affect their learning, satisfaction and attitudes to the medium.

2. <u>Review of the literature</u>

Eighteen studies on the effect of teaching methods (i.e. teacher-centred vs. student-centred) on learning acquisition indicate little difference between the two approaches. As reported by Gage (1963), Wispé (1954) and Patton (1955) have suggested that this apparent absence of effects may be due to a "failure to articulate teaching technique and student needs".

These two factors were taken into consideration in the present field experiment. First, a particular method was developed to suit the adult learner in a mediated learning situation. The method defined the roles to be assumed by both the educator and the learner, their respective responsibilities, and the steps to be undertaken to meet their educational objectives (Appendix A). Second, a survey was conducted to identify the training and development needs of the client population and the course content was elaborated on the basis of these needs (Appendix B). Since both teaching technique and student needs had been carefully articulated, it was predicted that the learning outcome would be greater for learners who preferred the student-centred approach.

However, conflicting findings have been reported in terms of satisfaction with student-centred classes. For example, Bills (1956), Flanders (1951), Lewin, Lippitt, & White (1939) and Deignan (1955) showed that students expressed positive attitudes toward student-centred classes, while other studies, conducted by Wispé (1951), DeLong (1949), and Weider (1954), reported student dissatisfaction with student-centred classes.

These conflicting results may be due to the fact that attitudes toward student-centred instruction seem to be largely related to personality characteristics. Wispé (1951) used results obtained from the Thematic Apperception Test to classify his students into three different groups: the "insecure", the "satisfied" and the "independent". The "independent" group had the most positive attitude towards the permissive method, their fellow students and the instructors. It was also the group with the highest number of interventions. (Patton (1955) also reported that student-centred instruction was preferred by "students who reject traditional sources of authority, have strong needs for demonstrating their personal independence, and are characterized by a high drive for academic achievement" (G. Stern, 1956).

Personality charateristics (autocratic-dependent, democratic-independent) have also been shown to influence learning outcome when the teaching approach applied corresponded to student preferences (Haythorn, et al, 1959).

The relationship between certain personality traits and learning outcome are the subject of a separate report (Evaluators Report) but that aspect of personality which is reflected in a student's learning style preference was used as the basis for the formulation of the hypotheses for this section of the study.

3. <u>Statement of hypotheses on effects of the teaching-method</u>

Three hypotheses were tested relating to the effects of the student-

centred teaching method (Appendix A) used. All three hypotheses tested the basic assumption that participants whose learning style preferences coincided with the method used would get more out of the course, in various ways, than participants who would have preferred a more traditional teaching approach.

The first hypothesis postulated the effect of the model on learning, the basic purpose of the course and the conventional measure of a course's success.

1. The learning outcomes of participants who show a preference for student-centred learning style will be greater than those of participants preferring a more traditional approach.

The second hypothesis concerned the effect of the model on one aspect of participant in-course behaviour, namely, their degree of interaction. This activity may be regarded as both an effect of the student-centred teaching approach and as a contributory means of achieving the result predicted in hypothesis 1 above. It may also be regarded in itself as a beneficial effect of the particular course used in this experiment, Long Range Planning, since the activity being learned to be effective usually involves much discussion and communication with other people, often in groups.

2. The degree of interaction, as measured by the number of interventions, will be greater in participants with a preference for a student-centred learning style than in those preferring a more traditional approach.

The third hypothesis related the effects of the model to the participants' attitude towards the satellite medium and towards the course in general. This hypothesis stemmed partly from the studies regarding student satisfaction, particularly from those relating it to the similarity between teaching approach and student preference or to personality. The theoretical rationale and development of the particular teaching model used is described in a separate report. It is relevant here, however, to mention that this particular adaptation of the student-centred teaching model was developed specifically for use in mediated (satellite) sessions. This appears to reinforce the validity of the following hypothesis:

3. Participants preferring a student-centred learning style will express greater satisfaction with the sessions and, if attending mediated sessions, a more positive attitude towards the medium, than will those preferring a more traditional approach.

Table I

Selection of participants

Course attended and enrollment procedures used.

Time of course	Type of course	Characteristics of Participants	Enrollment Procedures
April 26 - May 19 Tuesdays and Thursdays 1:00 p.m. - 3:00 p.m. Ottawa time	Satellite I	Middle Managers 11 fed. depts. all males 18* - St. John's 4 - Ottawa	Survey
May 24 - June 16 Tuesdays and Thursdays 1:00 p.m. - 3:00 p.m. Ottawa time	Satellite II	Middle Managers 3 univ. administrators 5 prov. gov. employees 10 fed. depts. 2 females 16 males 15* - St. John's 3 - Ottawa	BSDT format course announcement
May 25 - June 20 Mondays and Wednesdays 1:30 p.m. - 3:30 p.m. Ottawa time	Face-to-Face	Middle Managers 11 fed. depts. 3 females 18 males 21 Ottawa	BSDT format course announcement

* Enrolled. The number of people enrolled is not the same as the number of persons who actually attended the courses.

4. Methodology

4.1 Assumptions

In planning the experiment and the procedures necessary to test the foregoing hypotheses, certain assumptions were made. These were:

1. In determining development and training needs at the employee level, one would identify the perceived needs of the employee and not those of his employer.

2. If the employee were accessed directly and his stated needs were responded to, he would become more involved in the learning process.

3. Senior middle managers are responsible for the formulation of long-range plans and/or the implementation of these plans.

4. Classification (level and categories) of personnel in the regions is somewhat different from that in the National Capital Region in that they tend to have greater responsibility in the regions.

4.2 Participants

The subjects were 63 middle managers: 54 from the federal government, 6 from the Newfoundland provincial government and 3 from Memorial University. Of these, 23 took part in satellite course I, 18 in satellite course II and 22 in the face-to-face control group. Participants in satellite course I were identified after responding to a needs survey; participants in satellite course II and in the face-to-face course were recruited through usual Bureau of Staff Development and Training recruitment procedures (Appendix B). Table I provides a summary of the selection of participants, the course attended and the recruitment procedures.

4.3 Setting

Participants on satellite courses I and II were divided into five subgroups (four in St. John's, one in Ottawa). An interactive audio-video system was used. Course directors were in the Ottawa location. Regular classroom facilities were used for the face-to-face group. (Appendix C)

4.4 Procedure

Satellite sessions were held every Tuesday and Thursday afternoons from 1:00 p.m. until 3:00 p.m. Ottawa time, 2:30 to 4:30 p.m. Newfoundland time. Face-to-face sessions were held every Monday and Wednesday afternoons at the same time. An additional two hours was available for participants to work in subgroups or by themselves prior to the session in St. John's and after the session in Ottawa. Eight consecutive sessions formed each course.

Participants in the satellite courses had a briefing session prior to their course (for satellite I, 1 week in advance, for satellite II, 1 month in advance). This was in order to familiarize participants with the medium (although in the event satellite time was not available for this), and to summarize the evaluation, to propose a course plan, and to hand out time sheets and pre-tests in order to make maximum use of on-air satellite time.

4.5 Special conditions

In all three offerings of the course participants attended free of charge. For this privilege, it was understood that they would be

required to fill out questionnaires evaluating various aspects of the educational session.

5.   Variables

In this study, the independent variable was the participants' preferred learning style. This was measured by two roles preference questionnaires* and participants were grouped according to scores obtained as high or low student-centred learners.

The dependent variables were learning, the amount of participant interaction, satisfaction and attitudes to the medium. Learning was measured by a learning content test; participant interaction was measured by means of an observer's log; satisfaction by a satisfaction rating scale*and attitudes to the medium by an attitudinal rating scale. *

5.1 Roles Preference Questionnaires: Measurement of the Independent Variable

Purpose

The roles preference questionnaires were developed as part of the overall evaluation of the "Staff Training by Satellite" Project. It was intended to tap participants' wishes regarding the type of approach they would prefer for the learning session. This was in order to identify which participants' preferences matched the teaching approach used and which participants experienced a mismatch.

Description

A number of statements considered to be indicative of either a non-traditional approach (student-centred) or a traditional approach

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* The questionnaires used are given in Appendix D of the third article "The effect of Medium on Behaviour, Attitude and Satisfaction of Learners" (p. 81).

(teacher-centred) were formulated. Some statements referred to the roles to be assumed by the learner, some to those to be assumed by the educator. Two separate questionnaires were developed, one defining the role of the learner on a student-centred vs. traditional dimension, the other defining the role of the educator on the same dimension.

Validation of instrument

Both questionnaires, Role of the Learner/Role of the Educator, were judged by 58 persons: 22 educational experts working at PSC and 36 managers attending a BSDT course. Items which were clearly identified by at least 50% of the judges as being indicative of a particular approach, were kept. Items which were judged to be ambiguous in their formulation or which did not reach a 50% agreement rate were discarded (A copy of the questionnaire may be seen in Appendix D). The role of the learner finally consisted of 10 statements, the role of the educator of 12 statements, with each of which subjects were asked to indicate their measure of agreement on a 5 point Likert-type scale.

Use of Instrument

This questionnaire was administered to all participants attending the satellite courses I and II and the face-to-face course prior to their actually taking part in the experiment. It was also administered after the experiment to check the possibility that the use of a student-centred learning approach during the experiment may have influenced the learner's perception of his role and of that of the educator.

Analysis of data

Six statements were selected from each questionnaire as likely, on
theoretical grounds, to distinguish most clearly between the student-
centred and more traditional approaches. Each participant was then
classified as "high student-centred" or "low student-centred" on the
basis of his/her total scores, or agreement ratings, on each of the
shortened questionnaires individually and on both combined. The cut-
off point for classification into high student-centred versus low
student-centred was the mean score of the total group on the particular
scale. This classification was the measure of the independent variable
used in each of the three hypotheses.

5.2 Content learning test: Measurement of a Dependent Variable

The dependent variable used to test the first hypothesis was the
learning. This was measured by means of a content test (Appendix D)
which was developed on the basis of the planned course development
content, specifically on that portion of the textbook circulated
to all participants which was covered during the course. Since
participants' needs might vary in each course, only the core contents
of the textbook could serve as a means of comparison for all three
conditions.

Use of test

The test was administered to all participants on the seventh educational
session, of each satellite course and on the eight and final session
for the face-to-face group because of a poor participant attendance

at the 7th session. Participants had been informed during the briefing session about the learning acquisition test as well as the time of its administration.

Analysis of data

The unit of measurement was the participants' single final score on the content test. In order not to obscure any differences within each course between the high versus the low student-centred groups, the analysis of the results was done for each course separately as well as for the three courses combined.

5.3 Observer's Log: Measurement of a Dependent Variable

The dependent variable used to test the second hypothesis was participant interaction in the course sessions. This was measured by means of the log kept by observers present at every session.

Purpose

The observer's log was kept to record all interventions, that is, any verbal speech made by either educators or paricipants. It was designed to establish a) how the learning methodology was employed, and b) what effect it had on the behavior of the participants and educators. The type and length of intervention was recorded as well as the communication patterns (who talked to whom). The standardized categories in the log covered the most important elements of the teaching method, couched in terms of bits of observable behavior that could be readily and objectively noted by the observers.

Development

Since it was difficult to foresee what would take place with a new teaching methodology and a new medium, it was decided that satellite course I would be used to develop the observation log. Time spent observing in the Ottawa location on satellite course I was used to note any verbal activities. From the preliminary data, it became evident that observer's log needed to be developed which would include who the speaker was, to whom he was talking, the type of intervention he was making and the length of the intervention. It was also decided that the types of intervention should be classified into no more than ten categories representative of the learning approach used. (An observer's log may be found in Appendix D).

Use of Instrument

Two observers were used for each course. For the satellite courses, one observer was situated in the Ottawa classroom while the other was in one of the St. John's classrooms. All educational sessions were observed. The observers had been instructed to note the behavior, and communications, then code and record their observations for future analysis. Their reliability is demonstrated by the following correlations between their sets of observations of the face-to-face group:

Number of participant interventions per session: .993

Proportion of questions/interventions per session:.862

Analysis of data

The unit of measurement was the simplest measure of participant inter-action, namely, the number of times each participant intervened in the

discussion, in whatever way, in any session he/she attended. This measurement was obtained from analysis of the observation log. Since the log was refined during the first course (satellite 1), observation data from this course is incomplete; full data were available from the satellite II and face-to-face courses, and these data were used to test the second hypothesis.

5.4 The Satisfaction Scale: Measurement of a Dependent Variable

Two dependent variables were used to test the third hypothesis: the participants' general level of satisfaction with the sessions and the participants' attitude to the medium. These were measured by rating scale questionnaires.

Purpose of the Satisfaction Scale

Satisfaction has been shown to be one of the determining factors of the acceptance and use of a new medium. It is also used as an index for the degree of adaptation of user over time.

Development

The Satisfaction Scale was designed by Dr. Dorothy Phillips at the Communications Research Centre for the CTS experiments. It was pre-tested in a four node interactive audio/video laboratory experiment which involved groups of four to six people. Data obtained were used to calculate reliability; using the split half reliability method. The correlation co-efficient was .85 (n = 54).

Use of Questionnaire

The Satisfaction Scale was administered to both participants and educators at the end of every educational session, with the exception of session 4 on satellite course I, when the satellite was off-air.

Analysis of data

For the Satisfaction Scale the individual ratings given each item by a participant were averaged over the total number of items rated in all the sessions attended. This was done for greater ease in handling the data as this scale was both the longest (19 items) and the most frequently (8 items) given.

This technique was also partly necessitated by the varying attendance and incomplete evaluation forms of many participants; this made it almost impossible to get comparable data from comparison groups based on each participant's total scores over all 8 sessions of a course.

Slightly incomplete data (e.g. where only 16 out of a possible 19 items had been rated by a participant on a particular occasion) were pro-rated. Grossly incomplete data (e.g. where only 3 out of the possible items on the questionnaire had been rated) were not included in the analysis. Participants who attended fewer than 3 out of 8 sessions were also omitted.

5.5 Attitudes towards equipment

This questionnaire was the second measurement tool for the dependent variables used to test the third hypothesis.

Purpose

This questionnaire was developed to determine: (a) the technical quality of the audio-video system; (b) the perceived effectiveness of the audio-video system as a means of training; (c) the role of video as a means of establishing and maintaining human relationships in an interactive educational setting.

Although each of these elements alone could have been explored in depth, it was thought preferable to gain some information about all of the elements and their inter-relationships.

Development

This questionnaire was developed and used in a series of laboratory experiments on mediated learning. During these experiments, it was modified so as to permit a better understanding of what role the video played in establishing social interaction. It is final form the questionnaire consisted of 9 items, which the participant rated on a scale of 1 to 5.

Use of Questionnaire

The questionnaire was administered in both satellite courses to both participants and educators at the end of every second educational session. It was intended that each student should complete the questionnaire a total of four times, but since no satellite was available for session 4 of satellite course I, participants on this course only completed the questionnaire three times.

Analysis of data

A total score was computed for each participant for each session of
the course by summing his/her ratings of all the items on the particular
scale. Thus, each Attitude to Equipment Scale score represents the sum
of the ratings given to the 8 items on the scale by a participant at
the end of one session; scores could therefore vary between 8 (if a
participant gave each item a rating of 1) to 40 (if a participant gave
each item a rating of 5). Since this part of Hypothesis 3 related
to attitudes towards the equipment only data from participants attending
satellite courses were used to test it.

6.   Results

6.1 Hypothesis 1

To test hypothesis No. 1 participants were grouped according to their pre-course roles preference questionnaires scores into high student-centred and low student-centred groups. Participants who did not complete the content test were not included in these groups, which are somewhat smaller than those used to test the second and third hypotheses.

Table 1 shows the mean scores obtained by each group on the content test at the end of the course. In Table 1A participants are grouped on the basis of their attitudes towards the role of the learner; in Table 1B they are grouped on the basis of their attitudes towards the role of the educator.

An analysis of variance was made of the data provided by the cross-classification of participants' by course and attitude. This analysis is summarized in Table 2: again A refers to data based on participants' attitudes towards the role of the learner and B to data based on their attitudes towards the role of the educator.

These results appear not to support the first hypothesis.

In the satellite II and face-to-face courses there appears, indeed, to be a slight trend in the direction opposite to that hypothesised - namely, for participants with a preference for student-centred educational

approach to have a poorer learning outcome. This relationship only reaches a significant level when both course and attitude are taken into account as there is a contrary effect in satellite course I.

6.2 Hypothesis 2

To test hypothesis 2, the same high and low student-centred groups as used for hypothesis 1 were compared in terms of mean number of interventions per session. A t-test was performed to determine the significance of the difference between the means. Only participants from the satellite II and face-to-face courses were included in the analysis, since data about specific participants in satellite course I were not sufficiently reliable. No data was included from session 7 as very few participants attended this session on the face-to-face course and the data may have been atypical.

The data from the comparison of the two groups are summarized in Table 3. Only one of the 9 comparisons showed a significant difference between the 2 groups, and this only at a sufficiently low level to suggest that this one finding may itself be due to chance.

These data appear to disprove hypothesis 2.

6.3 Hypothesis 3

This hypothesis was tested by comparing participants' ratings on the satisfaction and attitude towards equipment scales. The significance of the differences between the mean scores of the high and

low student-centred groups were determined by means of a t-test. The results are given in Tables 4 and 5. The same participants were used as for Hypothesis 2, except that only participants attending satellite courses were included in the analysis of the attitude towards equipment ratings.

No statistically significant differences were found and this hypothesis also was therefore not unpheld.

