PDWAA886

UNIVERSITY OF THE WEST INDIES SATELLITE DEMONSTRATION EVALUATION REPORT

by

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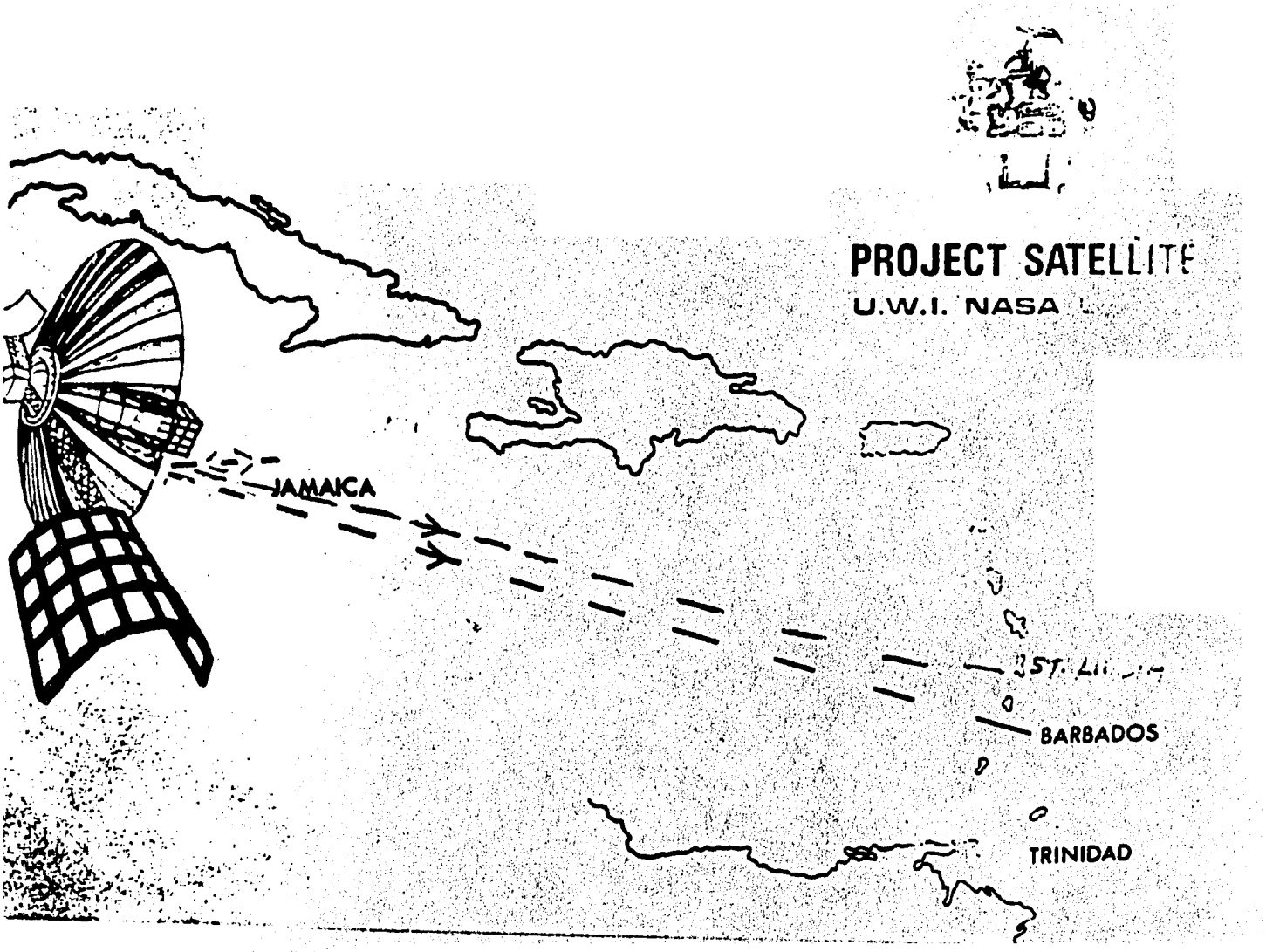
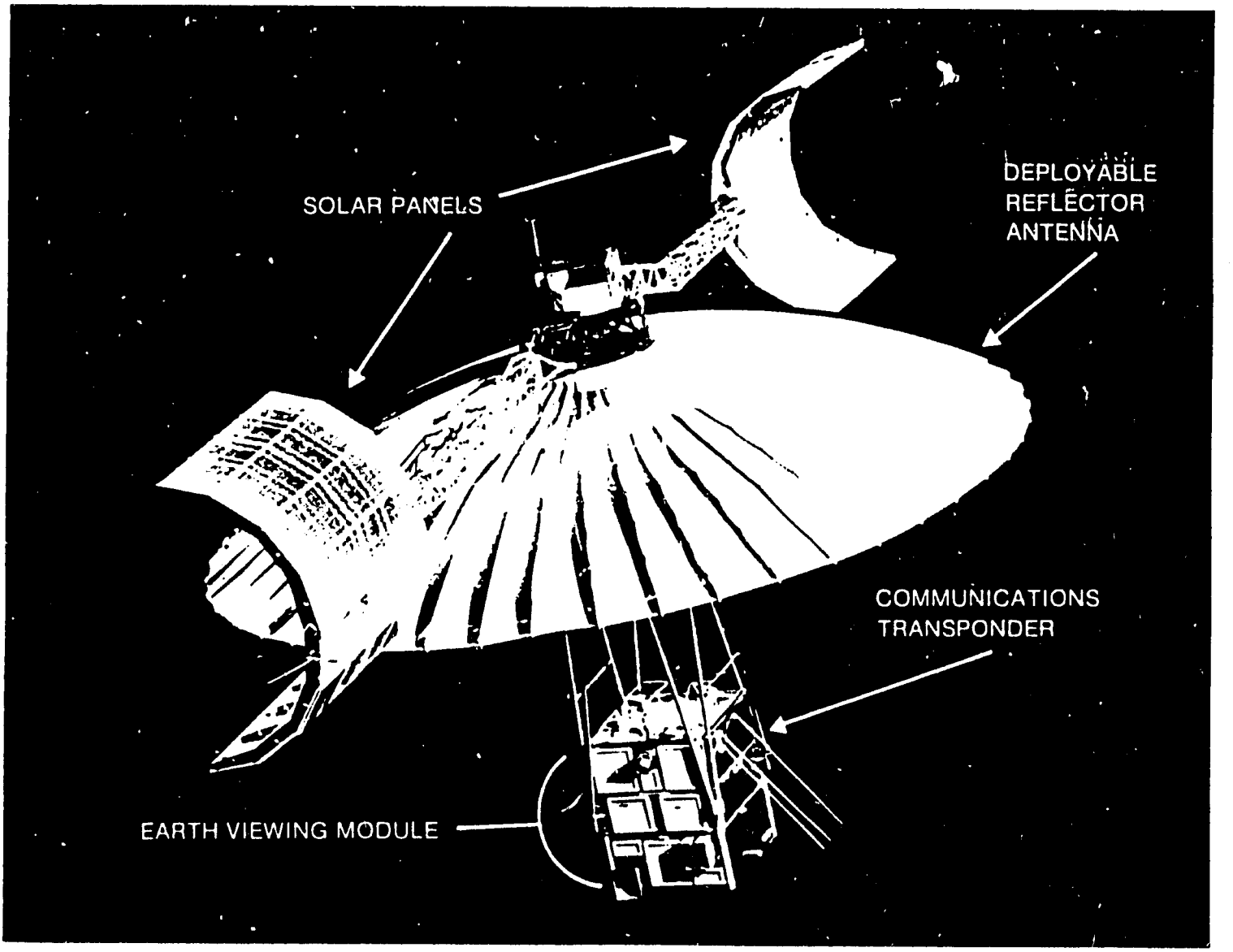


Photo 1.

ATS-6 satellite serving Jamaica, Barbados and St. Lucia.
ATS-3 audio only satellite which also delivered service to the three islands, is not in picture.



THE ATS-6 SPACECRAFT

The ATS-6 spacecraft is the most complex and powerful communications system developed in the 15-year history of communications satellites. Its high-powered receiver/transmitter system, coupled with a large parabolic reflector antenna, relayed high quality color television, audio, and digital signals simultaneously to a large number of small inexpensive earth stations.

The spacecraft weighs 3,090 pounds, is 26 feet high, and with solar array booms extended measures 52 feet from solar panel to solar panel. More than 21,000 solar cells capture energy from the sun to power the satellite's command, propulsion, attitude control, and telemetry.