Figure I

Mean Satisfaction Scale, ratings

Over Sessions

mean ratings

By

(Satellite I and II only)
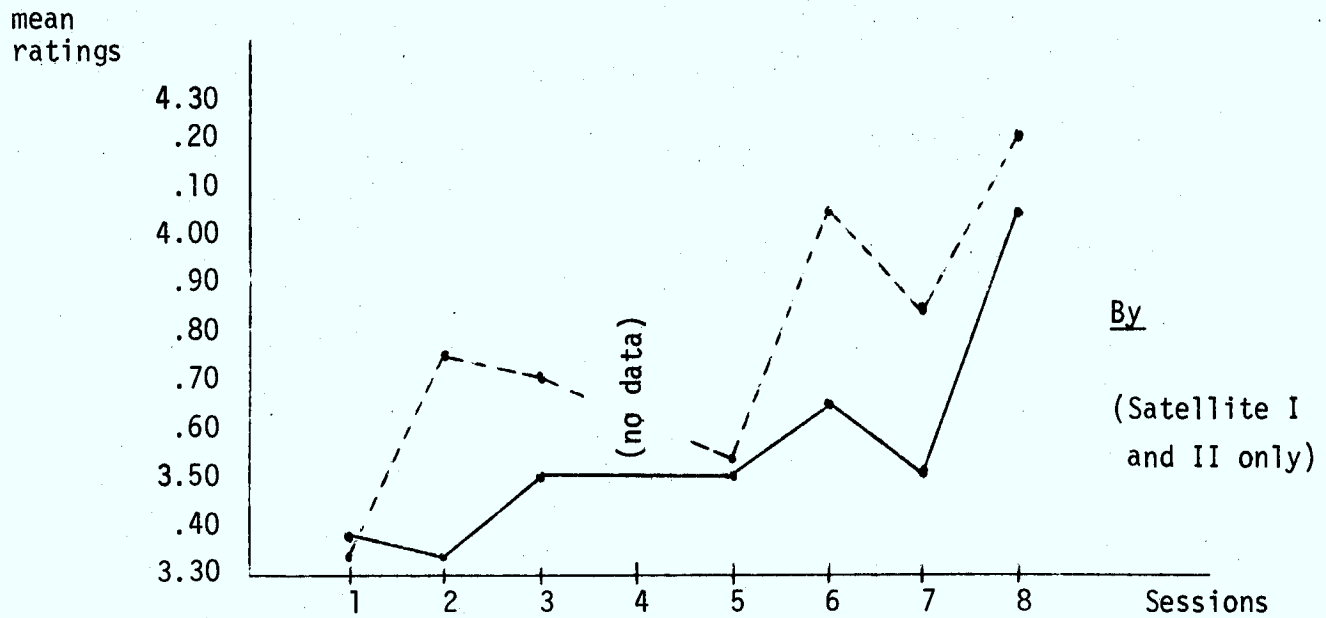
B

-------- High stud-cent. (Learn.+ Educ.) group.
———— Low stud-cent. (Learn.+ Educ.) group.
(Based on Hypothesis 1 population)

Learner-Role vs. Achievement

Table IA - Group Means by Student-Centred Attitude

	High	Low
Sat. 1	9.8	7.88
Sat. 2	9.33	11.57
F to F	9.22	12.00

N=41
uneven cells

Table IIA - Analysis of variance

Source	SS	df	MS	F	Sign
A	20.34	2	10.17	2.398	(.25)
B	8.49	1	8.49	2.002	(.25)
AB	36.59	2	18.29	4.313	.05
W. cell	148.43	35	4.24		

A = course
B = attitude

Educator-Role vs. Achievement

Table IB - Group Means by Student-Centred Attitude

	High	Low	
Sat. 1	8.00	8.72	
Sat. 2	10.43	12.00	
F to F	9.00	11.2	N-41 uneven cells

Table IIB - Analysis of variance

Source	SS	df	MS	F	Sign
A	48.19	2	24.095	2.57	(.25)
B	19.55	1	19.55	2.08	(.25)
AB	3.20	2	7.6	0.17	
W. cell	327.71	35	9.36		

A = course
B = attitude

Table III - Comparison between High student-centred and Low student-centred participants in terms of total-number of interventions per participant per session attended*.

Course	Classification Base	Comparison Groups	Mean	N	SD	t	Level of Significance
Satellite II	Role of Learner	High stud.-cent.	6.6	15	5.792	.42	(non)
		Low stud.-cent.	7.477	44	9.034		
	Role of Educator	High stud.-cent.	7.643	42	8.647	.59	(non)
		Low stud.-cent.	6.294	17	7.498		
	Role of Educator and Role of Learner	High stud.-cent.	6.6	15	5.792	.03	(non)
		Low stud.-cent.	6.667	18	7.444		
Face-to-face	Role of Learner	High stud.-cent.	15.358	53	14.001	.53	(non)
		Low stud.-cent.	12.85	20	18.608		
	Role of Educator	High stud.-cent.	13.729	48	14.436	.68	(non)
		Low stud.-cent.	16.48	25	17.005		
	Role of Educator and Role of Learner	High stud.-cent.	15.171	41	15.088	.26	(non)
		Low stud.-cent.	16.923	13	22.085		
Satellite II and Face-to-face	Role of Learner	High stud.-cent.	13.426	68	13.136	1.98	.05
		Low stud.-cent.	9.156	64	12.900		
	Role of Educator	High stud.-cent.	10.889	90	12.405	.56	(non)
		Low stud.-cent.	12.357	42	14.725		
	Role of Educator and Role of Learner	High stud.-cent.	12.875	56	13.739	.57	(non)
		Low stud.-cent.	10.9	30	16.172		

* Based on Satellite Course II and Face-to-face groups only, omitting Session 7.

Table IV - Comparison between High student-centred and Low student-centred groups.
(Based on mean Satisfaction Scale ratings made by each participant over all sessions attended)

Classification Base	Comparison groups	Mean	N	SD	t	Level of Significance
Role of Learner Scale	High stud.-cent.	3.568	26	.487	.72	(non)
	Low stud.-cent.	3.48	29	.375		
Role of Educator Scale	High stud.-cent.	3.607	22		1.08	(non)
	Low stud.-cent.	3.477	33	.441		
Role of Learner And Role of Educator	High stud.-cent. on both scales	3.666	12	.424	1.36	(non)
	Low stud.-cent. on both scales	3.451	19	.365		

Learning style preference and appreciation of the medium

Table V - Comparison between High student-centred and Low student-centred groups.

(Based on total rating over 8 items per session per participant on Attitudes to Equipment Scale)

Classification Base	Comparison groups	Mean	N	SD	t	Level of Significance
Role of Learner Scale	High stud.-cent.	29.23	39	6.380	.25	(non)
	Low stud.-cent.	29.53	66	4.912		
Role of Educator Scale	High stud.-cent.	28.89	52	5.769	.82	(non)
	Low stud.-cent.	29.784	51	5.194		

7. <u>Discussion</u>

In view of the results obtained, there is a clear indication that student preference in learning style has no significant effect on learning outcome, on participant satisfaction or attitude to the medium, or on participant interaction on the course.

This is particularly interesting when one considers the remarks of Wispé and Patton to the effect that the lack of significant differences in previous researches may have been attributable to a "failure to articulate teaching technique and student needs". In this field experiment, both of these factors were taken into consideration. On the one hand, the teaching technique used was clearly defined to the students prior to enrollment and committment to the course. On the other hand, a learning needs survey was undertaken to choose a content which was relevant to the prospective course population.

One might argue that the recruitment procedures favoured the enrollment of students who preferred the student-centred approach. As mentioned previously, the Role of the Learner/Role of the Educator questionnaires were used to identify student preference in learning style. Students were thus classified into one of two categories: preference for the student-centred approach or for the teacher-centred approach. Figure 2 shows the distribution of participants' scores on the two questionnaires. The Role of the Learner scale scores tend to be on the high side, but their distribution is relatively normal. Any indication they might give of a preponderance of "student-centred" attitude among participants is counterbalanced by the slight skew and lower mean of the Role of the

Educator Scale distribution. The variance in the two distributions seems to be sufficient to maintain that both student-centred and traditional learning styles were adequately represented in the three course population.

8. Conclusion

Student preference in learning style, as specified in the context of this paper, had no observable effect on learning outcome, on participants' interaction during the sessions, on student's satisfaction with the educational session or on students' attitudes to the medium. Other factors (recruitment procedure, location of teacher in the mediated situation, etc.) may have had a greater effect on the educational activity and will be discussed in another report.

While it may seem that this is not a fruitful area for future studies on professional and management development, it must be remembered that these findings are of limited scope, and may not apply to courses using a different approach or content, or to those given under different conditions.

Recommendation

Should preference in learning style be considered important to professional or management training, a further study would be necessary to clarify its effects.

Figure 2
Student-centred classification

Distribution of Roles Scores
(N=63)

No. of participants

M=23.063
SD= 3.28

Possible range
of scores = 6 to 3?

Scale Score
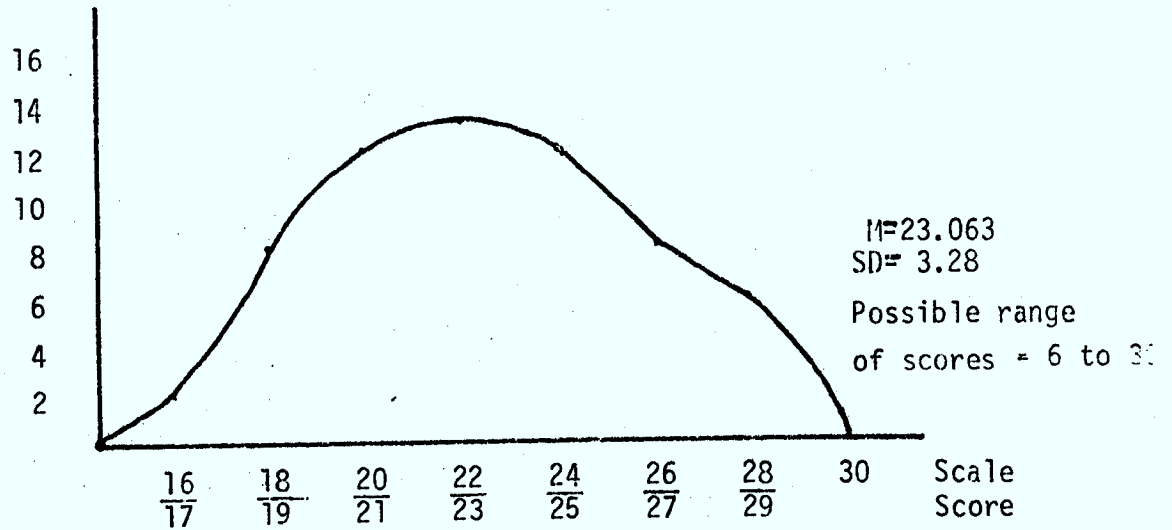
A. Distribution of Learner attitude scores.

M=17.21
SD= 3.49

Possible range
of scores = 6 to 30
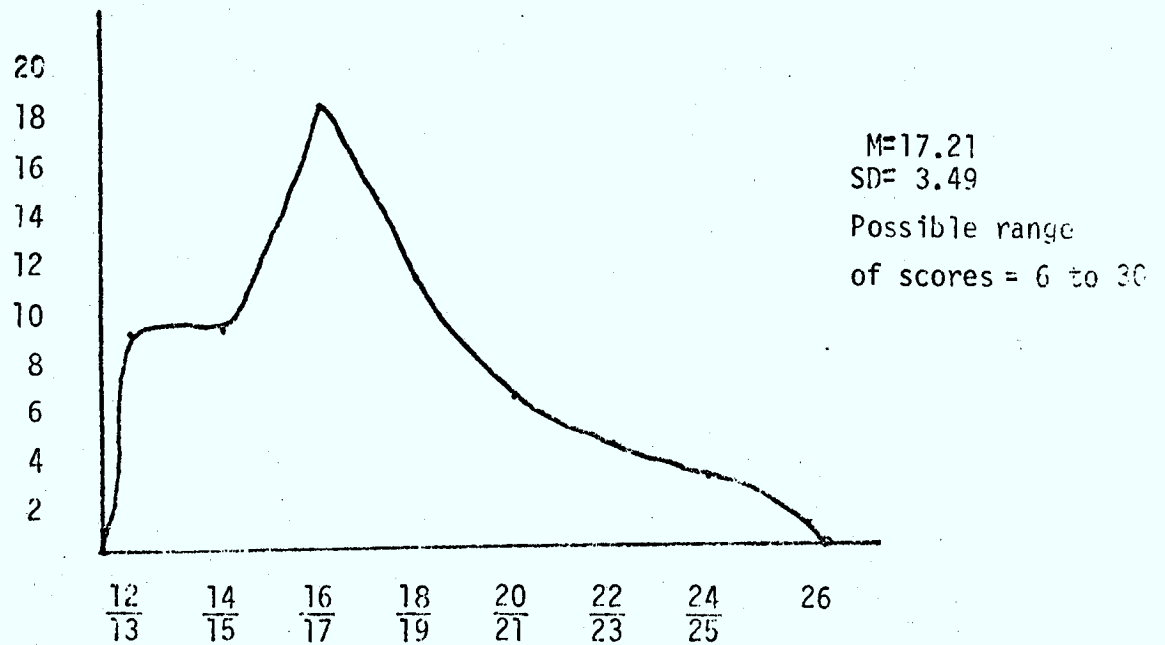
B. Distribution of Educator attitude scores.

Appendix A

Learning/Teaching Model

The learning/teaching model was developed specifically to meet two distinct requirements: a) the adult learner and b) the demand characteristics of an interactive medium used for educational purposes.

Based on the literature on adult learning (eg. Knowles, Kidd, Freire, etc.), and on the literature pertaining to the uses of mediated communication systems (CSG 1972, 1973, 1974, Havron 1973, Wedemeyer 1976), the learning mdoel developed proposes a non-directive, student-centred approach. To this effect, the model re-defines and describes the roles of the learner and of the educator. Briefly, the adult learner is called upon to assume the responsibility for his own learning:

a) by identifying his own training and development needs;

b) by determining his learning objectives and how he will achieve them; and

c) by negotiating these objectives with other learners in the group.

The educator's role, therefore, becomes that of a guide, a consultant who assists the learner as needed.

Since much of the learning process is undertaken by the individual learners, an interactive medium is essential to permit the learners to access each other as a group, sharing their experience and expertise as well as providing each other with related information. (See separate report on the model)

Course content

The training needs survey (see Appendix B) identified long-range planning
as one of the major concerns of middle management in the St. John's
population. Identification of specific topics to be included in the
course was then undertaken in the following way:

1. The course directors interviewed planning officers from a number of
   departments to determine if long-range planning existed in their
   departments and if so, how it was done.

2. A questionnaire was sent to all prospective participants asking them
   to check off those long-range planning concerns which they would like
   to explore in the course.

3. Subsequently, the course directors met with participants enrolled
   in satellite course I and established, from among the concerns checked
   in the questionnaire survey, their specific concerns.

Following these inquiries a review of literature was undertaken and
compiled into two texts: 1) Forward Planning in Government, 2) Forward
Planning: Selected Readings. The former formed the basis for the course.

Course directors

These were chosen from the Staff Development Branch because of their
experience and expertise in the development of new courses and their
knowledge of the teleconferencing medium.

Pre-test Simulation

A simulation of the learning/teaching approach, course content and use

of medium was undertaken at Carleton-Place Training School during

a four-day session to familiarize the course directors with the use

of the medium and with the teaching/learning methodology to be implemented.

The information gained through this trial session permitted clarification

of the teaching/learning procedures. (See separate report on the simulation)

Appendix B

Population

Satellite Course I

A needs identification survey of middle managers in St. John's was
undertaken in early 1976. The purpose of the survey was twofold:
a) to identify the participant population b) to identify the training
needs of this group. Training needs surveys are conducted on a yearly
basis by Regional Operations, but these are done through department
liaison training officers or managers. In this case it was decided
to contact the potential participants themselves. It was assumed
that this procedure would:

1) allow prospective participants themselves to identify
   their training needs, a necessary step in the application
   of the learning model;

2) allow us to offer an educational activity which answered
   the specific training need most relevant to the participants.

Senior administrators of each of the twenty-two departments located in
the St. John's area were informed by letter and, later, personally by
the regional representative of the PSC, about the needs survey and the
training by satellite project. Departments agreed that the survey should
be undertaken.

Nine hundred and twenty-four Newfoundland federal public servants were
screened through DATA-stream print out which included category, level
and department. Out of this population, 171 persons (i.e. 18%) were

identified by level and category as being middle managers according to Treasury Board guidelines. Forty-two were in the Technical category, 79 in the Administrative category and 50 in the Scientific and Professional category. A training needs questionnaire, a letter informing them of the project, and personal data sheet requesting information were sent to each of them personally. Sixty-four questionnaires were returned, giving a 37% return rate.

Of this total, 27 persons indicated their willingness to participate in the project, 14 answered that they were not interested for various reasons, and 22 were uncertain as to their participation. This uncertainty was due to several factors: the length of the course, the time of year that the course would be offered and the number of people who would be involved from their department.

Both the certain and uncertain respondents (n - 50) were considered in the identification of training needs. First, second and third choices were compiled. To avoid a duplication of training services or the creation of a competitive market, educational activities which were offered by PSC Regional Operations were not included in the compilation. Twenty-three of the 103 choices made by respondents indicated long-range planning as their major need.

It was, thus, decided that long-range planning would be the educational activity which would take place in both satellite and face-to-face conditions, and a group of 30 participants (consisting of all "certain" respondents, giving Long-Range Planning as a 1st, 2nd or 3rd choice,

and "uncertain" respondents who mentioned it as their 1st choice) was identified.

No other contact was made with these respondents until the fall. Then the educator, the regional Departmental representatives and the PSC liaison officer met with the participants and informed them that long-range planning had been selected as the topic. Both respondents and departmental representatives expressed their concern about two things: a) the length of the course, which had been scheduled to take place once a week for eight weeks, and b) the time of the year that the educational activity was to take place, that is, from April to June. Many of the departments involved have field activities during that particular season and a shortage of staff then for a period of eight weeks would severely handicap their operations and limit the number of people who could participate. The schedule was therefore changed to twice a week for four weeks.

Department officials also felt that participation of their middle managers should be limited to one per administrative unit. This decision modified the number of eligible participants for the project. "Uncertain" respondents who had identified long-range planning as either a second or third choice were therefore contacted to participate. Finally, eighteen participants representing ten different departments were identified as available, and made a firm committment to attend. These persons constituted our St. John's population for satellite course I.

This method of recruiting participants was found to be extremely time

consuming and unorthodox. It was also evident that the same selection
procedure could not be applied to comparison groups since the educational
activity would have to be the same for all groups concerned. The selection
of face-to-face and satellite II participants therefore differed from
the selection of satellite I course participants. It is noteworthy, however,
that this particular educational activity would not have been identified
if only a regular needs identification survey had been undertaken.

Face-to-face Course

A course announcement was circulated to all government departments and
organizations. This course announcement indicated that a long-range
planning session would be offered twice a week for a two-hour period
for four weeks. Information was also given on the learning/teaching
approach to be used and the requirement that participants would have
the responsibility of identifying what they considered to be their
needs in terms of a long-range planning course. The course announcement
also specified that it was limited to middle managers. One hundred and
seventeen applications were received. Candidates were matched with the
St. John's satellite I population on the basis of category, level and
department. These participants were then telephoned to see if they
would prefer to attend the face-to-face sessions, or a satellite session
from the Ottawa location.

Twenty-three participants indicated their preference for, and were selected
to attend, the face-to-face session. Eight more agreed to attend the
course offered by satellite from the Ottawa location. Remaining respondents
were offered the possibility of enrolling for another long-range planning

course in the fall.

Satellite course II

Participants for the St. John's satellite II course were recruited by the regional office representative. It is common practice in the regions for the federal government to share and/or exchange educational activities was well as human resources with both Provincial governments and universities. This was also the case for this course. A course announcement was circulated in the usual way to the university and to provincial and federal departments. It described the project and the proposed long-range planning course. Eighteen people enrolled, three from the university, five from the provincial government, and the remaining 10 from the federal government.

Several other points should be kept in mind when considering the population of the 3 courses. First, although the category and level identifies middle management as such, people may fit the descriptives without having any managerial functions to perform. An individual RES-2, for example, may not have any supervisory function but still is classified as middle management. Secondly, it is often said that classifications which would be in the middle management range in Ottawa would carry responsibilities more equivalent to senior middle management in the Regions. Thirdly, the functions of a middle manager in a department will differ from those of other departments according to the mandate or function of the group. The interpretation of "middle managers as the selection criteria" was left to the discretion of the departments. It was therefore impossible to control for these variables in this particular project.

Appendix C

Setting for the satellite course I and II

Five rooms were equipped with an interactive audio/video system. Of these, four rooms were located on three floors at Memorial University, St. John's, the fifth in Esplanade Laurier in Ottawa, and linked with a closed-circuit television network. Each room was arranged to seat five people behind a rectangular table. Four black and white 21" television monitors were placed 7 feet in front of the table in each room. This allowed paricipants to view every other group. No self-view monitors were provided. Monitors, with the camera placed between them, were stacked in two's. Wide angle zoom lens were used in order to view all five participants at the same time.

In terms of the audio system, participants used omni-directional microphones and wore open-air headsets with adjustable volume control. During the first satellite course, no location identification system was used. For the second course, a voice-activated light was used to identify speaker location. This was put in at the requests of educators and participants.

All rooms were provided with flip-charts and room dividers. Name tags were placed on each monitor identifying each individual and group.

The Ottawa location differed in the sense that they had a multiplexing green image of each of the four groups in St. John's. The green color tube was to reduce the glare and provide a longer persistance of the

image transmitted. This location was also equipped with a close-shot manually switched camera to be used as an audio-visual aid for graphic displays. Two clocks were used, one to indicate St. John's time, the other, Ottawa time. Further details on the technical aspect of the study may be found in the Technological Report.

Setting for the face-to-face session

Participants gathered in a large room at a west end location in Ottawa. The room was equipped with comfortable chairs but no tables, and the chairs were placed in a full circle allowing all participants and educators to face one another. Syndicate rooms were provided for work in small groups. Pariticipants wore name tags until they knew each other.

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The Effects of Medium on behaviour,

attitudes, and satisfaction of learners.

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Pat Grygier
Public Service Commission
August, 1977.

SOMMAIRE

Cet article décrit une étude qui a mesuré l'effet d'un médium de communication

sur le comportement, les attitudes et la satisfaction des apprenants. Le

médium dans ce cas-ci était un système audio-video interactif via le satellite

Hèrmes qui rejoignait cinq groupes d'apprenants. Dans le groupe contrôle

les apprenants se recontraient face-à-face. L'analyse a indiqué que l'inter-

action était plus grande dans la première classe utilisant le satellite que

dans la deuxième classe utilisant le satellite et que dans la classe face-à-

face. Les résultats ont indiqué que les apprenants qui ont étudié par satel-

lite étaient plus satisfaits que ceux qui ont étudié face-à-face. De plus

les étudiants du premier cours par satellite étaient les plus satisfaits.

L'attitude des participants dans le local central était moins positive que

celle des apprenants dans les locaux éloignés. Ces résultats sont discutés

en regard de la théorie et de la pratique impliquées.

1. Introduction

Two major objectives of the Public Service Commission "Staff Training by Satellite" project were:

    1) to explore new methods of professional training through the development of a mediated learning methodology;

    2) to study aspects of interactive human telecommunication which facilitate or hinder learning.

This paper is one of a series of reports on the results of a field experiment conducted to determine the effectiveness of an audio-video interactive system as a means of providing professional training to middle managers located in both regional (St. John's, Nfld.) and central (Ottawa) areas. This field experiment also explored the use of a student-centred learning approach in mediated and non-mediated conditions. The experiment was carried out as part of the Communications Technology Satellite tele-education projects during the months of April, May and June of 1977. The location and timing of the experiment were determined by the fact that a satellite earth station was to be shared between the Public Service Commission and Memorial University in St. John's for a particular period of eight weeks.

Two satellite educational sessions were compared to a face-to-face control group. Satellite session I occurred four weeks prior to satellite session II and the face-to-face session.

This report is concerned with the effects of the medium on the

practice of the learning/teaching method and the value of the educational sessions as perceived by the participants. It includes the effects of the medium on non-cognitive variables: attitudes, satisfaction, and participation of users.

Definition of terms

Medium, as the independent variable, is defined as the mode of communication used to provide training to middle managers. In this study, medium refers to either face-to-face or interactive video.

The learning/teaching method applied was non-directive and student-centred. It focused on individualizing the content and learning processes and as such was meant not to be subject-oriented but rather person-oriented.

The educational or learning session is defined as time spent with the educator and the total group, when the actual educational activity is taking place.

Participation of users is defined as the total number of interventions made by any member of the total group.

Before reviewing the relevant literature, it is necessary to explain how this study on the effect of the medium differs from other reported studies.

- This study focused on the effect of the medium on the training of a small number of adult learners: each course consisted of less

than 25 persons, grouped into units of 5 or less on the satellite courses. Although satellite link may provide access to larger audiences, e.g. 200 persons, interaction among students was considered necessary for meaningful participation in this study. Active student participation has almost invariably been found to contribute to learning.

- The study explored the use of a learning/teaching methodology which was learner-centred and non-directive. This approach entrusts the responsibility of the learning processes to the students and as such extends the individual's capacity for independent study. (See Lortie, 1976, 1977 a, b, c, d,) A discussion of the teaching approach may be found in Appendix C.

- The technical system in this study explored the use of a multi-way interactive audio and video system. Full bandwidth video was received in four locations. The use of multiplexing, as a means of reducing the cost of full video transmission, was explored in one location. An open microphone system rather than a voice-switched system was used. (See Miller, 1977 a, b, c,)

2. Review of literature

2.1 Media comparison studies

In recent years, both interactive and broadcast media of communication have been studied to determine their effects on learning, (Bramble, 1975; McNamara, 1977; Puzzuoli, 1970; Schramm and Chu, 1967) their relationship to student-group size in small vs large groups (Driscoll, 1959; Neale, 1961); to style of presentation (Brandon, 1956; Lucas, 1977), etc. The transmission link and technical configuration have varied, on the one hand, from telephone,

closed-circuit television, micro-wave to satellite; on the other hand, from one-way audio to two-way video, from two locations to multi-locations. Learning results, however, have been consistent. All three media, face-to-face, video and audio, have been found comparatively effective as modes of communication for educational purposes. Thus, operational audio and sometimes video systems have mushroomed. They are being used for adult learning, for instance, in the universities of Wisconsin, Quebec, London (England), Southern California and Stanford.

Given the results of these studies, it was predicted that no significant differences would be found on learning between satellite mediated sessions and face-to-face sessions.

2.2 Teaching methods

Evaluation studies carried out on mediated systems used for education have shown that one could not simply transfer face-to-face teaching methods to a mediated teaching situation (Baird, 1977; Wedemeyer, 1976). The educational method has to take into account the needs of learners, the content to be given and the medium to be used. For example, an educational method which stresses interaction between students and teacher (seminars, discussion groups) could not use a one-way broadcasting medium such as instructional television.

The methodology designed for this study was non-directive and student-centred. It established procedures so that the specificity of an inter-active, multi-location, video system would be used to its maximum. Adult learners would be called upon to determine the course objectives, the

content and the format. It was assumed that this responsibility would provide the impetus necessary for interaction. The learning/teaching methodology also provided a mechanism for student interactions by redefining the role of the educator to be that of a guide, animateur, and counselor.

The previous studies suggested that an educational method used in a face-to-face setting cannot be used in the same way in a mediated setting. It was therefore predicted that if a method were designed specifically for a mediated situation, the use of this same method in a face-to-face condition would be found less satisfactory and therefore would be rated more critically.

2.3   The role of video

According to Argyle (1969), the role of visual signals play several major functions in social interaction. First, the visual signals provide both emotional and cognitive feedback to the speaker. For example, a frown may indicate a lack of comprehension or scepticism either about the content of the message or about the speaker. Second, the visual cues seem to play the role of gatekeepers in conversation by establishing when it is appropriate to speak and when to stop speaking. These functions suggest that verbal communication is largely dependent on visual cues and that a reduction in visibility may have an effect on communication behavior, particularly on the ease of interaction and speech patterns.

Several laboratory studies investigated the effect of lack of vision

(back-to-back vs. face-to-face) on speech patterns (Cook, 1969), and the effect of varying the degree of visibility (masks, dark glasses, opaque screens) on ease of interaction (Argyle, Lallje and Cook, 1968). Results of these studies showed no major differences between conditions, although speech patterns in the back-to-back condition produced fewer interruptions and shorter utterances. An experiment conducted by Williams (1974) on the effect of the medium of communication (face-to-face, audio and video) on the generation of ideas showed no significant differences between the medium used and the number of ideas generated.

Contrary findings in recent laboratory studies using dyads have been reported by Ocksman and Chapanis (1974), and Weeks and Chapanis (1976). They found that more messages were exchanged in face-to-face than via audio-video or audio only in a given amount of time. Similar findings were also reported from a field group-to-group experiment (Weston, Kristen and O'Connor, 1975) where more words were spoken via video than via audio, and more still via face-to-face for the same amount of time. Similar profiles of communication (using Bale's Interaction Analysis) were obtained when comparing in-person and two-way video tele-consultation in a satellite experiment (Zinser, 1975).

The results of these studies suggest that in some cases the mode of communication (which permits a greater or easier degree of visibility) has an effect on the type of interaction as well as on the amount of interaction. It was therefore predicted that face-to-face participants, having full opportunity for visual cues, would make more interventions than participants in mediated sessions.

The multiplexing of video signals produces a reduction in the resolution of the picture. In this particular study, one line out of four was transmitted to the Ottawa location. Participants at this location received an image which did not permit them to identify non-verbal signals such as frowns, smiles, head nods, etc. In fact, it took some time to identify who was speaking from the remote location.

This asymetrical condition may also have been perceived by the Ottawa participants as imposing more restrictions on them since more detail could in fact be seen by the St. John's participants. It seemed reasonable to predict, therefore, that participants experiencing the multiplexing conditions (that is, with limited visibility) would have more negative attitudes toward the medium and would be less satisfied with the educational sessions than would those experiencing full video conditions.

It was also considered that, given the novelty of the medium, the methodology and the course content, more uncertainty would be experienced in the mediated condition. Zinser (1975) reported that although the profile of communication in a satellite situation was similar to that in a face-to-face situation, a slightly higher proportion of questions were asked. She attributed this to the need for re-assurance to reduce the strain caused by an unfamiliar medium. Since the learning/teaching methodology used in our study was non-directive, it was thought this lack of formal structure in a mediated situation would, of itself, necessitate more questions, reinforcing the needs postulated by Zinser. This led to the prediction

that participants on the mediated courses would ask a relatively higher

proportion of questions than would their colleagues in the face-to-face

sessions.

3. Statement of hypotheses on effects of the medium

The hypotheses were based on the theoretical considerations and survey

of the literature outlined above. The first group was related to participants'

evaluation of various aspects of the sessions.

1. There will be no significant difference in satisfaction with
    and evaluation of the learning sessions between participants
    attending mediated sessions and those attending face-to-face
    sessions.

2. Participants attending mediated sessions will be less critical
    of the teaching approach as practised than will participants
    attending face-to-face sessions.

3. Of participants attending mediated sessions, those using a multi-
    plexing system will be more critical of the equipment and less
    satisfied with the sessions than will those not using such a
    system.

The second group covered the effect of the medium on the numbers and type

of interventions made by participants, i.e. on their interactivity during

the course sessions.

4. The degree of interaction, as measured by the number of inter-
    ventions, will be greater among participants attending face-to-face
    sessions than among those attending mediated sessions.

5. The proportion of questions to total interventions will be
    greater among participants attending mediated sessions than
    among those attending face-to-face sessions.

4. Methodology

4.1 Assumptions

In planning the experiment and the procedures necessary to test the foregoing hypotheses, certain assumptions were made. These were:

1. In determining development and training needs at the employee level, one would identify the perceived needs of the employee and not those of his employer.

2. If the employee were accessed directly and his stated needs were responded to, he would become more involved in the learning process.

3. Senior middle managers are responsible for the formulation of long-range plans and/or the implementation of these plans.

4. Classification (level and categories) of personnel in the regions is somewhat different from that in the National Capital Region in that they tend to have greater responsibility in the regions.

4.2 Participants

The subjects were 63 middle managers: 54 from the federal government, 6 from the Newfoundland provincial government and 3 from Memorial University. Of these, 23 took part in satellite course I, 18 in satellite course II and 22 in the face-to-face control group. Participants in satellite course I were identified after responding to a needs survey; participants in satellite course II and in the face-to-face course were recruited through usual Bureau of Staff Development and Training recruitment procedures (Appendix A). Table I provides a summary of the selection of participants, the course attended and the recruitment procedures.

Table I

Selection of participants

Course attended and enrollment procedures used.

Time of course	Type of course	Characteristics of Participants	Enrollment Procedures
April 26 - May 19 Tuesdays and Thursdays 1:00 p.m. - 3:00 p.m. Ottawa time	Satellite I	Middle Managers 11 fed. depts. all males 18* - St. John's 4 - Ottawa	Survey
May 24 - June 16 Tuesdays and Thursdays 1:00 p.m. - 3:00 p.m. Ottawa time	Satellite II	Middle Managers 3 univ. administrators 5 prov. gov. employees 10 fed. depts. 2 females 16 males 15* - St. John's 3 - Ottawa	BSDT format course announcement
May 25 - June 20 Mondays and Wednesdays 1:30 p.m. - 3:30 p.m. Ottawa time	Face-to-Face	Middle Managers 11 fed. depts. 3 females 18 males 21 Ottawa	BSDT format course announcement

* Enrolled. The number of people enrolled is not the same as the number of persons who actually attended the courses.

4.3 Setting for the satellite courses I and II

Five rooms were equipped with an interactive audio/video system and linked by means of a closed-circuit television network. Of these, four rooms were located on three floors at Memorial University, St. John's, the fifth in Esplanade Laurier in Ottawa. Each room was arranged to seat five people behind a retangular table. Four black and white 21" television monitors were placed 7 feet in front of the table in each room. This allowed participants to view every other group. No self-view monitors were provided. Monitors, with the camera placed between them, were stacked in two's. Wide angle zoom lenses were used in order to view all five participants at the same time.

In terms of the audio system, participants used omni-directional microphones and wore open-air headsets with adjustable volume control. During the first satellite course, no location identification system was used. For the second course, a voice-activated light was used to identify speaker location. This was put in at the request of educators and participants. All rooms were provided with flip charts and room dividers. Name tags were placed on each monitor identifying each individual and group.

The Ottawa location differed in the sense that they had a multiplexing green image of each of the four groups in St. John's. The green color tube was to reduce the glare and provide a longer persistance of the image transmitted. This location was also equipped with a close-shot

manually switched camera to be used as an audio-visual aid for graphic displays. Two clocks were used, one to indicate St. John's time, the other, Ottawa time.

Setting for the face-to-face session

Participants gathered in a large room at a west end location in Ottawa. The room was equipped with comfortable chairs but no tables, and the chairs were placed in a full circle allowing all participants and educators to face one another. Syndicate rooms were provided for work in small groups. Participants wore name tags until they knew each other.

4.4 Procedure

Satellite sessions were held every Tuesday and Thursday afternoons from 1:00 p.m. until 3:00 p.m. Ottawa time, 2:30 to 4:30 p.m. Newfoundland time. Face-to-face sessions were held every Monday and Wednesday afternoons at the same time. An additional two hours were available for participants to work in subgroups or by themselves prior to the session in St. John's and after the session in Ottawa. Eight consecutive sessions formed each course.