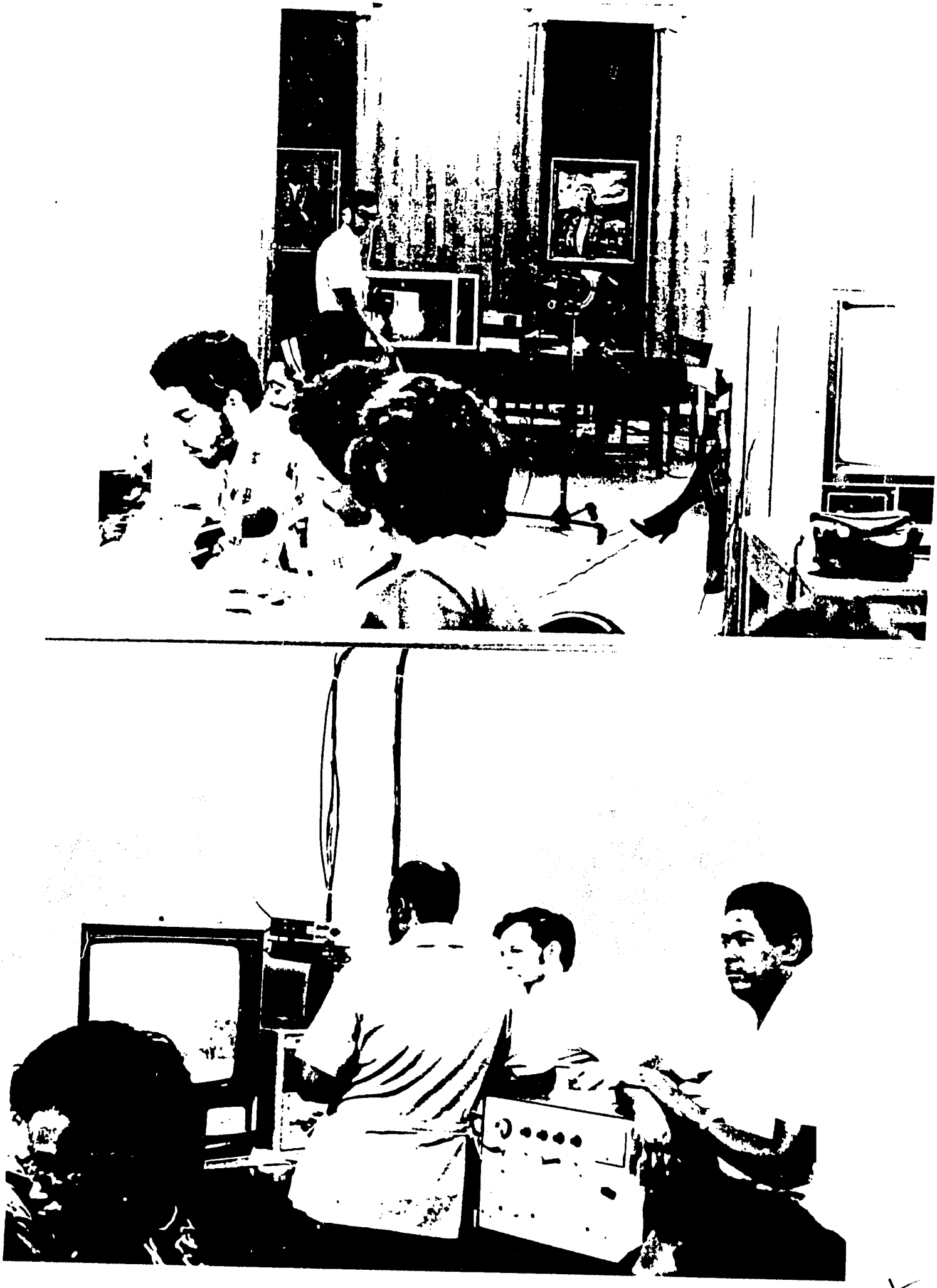


Photo 3. Technicians and Production crews at rehearsals.

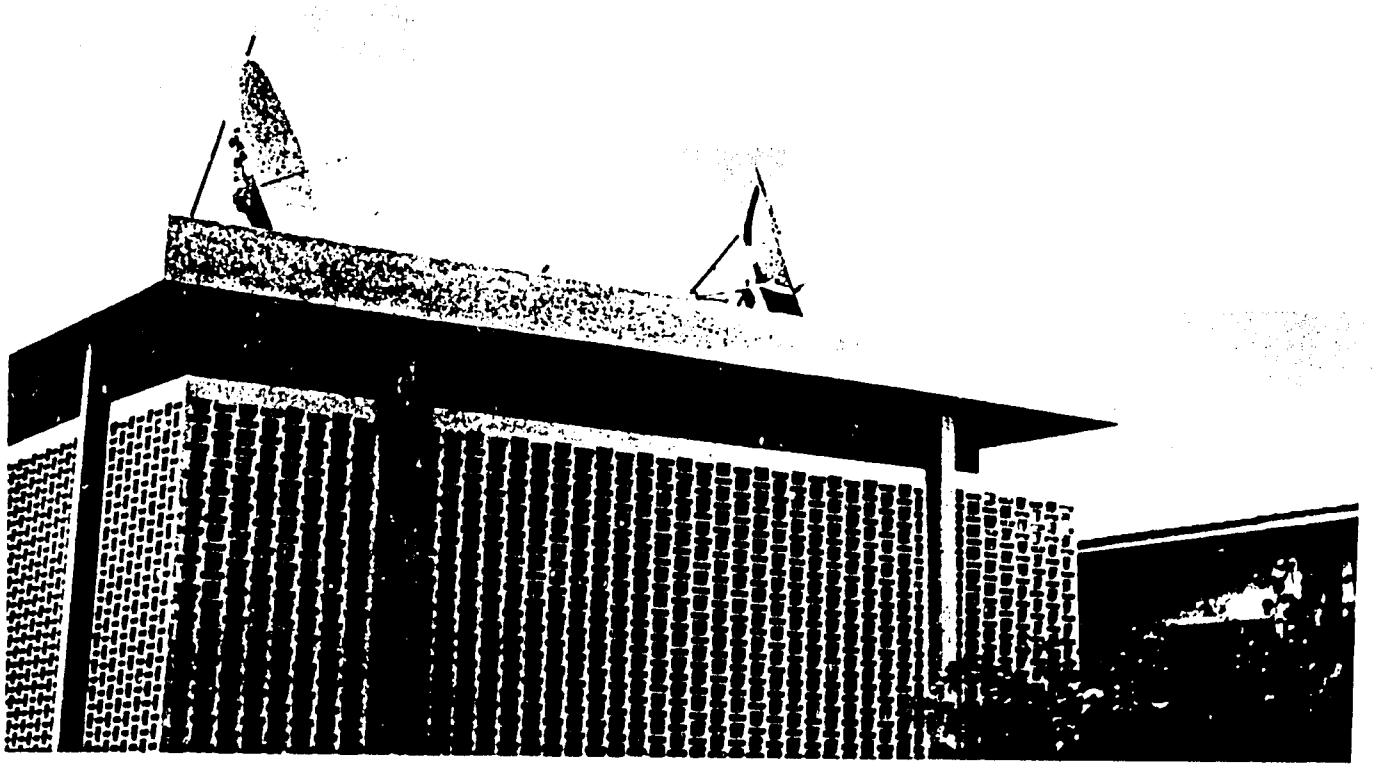


Photo 4. ATS-6 transmit and receive antennas on top of Council Building.

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EXECUTIVE SUMMARY

Communications satellites have tremendous potential for the enrichment of human learning, improvement in the quality of life and the fostering of closer international and intercultural understanding. For eight weeks (from mid January to mid March) the University of the West Indies (UWI) carried out a satellite demonstration using two of NASA's synchronous satellites, the ATS-6 and ATS-3, to deliver educational and outreach services to two of the three University of the West Indies campuses located at Mona (Jamaica) and Cave Hill (Barbados). For the last two weeks of the demonstration, a third site, the University Center in Castries (St. Lucia), was added.

The demonstration was sponsored jointly by AID/Washington and the University of the West Indies while NASA provided free satellite time. The Academy for Educational Development in Washington D.C., on behalf of AID, provided consultants and logistics support services to the UWI, and a number of Caribbean institutions cooperated in the satellite venture.

Objective

The major objective of the demonstration was to explore the possible utility and feasibility of satellite communication for improving the functioning of current activities of the UWI and making possible the provision of new services. Specifically, the University sought to gain firsthand experience with the satellite technology to test technical feasibility, to experiment with some

outreach programs, to improve administrative consultation and interaction, and to deliver video lectures to students by satellite.

Technical Design

The technical design of the experiment called for the simultaneous use of the two satellites ATS-6 and ATS-3. ATS-6 provided video and audio capability utilizing small earth station antennas about 10 feet in diameter. Simultaneous two-way audio (transmit and receive) was accomplished using ATS-3 as the return audio channel. Only Mona could transmit video on ATS-6, but all stations received the ATS-6 video on 860 MHz using the 10 feet parabolic antennas.

Project Management

The UWI utilized many of its top-level personnel in the management of the project. The project management teams at each location consisted of a local project coordinator, outreach, administrative and technical coordinators, back-up resource persons and secretarial assistance. The overall project director was located at the Mona campus in Jamaica. NASA provided engineers who travelled to the islands, assembled (and later dismantled) the earth stations, tested signals and held short training and hand-over sessions with the local technical co-ordinators and technical operators, under supervision from the local project coordinators.

Programs

Formal programs took place three times a week on Mondays, Wednesdays and Fridays in 90 minute blocks;and in all there were 34 hours of ATS-6 transmission and 90 hours of ATS-3 time, 34 of which were

used simultaneously with the ATS-6 for formal programs. Over 1500 persons attended the 24 events which included a formal opening and closing ceremony and a special teleconference on Solar and Wind Energy involving Denver, Colorado and the UWI sites. Three basic types of program activity were undertaken during the demonstration. They were:

a) University outreach programs (teleconferences and seminars);

b) Guest lecture series to students in the facilities of Law, Natural Science, English, History, and Medicine;

c) Administrative and academic teleconferences.