Participants in the satellite courses had a briefing session prior to their course (for satellite I, 1 week in advance, for satellite II, 1 month in advance). This was in order to familiarize participants with the medium (although in the event satellite time was not available for this),

and to summarize the evaluation, to propose a course plan, and to hand out time sheets and pre-tests in order to make maximum use of on-air satellite time.

4.5 Special conditions

In all three offerings of the course, participants attended free of charge. For this privilege, it was understood that they would be required to fill out questionnaires evaluating various aspects of the educational session.

5. Variables

5.1 The independent variable

In this study the independent variable was the medium used to conduct the educational experience. Medium refers to either face-to-face or interactive audio-video. One course was conducted in an immediate face-to-face situation, with all participants and educators present in the one room for the bulk of the time; the other two courses were conducted by means of an interactive audio-video telecommunication system transmitted via satellite, with participants divided into five sub-groups located in different rooms. One of the sub-groups consisted of three participants and the two educators.

This variable was manipulated by assigning participants according to the course followed.

5.2 The dependent variables

The dependent variables for the first group of hypotheses were: the

participant's satisfaction as measured by the Satisfaction Scale; the evaluation of the learning session as measured by the Learning Session Questionnaire; the evaluation of the educational method used as measured by the Learning/Teaching Approach; the evaluation of the equipment as measured by the Attitudes to Equipment Scale.

These dependent variables were measured by means of the participants' scores on the questionnaires administered at the end of each session.

Ratings from the Satisfaction Scale, given at the end of each session, and Learning Session Scale, given every second session, were used to test hypothesis 1. The Teaching and Learning Approach Scale ratings, obtained every second session, were used to test Hypothesis 2. Ratings from the Attitude towards Equipment Scale, also given at the end of every second session, and ratings from the Satisfaction Scale were used to test Hypothesis 3.

For the second group of hypotheses the dependent variables were the amount and type of participant interaction during the sessions. These were measured by means of data from the observers' log kept of all the course sessions.

The unit of measurement used for testing Hypothesis 4 was the mean number of interventions per group of participants per session, that is, the number of times (on the average) that each participant spoke in a session. The unit of measurement used for testing Hypothesis 5 was the proportion of participants' interventions that were in the form of questions.

These dependent measures are described in detailed in Appendix B.

5.3 Analysis of data

To test the hypotheses, each group of participants were compared with those on the other courses in terms of the dependent measure. Unless otherwise indicated in the text, scores were computed for each participant as detailed in the description of each questionnaire (Appendix B). Mean scores and estimates of variance were then computed for the members of each course and the significance of the differences between each pair of means examined by means of a t-test.

6. Results

6.1 Preliminary to the testing of the main hypotheses, mean ratings were computed by courses for each item on each scale for each session. These data are to be used in later studies. Here they formed the basis for computing overall mean ratings by courses for each scale and each session.

These mean ratings are shown in Figures 1, 2 and 3. These show the variations of ratings throughout the length of the course on the three questionnaires completed by all three groups of participants in this study. Comparison of the ratings given on the 8th session with those given on all earlier sessions produced the results shown in Table 1. It was decided therefore to omit ratings from the 8th session in testing the main hypotheses unless these were equally available to both comparison groups.

Figure I

Mean Satisfaction Scale ratings
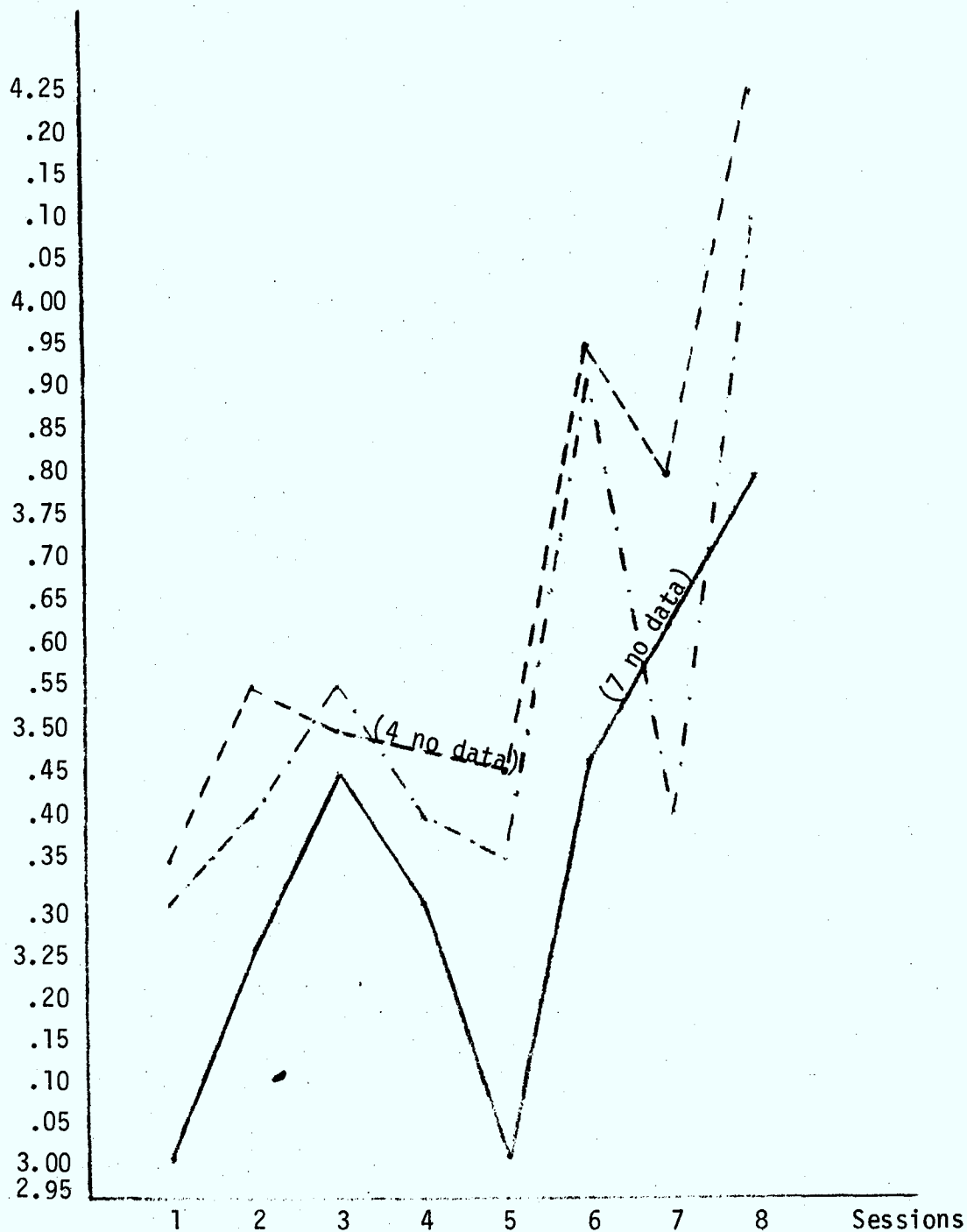
Over Sessions

Figure 2

Mean ratings over sessions

Sat. I _ _ _ _ _ _ (no data for session 4)
Sat. II _ . _ .. .... _
Face/face _____

(given in session 7 instead of 6 and 8)

mean
ratings
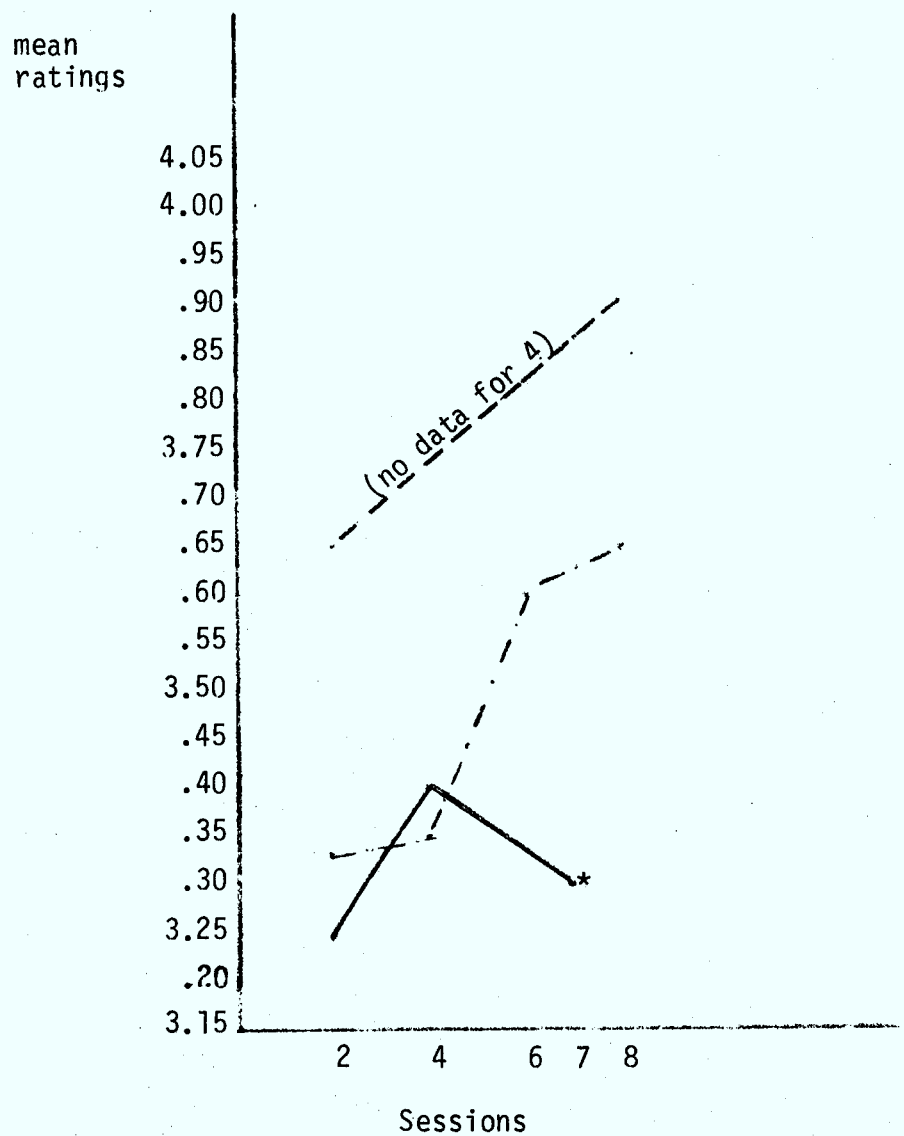
Sessions

Learning Session Scale

* Based on 4 participants only (given in session 7).

Figure 3

Mean ratings over sessions

Sat. I __(no data_for session 4)
Sat. II
Face/face _____

(given in session 7 instead of 6 and 8)

mean
ratings

4.05
4.00
.95
.90
.85
.80
3.75
.70
.65
.60
.55
3.50
.45
.40
.35
.30
3.25
.20
3.15

(no data)

*

2   4   6 7 8
Sessions
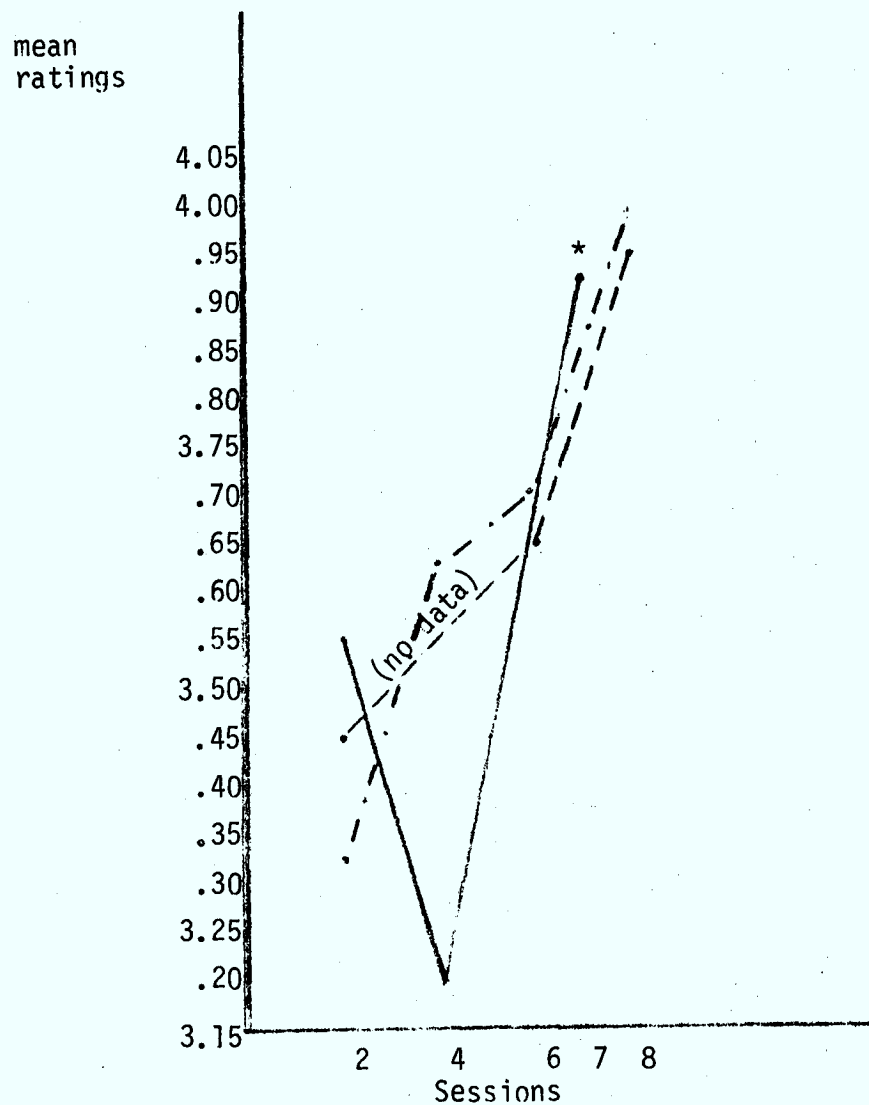
Teaching and Learning
Approach Scale

* Based on 3 participants only (given in session 7).

TABLE 1

Ratings of the 8th session compared to those of previous sessions.

Scale	Comparison groups	Mean	N	SD	t	Level of Significance
Satisfaction (Sats. I, II + F/F	Sessions 1-7 Session 8	3.435 4.04	19 3	.245 .200	3.84	.01
Teaching and Learning App. (Sats. I + II)	Sessions 2,4,6 Session 8	3.56 3.995	5 2	.155 .035	4.87	.01
Learning Sess. (Sats. I + II)	Sessions, 2,4,6 Session 8	3.556 3.775	5 2	.209 .148	1.2	non

6.2 Hypothesis No. 1.

The first hypothesis was that there would be no significant difference in evaluation of the learning session or in satisfaction between participants attending mediated sessions and those attending face-to-face sessions.

To test this, participants on the 3 courses were compared in terms of their Satisfaction and Learning Session Scale scores. Scores were computed for each participant as detailed in Appendix B. Mean scores and estimates of variance were then computed for each course and a t-test applied to check the significance of the differences.

Table 2 summarizes the between-course comparisons on the evaluation of the learning session. Learners in Satellite course I gave more positive ratings of the learning session than participants in either of the two other conditions. In fact, these ratings were found to be significant at the .01 level. These data do not support the hypothesis.

TABLE 2

Effect of the medium on the learning session evaluations

Between course comparisons

Factor	Classification base	Comparison groups	Mean	N	SD	t	Level of Significance
Evaluation of the Learning session	Learning session scale *	Face/face	19.938	32	3.627		
		Satellite I	22.579	38	3.037	3.22	.01
		Face/face	19.938	32	3.627		
		Satellite II	20.486	37	3.194	.65	(non)
		Satellite I	22.579	38	3.037		
		Satellite II	20.486	37	3.194	2.88	.01

* Based on 3 sessions only for Satellite II and Face/face
  and on 2 sessions only for Satellite I: Session 8 omitted
  for groups, Session 4 no data available for Satellite I.

TABLE 3

Effect on the medium on Satisfaction

Between course comparisons

Factor	Classification base	Comparison groups	Mean	N	SD	t	Level of Significance
Satisfaction with sessions	Satisfaction Scale *	Face/face	65.435	62	11.176		
		Satellite I	70.602	98	10.883	2.88	.01
		Face/face	65.435	62	11.176		(16%)
		Satellite II	68.026	77	10.557	1.39	(non)
		Satellite I	70.602	98	10.883		(11%)
		Satellite II	68.026	77	10.557	1.58	(non)

* Based on 6 sessions only; Sessions 4 and 7 were omitted

because of incomplete data.

Table 3 shows that participants on Satellite course I were again consistently more satisfied than participants in the Face-to-face course. This difference reaches a statistically significant level. The difference between Satellite course II and Face-to-face participants was in the same direction as that between Satellite course I and Face-to-face, but did not reach a statistically significant level.

While not conclusive, these data suggest that participants attending the mediated sessions were more satisfied than participants attending the face-to-face course. The main finding, however, is that participants attending the first mediated course gave more positive ratings to the learning sessions than did participants on the later courses.

6.3 Hypothesis No. 2.

The second hypothesis stated that participants attending mediated sessions would be less critical of the teaching approach as practised than would participants attending face-to-face sessions.

This hypothesis was tested in the same way as the first one, except that the measuring instrument used was the Teaching and Learning Approach Scale. The results are summarized in Table 4. No significant differences were found and the hypothesis is therefore not upheld. Participants on all 3 courses seemed equally critical of (or favourable towards) the teaching approach as practised.