Evaluation Instruments and Data Sources

Information was gathered for the evaluation from technical logs kept by technical operators at each location; technical notes kept by technical coordinators at Cave Hill and Mona on system reliability, repairs and other maintenance problems; questionnaires to students and teleconference participants; an open-ended questionnaire which formed the basis for the end-of-demonstration interviews; and personal observation.

Findings and Recommendations

The two major types of activities engaged in during demonstration, student lectures and teleconferences were both very successful. Every program went off as scheduled. The 301 students who filled out the questionnaires rated the lectures highly, and the 137 participants who spoke on the satellite system were very satisfied with the teleconferences. The findings are grouped under clusters of dependent

variables of interest to UWI and AID and with an eye to future operational ventures.

Technical Performance of the System

The received signal quality of the ATS-6 satellite was mostly good at both Cave Hill and Mona, but many fades were experienced in Castries. The ATS-3 received signal quality was erratic during formal programs, i.e. when operating simultaneously with the ATS-6 satellite, suggesting possible interference from the two antenna systems. Despite this, over 60% of all participants evaluated the signal as adequate or better for the day's tasks.

The system was highly reliable. The space segment behaved remarkably well and there were no outages. Breakdowns of electronic equipment were moderate and did not prevent formal sessions from taking place.

Attitudes

Attitudes to both the programs and the technology were very positive. Students and teleconference participants liked the programs a great deal, rating them 2.74 on a scale of 1 to 3 in ascending order of affect. Feelings were positive at all locations with a high of 2.94 (out of 3) in St. Lucia where delegates from non-campus territories participated. The unequal video capability affected some users, but it did not inhibit their participation.

Benefits and Impact

In addition to benefits to students, teleconferences and coordinating teams, the UWI as an institution successfully accomplished the stated objectives of the demonstration and received favorable

regional publicity, thereby enhancing its stature in the region. Eighty four percent of top UWI personnel interviewed after the demonstration felt the UWI had been successful in accomplishing all objectives. Eighty-three percent of all students felt they had learned the same as in a normal classroom situation and 96 percent of the student respondents deemed the lectures to be useful to their coursework to some degree.

Ninety percent of the teleconference participants stated the activities by satellite were valuable to their own work. Many remarked that they felt an added benefit to be part of this first venture in education and outreach by satellite in the Commonwealth Caribbean.

Task Accomplishment

The satellite system was rated as suitable for accomplishing many specific and varied tasks. Over 60 percent saw applications of the technology in the Caribbean for tasks related to rural health care, teacher training, general "outreach" activities, lectures, agricultural extension seminars and information exchanges. Teleconferences were seen to have particular strengths: idea exchanges, better insights into problem solving, awareness of problems others face and for clarifying issues.

Resources to Draw on for Operational Service

One of the most striking findings of the evaluation is the fact that a climate of receptivity towards a follow-on project exists. A large majority of all participants declared their willingness to use satellite technology for similar and other purposes in the future. Participants from virtually all of the fourteen

territories that form UWI's constituency identified a wide range of applications to which satellite technology could be put to improve ducation and outreach in their countries.

The co-operation of many Caribbean organizations in the satellite effort was perceived by UWI and the cooperating entities themselves as a useful base on which to plan for the future.

The recommendations are ranked in order of priority (for consideration and further action).

Recommendation 1: The UWI should capitalize on the favorable regional publicity and the declared beneficial impact of the demonstration, to activate urgent discussion across campuses on likely follow-on plans.

Recommendation 2: AID should encourage and if possible facilitate a visit by UWI officials to one or two Pacific Basin members of PEACESAT and the University of the South Pacific, to observe at first-hand the range of services that are possible using an audio only satellite channel.

Recommendation 3: UWI should make an effort to resolve the impasse with Trinidad and plan to include that territory in future efforts, unless there is a firm statement to the contrary.

Recommendation 4: AID should support a UWI effort to make, as early as possible, a needs assessment survey and inventory of local technical expertise of all the territories served by the University.

Recommendation 5: AID should consider providing a substantial amount of foreign aid for capital costs of installing earth stations for reception and transmission, a microwave link on each campus, up-grading of production facilities on each campus, and rental of capacity from INTELSAT.

Recommendation 6: AID should be receptive to a UWI request for short attachments and training of UWI technicians and production personnel in the United States.

Recommendation 7: For operational service UWI should utilize INTELSAT satellites as it is both politically important and practically sensible to do so.

Recommendation 8: UWI ought to investigate the possibility of substituting remote teleconferencing for some travel.

Recommendation 9: In general, for satellite activities involving many locations, including some with marginal conditions of reception, time should be set aside before each program activity for system check of reception conditions which might necessitate realignment of antenna positions.

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Chapter One

PROJECT BACKGROUND AND DEVELOPMENT

1.1 Introduction

During the fall of 1976, USAID, in cooperation with NASA, carried out a series of 27 demonstrations in developing countries. These demonstrations were conducted over ATS-6 and were designed to increase the awareness of developing country planners of possible applications of communications technology to development problems. Partly as a result of the interest stimulated by those demonstrations, AID received a number of requests for consultation and demonstration activity. One such request came from the University of the West Indies, a regional institution serving a number of countries in the Caribbean.

The university concluded that improvement in the communication links among the campuses and between the university and outside groups has the potential significantly to improve their efficiency, their ability to conduct outreach programs, and their cohesiveness as a regional institution. They approached AID to request a demonstration of possible uses of satellite communication to address the problems they face.

The University of West Indies is supported by and serves the following 14 English-speaking West Indian territories; Antigua, Bahamas, Barbados, Belize, British Virgin Islands, Cayman Islands, Dominica, Grenada, Jamaica, Montserrat, St. Kitts/Nevis/Anguila, St. Lucia, St. Vincent, and Trinidad and Tobago. Some services are also provided for Guyana.

The three main campuses of the University are situated at Kingston/Jamaica, Cave Hill/Barbados and St. Augustine/Trinidad. The 1977 distribution of students was as follows; Jamaica 4,053, Trinidad 2,310 and Barbados 1,144 for a total of 7,507. Less than 10% of the students now come from the Lesser Developed Countries (LDC's). In addition to the main campuses, the University maintains "extra-mural" adult education campuses, staffed by a resident tutor, in each of the contributing territories.

The geographically dispersed nature of the region and the institution cause some difficulties for the university. Because the constituency of the university is scattered across a large region and many separate islands, it is difficult for UWI to extend its services to people located on islands other than those having a major campus, and it is even more difficult to reach out to groups outside the traditional academic community.

In addition, the efficiency of the institution as a whole is hampered by the situation. In many cases, a considerable amount of work time is lost and travel funds expended to accomplish simple tasks of coordinating university activities. Staff expertise that is available at one campus is either duplicated at other locations or is not available there. Resources of specialized units of the university, such as those involved with food and nutrition and medicine, are not easily available to people on other islands.

The use of satellite was seen as likely to open up new teaching and outreach opportunities. It has not been easy for UWI to conduct prolonged activities in agriculture, health, extra-mural affairs, social welfare, and engineering in the Lesser Developed Countries of

the Windward and Leeward Islands, because it is difficult to release staff from their other responsibilities for such long periods. Demonstrating the potential of utilizing satellites to link the LDCs with the main campuses offered an opportunity for the future to carry out such activities with minimal disruption of other programs.

In addition to sharing university resources and coordinating outreach activity, the University envisaged the use of the satellite systems for administrative communication, to improve University management and facilitate teaching and research programs.[1]

1.2 The University of the West Indies

The University of the West Indies (UWI) is an international institution of Higher Education dedicated to teaching and research. The University began operations in 1948 as the University College of the West Indies, affiliated to the University of London and became an independent University under a Royal Charter granted by Queen Elizabeth II of England in 1962.

The major objective of the University established by Charter is

> To provide a place or places of education, learning and research of a standard required and expected of a university of the highest standard, and to secure the advancement of knowledge and the diffusion and extension of arts, sciences and learning throughout the contributing Territories.

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[1]Source for some of the foregoing is Dennis Foote's report to the Academy for Education Development after consulting at the University of the West Indies.

[2]Source, The Charter, University of the West Indies.

In 1948 there was only one Faculty-- the Faculty of Medicine, situated on the Mona Campus in Jamaica, with an enrollment of 33 students. Today the UWI can boast of eight Faculties; Agriculture, Arts and General Studies, Education, Engineering, Law, Natural Sciences, Medicine and Social Sciences, on three campuses. The enrollment in 1977 was 7500 students of whom about 8 percent are postgraduates.

INSERT TABLE 1 HERE

The biggest growth period in terms of student population was the period 1961 to 1976. In that fifteen year period the student population has increased by a factor of 8 (UWI, 1977).

The oldest campus is at Mona, Jamaica, where the central University Administration takes place. The Mona campus contains all Faculties with the exception of Agriculture and Engineering which is the speciality of the sister branch in St. Augustine, Trinidad. First year courses in Law are offered by the Faculty of Law at Mona, but the full-fledged Law Faculty is the speciality of the Cave Hill campus in Barbados.

The campus of St. Augustine, Trinidad, while specializing in Agriculture and Engineering, also contains Faculties of Arts and General Studies, Natural Sciences, Social Sciences and Education. A medical school building is being built in the St. Augustine area but its relationship to the Faculty of Medicine at Mona is not yet clearly defined.

The Cave Hill Campus in Barbados offers degrees in the Faculties of Law, Arts and General Studies, Natural Science and Social Sciences.

Table 1

Growth of Total Student Registration: 1948-1975

Year	Men	Women	Total
1948/9	23	10	33
1951/2	152	53	205
1954/5	275	109	384
1957/8	354	201	555
1960/1	657	320	977
1963/4	1,465	722	2,187
1966/7	2,047	1,212	3,259
1969/70	2,914	1,713	4,627
1972/3	3,739	2,587	6,326
1975/6	3,994	3,263	7,257

Details of the 1976/77 registrations are in Table 2.

Table 2 gives the provisional figures for the 1976/77 student enrollment by Faculty and by type of course.

Table 2

1976/77 Student Enrollments by Faculty

	First Degrees		Diploma/Cert.		Higher Degrees		Total
	Full Time	Part Time	Full Time	Part Time	Full Time	Part Time	
Agriculture	220	-	-	-	33	37	290
Arts & General Studies	1,427	73	32	-	16	49	2,097
Education	56	-	117	183	3	66	425
Engineering	441	-	13		17	6	477
Law	297	2	-		6	21	346
Medicine	557	-	67	-	48	17	689
Nat. Sciences	1,540	34	-	3	56	38	1,771
Soc. Sciences	716	47	108	363	98	80	1,412
TOTAL	5,254	776	337	549	277	314	7,507

Because of its proximity to the Windward and Leeward Islands many students from those territories now go to Cave Hill instead of the longer trek to Mona for services that both have in common. Table 3 allows the most recent comparison of student numbers across the campuses, while Table 4 allows comparisons of the numbers of students from various territories in the region.[3]

Table 3 allows a comparison of student numbers across the campuses.

Table 3

Distribution of 1976/77 Enrollments by Faculty and Campus

Faculty	Mona	St. Augustine	Cave Hill	All Campuses
Agriculture	-	290	-	290
Arts & Gen. Studies	1,067	605	425	2,097
Education	288	98	39	425
Engineering	-	177	-	477
Law	31	26	289	346
Medicine	689*	-	-	689
Natural Sciences	1,088	396	287	1,771
Social Sciences	890	418	104	1,412
ALL FACULTIES	4,053	2,310	1,144	7,507

*Includes some clinical students attached to hospitals in Barbados and Trinidad.

[3]Source. U.W.I.

Table 4 allows comparisons of the numbers of students from various territories in the region.

Table 4

Territorial Distribution of 1976/77 Enrollments

Territory	First Degrees Full-Time	First Degrees Part-Time	Diploma/Certs. Full-Time	Diploma/Certs. Part-Time	Higher Degrees Full-Time	Higher Degrees Part-Time	Total
Anguilla	7	-	-	-	-	-	7
Antigua	60	3	8	1	2	2	76
Bahamas	67	2	6	-	3	3	81
Barbados	415	252	19	33	9	13	741
Belize	43	-	4	1	4	3	55
Br. Virgin Is.	18	2	1	-	-	-	21
Cayman Islands	5	-	-	-	-	-	5
Dominica	26	1	2	1	4	1	35
Grenada	40	1	3	2	1	7	54
Jamaica	2,478	389	221	287	114	149	3,558
Montserrat	32	-	2	2	-	1	37
St. Kitts/Nevis	45	2	2	-	3	1	53
St. Lucia	96	5	11	1	1	1	115
St. Vincent	49	1	3	-	1	3	57
Trinidad & Tob.	1,759	115	43	220	86	87	2,310
Guyana	101	3	10	-	11	17	142
Others	13	-	2	1	38	26	80
TOTAL	5,254	776	337	549	277	314	7,507

In addition, to Faculties on its campus territories, the University has centres (administered through it's Extra Mural Department) on the non-campus territories. The following units are also affiliated to the University of the West Indies and are particularly useful in any consideration of resource sharing since many of them generate independent capital and grants.

1. The Caribbean Food and Nutrition Institute.
2. The Institute of Social and Economic Research.
3. The Social Welfare Training Centre.
4. The Centre for Early Childhood Education.
5. Central Radiosotope Laboratory.
6. Trade Union Education Institute.
7. Tropical Metabolism Research Unit
8. Advanced Nursing Education Unit.
9. Caribbean Agricultural Research and Development Institute.

Funding of the University of the West Indies is approved tri-annually by the University Grants Committee which is a Ministerial Committee of the contributing Governments. Income from tuition fees and other miscellaneous sources amounts to only 6 percent of the UWI's total expenditures. Donations and contributions from outside sources account for another 20 percent. The remainder of its total income comes from the contributory territories

Table 5 gives a breakdown of income from West Indian governments for the academic years 1974/75 and 1975/76.

Table 5

Breakdown of Income From West Indian Governments 1974/75-1975/76

Government	1974/75 J$	1975/76 J$
Antigua	178,718	288,493
Dominica	160,243*	272,019
Grenada	100,000*	108,622
Montserrat	70,869	53,596
St. Kitts/Nevis/Anguilla	71,370	100,054
St. Lucia	183,148	312,185
St. Vincent	302,079*	185,959
Bahamas	233,570	403,230
Belize	163,461	264,645
Cayman Islands	13,173	25,501
British Virgin Islands	32,074	25,037
Barbados	1,170,921	1,995,935
Trinidad & Tobago	5,398,850	6,845,317
Jamaica	6,695,778	11,524,227
Guyana**	606,737	430,804
	15,380,991	22,835,624

*includes arrears 1969/74

**Guyana's contribution for students in the Medical and Law Faculties.

1.3 Objectives of the Demonstration

The general objective of the demonstration was to explore the possible utility and feasibility of satellite communication for improving functioning of current activities of the UWI and for making possible the provision of new services. Specifically, the University sought to gain firsthand experience with using satellite technology to

a) test technical feasibility,

b) try to overcome administrative bottlenecks by facilitating more communication and consultation among the administrative branches of the UWI,

c) permit lecturers to reach a wider student audience through the use of television lectures,

d) experiment with some outreach programs.

The experience from the demonstration would permit the university to test potential applications and to assess their own level of interest in pursuing further use of satellite communicating to interconnect the campuses and extend university services to a broader audience. It was also expected that the experience should enable UWI to assess the type and amount of resources that would be required for a longer-term pilot project, and to decide whether such a project should be developed.

1.4 Planning and Pretesting

Extensive conversations were held between UWI and AID to identify the parameters of a demonstration that would be of mutual interest. All parties were concerned that as much outreach activity[4]

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[4]Activity beyond the University campuses.

as possible be included in the programs and that every effort should be made to try to ensure some degree of non-campus territories (NCT's) participation. That group includes the small Windward and Leeward islands. Short of putting an earth station on each island (and NASA did not have that many to spare in any event), a compromise was worked out whereby St. Lucia was chosen as the NCT site for an earth station and participants gathered there for two seminars during which time they conducted some sessions by satellite with the main campuses. This enabled the delegates from the non-campus territories to observe and/or use the satellite technology and gain some idea of possible applications to their work. The St. Lucia activity was outreach in nature.

The Academy for Educational Development on behalf of AID assisted the University of the West Indies with logistics planning and co-ordination, program production development, project design and evaluation preparation.[5] The equipment, satellite time and technical support was provided by NASA through its Resources Support Services Agreement with AID.

Preliminary discussions with NASA about the technical feasibility of the interconnection of the campuses identified potential problems with reception from ATS-6 in Barbados, which is situated at the extreme eastern edge of the ATS-6 coverage. Due to the extremely low look angle to ATS-6 from Barbados of 0.6 degrees it was felt that circuit quality could not be predicted until an on-site test had

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[5]Much of the early planning and consultation was done by Dr. Dennis Foote. Later the author, Dr. Lionel Duncan, Dr. Heather Hudson and Messrs. Peter Boynton and Caesar Neres (all consultants to or employees of A.E.D.) joined in the process.

demonstrated the quality of the circuit. In order to resolve the questions raised, a technical test was conducted from August 1-6, 1977, by personnel from the Goddard Space Flight Center. The university provided support for local transportation and storage of the equipment. Personnel from the Physics lab assisted with the assembly of the equipment and were present during the tests to provide assistance as required.

The results showed that, because of the marginal ATS-6 reception conditions at Barbados, brief fades resulting in loss of picture and sound for 30 to 90 seconds would be expected several times per hour, and reception would be completely impossible at sunset. Between the fades, the quality of picture and sound was excellent.

Interference between the ATS-3 uplink signal and the ATS-6 downlink were observed.[6] The ATS-3 Yagi antenna, connected to a 14 watt amplifier was located only 20 feet from the 10 foot ATS-6 antenna. This pre-test enabled a recommendation to be made for the actual demonstration, to wit, that these antennas be separated by at least 100 feet.

UWI officials observed these tests, including periods of fading and were fully informed of the probable frequency and extent of signal degradation. It was made clear that there may be similar, but less severe problems at Trinidad. (At that juncture it was not clear which non-campus territory would be added in. In the end St. Lucia was chosen.) The University policy makers concluded that the anticipated degradation was tolerable for their intended use, and agreed

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[6]David Nace's report on the NASA test in Barbados.

that they would take steps in the organization of their programs to overcome any substantive problems caused by loss of picture (e.g., by repeating that material immediately after a fade had occurred). The University, therefore, proceeded with planning and organization that permitted a demonstration that included Barbados.