TABLE 4

Effect of the medium on

the evaluation of the teaching model

Factor	Classification base	Comparison groups	Mean	N	SD	t	Level of Significance
Evaluation of teaching approach	Teaching and learning approach scale	Face/face	24.118	34	4.277		
		Satellite I	25.105	38	4.820	.91	non
		Face/face	24.118	34	4.277		
		Satellite II	24.676	37	3.779	.57	non
		Satellite I	25.105	38	4.820		
		Satellite II	24.676	37	3.779	.42	non

Based on 3 sessions only for Satellite II and Face/face groups, and on 2 sessions only for Satellite I: Session 8 omitted for all groups, Session 4 no data available for Satellite I.

6.4 Hypothesis No. 3.

The third hypothesis predicted that participants using a multiplexing
system (i.e. the Ottawa sub-groups of Satellite courses I & II) would
be more critical of the equipment and less satisfied with the sessions
than would participants using the alternate audio-video system (i.e.
the St. John's sub-groups of Satellite courses I & II).

This was tested by means of the Satisfaction and Attitudes towards
Equipment Scales. For the Attitude towards Equipment comparisons,
the mean scores of participants in Ottawa were compared with those of
participants in St. John's, using the method of analysis outlined in
Appendix B, and t-tests were performed. For the Satisfaction Scale,
a mean score was computed for each participant giving the average of
all his/her ratings of all items over all sessions of the course. The
means of the two groups were then tested for significance using a
t-test.

Table 5 summarizes the results. In each comparison the ratings of
the St. John's group were higher than those of the Ottawa (multiplexed)
group. When the entire St. John's sample is compared with the entire
Ottawa sample, a statistically significant difference is found on the
Attitude towards Equipment scale. When the St. John's and Ottawa par-
ticipants in only one course are compared with each other, the Satis-
faction Scale ratings produced a significant difference on Satellite
course II and the Attitude towards Equipment Scale ratings produced
a significant difference on Satellite course I. The remaining three
comparisons did not result in significant differences.

TABLE 5

Effect of multiplexing system on satisfaction

evaluation of the medium and learning

Between node comparisons

Factor	Classification base	Comparison groups	Mean	N	SD	t	Level of Significance
Satisfaction in general	Satisfaction Scale	Sat. I - Ottawa	3.608	4	.391	.1	(non)
		Sat. I - St. John's	3.697	17	.353		
		Sat. II - Ottawa	3.2	3	.092	2.9	.02
		Sat. II - St. John's	3.589	14	.426		
		Sat. I & II - Ottawa	3.433	7	.356	1.3	(non)
		Sat. I & II - St. John's	3.648	31	.385		
Evaluation of the medium	Attitude towards Equipment Scale	Sat. I - Ottawa	25.727	11	4.756	2.76	.01
		Sat. I - St. John's	30.444	45	5.463		
		Sat. II - Ottawa	26.	9	5.268	1.99	(5 - 10%)
		Sat. II - St. John's	30.05	40	5.159		(non)
		Sat. I & II - Ottawa	25.85	20	4.859	3.52	.01
		Sat. I & II - St. John's	30.259	85	5.294		
Learning	Content Test	Sat. I & II - Ottawa	8.6	5	1.342	1.4	(non)
		Sat. I & II - St. John's	9.792	24	2.519		

These results are consistent with the hypothesis, but not conclusive. They indicate that, in this experiment, participants at the head-quarter location tended to be more critical of the equipment than were participants in St. John's but that they were not necessarily less satisfied in general.

These findings were sufficiently suggestive to prompt investigation of the effect of multiplexing on learning. The results are also shown in Table 5, and indicate no significant difference between the groups.

6.5 Hypothesis No. 4.

The fourth hypothesis predicted that the number of interventions would be greater among participants attending face-to-face sessions than among those attending mediated sessions.

To test this hypothesis, the total number of interventions made by all the participants at a particular course/session was computed. This sum was divided by the number of participants present at the session and the resultant sum was considered as the "score" for that session. In this way each course had a possibility of 8 scores (one for each session). The courses were then compared with each other in terms of these session scores, and t-tests performed to check the significance of the differences.

In the analysis, Session I was omitted from all the courses as it
was considered a-typical in the sense that there would be an unequal
amount of time spent on administration, instructions on using media
equipment, etc. No score was available for session 4 on Satellite I,
as the Satellite was off-air.

The results are summarized in Table 6. From this it appears that there
was a difference between the groups in the expected direction, but that
it barely reached significant levels. This is possibly because of the
small numbers and wide variation (particularly in the face-to-face
groups). The hypothesis was only partially upheld, therefore.

6.6 Hypothesis No. 5.

The last hypothesis postulated in this study was that the proportion
of questions to total interventions would be greater among participants
attending mediated sessions than amoung those attending face-to-face
sessions.

To test this hypothesis the total number of questions posed by participants
in any session was divided by the total number of their interventions for
that session. The resulting figure was considered the score for that
session. The three courses were then compared with each other in the
same way as for Hypothesis 4.

The results are also given in Table 6. From this it appears that there
was no difference between any of the courses on this factor.

This hypothesis was therefore not upheld.

TABLE 6

Effect of the medium on participant interaction

Between course comparisons

* Interventions

Factor	Classification base	Comparison groups	Mean	N	SD	t	Level of Significance
Participant Interaction	Observation Log	Sat. I (obs. 1)	3.507	6	2.385		
		Face/face (obs. 1)	15.317	6	8.146	3.11	.02
		Sat. II (obs. 2)	8.974	7	3.954		(5% to 10%)
		Face/face (obs. 2)	16.138	6	7.861	1.85	(non)
	Proportion Questions to Interventions	Sat. I (obs. 1)	.22 %	6	.233		
		Face/face (obs. 1)	.203 %	7	.050	.17	(non)
		Sat. II (obs. 2)	.226 %	7	.071		
		Face/face (obs. 2)	.197 %	7	.034	.89	(non)

Only observer 1 noted items for Satellite I. Only observer 2 noted items for Satellite II. Both observers noted items for the Face/face course. Each observer's results for the Satellite course were only compared with the same observer's results for the Face/face course.

* (Based on mean number of interventions per participant per session).

Discussion

Satellite course I participants benefited the most from the application of the student-centred, non-directive educational method since the recruiting method used for this course gave them the opportunity to define their training needs and to determine the specific content of the course. The recruitment method also favored this group in another way. The individuals were accessed directly to find out if they were willing to participate as self-directed learners in a mediated learning situation. This factor may be partly responsible for the high degree of involvement and satisfaction that was shown by the responses of this group.

Another factor may also be postulated. At the students' request, a course director went to St. John's for the last four satellite sessions. This established a degree of personal rapport which, together with the participants' satisfaction at having their wishes met, may have provided the groundwork for their more positive evaluation of the learning session. A comparison between the first four sessions with subsequent sessions would be necessary to determine if significant differences could be observed on satisfaction, attitudes to the medium and participant behaviour. However, there seems to be an indication that personal training needs assessment and recruiting methods are factors that should be considered as important to promote learner involvement and satisfaction with the learning session.

As may be seen in Table 1, satellite course II and face-to-face participants are more comparable in terms of both the recruitment method used and the course offering. In view of this similarity, it is interesting to note that

satellite course II participants rated the learning sessions more positively, and were more satisfied in general that the face-to-face group. Figures 1, 2, and 3 show that the trend in the mediated condition was increasingly positive over time. It would be interesting to determine how many sessions would be needed to attain a plateau.

Face-to-face evaluations of both the learning session and the participants' satisfaction were more negative than those of either of the satellite courses; it seems possible that this could be partly explained by a reduction of the role of the educator in this group. It is possible that a certain minimal level of educator input is necessary even in a student-centred approach to make sessions worthwhile for participants. For example, Table 3 in Appendix C, shows that no organizational information was made available to the face-to-face group after the second session whereas in satellite course II it continued through the sixth session. The same trend is noted in the educators' presentation time.

When they referred to the participant's own experiences, subjective evaluative ratings of the learning/teaching approach produced similar results to those obtained by the objective evaluative measures. There appears to be a conflict between the objective and subjective evaluations when participants were asked to make judgments on the group's activities as a whole, on, for instance, the Learning Session Scale. It may be worthwhile to investigate which of the items in the Learning Session Scale were responsible for the significant differences noted. It must be remembered that only overall effects were considered in these analyses. More time would be needed to investigate in depth those factors

which appear to be affected by the medium used.

The desirability and future use of the multiplexing system is difficult to determine. On the one hand, users seemed to have achieved their learning objectives and were generally satisfied with the sessions. On the other hand, as predicted, full bandwidth video was rated significantly better than the multiplexing system. It is possible that only a moderate level of satisfaction with the equipment is necessary for adquate learning, or that only certain of the technical aspects are critical. It would be necessary to investigate in depth the items which produced the difference between the multiplexed and full bandwidth nodes. This information would provide a clearer idea as to the desirability of multiplexing systems for educational purposes.

Conclusions

It seems apparent from these preliminary findings that the learning/teaching approach used well implemented the theoretical learning model. It also seems that the teaching method was well suited to the needs of the adult learner and proved to be satisfactory in both satellite and face-to-face conditions. The interactive video system used was well adapted to the non-directive, learner centred approach, to the course content, and to active student participation. It can be said, in fact, that the use of the video system linked by satellite seems to be as effective as the face-to-face setting for answering a need for task-oriented training.

Both recruitment method and personal training needs assessment appear to have been important factors in producing a high degree of involvement and learner satisfaction.

Student-centred approach does not imply laissez-faire on the part of the educator. A certain minimum of educator guidance, recapitulation and orientation are necessary for students to get the full benefit out of their courses.

Participants' evaluative ratings were found to be reasonably comparable to data from objective observations, particularly when they were related to their own personal perceptions and involvement. When the participants were asked to make judgements based on their perception of what other participants experienced, their ratings appeared less reliable.

As may be seen in Appendix C, Table 3, the varying attendance in both satellite and face-to-face courses may have affected the results found in this study. The reasons for this phenomenon, which could only be hypothesized here, need to be investigated.

General Conclusions

The use of a new medium has often provided an impetus to reconsider learning methods, objectives and even the very philosophy underlying training. In the context of this field experiment, the introduction of a new medium provided the following opportunities:

a) to question the training needs identification process and the recruitment method for staffing courses. The decision as to the type of learning required was "developed from the bottom and not imposed from the top."

b) to bring training to the employee rather than requiring him to come to it;

c) to adapt the learning conditions to the needs to the organization;

d) to bridge the communication and identity gap between learners in different regions, permitting them not only to communicate directly but also on an equal status;

e) to investigate aspects of learning which have been taken for granted in the face-to-face situation.

Preliminary results from the studies so far concluded are encouraging. They suggest that satellite mediated management training can be as effective and as well appreciated by participants as that conducted in a face-to-face setting. More detailed analysis of the results is needed to clarify certain findings.

Recommendations

It is recommended that:

1. The Public Service Commission establish a policy and guidelines in the field of tele-training;

2. the organizational implications and second-order effects of using mediated training be explored;

3. the PSC, under its mandate as a central agency for training public servants, assume the responsibility for providing guidelines and advice to departments regarding the implementation of mediated training courses;

4. the PSC use the expertise and knowledge gained through this field experiment in tele-training to train departments in the design and mounting of mediated training courses;

5. the use of experimental satellites continue to be explored while they are available;

6. the possibility of using and cost-sharing operational satellites with other government departments be explored;

7. the use of satellites for training other categories of employees be explored;

8. slow-scan be explored as an alternative to a multiplexing system;

9. courses be designed so that they may be given in either a mediated or a face-to-face setting;

10. the need for two course directors in a student-centred training course be determined;

11. correlational studies be undertaken to determine the relationship between the various measures used in this study.

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Appendix **A**

Population

Satellite Course I

A needs identification survey of middle managers in St. John's was
undertaken in early 1976. The purpose of the survey was twofold:
a) to identify the participant population b) to identify the training
needs of this group. Training needs surveys are conducted on a yearly
basis by Regional Operations, but these are done through department
liaison training officers or managers. In this case it was decided
to contact the potential participants themselves. It was assumed
that this procedure would:

> 1) allow prospective participants themselves to identify
>   their training needs, a necessary step in the application
>   of the learning model;
>
> 2) allow us to offer an educational activity which answered
>   the specific training need most relevant to the participants.

Senior administrators of each of the twenty-two departments located in
the St. John's area were informed by letter and, later, personally by
the regional representative of the PSC, about the needs survey and the
training by satellite project. Departments agreed that the survey should
be undertaken.

Nine hundred and twenty-four Newfoundland federal public servants were
screened through DATA-stream print out which included category, level
and department. Out of this population, 171 persons (i.e. 18%) were

identified by level and category as being middle managers according
to Treasury Board guidelines. Forty-two were in the Technical category,
79 in the Administrative category and 50 in the Scientific and Pro-
fessional category. A training needs questionnaire, a letter informing
them of the project, and personal data sheet requesting information
were sent to each of them personally. Sixty-four questionnaires were
returned, giving a 37% return rate.

Of this total, 27 persons indicated their willingness to participate
in the project, 14 answered that they were not interested for various
reasons, and 22 were uncertain as to their participation. This uncertainty
was due to several factors: the length of the course, the time of
year that the course would be offered and the number of people who would
be involved from their department.

Both the certain and uncertain respondents (n - 50) were considered
in the identification of training needs. First, second and third choices
were compiled. To avoid a duplication of training services or the
creation of a competitive market, educational activities which were
offered by PSC Regional Operations were not included in the compilation.
Twenty-three of the 103 choices made by respondents indicated long-range
planning as their major need.

It was, thus, decided that long-range planning would be the educational
activity which would take place in both satellite and face-to-face
conditions, and a group of 30 participants (consisting of all "certain"
respondents, giving Long-Range Planning as a 1st, 2nd or 3rd choice,

and "uncertain" respondents who mentioned it as their 1st choice) was identified.

No other contact was made with these respondents until the fall. Then the educator, the regional Departmental representatives and the PSC liaison officer met with the participants and informed them that long-range planning had been selected as the topic. Both respondents and departmental representatives expressed their concern about two things: a) the length of the course, which had been scheduled to take place once a week for eight weeks, and b) the time of the year that the educational activity was to take place, that is, from April to June. Many of the departments involved have field activities during that particular season and a shortage of staff then for a period of eight weeks would severely handicap their operations and limit the number of people who could participate. The schedule was therefore changed to twice a week for four weeks.

Department officials also felt that participation of their middle managers should be limited to one per administrative unit. This decision modified the number of eligible participants for the project. "Uncertain" respondents who had identified long-range planning as either a second or third choice were therefore contacted to participate. Finally, eighteen participants representing ten different departments were identified as available, and made a firm commitment to attend. These persons constituted our St. John's population for satellite course I.

This method of recruiting participants was found to be extremely time

consuming and unorthodox. It was also evident that the same selection procedure could not be applied to comparison groups since the educational activity would have to be the same for all groups concerned. The selection of face-to-face and satellite II participants therefore differed from the selection of satellite I course participants. It is noteworthy, however, that this particular educational activity would not have been identified if only a regular needs identification survey had been undertaken.

Face-to-face Course

A course announcement was circulated to all government departments and organizations.. This course announcement indicated that a long-range planning session would be offered twice a week for a two-hour period for four weeks. Information was also given on the learning/teaching approach to be used and the requirement that participants would have the responsibility of identifying what they considered to be their needs in terms of a long-range planning course. The course announcement also specified that it was limited to middle managers. One hundred and seventeen applications were received. Candidates were matched with the St. John's satellite I population on the basis of category, level and department. These participants were then telephoned to see if they would prefer to attend the face-to-face sessions, or a satellite session from the Ottawa location.

Twenty-three participants indicated their preference for, and were selected to attend, the face-to-face session. Eight more agreed to attend the course offered by satellite from the Ottawa location. Remaining respondents were offered the possibility of enrolling for another long-range planning

course in the fall.

Satellite course II

Participants for the St. John's satellite II course were recruited by the regional office representatives. It is common practice in the regions for the federal government to share and/or exchange educational activities was well as human resources with both Provincial governments and universities. This was also the case for this course. A course announcement was circulated in the usual way to the university and to provincial and federal departments. It described the project and the proposed long-range planning course. Eighteen people enrolled, three from the university, five from the provincial government, and the remaining 10 from the federal government.

Several other points should be kept in mind when considering the population of the 3 courses. First, although the category and level identifies middle management as such, people may fit the descriptives without having any managerial functions to perform. An individual RES-2, for example, may not have any supervisory function but still is classified as middle management. Secondly, it is often said that classifications which would be in the middle management range in Ottawa would carry responsibilities more equivalent to senior middle management in the Regions. Thirdly, the functions of a middle manager in a department will differ from those of other departments according to the mandate or function of the group. The interpretation of "middle managers as the selection criteria" was left to the discretion of the departments. It was therefore impossible to control for these variables in this particular project.

Appendix B

1. <u>The Satisfaction Scale: Measurement of a Dependent Variable</u>

This dependent variable was used to test the first and third hypotheses:

the participants' general level of satisfaction with the sessions.

Purpose of the Satisfaction Scale

Satisfaction has been shown to be one of the determining factors of the

acceptance and use of a new medium. It is also used as an index for the

degree of adaptation of user over time.

Development

The Satisfaction Scale was designed by Dr. Dorothy Phillips at the Commu-

nications Research Centre for the CTS experiments. It was pretested in

a four node interactive audio/video laboratory experiment which involved

groups of four to six people. Data obtained were used to calculate re-

liability, using the split half reliability method. The correlation co-

efficient was .85 (n - 54).

Use of Questionnaire

The Satisfaction Scale was administered to both participants and educators

at the end of every educational session, with the exception of session

4 on satellite course I, when the satellite was off-air.

Analysis of Data

A total score was computed for each participant for each session of the

course by summing his/her ratings of all the items on the scale.