1.5 Early Setbacks

Efforts to start the demonstration by October 1, 1977, to coincide with the first week of the new academic year when the Vice Chancellor, resident at Mona, would embrace the opportunity afforded for the first time because of the satellite technology to simultaneously address the three campuses, were thwarted by the fact that

a) the lead time was too short for all the planning required (only two months),

b) NASA wanted more time to ensure that all equipment and all technical assistance promised could be met on time,

c) Trinidad had not replied to the request for use of the frequencies for the satellite links in her territory.

The effect of that setback was felt heavily by the coordinating team, particularly the resourceful Pro-Vice-Chancellor Lalor who had worked tirelessly in getting the project to its advanced state of development, but it did provide the University some breathing space to plan programs more effectively, to augment their manpower resource pools at all sites and to settle on St. Lucia as the NCT location for an earth station. Additionally, the postponement to a January 16th start enabled the University personnel at Mona to make repeated approaches to the Trinidad government to attempt to determine the reasons for the delay in replying to the request for frequency

clearance and to continue discussions on matters relative to customs (duty-free) clearances of the satellite earth station equipment and any other assurances the Trinidad government might require.

1.6 The Trinidad Withdrawal

On January 20th in a speech to the house of representatives the Minister of Education in the Trinidad government announced that the Trinidad government had decided against granting frequency clearance for use of the satellite equipment. The main reasons for the decision were that

a) The Trinidad Government felt that as a major contributor to the UWI it had not been consulted during the early planning period on a matter that involved not just inter-university campuses, but dealings with a foreign government agency (AID) and foreign government equipment (NASA's).

b) The matter of a White Paper which called for some re-organization of the UWI, to provide more autonomy to individual campuses was before the University, and the project satellite embarked upon completely ignored that initiative, the Government announcement said.

The Trinidad government announced it was sending a letter of protest to the UWI about the manner in which the UWI planned the project. The UWI did not make a public response to the government announcement.

1.7 Site Construction and Studio Preparation

The earth stations were assembled sequentially,[7] beginning with Mona, where there was need to provide, in addition to transmit and receive capability for ATS-3 and ATS-6, a production studio complete with cameras, lighting, microphones, monitors, etc. The Mona Campus allowed one of its most prestigious rooms, the Council Room (where most top-level meetings are held), to be the studio site. The same was done in Barbados, although no TV production was required at that end.[8] In Castries, St. Lucia, the local University Center's main activities room was reserved for the satellite and other seminar sessions.

Three NASA engineers Messrs. Joe Day, Bart Sessions and John Chitwood set up the earth station at Mona with assistance provided by Mr. Tony Walling, two U.W.I. engineers, one electronics engineer from the Jamaica Broadcasting Corporation and two maintenance technicians of the Mona Campus.

Dr. Lionel Duncan (AED consultant) worked closely with Mrs. Mockyen and her team of UWI mass communication students, technicians from the UWI electronics unit as well as other personnel recruited to help from outside the University, to put together the make-shift studio, develop appropriate camera, lighting and microphone optimization and production requirements.

In addition to the NASA equipment provided for the studio, which consisted of color cameras and video monitors, the following were

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[7] Just a few days apart.

[8] It was the only room that could be spared for an extended period of time.

added locally in order to achieve greater flexibility in program production:

1) One color video switcher unit
2) Two Black and White Baseband Video Monitors
3) One Black and White Baseband Video Monitor was added after breakdown of a NASA Color Monitor
4) Four Lighting Units of 3200 Kelvin, 800 watts
5) One-Audio Mixer and four microphones
6) One-Audio Mixer for Production and Floor Management
7) Two-Audio Amplifiers and 3 speakers
8) Two-lights attached to Camera #1 and #2
9) Slide Projector and Frosted Screen

At Cave Hill, NASA engineers, Messrs. Walter Sullivan and Jim Meenan constructed the earth station with assistance from Mr. Roy Braithwaite, and a pool of Technicians from the Physics Lab department as well as the maintenance and works section of the campus.

In Castries, NASA engineers Messrs. Ben Bemis and Fred Kissel set up the equipment with help from Mr. Linford Fevrier, technician attached to Radio St. Lucia and other local maintenance people. Mr. Michael Brown, a technician at the Electronics Operations Unit on the Mona Campus in Jamaica, who had been sent to the Goddard Space Center in Maryland to help build a receiver for the St. Lucia site, joined the team in Castries during the testing period. Michael Brown's short-term attachment to NASA was a step in training UWI personnel in handling the technology.

Chapter Two

THE DEMONSTRATION

2.1 Technical Design

The design called for the simultaneous use of the two NASA satellites ATS-6 and ATS-3. ATS-6 has the capability of providing a good video signal to a small earth station antenna about 10 feet in diameter. It also provides accompanying audio. Simultaneous two-way audio was accomplished using ATS-3 as the return audio channel. Figure 1 gives an idea of the technical configuration of the experiment.

All sites had equal audio capability (they could both transmit and receive via ATS-3), but only Mona could transmit video to ATS-6 on 2250 MHz, S-band uplink, with all stations being able to receive video on the 860 MHz downlink using the 10 foot parabolic antennas.

Three main reasons for the unequal video capability across sites were

a) there was only one S-band uplink available from NASA;

b) the low look angle of the other sites (Barbados 0.6^{o}), (Trinidad 2°), (St. Lucia 1.5^{o}) might make video <u>transmission</u> impossible or subject to frequent interference;

c) in addition to its more favorable look angle of 17° to the ATS-6 satellite, Mona had also spearheaded the project and had more resources to call on to service project implementation.

Table 6 presents a clearer picture of the technical characteristics at each location as well as design specifications relative frequencies and power.

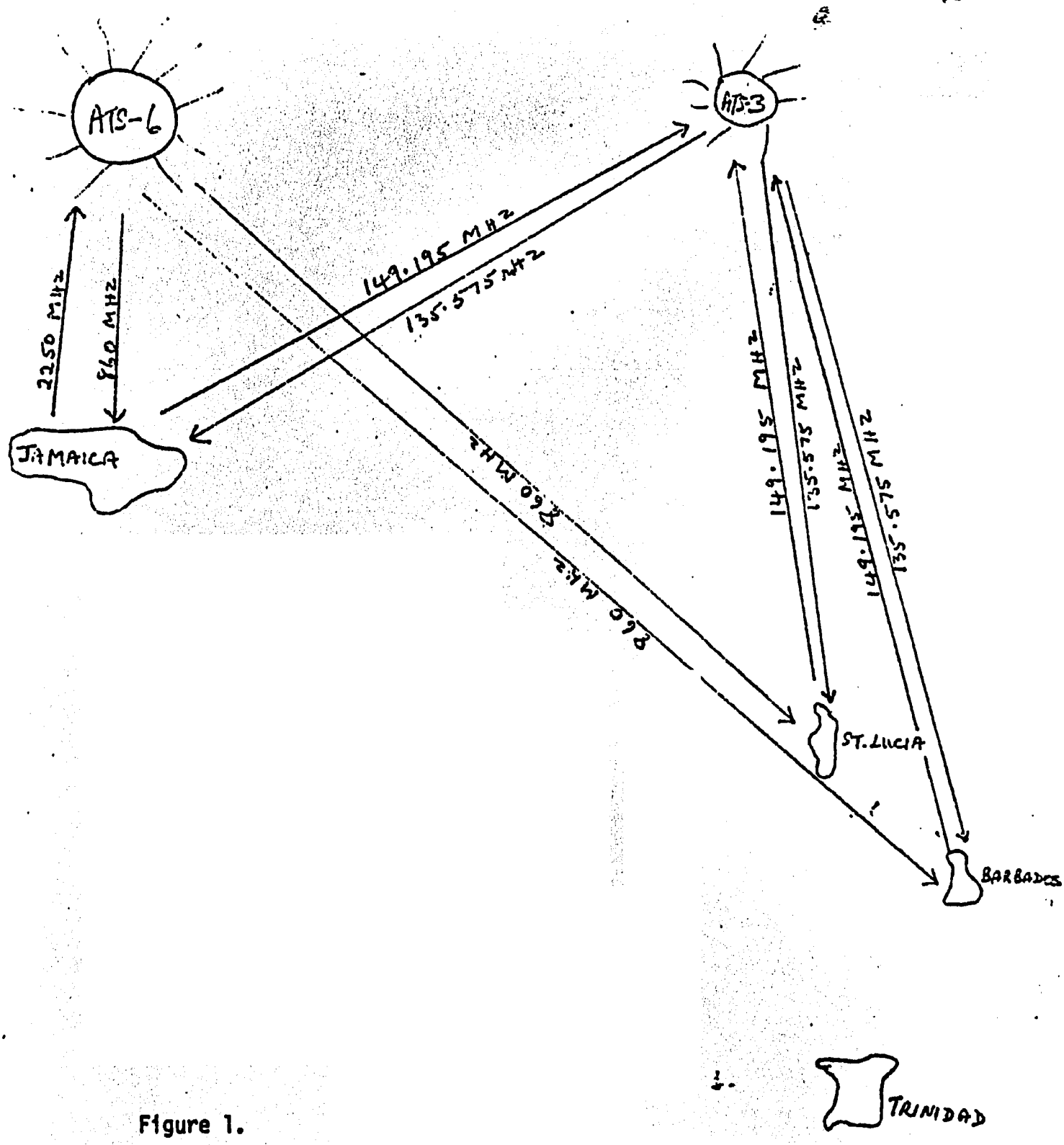

Figure 1.

Technical Configuration of the Experiment

Table 6

Technical Characteristics and Capability at Each Site

Satellites	Mona	Cave Hill	Castries
ATS-6			
1. Video and Audio	Transmit/Receive	Receive only	Receive only
2. Transmit frequency	2250 MHz S-band	-	-
3. Receive frequency	860 MHz UHF	860 MHz UHF	860 MHz UHF
4. Transmit power	200 watts	-	-
5. Antenna elevation	17°	0.5^{o} *	1.5^{o}
ATS-3			
1. Audio	2-way	2-way	2-way
2. Transmit frequency	149.195 MHz	149.195 MHz	149.195 MHz
3. Receive frequency	135.575	135.575	135.75
4. Transmit power	120 watts**	120 watts**	120 watts**
5. Antenna pointing	Not available	36°	Not available

*This was the optimum elevation arrived at allowing for atmospheric refraction

**This was the best got out of the 140 watt KLM unit.

2.2 Project Management and Manpower Resources

Professor Gerald Lalor, a Pro-Vice Chancellor at the Mona campus in Jamaica, was the overall project director. The author had several opportunities to observe at firsthand the enormous amount of energy Dr. Lalor directed towards the project and his enthusiasm for the project was transmitted to both his secretarial staff Mrs. Lowe and Miss Edwards and the technical and production teams headed by Mr. Tony Walling and Mrs. Alma Mockyen, respectively. Throughout, the project received the full approval and support of the Vice-Chancellor of the University, Mr. Aston Z. Preston.

Production and technical assistance came from personnel of the Jamaica Broadcasting Company (JBC), the UWI School of Education, the College of Arts, Science and Technology in Jamaica, while the Academy for Educational Development responded to a request for a production consultant by sending Dr. Lionel Duncan of Morgan State University Media Technology Centre to assist the UWI in program production for about half the duration of the demonstration.

At Cave Hill, Mr. Francis Blackman, Secretary of the Cave Hill Campus was the local project co-ordinator, ably assisted by Mr. Roy Braithwaite, the technical coordinator, Mr. Michael Gill, resource person, Mrs. Velma Abrahams, with Dr. Leonard Shorey and Mr. R. Nicholson jointly assuming roles in coordinating outreach aspects of the program.

In St. Lucia, Mrs. Pat Charles, local project co-ordinator, drew on the services and facilities of the University Center to provide an efficient secretariat who catered to all the requirements of the seminars, while Messrs. Michael Brown and Linford Fevrier acted in the capacity of joint technical operators on this Castries site.

NASA provided engineers who assembled the earth stations on all sites, tested signals and held short training and hand-over sessions with the local technical co-ordinators and technical operators before returning to the U.S., there to remain on call in cases of emergency. In addition, Goddard monitored all ATS-3 traffic and helped with problems of logistics, planning, requests and repair information, frequently giving extra time on ATS-3 to assist in trouble shooting problems or responding to other requests for assistance.

A.E.D. in Washington also had Drs. Dennis Foote, Heather Hudson and Messrs. Peter Boynton and Caesar Neres on call to assist with any requests from NASA and UWI.

Table 7

The Project Management Teams of the UWI Satellite Demonstration

Project Director, Dr. G. Lalor

Project Management	Mona Personnel	Cave Hill Personnel	Castries Personnel
Local Project Coordinator	Mrs. C. Lowe	Mr. F. Blackman	Mrs. P. Charles
Local Outreach Coordinator	Dr. G. Lalor	Messrs. L. Shorey and R. Nicholson	----
Local Technical Coordinator	Mr. T. Walling	Mr. R. Braithwaite	Messrs. M. Brown and L. Feverier
Backup resource persons	Dr. Lalor's nominee	Mr. M. Gill	Mrs. O. Francois Mrs. U. George
Secretarial	Miss J. Edwards	Mrs. V. Abrahams	Miss M. Ambrose

Most of the project coordinating personnel were not involved full time on the satellite project. They simply added the duties connected with the experiment to their already pressing day-to-day commitments.

2.3 The Program Events

During the eight consecutive weeks that the demonstration lasted, 24 formal programs were broadcast, 8 outreach and 6 academic teleconferences, 7 lectures and three special programs including the special solar energy teleconference involving Denver, Colorado and the three UWI sites. Programs were broadcast on Mondays, Wednesdays and Fridays for 1½ hours from 9:30 to 11 a.m., Jamaica time; the equivalent of 10:30 to 12 noon Eastern Caribbean time. This called for the synchronization of lecture schedules and conference time schedules on the part of the UWI branches as well as the simultaneous availability of ATS-6 and ATS-3 satellite through NASA.

Three basic types of activity were undertaken during the demonstration. They were:

a) University outreach programs (teleconferences and seminars);
b) Guest lecture series to students in the faculities of Law, Natural Science, English, History, and Medicine;
c) Administrative and academic teleconferences.

2.3.1 Outreach Programs

Outreach program activities of the University are designated to serve persons outside of the campuses, especially in the lesser developed areas of the Caribbean. Such activities are meant to enhance rural and urban development. Many of these efforts are organized jointly with the Department of Extra-Mural Studies or with appropriate Government Ministries. The Faculty of Agriculture in Trinidad, for example, often conducts seminars in the LDC's of the region to help improve rural agriculture, farming practices, provide advice on use of innovations and training of extension officers.

The Faculty of Agriculture conducted one such seminar, with emphasis on food production in St. Lucia which included two sessions by satellite linking the participants there to their colleagues and observers at Mona and Cave Hill.

Other outreach programs carried out during the demonstration included teleconferences on the following topics "Developments in Rural Medical Care in the Carribean," "Rural Integrated Development," "The Nurse Practitioner Programme in the Caribbean Context and its Value to Rural Clinics," "A New Approach to Family Life Education Techniques," "Project Management for Small Contractors" (Engineering outreach seminar), and the "Education for the Deaf" (outreach seminar and teleconference) in St. Lucia.

Appendix I lists all program events held during the eight week demonstration.

Outreach programs were particularly useful in permitting organizations and institutions in the territories with earth stations, to take part in the satellite demonstration. Agricultural extension agencies, engineering associations, nursing organizations, the Caribbean Development Bank, Ministries of Education, Health and Social Services, the Society for the Deaf, and Library Associations were among public service or public spirited bodies who participated and or witnessed outreach programs.

2.3.2 Student Lectures

There were seven lectures in all. Six of them were of 45 minutes duration and were presented two per day, while the seventh was a 90 minute presentation. Lectures accounted for about 1/3 of total satellite transmission time. The lectures consisted of live

video presentations from Mona to students at Mona and Cave Hill simultaneously via ATS-6, with audio interaction capability provided by ATS-3. The ATS-3 sound was locked in to the ATS-6 picture monitor employing a switching technique that enabled interruption of the ATS-6 transmission by someone wishing to ask a question on ATS-3. In practice, however, the lecturers presented their lectures with built-in pauses for questions from both sites, very rarely did anyone interrupt in an unscheduled fashion though the capability existed.

As can be gleaned from Table 8, quite a number of faculties got an opportunity to use the system.

Table 8

Lecture to Students by Attendance

Lecture	No. of students attending*
Botany	20
Law One	43
Law Two	51
History	21
Chemistry	62
English	48
Medicine	56
Total	301

*This does not include the few students who were observers.

2.3.3 Faculty and Administrative Teleconferences

Academic and Administrative Teleconferences provided the opportunity for faculty boards and committees and administrative personnel to carry out round table discussion without the customary travel to each territory or reliance on what has been criticized by most as poor overseas telephone links allied with lengthy waiting periods for calls to come through.

Deans/Vice Deans, Heads of Departments and various faculties held meetings via satellite that varied from confirmation of grant requests to discussions on new degree structures, affects and implications.

2.3.4 Special Programs

2.3.4.1 Opening Ceremony. The opening ceremony took place on Friday, January 20th with special invited guests seated at Mona and Cave Hill. The featured address was delivered by the Vice Chancellor of the UWI, Mr. Aston Z. Preston. Expressions of praise for the attempt to use communication satellites to assist the University's objectives came from Mr. D. Bradshaw, acting Minister of Education, Barbados, and Mr. John Eddy, an official of the American Embassy in Barbados (both spoke from Cave Hill). The U.S. Ambassador to Jamaica, Mr. Frederick Irving, saw the project as "demonstrating the mechanism of inter-dependence and a reaffirmation of the commitment of the UWI to consultation and collaboration."

Other addresses came from P.V.C. Lalor, P.V.C. Brathwaite and P.V.C. Martin, the latter two making their contributions by videotape. The inaugural ceremony received good reports in the region's press (two clippings from the press in Jamaica are presented).

2.3.4.2 Solar Energy Teleconference. On Monday February 27th there was an International Teleconference on the uses of solar and wind energy originating from Denver, Colorado on ATS-6 with down links to Mona (Jamaica), Cave Hill (Barbados), and Castries (St. Lucia). Mona transmitted for a few minutes on ATS-6 to present the topic and scenario for the conference, then switched off the ATS-6 up-link. Audio interaction was provided on ATS-3 from UWI while Denver spoke on ATS-6 audio.

While the signal quality of the ATS-6 picture and voice were excellent, there were considerable problems on ATS-3 which resulted in a one-way lecture rather than an interactive teleconference.