Ratings for each session were thereby converted into 1 score for each participant. Satisfaction Scale scores could vary between 19 (if a participant gave each item a rating of 1) and 95 (if a participant gave each item a rating of 5).

This technique was partly necessitated by the varying attendance and incomplete evaluation forms of many participants; this made it almost impossible to get comparable data from comparison groups based on each participant's total scores over all 8 sessions of a course.

Slightly incomplete data (e.g. where only 16 out of a possible 19 items had been rated by a participant on a particular occasion) were pro-rated. Grossly incomplete data (e.g. where only 3 items had been rated) were not included in the analysis. Participants who attended fewer than 3 out of 8 sessions were also omitted.

2. The Learning Session Questionnaire: A measurement of a dependent variable. The dependent variable was the evaluative rating of functions performed in the learning session such as feedback, presentation of subject matter. This tapped participants' judgement of the medium as a vehicle of instruction for the group.

Purpose

This questionnaire was developed to discern which functions performed in the learning session might be affected by the medium used.

Development

This questionnaire was designed and used in a series of laboratory

experiments on mediated learning. In its final form, the questionnaire used
in the satellite courses consisted of 10 items, which the participants rated
on a scale of 1 to 5.

Four of the items did not apply to the face-to-face learning session and
the questionnaire administered to this group therefore consisted of only
six items.

Use of the questionnaire

Participants in the face-to-face and satellite course I completed
the questionnaire only three times instead of four. As intended, satellite
course II participants completed the questionnaire four times.

Analysis of data

A total score was computed for each participant for each session of the
course by summing his/her ratings of all items on the scale. Only items
common to both satellite and face-to-face conditions were used in the analysis
of data for this study. Thus, the Learning Session Questionnaire score
represents the sum of the ratings given to the six common items on the
scale by a participant at the end of one session; scores could therefore
vary from six (if a participant gave each item a rating of 1) to 30 (if a
participant gave each item a rating of 5).

3. The Learning/Teaching Approach: A measurement of a dependent variable.
    The dependent variable was the evaluative rating of students' participatory
    behaviour, such as freedom to express ideas.

Purpose

This questionnaire was developed to determine if the behavior of the students as elicited by the learning method differed according to the medium used. In essence, this questionnaire tapped a participant's judgement of the extent to which the teaching method was successfully applied in relation to himself.

Development

Seven statements indicative of various forms of student participatory behaviour were made. These statements were chosen as being representative of the role to be assumed by the learner if the non-directive, student-centred teaching approach was practised. The responses would also verify the application of the methodology.

Use of questionnaire

This questionnaire was administered to all students and educators at every other session. Due to either technical difficulties or procedural misunderstanding, the questionnaire was completed only three times instead of four times in Satellite course I and face-to-face.

Analysis of data

The same procedure was used as with the Learning Session Scale. Each Teaching/Learning Approach score represents the sum of the ratings given to the seven items on the scale by a participant at the end of one session; scores could vary from 7 (if a participant gave each item a rating of 1) to 35 (if a participant gave each item a rating of 5).

4. <u>Attitudes towards equipment</u>: A measurement of a dependent variable. This questionnaire was the second measurement tool for the dependent variables used to test the third hypothesis. The first measurement tool was the Satisfaction Scale.

Purpose

This questionnaire was developed to determine: (a) the technical quality of the audio-video system; (b) the perceived effectiveness of the audio-video system as a means of training; (c) the role of video as a means of establishing and maintaining human relationships in an interactive educational setting.

Although each of these elements alone could have been explored in depth, it was thought preferable to gain some information about all of the elements and their inter-relationships.

Development

This questionnaire was developed and used in a series of laboratory experiments on mediated learning. During these experiments, it was modified so as to permit a better understanding of what role the video played in establishing social interaction. In its final form the questionnaire consisted of 8 items, which the participant rated on a scale of 1 to 5, and one to be checked to indicate the ideal length of time for the learning session. This last -- qualitatively as well as quantitatively different -- item was not used in the analysis of data in this part of the study.

Use of questionnaire

The questionnaire was administered in both satellite courses to both
participants and educators at the end of every second educational session.
It was intended that each student should complete the questionnaire a
total of four times, but since no satellite was available for session
4 of satellite course I, participants on this course only completed the
questionnaire three times.

Analysis of data

A total score was computed for each participant for each session of the
course by summing his/her ratings of all the items on the scale. Thus,
each Attitude to Equipment Scale score represents the sum of the ratings
given to the 8 items on the scale by a participant at the end of one
session; scores could therefore vary between 8 (if a participant gave
each item a rating of 1) and 40 (if a participant gave each item a
rating of 5). Since this part of Hypothesis 3 related to attitudes towards
the equipment only data from participants attending satellite courses
were used to test it.

5. ### Observer's Log: Measurement of a dependent variable.

    The dependent variable used to test the fourth and fifth hypotheses was
    participant interaction in the course sessions. This was measured by
    means of the log kept by observers present at every session. This was an
    objective means of evaluating the application of the teaching method and
    complemented the Learning Session and Teaching/Learning Approach scales.

    ### Purpose

    The observer's log was kept to record all interventions, that is, any
    verbal speech made by either educators or participants. It was designed

to establish (a) how the learning methodology was employed, and (b) what effect it had on the behaviour of the participants and educators. The type and length of intervention was recorded as well as the communication patterns (who talked to whom). The standardized categories in the log covered the most important elements of the teaching method, couched in terms of bits of observable behaviour that could be readily and objectively noted by the observers.

Development

Since it was difficult to foresee what would take place with a new teaching methodology and a new medium, it was decided that satellite course I would be used to develop the observation log. Time spent observing in the Ottawa location on satellite course I was used to note any verbal activities. From the preliminary data, it became evident that an observer's log needed to be developed which would include who the speaker was, to whom he was talking, the type of intervention he was making and the length of the intervention. It was also decided that the types of intervention should be classified into no more than ten categories representative of the learning approach used. (An observer's log may be found in Appendix D).

Use of Instrument

Two observers were used for each course. For the satellite courses, one observer was situated in the Ottawa classroom while the other was in one of the St. John's classrooms. All educational sessions were observed. The observers had been instructed to note the behaviour, and communications, then code and record their observations for future analysis. Their reliability is demonstrated by the following correlations

between the sets of observations of the face-to-face group:

Number of participant interventions per session: .993

Proportion of questions/interventions per session: .862

Analysis of data

The first unit of measurement was the simplest measure of participant
interaction, namely, the number of times each participant intervened
in the discussion, in whatever way, in any session he/she attended. The
second unit of measurement was the proportion of these interventions
that were in the form of questions. Although the log was refined during
the first course (satellite I), the categories of observations necessary
for testing the hypotheses in this study were sufficiently broad that
comparable data could be extracted from the Satellite I log despite the
slightly different method used to note the observations from that used
in the Satellite II and face-to-face logs.

Appendix C

Application of the Learning/Teaching Model

Description

The learning/teaching model was developed specifically to meet two distinct requirements: a) the adult learner and b) the demand characteristics of an interactive medium used for educational purposes.

Based on the literature on adult learning (eg. Knowles, Kidd, Freire, etc.), and on the literature pertaining to the uses of mediated communication systems (CSG 1972, 1973, 1974, Havron 1973, Wedemeyer 1976), the learning model developed proposes a non-directive, student-centred approach. To this effect, the model re-defines and describes the roles of the learner and of the educator. Briefly, the adult learner is called upon to assume the responsibility for his own learning:

a) by identifying his own training and development needs;

b) by determining his learning objectives and how he will achieve them; and

c) by negotiating these objectives with other learners in the group.

The educator's role, therefore, becomes that of a guide, a consultant who assists the learner as needed.

Since much of the learning process is undertaken by the individual learners, an interactive medium is essential to permit the learners to access each other as a group, sharing their experience and expertise as well as providing each other with related information.

Application

To evaluate the application of the learning model, it was decided to look
at the comparative number of interventions made by students and educators
on the Satellite II and Face-to-face courses. It was assumed that the
frequency of interventions would provide an indication as to whether the
educational sessions were student-dominated or teacher-dominated. Figures
1 and 2 show that the average number of interventions made by the participants
was greater than the average number made by educators in both satellite
and face-to-face courses. However, the total number of interventions proved
to be misleading when considered by itself since this did not allow for
the brevity or length of the interventions. When the amount of time spent
per type of verbal activity was considered (see Table 1), a different result
emerged.

Verbal activities were divided according to the form (discussion or presen-
tation); type (technical, organizational, content) and speakers (students,
educators, or resource persons). Table 1 indicates that the predominant
role for content discussion and content presentation, representing 44% of
the satellite time, was assumed by the students.

The verbal activities assumed by the educators were providing technical and
organizational information, content presentation and discussion. These
activities represent 38.5% of the total satellite time. Thus, it seems
apparent from these findings that the teaching method in fact implemented
the theoretical learning model well, and as such was student-centred and
student-directed.

This predominant role of the student seems to be even more evident in the face-to-face sessions where 56.6% of the time spent on verbal activities was used by the students in comparison to 22.2% for the teachers. These calculations exclude time spent on presentations made by resource persons and discussion in sub-groups.

Figure 3 presents the distribution of time spent on various educational activities for each satellite and face-to-face session. It is interesting to note how constant the teachers' presentation time was in the satellite course. This differs in the face-to-face course, where the teachers' presentation time diminished over sessions while student presentation increased.

As may be seen in Figure 4, the learning model seems to have been as well suited to the mediated sessions as to the face-to-face sessions. The profile of communication of satellite and face-to-face courses is very similar. The total number of interventions are slightly higher in satellite for asking for opinions, designating activities, making suggestions and technical discussion than in face-to-face. However, twice the amount of information is given and slightly more questions are asked and answered in the face-to-face as compared with the satellite course. This phenomenon is consistent with earlier findings reported in the review of literature.

It seems that one can conclude that the interactive medium was used effectively since the major proportion of time was spent on discussions, whether

by students (35.7%) or by educators (21.8%) for a total 57.5%. Presentations were kept to a minimum: only 12.1% of the time was devoted to it.

Little time was spent on technical discussion, which allowed equal time to be spent on the content in both conditions. It could be argued, however, that presentations made by resource persons could have been video-taped and viewed prior to the educational session. This procedure would have permitted more discussion time amoung participants.

FIGURE I

FACE-TO-FACE TOTAL INTERVENTIONS VERSUS PARTICIPANTS' INTERVENTIONS

NUMBER OF
INTERVENTIONS

500
480
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0

MAY 25   MAY 30   JUNE 1   JUNE 6   JUNE 8   JUNE 13   JUNE 15   JUNE 20

	MAY 25	MAY 30	JUNE 1	JUNE 6	JUNE 8	JUNE 13	JUNE 15	JUNE 20
participants	18	15	14	15	14	13	14	12
educators	3	2	4	3	2	2	3	3

No. of:
participants
educators

TOTAL
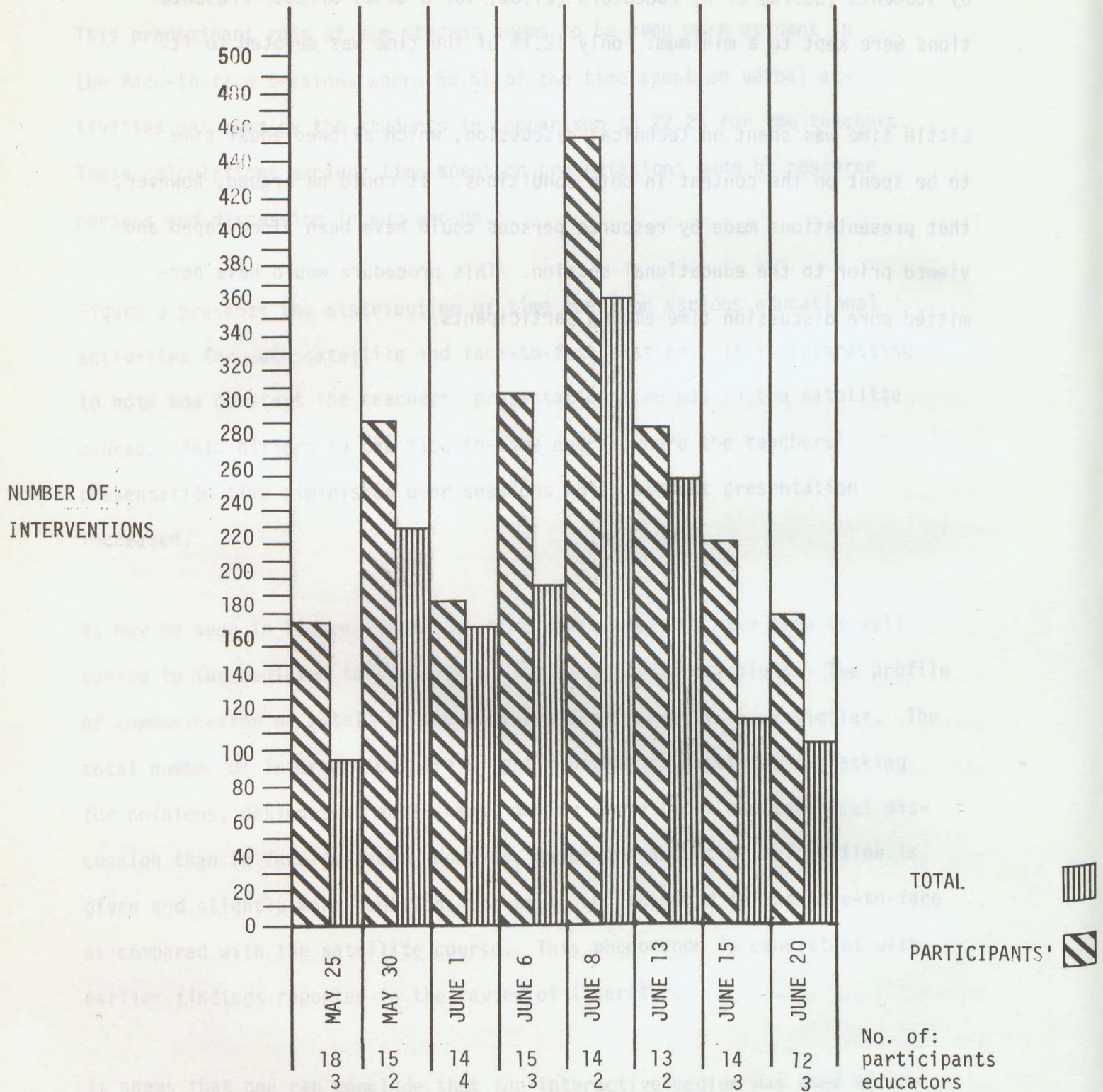
PARTICIPANTS'

FIGURE 2

SATELLITE COURSE II - TOTAL INTERVENTIONS VERSUS PARTICIPANT INTERVENTIONS

NUMBER OF
INTERVENTIONS

| | 300 280 260 240 220 200 180 160 140 120 100 80 60 40 20 0 |

| MAY 24 | MAY 26 | MAY 31 | JUNE 2 | JUNE 7 | JUNE 9 | JUNE 14 | JUNE 16 |

TOTAL

PARTICIPANTS'

No. of:							
participants	19	14	17	13	11	10	12	12
educators	4	2	2	2	1	3	3	3
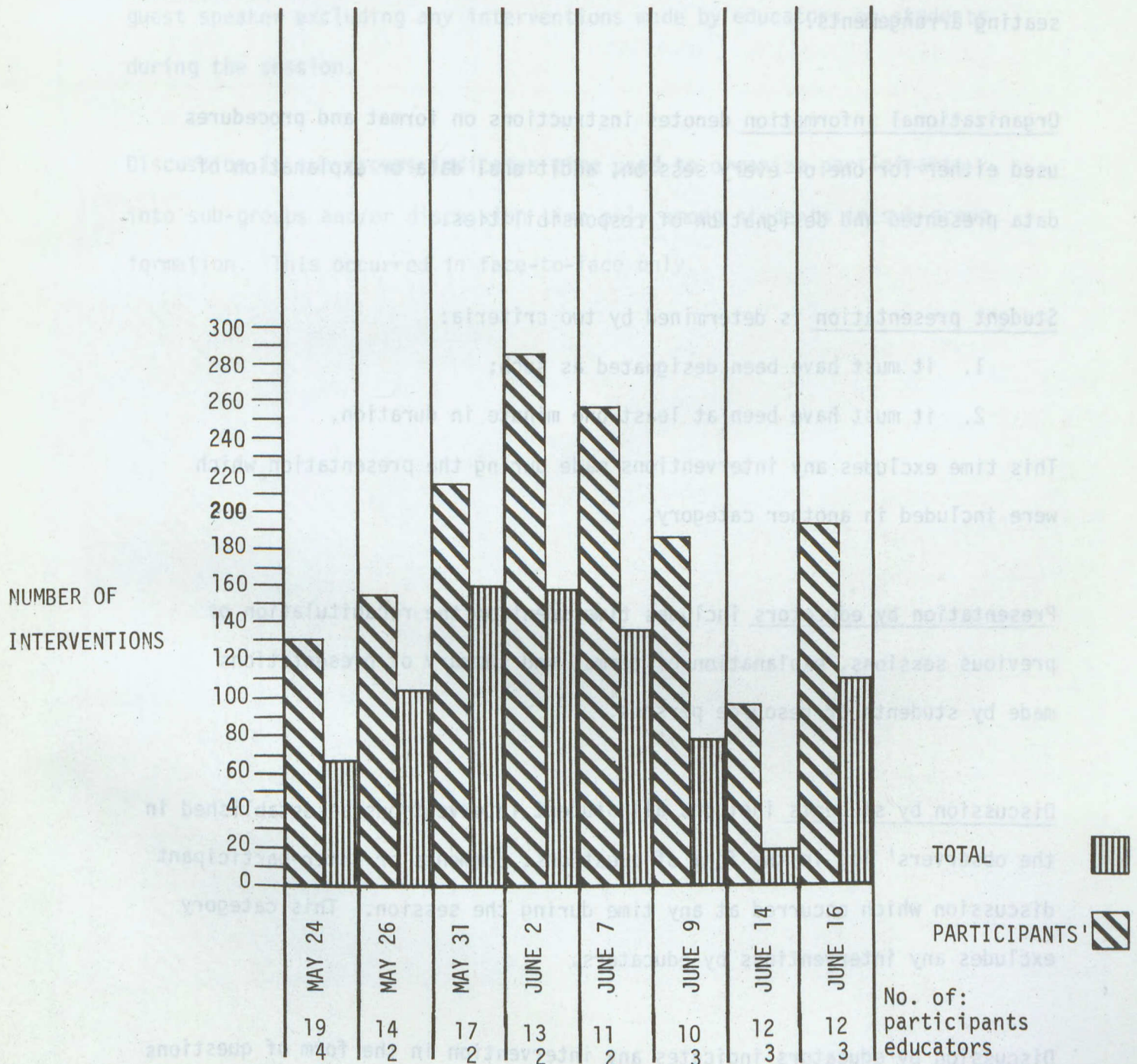
Explanation of Categories

Technical discussion indicates equipment adjustments (lights, camera focus, location of flip chart,etc.), equipment failures (audio or video), and seating arrangements.