2.3.4.3 Closing Ceremony. In an impressive ceremony, UWI top-level policy personnel gave verbal personal evaluations of the project, its scope and impact. All three sites were linked for the event. The Chancellor of the University, Sir Allan Lewis, was seated at the Castries location to witness the event, which included a videotape of his closing remarks. Describing the project as "a splendid and valuable effort," Vice-Chancellor Preston indicated that the next step was to determine "the extent to which satellite technology may assist our human efforts to contribute some solutions to some of the region's problems. Other addresses came from Pro Vice Chancellors, Lalor, Robinson, and Martin, while P.V.C. Braithwaite of the Trinidad campus chaired the occasion. Carl Jackman, Registrar, called for the permanent establishment of the satellite link-up to facilitate inter-campus administrative teleconferences. Dr. Clifford Block of USAID, who had spearheaded the experiment within AID, spoke briefly of the role of AID in the venture, the tested applications of

satellite technology in the fields of education and social services, and informed the gathering that funding for similar long-term projects could be available. His Excellency, The Governor of St. Lucia and Chancellor of the University, delivered the closing remarks.

2.4 The St. Lucia Outreach Activity

> In our struggle against the entrenched enemies of Poverty, Disease and Ignorance, our Scientists and Researchers have placed into our hands and into the hands of our Agricultural Extension Officers, a formidable array of weapons-- the latest being the Satellite Communication Link which we are about to inaugurate here today. But for these weapons to be fully effective, they must reach down to every farmer, for they are the foot soldiers in the front line of the struggle.
>
> Too often our farmers are left to exhaust themselves and our precious resource-- the soil-- by employing out-moded methods, while scientific discoveries which can ease their burdens are left to 'blush unseen' in the pages of learned scientific journals or to gather dust on the shelves of our various Ministries of Agriculture. In the Caribbean, the gap between available scientific knowledge and practice in the field, is too wide.

This excerpt is from the speech delivered by the Premier of St. Lucia, Mr. John Compton, at the opening of the Agricultural Seminar (the first of the two LDC's outreach seminars held in St. Lucia) as part of the Satellite Demonstration Project.

2.4.1 Agricultural Seminar

The theme of the Agricultural Seminar was "Co-operation betweeen Food Producers and Professional Agriculturalists for improved Food Production." Among the topics discussed were "Research in Food Production," "Food Processing and Preservation," "Credit for Small

Farmers," "Agricultural Extension and Food Producers" and "Food for Home Consumption and Market."

The Premier of St. Lucia set an upbeat tone which was maintained throughout the 2½ day seminar. The Premier himself gave a short message by Satellite on ATS-3. Many Government officials also attended.

Satellite interaction was only a small portion of the seminars. Each seminar contained two 90 minute teleconferences by satellite.

Despite the fact that the picture quality on ATS-6 was only fair, participants were able to get an idea of the potential, performance and application of the technology. Many of them spoke on ATS-3. The local press and radio gave the seminar publicity.

The seminar included not only extension officers who interface with rural development and rural poor, but also farmers -- out of the 26 persons attending from 9 of the possible 11 countries, 12 (or close to 50%) were farmers-- truly an "Outreach" effort.

Among the recommendations which emerged from the seminar were:

1. Areas for research in food production should come from the farmer and farmer organizations rather than policy makers;
2. In order to create awareness of their activities and to solicit greater support from the farming community research units in each Caribbean country should hold demonstration and seminars with farmers in the field;
3. Each island should have a versatile canning plant;
4. Farmers should ensure that they have all the credentials to facilitate receiving of credit and loans.

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Mr. Garth Southwell speaking at the Agricultural Seminar in St. Lucia

Satellite Seminar

A THREE day agricultural extension seminar, by satellite, ended on Friday at the University Centre on the Morne.

The seminar was opened on Wednesday by Premier John Compton and had as its theme "Cooperation between food producers and professional agriculturists for improved food production."

Our picture shows Mr. Garth Southwell, Lecturer in the Department of Agricultural Extension, and Chairman for the seminar addressing participants and invitees to the opening ceremony.

VACANCY NOTICE

The Electrical Engineering Department, Barbados

Requires an

ELECTRICAL ENGINEER

To take charge of all Electrical Installations under the Government's control and to be responsible for the inspection of all electrical installations in the private sector.

QUALIFICATIONS:
A degree in Electrical Engineering and/or Membership of the Institute of Electrical Engineers plus five years' practical experience since graduating.

SALARY:
$21;768 per annum plus a non-pensionable allowance of 20% of basic salary.

CLOSING DATE:
April 22; 1978.

Further details and appropriate application forms may be obtained from:-

EXTERNAL AFFAIRS DIVISION
OFFICE OF THE PREMIER
GOVERNMENT BUILDINGS
CASTRIES.

SERVICES COMMISSIONS DEPARTMENT
St. Michael
Barbados.

SUNDAY

9.00 ANIMALS, ANIMALS – The Pelican
9.25 FLINTSTONES – No. 2 (Colour)
9.50 UNDERSTANDING (Colour)
10.35 MOVIE : NO PLACE TO RUN
11.45 CLOSE DOWN
4.10 SUNDAY MOVIE : MONTANA BELLE starring Jane Russell & George Brent
5.30 A TIME TO SING (Colour)
6.00 STAR SOCCER Derby County Vs Manchester City (Colour)
7.00 IN CONCERT (Colour)
7.30 SUNDAY NEWS (Colour)
7.40 NEWS REVIEW (Colour)
8.00 STARSKY AND HUTCH – Playboy Island Pt. 2 (Colour)
8.50 SADAT : ACTION BIOGRAPHY (Colour)
9.40 MYSTERY MOVIE : COLUMBO – Identity Crisis (Colour)
11.15 CLOSE DOWN

MONDAY

9.15 SPANISH – Entender y hablar

GUIDE

5.00 HARLEM GLOBE TROTTERS – Jungle Jitters (Colour–
5.30 JUNIOR TALENT – (Colour–
6.00 SIXTY MINUTES PREVIEW (Colour)
6.02 ANIMAL WORLD (Colour)
6.30 THE PARTNERS – Two or False
6.55 LIONS' BINGO (Colour)
7.00 DAYS OF OUR LIVES
7.30 SIXTY MINUTES (Colour)
8.30 BEST SELLERS –Seventh Avenue (Colour
9.15 SPORTS MAGAZINE (Colour)
9.45 BERT DI ANGELO SUPERSTAR - Concer Citizens (Colour)
10.35 ALFRED HITCHCOCK – Most Likely To Succeed

Favorable mention was made during the seminar of the fact that USAID funds are now available at the Caribbean Development Bank to help farmers through a scheme called A.P.C. (Agricultural Production Credit).

Before each session by satellite, participants and observers were given a brief idea of the satellites being used and the likely problems with reception because of the low-look angle of the satellite from St. Lucia (approx. 1.5°). After the sessions several questions were answered.

2.4.2 Education of the Deaf Seminar

This seminar was most successful. The 42 overseas participants from 17 countries, including those from as far afield as the United Kingdom, United States and Curacao, were highly enthusiastic and fully praised the effort. Once again the media gave good publicity and ran pictures of Lady Lewis (wife of the U.W.I. Chancellor, Sir Allen Lewis) President of the Society of the Dean in St. Lucia delivering the opening address and Mrs. Jeanne Robinson, Conference Chairperson lecturing with a member of Gallaudet College in Washington interpreting by total communication (lip and sign language) for the deaf in the audience. (See Photo 2).

Mr. Thomas Stuman of the USAID Regional Office in Barbados flew to St. Lucia to give the AID message at the opening of this seminar and Dr. Clifford Block observed the second satellite teleconference from Jamaica. The St. Lucia Minister of Health, Mr. Bousquet gave a message at the opening.

5D

Seminar publicity in the Voice of St. Lucia newspaper

Seminar For Deaf Opens

A 3-DAY seminar on the Education of the Deaf was officially opened yesterday at the University Centre.

The seminar which was declared open by Lady Edna Lewis, wife of the Governor Sir Allen Lewis and patron of the St. Lucia Society for the Deaf, is being attended by some 42 participants from 17 countries in the region.

It has as its theme "Education of the Deaf – toward a Caribbean Model" and is being sponsored by the University of the West Indies together with the United States Agency for International Development (USAID) the Commonwealth Fund for Technical Co-operation and NASA with the support of the St. Lucia Government and the St. Lucia Society for the Deaf.

Chairperson for the conference is Mrs. Jeanne Robinson, Executive Officer of the Jamaica Association for the Deaf, Mrs. Patricia Charles of St. Lucia is conference Co-ordinator.

Among the resource personnel and experts attending the seminar are four members of the staff of Gallaudet College in the United States, the only university in the world specifically for the deaf. Otherr include Dr. Heloise Lewis from the School of Education, Mona, Jamaica; Miss Lou Brown of Project Hope, St. Michael's School for the deaf, Barbados; Mr. W. Pedro, Principal of the School for the Deaf, Trinidad; and Mr. M. Mitchell of Mico College in Jamaica.

Mrs. Keith Gordon, president of the St. Lucia Society for the Deaf, made the opening remarks at the ceremony to mark the official opening. Messages were read by Mr. Allan Bousquet, St. Lucia's Minister for Education, who welcomed the participants on behalf of the Government of the State and thanked the agencies and persons who made the seminar possible, as well as by the representative of USAID, Mr. Thomas Stuman.

The Governor of St. Lucia, Sir Allen Lewis, was also present at the opening function.