Organizational information denotes instructions on format and procedures used either for one or every session, additional data or explanation of data presented and designation of responsibilities.

Student presentation is determined by two criteria:

1. it must have been designated as such;

2. it must have been at least one minute in duration.

This time excludes any interventions made during the presentation which were included in another category.

Presentation by educators includes time spent on the recapitulation of previous sessions, explanation of terms, and summary of presentations made by students or resource persons.

Discussion by students includes all student interventions as established in the observers' log in the form of questions, comments or inter-participant discussion which occurred at any time during the session. This category excludes any interventions by educators.

Discussion by educators indicates any intervention in the form of questions or comments less than one minute in duration offered by educators or resource

persons to facilitate duscussion. Interventions of students are not considered here.

Presentation by resource person is the duration of a presentation by a guest speaker excluding any interventions made by educators or students during the session.

Discussion in sub-groups indicates time used to organize participants into sub-groups and/or discussion time only among students in sub-group formation. This occurred in face-to-face only.

TABLE 1

TOTAL PERCENTAGE OF TIME ALLOCATED PER TYPE OF VERBAL ACTIVITY

ACTIVITY	SATELLITE	FACE-TO-FACE
TECHNICAL DISCUSSION (EDUCATOR)	3.1	0.1
ORGANIZATIONAL INFORMATION (EDUCATOR)	7.8	8.9
CONTENT PRESENTATION (STUDENTS)	8.3	14.6
CONTENT PRESENTATION (EDUCATORS)	3.8	2.0
CONTENT DISCUSSION (STUDENTS)	35.7	42.0
CONTENT DISCUSSION (EDUCATORS)	21.8	11.3
PRESENTATION BY RESOURCE PERSON; DISCUSSION IN SUB-GROUPS ONLY	19.5	21.1
TOTAL	100%	100%
ALLOTTED TIME	*112 minutes	120 minutes

* Slightly less time was available for the satellite sessions because
a few minutes were always needed at the beginning and end of air time
for satellite interface with adjoining users.

FIGURE 3

DISTRIBUTION OF VERBAL ACTIVITIES PER SESSION: SATELLITE COURSE II VS. FACE-TO-FACE

KEY

TECHNICAL DISCUSSION
(educators)

ORGANIZATIONAL INFORMATION
(educators)

CONTENT PRESENTATION
(students)

CONTENT PRESENTATION
(educators)

CONTENT DISCUSSION
(students)

CONTENT DISCUSSION
(educators)

RESOURCE PRESENTATION;
SUB-GROUP DISCUSSION

ONE GRADATION EQUALS 5 MINUTES.
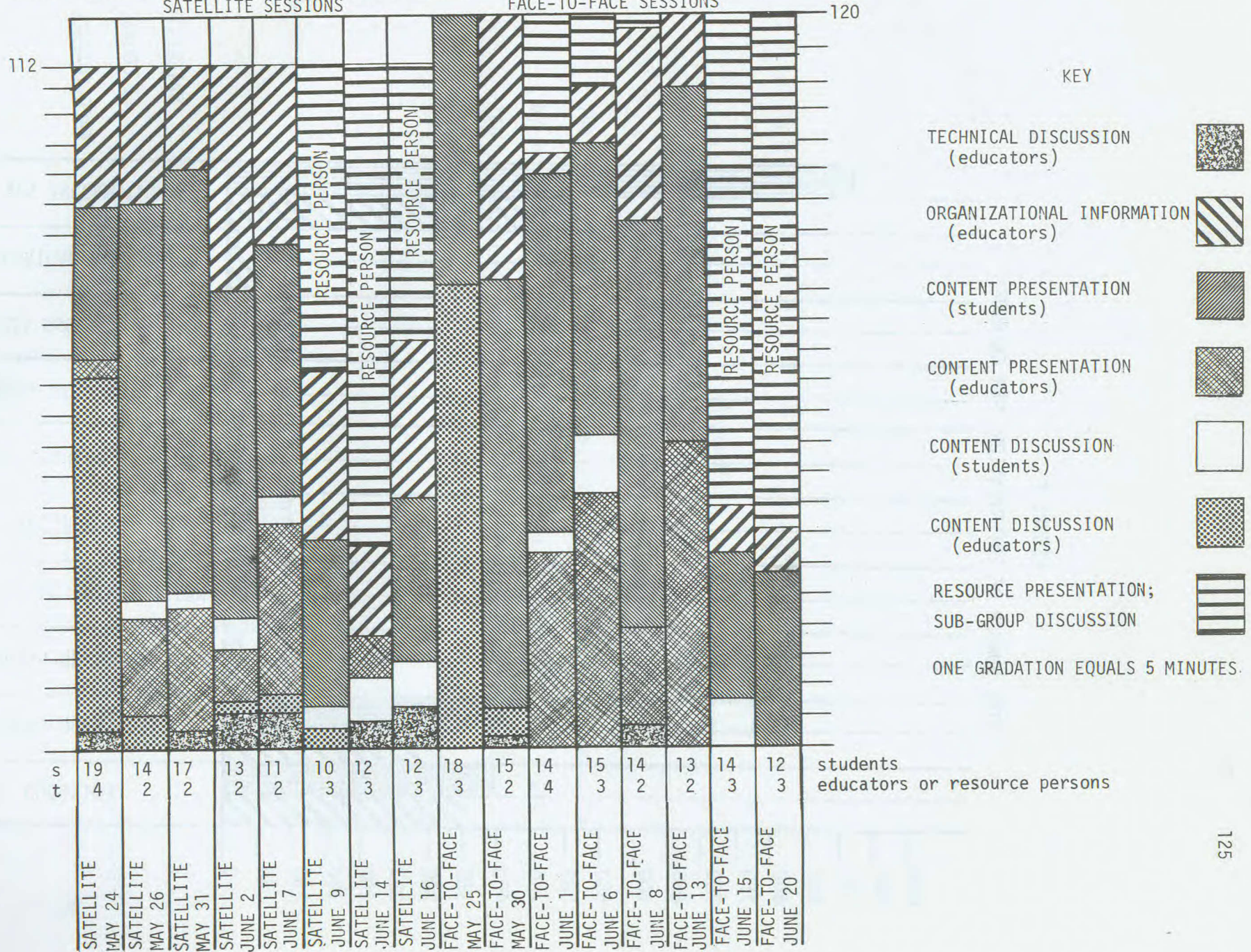
NUMBER OF INTERVENTIONS FOR ALL EIGHT SESSIONS

FIGURE 4

TOTAL NUMBER OF INTERVENTIONS PER CATEGORY

ASKS QUESTION
ANSWERS QUESTION
RETURNS QUESTION
RESTATES INTERVENTION
DEFINES TERMS
ASKS OPINION
IMPOSE ACTIVITY
MAKES SUGGESTION
TECHNICAL DISCUSSION
GIVES INFORMATION

FACE-TO-FACE
SATELLITE II COURSE

126
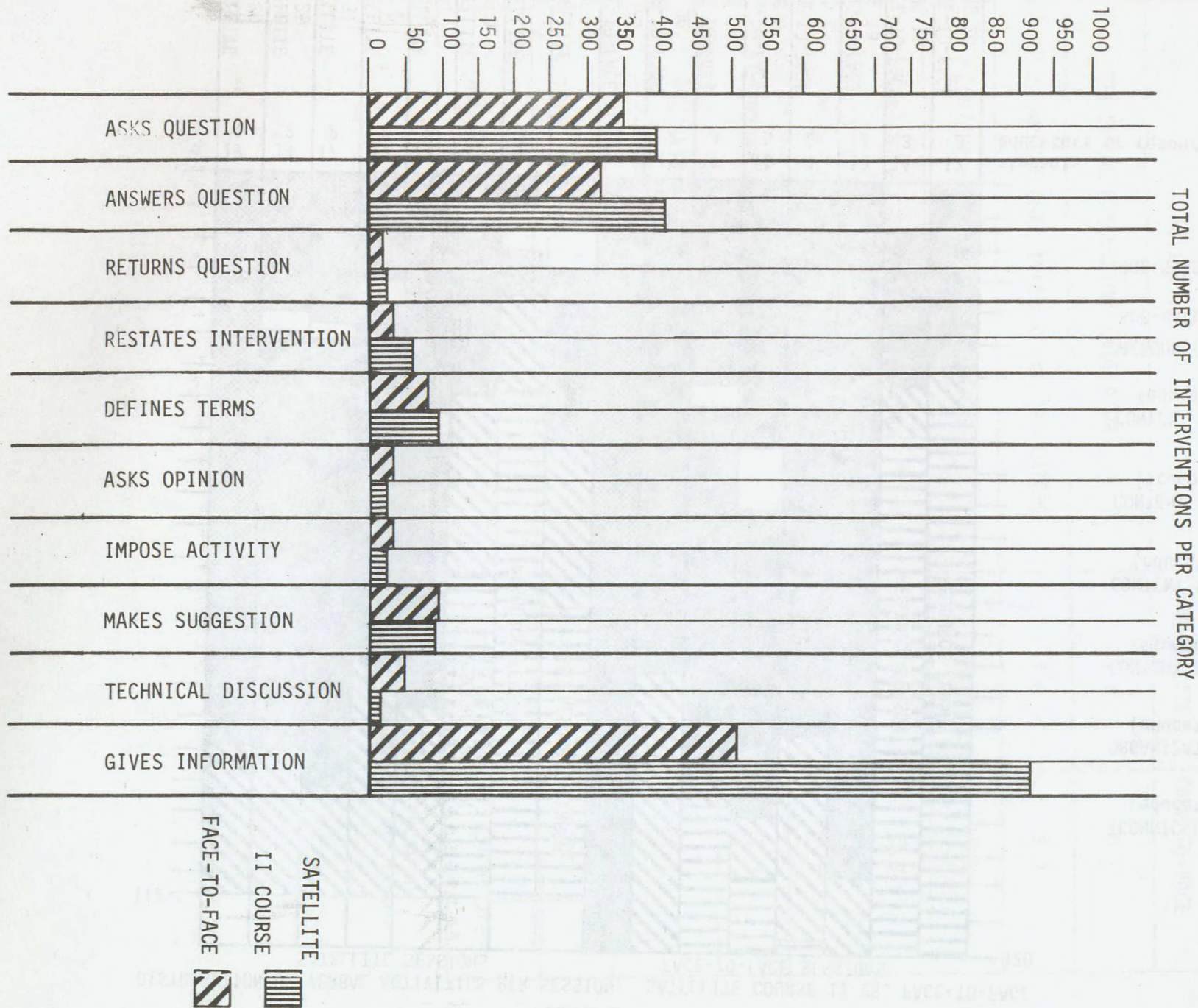
Appendix D

QUESTIONNAIRES

The first set of questionnaires, pages 128 to 139, were completed by participants on the satellite courses. The second set, pages 140 to 145, were completed by participants on the face-to-face course.

Public Service Commission de la
Commission Fonction publique

Staff Direction
Development générale
Branch du perfectionnement

Name _____

Sub-group __A_____

Room number _115_____

Date _____

Dear participant,

In the following pages you will find:

- a questionnaire. This questionnaire should be filled out
  individually immediately after each Thursday session.
  Please complete every question without pausing more than
  a few seconds on each one. This data will be kept in the
  strictest confidence.

Your answers to these questions will allow us to gain very useful
information on the educational content, your involvement in the
learning process, and the extent to which these, and the educational
technology used, met your expectations.

Please respond to the questions in terms of this particular session.
Indicate your response by checking one of the five lines under each
question according to whether you agree more with the qualifier on
the left or the qualifier on the right.

- Ex: the use of an audio-video system:
  increased the likelihood of my completing these sessions

  (not at all) __ __ X __ __ (a great deal)

This response would mean that you considered the likelihood of your
completing these sessions had been somewhat, but not a great deal,
increased by the use of the audio-video system.

Nicole Mendenhall
Jerzy Jarmasz
René Lortie

Definition of terms:

---

total group - is defined as all five sub-groups.

resource person - any participant who contributes his
expertise and experience.

educator - a person who assumes the responsibility of
providing training and development **to**
the learner.

learning session - time spent with educator and total
group.

"air time" - the total length of time an individual
speaks.

In this session, the use of an <u>audio-video</u> learning system:

1. satisfied the individual learning requirements of the participants

(not at all) _____   _____   _____   _____   _____ (a great deal)

2. permitted the presentation of the subject matter

(not at all) _____   _____   _____   _____   _____ (a great deal)

3. provided a means for participants to act as resource persons

(not at all) _____   _____   _____   _____   _____ (a great deal)

4. increased the influence of an individual

(not at all) _____   _____   _____   _____   _____ (a great deal)

5. reduced the importance of the educator in the learning process

(not at all) _____   _____   _____   _____   _____ (a great deal)

6. permitted conversation in one's own group

(not at all) _____   _____   _____   _____   _____ (a great deal)

7. required a set of procedures necessary for interaction

(not at all) _____   _____   _____   _____   _____ (a great deal)

8. permitted an immediate feedback as to the comprehension of the content
    material

(not at all) _____   _____   _____   _____   _____ (a great deal)

9. favoured the group where the educator is present

(not at all) _____   _____   _____   _____   _____ (a great deal)

10. offered each member of the total group equal opportunity to interact with
    any other member

(not at all) _____   _____   _____   _____   _____ (a great deal)

In terms of this session, please rate the following statements.

1. I participated in the development of this learning session.

(not at all) _____   _____   _____   _____   _____ (a great deal)

2. To what extent were the objectives of this session achieved?

(not at all) _____   _____   _____   _____   _____ (completely)

3. The decision-making process was

(unsuccessful) _____   _____   _____   _____   _____ (successful)

4. I felt free to express my ideas and opinions.

(not at all) _____   _____   _____   _____   _____ (fully)

5. The distribution of "air time" between participants was

(unsatisfactory) _____   _____   _____   _____   _____ (satisfactory)

6. I felt that my capabilities as a participant were utilized.

(ineffectively) _____   _____   _____   _____   _____ (effectively)

7. I felt we were managing our time in a manner which was

(unsatisfactory) _____   _____   _____   _____   _____ (satisfactory)

8. Was it clear to you what the objectives of this session were?

(not at all) _____   _____   _____   _____   _____ (completely)

9. I felt that I identified more with

(my sub-group) _____   _____   _____   _____   _____ (the total group)

10. I felt I was under pressure to perform.

(not at all) _____   _____   _____   _____   _____ (a great deal)

11. I felt that conversation was

(easy) _____   _____   _____   _____   _____ (difficult)

12. To what extent did you meet your personal goals during this session?

(not at all) _____   _____   _____   _____   _____ (completely)

ATTITUDES TOWARDS EQUIPMENT

In terms of this session, please rate the following statements.

1. The use of headphones is recommended for future sessions.

(not at all) _____ _____ _____ _____ _____ (a great deal)

2. The use of technology was successful for this learning session.

(not at all) _____ _____ _____ _____ _____ (a great deal)

3. The video enhanced the interaction between the groups.

(not at all) _____ _____ _____ _____ _____ (a great deal)

4. The quality of the sound was sufficient to permit identification of the person speaking.

(not at all) _____ _____ _____ _____ _____ (a great deal)

5. The ideal length of time "on air" for a learning session such as this would be

     1hr   1½hrs   2hrs   2½hrs   3hrs

6. The video distracted me from the ongoing conversation.

(not at all) _____ _____ _____ _____ _____ (a great deal)

7. The audio-video system has a unifying effect on the total group.

(not at all) _____ _____ _____ _____ _____ (a great deal)

8. I felt I really got to know the people in the other groups.

(not at all) _____ _____ _____ _____ _____ (a great deal)

9. The audio-video system demands extra concentration in the sense that it requires careful thought, etc. in learning.

(not at all) _____ _____ _____ _____ _____ (a great deal)

*LEARNING INTERACTION SCALE

In terms of this session, please answer the following questions:

1. How many of the participants in your sub-group talked with members other sub-groups during this session?

   none _____; one or two _____; three _____; four _____; five _____;

2. Did you talk as much as you usually do?

   less than
   usual   _____ _____ _____ _____ _____   more than
                                                           usual

3. Did you talk as much as others did?

   less than   _____ _____ _____ _____ _____   more than

4. Rate your appreciation of each sub-group. Start with your own group.

   A _____ _____ _____ _____ _____

   B _____ _____ _____ _____ _____

   C _____ _____ _____ _____ _____

   disliked D _____ _____ _____ _____ _____   liked

   E _____ _____ _____ _____ _____

5. Rate the participation of each sub-group in terms of the quality and quantity of their contributions. Again start with your own group.

   A _____ _____ _____ _____ _____

   B _____ _____ _____ _____ _____

   C _____ _____ _____ _____ _____

   low level D _____ _____ _____ _____ _____   high level
   of contribution   of contribution

   E _____ _____ _____ _____ _____

* Not used in these studies

6. How much did each sub-group encourage the <u>participation</u> of other groups? Again start with your own group.

A   _____   _____   _____   _____   _____

B   _____   _____   _____   _____   _____

not at   C   _____   _____   _____   _____   _____   very

all   much

D   _____   _____   _____   _____   _____

E   _____   _____   _____   _____   _____

7. How much did each sub-group keep conversation oriented towards the total group's goals? Again start with your own group.

A   _____   _____   _____   _____   _____

B   _____   _____   _____   _____   _____

not at   very

all   C   _____   _____   _____   _____   _____   much

D   _____   _____   _____   _____   _____

E   _____   _____   _____   _____   _____

8. Rate the participation of each of the sub-groups in terms of their <u>influence</u> in the total group's learning process. Again start with your own group.

A   _____   _____   _____   _____   _____

B   _____   _____   _____   _____   _____

less   more

influential C   _____   _____   _____   _____   _____   influential

D   _____   _____   _____   _____   _____

E   _____   _____   _____   _____   _____

SATISFACTION SCALE

In the following items, please mark each scale once.

Please indicate how you would describe the relationship between your own sub-group and the other sub-groups during this session.

1.	EQUAL	_____	_____	_____	_____	_____	UNEQUAL
2.	COMPETITIVE	_____	_____	_____	_____	_____	COOPERATIVE
3.	FRIENDLY	_____	_____	_____	_____	_____	UNFRIENDLY

Please indicate your feelings about today's session.

4.	LONG	_____	_____	_____	_____	_____	SHORT
5.	DISORGANIZED	_____	_____	_____	_____	_____	ORGANIZED
6.	RELAXED	_____	_____	_____	_____	_____	TENSE
7.	DISSATISFYING	_____	_____	_____	_____	_____	SATISFYING
8.	EMOTIONAL	_____	_____	_____	_____	_____	CONTROLLED
9.	DRAGGING	_____	_____	_____	_____	_____	LIVELY
10.	STATIC	_____	_____	_____	_____	_____	DYNAMIC
11.	GOOD	_____	_____	_____	_____	_____	BAD
12.	USELESS	_____	_____	_____	_____	_____	USEFUL
13.	VARIED	_____	_____	_____	_____	_____	REPETITIVE
14.	PRODUCTIVE	_____	_____	_____	_____	_____	COUNTERPRODUCTIVE
15.	AIMLESS	_____	_____	_____	_____	_____	DIRECTED

Comments:

Do you have any comments to make concerning any aspect of this learning session?

NAME _____

DATE _____

ROLES QUESTIONNAIRE
THE ROLE OF THE EDUCATOR
AND
THE ROLE OF THE LEARNER

This is a two-part questionnaire. The aim of the questionnaire is for you to identify:

       1)   the role you want the educator to play in the learning session.

       2)   the role you as a learner want to play in the learning session.

A 5-point scale has been provided for you to determine the __extent__ to which:

       1)   you want the educator to play the role you have selected for him.

       2)   you as a learner want to play the role you have selected for yourself.

Example:

It is the role of the educator to design content material for the participants.

(not at all)   ___ ___ ___ _X_ ___ (very much)

The questionnaires will be held in the strictest confidence.
We thank you in advance for your co-operation in answering them.

Nicole Mendenhall   Angie Todesco
René Lortie   Jerzy Jarmasz

A. THE ROLE OF THE EDUCATOR

It is the role of the educator to:

1. Set educational objectives for the group.

    (not at all) _____ _____ _____ _____ _____ (very much)

2. Encourage critical and creative thinking.

    (not at all) _____ _____ _____ _____ _____ (very much)

3. Respond to the learning needs of the participants.

    (not at all) _____ _____ _____ _____ _____ (very much)

4. Determine the course content for the group.

    (not at all) _____ _____ _____ _____ _____ (very much)

5. Co-ordinate the group's efforts towards the group's goal.

    (not at all) _____ _____ _____ _____ _____ (very much)

6. Plan the educational activities for the group.

    (not at all) _____ _____ _____ _____ _____ (very much)

7. Assign tasks to the group.

    (not at all) _____ _____ _____ _____ _____ (very much)

8. Facilitate the participation of all the members of the group.

    (not at all) _____ _____ _____ _____ _____ (very much)

9. Promote co-operative interpersonal relations.

    (not at all) _____ _____ _____ _____ _____ (very much)

10. Evaluate each participant's learning.

    (not at all) _____ _____ _____ _____ _____ (very much)

11. Determine a set of procedures for the learners' participation.

    (not at all) _____ _____ _____ _____ _____ (very much)

12. Participate in the discussion as a member of the group.

    (not at all) _____ _____ _____ _____ _____ (very much)

B. THE ROLE OF THE LEARNER

It is the role of the learner to:

1. Entrust the responsibility for his learning to the educator.

    (not at all) ____ ____ ____ ____ ____ (very much)

2. Determine his own learning needs.

    (not at all) ____ ____ ____ ____ ____ (very much)

3. Act as an educator towards the group from time to time.

    (not at all) ____ ____ ____ ____ ____ (very much)

4. Expect the educator to provide the participants with a structured plan and content for the session.

    (not at all) ____ ____ ____ ____ ____ (very much)

5. Negotiate his learning objectives with the educator.

    (not at all) ____ ____ ____ ____ ____ (very much)

6. Evaluate his own learning.

    (not at all) ____ ____ ____ ____ ____ (very much)

7. Accept the competency and the authority of the educator.

    (not at all) ____ ____ ____ ____ ____ (very much)

8. Rely on the educator to provide him with solutions to his learning problems.

    (not at all) ____ ____ ____ ____ ____ (very much)

9. Respond to the expectations of the educator.

    (not at all) ____ ____ ____ ____ ____ (very much)

10. Work towards creating an atmosphere conducive to learning.

    (not at all) ____ ____ ____ ____ ____ (very much)

Public Service Commission **Commission de la Fonction publique**

Staff Development Branch

Direction générale du perfectionnement

Name _____

Date _____

Dear participant,

In the following pages you will find:

- a questionnaire. This questionnaire should be filled out
  individually immediately after each Wednesday session.
  Please complete every question without pausing more than
  a few seconds on each one. This data will be kept in the
  strictest confidence.

Your answers to these questions will allow us to gain very useful
information on the educational content, your involvement in the
learning process, and the extent to which these met your expectations.

Please respond to the questions in terms of this particular session.
Indicate your response by checking one of the five lines under each
question according to whether you agree more with the qualifier on
the left or the qualifier on the right.

- Ex: the use of a resource person:
  contributed to my understanding of the content

  (not at all) __ __ X __ __ (a great deal)

This response would mean that you considered your understanding of
the content had been somewhat, but not a great deal, increased by
the use of a resource person.

Nicole Mendenhall
Jerzy Jarmasz
René Lortie

Definition of terms:

total group - is defined as all five sub-groups.

resource person - any participant who contributes his
expertise and experience.

educator - a person who assumes the responsibility of
providing training and development to
the learner.

learning session - time spent with educator and total
group.

"air time" - the total length of time an individual
speaks.

THE LEARNING SESSION

1. satisfied the individual learning requirements of the participants

(not at all) _____   _____   _____   _____   _____   (a great deal)

2. permitted the presentation of the subject matter

(not at all) _____   _____   _____   _____   _____   (a great deal)

3. provided a means for participants to act as resource persons

(not at all) _____   _____   _____   _____   _____   (a great deal)

4. required a set of procedures necessary for interaction

(not at all) _____   _____   _____   _____   _____   (a great deal)

5. permitted an immediate feedback as to the comprehension of the content material

(not at all) _____   _____   _____   _____   _____   (a great deal)

6. offered each member of the total group equal opportunity to interact with any other member

(not at all) _____   _____   _____   _____   _____   (a great deal)

TEACHING AND LEARNING APPROACH

In terms of this session, please rate the following statements.

1. I participated in the development of this learning session.
(not at all) ____ ____ ____ ____ ____ (a great deal)

2. To what extent were the objectives of this session achieved?
(not at all) ____ ____ ____ ____ ____ (completely)

3. The decision-making process was
(unsuccessful) ____ ____ ____ ____ ____ (successful)

4. I felt free to express my ideas and opinions.
(not at all) ____ ____ ____ ____ ____ (fully)

5. The distribution of "air time" between participants was
(unsatisfactory) ____ ____ ____ ____ ____ (satisfactory)

6. I felt that my capabilities as a participant were utilized.
(ineffectively) ____ ____ ____ ____ ____ (effectively)

7. I felt we were managing our time in a manner which was
(unsatisfactory) ____ ____ ____ ____ ____ (satisfactory)

8. Was it clear to you what the objectives of this session were?
(not at all) ____ ____ ____ ____ ____ (completely)

9. I felt I was under pressure to perform.
(not at all) ____ ____ ____ ____ ____ (a great deal)

10. I felt that conversation was
(easy) ____ ____ ____ ____ ____ (difficult)

11. To what extent did you meet your personal goals during this session?
(not at all) ____ ____ ____ ____ ____ (completely)

12. The ideal length of time for a learning session such as this one
would be (circle one)

1 hr.   1½ hrs.   2 hrs.   2½ hrs.   3 hrs.

SATISFACTION SCALE

Please indicate how you would describe the <u>relationship between your own sub-group and the other sub-groups</u> during this session. If inapplicable, check <u>NA</u>.

1.	EQUAL	____ ____ ____ ____ ____				UNEQUAL
2.	COMPETITIVE	____ ____ ____ ____ ____				COOPERATIVE
3.	FRIENDLY	____ ____ ____ ____ ____				UNFRIENDLY

In the following items, please mark each scale <u>once</u>.

Please indicate <u>your feelings about today's session</u>.

4.	LONG	____ ____ ____ ____ ____				SHORT
5.	DISORGANIZED	____ ____ ____ ____ ____				ORGANIZED
6.	RELAXED	____ ____ ____ ____ ____				TENSE
7.	DISSATISFYING	____ ____ ____ ____ ____				SATISFYING
8.	EMOTIONAL	____ ____ ____ ____ ____				CONTROLLED
9.	DRAGGING	____ ____ ____ ____ ____				LIVELY
10.	STATIC	____ ____ ____ ____ ____				DYNAMIC
11.	GOOD	____ ____ ____ ____ ____				BAD
12.	USELESS	____ ____ ____ ____ ____				USEFUL
13.	VARIED	____ ____ ____ ____ ____				REPETITIVE
14.	PRODUCTIVE	____ ____ ____ ____ ____				COUNTERPRODUCTIVE
15.	AIMLESS	____ ____ ____ ____ ____				DIRECTED

Comments:

Do you have any comments to make concerning any aspect of this learning session?

L'ANALYSE COÛT/EFFICACITÉ

DE L'EXPERIENCE SATELLITE

Jerzy Wladyslaw Jarmasz
Service d'évaluation
Ottawa, juillet 1977

COST-EFFECTIVENESS ANALYSIS OF
THE SATELLITE EXPERIMENT

Abstract

This analysis provides information on the cost-effectiveness of two learning methods utilized in the same circumstances, learning mediated by the satellite, Hermes, and learning in the face-to-face context. The analysis restricts itself to intra-project figures as the space and ground segment costs of the project are inflated and unreliable due to the experimental nature of the satellite. Using a method developed by Gallop (1964) the author demonstrates that the satellite mediated learning is more cost-effective than face-to-face learning in the framework of the project. The conclusion recommends further involvement in such tele-education systems.

1.0   LES BUTS

Afin d'établir la rentabilité d'une méthode pédagogique, il convient
d'identifier les coûts de la méthode et les avantages résultant de
l'application de cette méthode. Tandis que la détermination des
divers éléments constituant les coûts est un processus relativement
indépendant des influences externes (comme par exemple, l'amortissement
de la construction d'un immeuble), l'aspect avantages est sujet à une
série d'influences très souvent non-quantifiables (p.ex.: prestige de
l'institution). Il en résulte que la rentabilité, étudiée en termes
des coûts et avantages, reflète plus les valeurs de l'organisation que
les coûts réels de l'expérience.

Dans l'analyse des coûts en fonction de l'efficacité d'une méthode,
il ne s'agit plus d'assigner des valeurs sociales aux avantages obtenus,
mais de comparer simultanément les coûts et les résultats de l'utili-
sation des deux méthodes. Ainsi, toutes les données sont réelles,
c'est-à-dire quantifiables en fonction de critères objectifs. Cette
analyse coût/performance ou coût/efficacité donne des renseignements
utiles quant à l'application d'une méthode en comparaison avec une
autre méthode dans les mêmes circonstances.

Le projet satellite se prête facilement à l'analyse coût/efficacité,
comme tous les éléments, et du côté coût et du côté efficacité, sont
connus et facilement disponibles. La comparaison s'est faite entre
les cours donnés par satellite et le cours donné sans l'intervention
du satellite. En effet, le satellite fut le seul traitement différent.

Les groupes, sous tous les autres angles, étaient comparables dans leurs
caractéristiques.

Ainsi on a pu obtenir un indice relatif d'efficacité de l'enseignement
par satellite en comparaison avec un cours identique donné dans le
cadre traditionnel des cours de la Commission de la fonction publique.

2.0   LES DONNEES DE L'ANALYSE

Les données de cette analyse proviennent de sources variées. Les

budgets du projet furent les plus utiles dans cet exercice. Les

équations servant à calculer la rentabilité de l'expérience sont

prises chez Gallup (1974). Dans ce modèle on obtient d'abord l'effi-

cacité absolue (e) d'une alternative, ensuite l'efficacité du cours (E),

et enfin l'efficacité relative de l'alternative étudiée en comparaison

avec le groupe contrôle.

Les données brutes des équations proviennent des totaux non-ajustés

des données initiales. Ainsi

$$e_1 = \frac{A_1 \times S_1}{T_1 \times C_1}$$

où e_1 - l'efficacité absolue de l'alternative Satellite,

        A_1 = la somme des notes obtenues par tous les participants
             Satellite,

        T_1 = le temps que les participants ont consacré au cours,

        S_1 - le nombre des participants qui ont terminé le cours,

        C_1 - le coût total du cours.

Le coût total du cours, en détail, se chiffre comme suit:

     1.1.1 Salaires de l'équipe satellite (août '75 - juin '77) 100 643

     1.1.2 Salaires des directeurs de cours   32 914

     1.1.3 Salaires de l'équipe de soutien   102 199

1.2.1 Coût des salles de classe	960
1.2.2 Coût des fournitures, photocopies, etc.	2 457
1.2.3 Coût de l'équipement électronique	25 527
1.2.4 Locations	22 440
1.2.5 Voyages	8 829
1.2.6 Sous-contrat	9 712
Coût total du cours	305 681

Pour la composante face-à-face (le groupe contrôle) on utilisa la même équation.

Le chiffre des coûts est comme suit:

2.1.1 Salaires de l'équipe satellite	100 643
2.1.2 Salaires des directeurs de cours	32 914
2.2.1 Coût des fournitures	1 229
Coût total du cours	134 786

Pour ce qu'il y est de l'efficacité absolue des alternatives respectives, nous resterons avec la notation e_1 pour le cours par satellite et e_2 pour le cours face-à-face.

$A_1 = 263$	$A_2 = 94$
$S_1 = 27$	$S_2 = 9$
$T_1 = 750$	$T_2 = 238$
$C_1 = 305\ 681$	$C_2 = 134\ 786$
$e_1 = 0,000031$	$e_2 = 0,000026$

L'efficacité du cours se calcule selon la formule

$$E = e_1 + e_2 \div 0,000057$$

Et l'efficacité relative du cours s'obtient dans l'équation

$$\frac{e_1}{E} \times 100$$

C'est seulement à l'aide de cette dernière équation que nous pouvons comparer l'efficacité du cours donné par satellite en relation avec l'efficacité du cours face-à-face. En d'autres termes, nous pouvons juger de la rentabilité du cours. Ainsi:

L'efficacité relative du cours par satellite $= \dfrac{0,000031 \times 100}{0,000057} = 54,38$

L'efficacité relative du cours face-à-face $= \dfrac{0,000026 \times 100}{0,000057} = 45,61$

3.   DISCUSSION ET CONCLUSIONS

Comme il appert de la présentation des calculs,le cours donné par
satellite fournit une équation plus rentable. Dans l'expérience
entreprise,l'utilisation du satellite dans l'enseignement des fonc-
tionnaires a produit un gain net. Si l'on ajoute aux considérations
les résultats de l'évaluation de l'expérience (Jarmasz, 1977, b)
il semblerait que cette tentative s'est avérée très avantageuse.

Les chiffres obtenus dans cette étude resteraient insignifiants si
on ne les examinait pas dans le contexte du mandat et du rôle de la
Commission de la fonction publique. L'utilisation du satellite dans
un cycle budgétaire de cinq ans ferait accroître la rentabilité des
cours offerts.

Le satellite permet une souplesse administrative inouie jusqu'ici.
Il rend réel le cycle travail-formation sans bousculer le train
naturel du rythme de travail d'un fonctionnaire. Il minimise,
voire annule les frais de déplacement pour tout candidat à l'ex-
térieur des grands centres. Il rend plus accessibles les personnes-
ressources et par ce fait même distribue plus équitablement leurs
honoraires.

Le lancement prochain d'un autre satellite de télécommunication exige
une attitude de préparation de la part des formateurs de la fonction
publique. C'est le temps de mettre au point les techniques appropriées

d'enseignement, de réaliser un programme de cours spécialement aptes
à la formation médiatisée.

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Date Due

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