During the seminar participants will discuss and look at many of the problems and special considerations involved in the education of the deaf. On the first day of the seminar there was a special feature – Teleconference via satellite – during which there was a link-up between Mona, Cave Hill and St. Lucia for a television panel discussion on subjects related to the deaf. St. Lucia's panellists were Mr. Leton Thomas, Mrs. C. Weekes, Mrs. M. Charles, Dr. E. Cooper and Mr. Parry, Husbands.

The teleconference feature is to continue throughout the seminar.

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Lady Lewis speaking at the Opening of the Society for the Deaf Seminar

THE VOICE Tuesday March 7, 1978 Page 8

LADY Lewis, speaking at the official opening ceremony at the University Centre yesterday morning.

The seminar which ends tomorrow is the last in a series of "education by satellite" programmes undertaken by the University of the West Indies as part of its "Outreach" programme.

The President and Members
of
THE WEST INDIES CRICKET
BOARD OF CONTROL
wish to express their
GRATITUDE

Diaspora

A major recommendation to come out of the seminar is the formation of a Caribbean Deaf Association. Another was the institution of High Risk Registers in hospitals to assist in the early identification of deafness in infants. Several other recommendations are featured in the final report of the Seminar available from the UWI.

2.4.3 Solar Energy Teleconference

Prior to the formal inauguration of the St. Lucia link on March 1st, St. Lucia had in fact participated in the Solar Energy Teleconference involving Denver, Cave Hill, and Mona. A cross section of disciplines and personnel witnessed the telecast including Government officials, engineers, agriculturalists,upper school and college students,community development workers and financiers.

In all, the St. Lucia activity achieved its objective---exposure of LDC participants to the technology and its uses and the testing of technical feasibility. The technical quality of the system as experienced in St. Lucia is discussed in the evaluation findings section (Chapter Three) of this report.

2.5 Greetings from the South Pacific

On February 14th at about 12:30 a.m. Jamaica time (1:30 a.m. Barbados time), brief greetings were exchanged between Cave Hill and Mona using ATS-3 with users of ATS-1 in the South Pacific. The technical hook-up involved the use of satellite earth station facilities in Denver, Colorado. Denver received the ATS-3 signal from the UWI sites and retransmitted it to ATS-1 and vice-versa with a very short delay. About five of the dozen PEACESAT stations in the Pacific basin communicated with the UWI stations.

Chapter Three

THE EVALUATION: PHILOSOPHY AND METHODOLOGY

3.1 Evaluation Philosophy

All social institutions usually require some evidence or proof of their effectiveness if they are to continue to derive societal support. The amount and extent of proof depends to a large measure on the type of relationship that exists between the social institutions and the public. At the heart of principles, such as public accountability, is a tacit requirement for evidence of performance and growth. Evaluation and evaluative research can play an important part in accountability.

Some twenty-five years ago, Koos (1953) drew attention to the realization that as the nature of social problems and the organization of public services have changed, so have the attitudes and behavior of the public both as the targets of public service activity and as the ultimate determiners of the degree and the type of support to be given to these programs. The public sees benefit in evaluation of social programs.

Suchman (1976) distinguishes between "evaluation" and "evaluative research." The former is used in a general way as referring to the social process of making judgments of worth. This process is basic to almost all forms of social behavior, whether that of a single individual or a complex organization. Suchman argues that while "evaluation" implies some logical or rational basis for making judgments, it does not require any systematic procedures for marshalling and presenting objective evidence to support the judgment. Evaluative research, on the other hand, is regarded as the utilization of

scientific research methods and techniques for the purpose of making an evaluation.

Evaluation methods have as their raison d'etre to arrive at a valid and systematic judgment of the project under scrutiny. In the quest to discover information relevant to project managers and sponsors, information to guide program practice and/or public policy, one uses the tools of social science research. In general, the more clearly delineated the project objectives, the easier it is to decide upon the appropriate methodology and assessment techniques to use to determine the outcome of the project.

It is important to avoid conflict between the four sets of objectives which are likely to face an external evaluator:

a) Objectives of the project managers;

b) Objectives of funders or sponsors;

c) Objectives of ancillary groups[9];

d) Evaluator's own objectives.

Indeed the evaluator's objectives are expected to be a combination of a, b, and c. He or she might also take the opportunity to use scientific methods to further the state-of-the-art knowledge in the particular discipline of interest, which (theoretically at least) makes the evaluation report on outcome, policy and scientific understanding worth reading.

Yet, at the same time one should be careful not to try to serve

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[9]For example NASA, contracted as a third party, had vested interest in the performance of the technology.

all masters equally. As Weiss (1972) put it

> Part of the trouble with many past evaluations is that they tried to serve too many masters. With careful design and adequate resources, perhaps two kinds of information needs can be met by a single study, but research requirements for different purposes are often incompatible. The evaluator should take pains to find out which decisions are pending, which pending decision decision has priority, and to which decision his study is expected to contribute. Then he can gear his study to serve the most important purposes.

The evaluation of the UWI satellite demonstration provides an example of merging the different sets of objectives. UWI (project managers) will look to the evaluation to determine how well the demonstration worked, what lessons can be learned from the feasibility test that can assist the planning of an operational service, e.g., what resources the university can draw on, what type of programs users would like to develop, and non-university agencies that would be interested in participating in future projects. AID (the sponsor) is interested in the foregoing also, but more particularly, will look to the evaluation report to determine whether the Agency should continue to support further efforts by the UWI involving satellite technology. NASA, the providers of the hardware (ancillary group referred to earlier), will be most interested in the technical performance of the system, especially with regards to Barbados where the signal quality of the ATS-6 was expected to be somewhat erratic, as well as the reliability of the equipment. The present evaluation attempts to combine all these interests.

Evaluation and evaluation research is concerned with success and the failure of projects or aspects of projects (McAnany, Hornik and Mayo, 1973). It is also concerned with utility (Weiss 1972). Its

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purpose is to answer questions of decision makers who want to know whether to continue a program, extend it, modify it or scrap it altogether. Essentially, it aims to provide information for decision-making about programs.

The basic paradigm an evaluator follows seems to be to:

a) Determine the goals/objectives of the project;

b) Translate these into measurable indices of performance;

c) Administer the measuring instruments and collect all relevant data;

d) Analyze data;

e) Relate outcomes to objectives, determine how much to report, make policy recommendations consistent with research findings.

Paul (1956) talks of three major sets of criteria for classifying types of evaluation. He identifies assessment of effort, by which is meant the energy and action of the service team, assessment of effect, which refers to the results of the effort rather than the effort themselves, and assessment of process, which deals with an analysis of why and how an effect was achieved.

Michael Scriven in "The Methodology of Evaluation" (1967) introduced a useful distinction between two types of evaluation, "formative" and "summative," both of which apply to the present UWI satellite study. Formative evaluation is the process of collecting data and information during the early phases of a program, designed to aid in the later development of the program, to improve its functioning. Summative evaluation, on the other hand, judges the worth of the program after it has been in operation.

For the UWI project formative evaluation took the form of:

1) Keeping a log at Mona of breakdown of equipment, down-time and early determination of what repair was needed before next transmission;
2) A 45-minute meeting by the production and technical team at Mona immediately after every program. This feedback session proved invaluable for improving overall performance of the demonstration;
3) On preparation days (Tuesdays and Thursdays), technical consultation over ATS-3 between technical coordinators at each location, production co-ordination by members of the "manpower" teams at each site;
4) Daily consultations with NASA engineers at the Goddard Space Flight Center in Maryland.

The summative evaluation consists of this report, plus the University's own internal evaluation of the demonstration. Together, the two reports will provide decision makers at UWI and AID with information relative to decision-making in terms of future operations of this kind.

3.2 Evaluation Objectives

The main evaluation objectives are:

1) To estimate technical feasibility through measurement of the technical performance of the satellite system, the reliability of the technology and the adequacy of signal quality for task accomplishment.
2) To assess user attitudes to the satellite system.

3) To gauge the benefits and utility of the satellite activities in furthering the University's objectives.

4) To estimate resources needed for an operational service.

Since technical feasibility was an important general objective of the demonstration, its evaluation is of paramount importance. The technical performance of the satellite system refers not only to received signal quality, but also signal loss, outages, reliability of the earth station component of the system, maintainability of equipment and user judgment as to the adequacy of the signal for the day's activity.

User attitude is a foremost concern since the level of acceptance of this new technology used by its members must be taken into consideration when UWI considers its future options in this field.

Measurement of benefits and utility of the programs can give useful indications of the worthwhileness of the demonstration as a whole while churning up important evidence and comments as to which elements of the demonstration are worth maintaining in a possible future operational system.

The resources needed for an operational service are very different in many ways than the resources that were available for the short eight-week demonstration. For one thing satellite time will not be free. The demonstration used NASA's ATS-6 and ATS-3 satellites, an operational service would most likely use an INTELSAT satellite. The present evaluation will examine the type of costs involved for such an operational service as well as draw on the information gathered from the demonstration to assess the resources that UWI can draw upon to support and service an operational system and the type of programs that can be developed.

3.3 Methodology, Data Sources and Measuring Instruments

Different projects necessitate different evaluation approaches. The UWI satellite demonstration was primarily a test of feasibility of using satellite technology to improve some services offered by the University and to overcome some problems of inter-campus communication and administration. Although a feasibility demonstration, it was expected to provide answers not only to the feasibility question but also to the type of resources, programs and services for a possible operational system. The demonstration was not meant to be an experiment in the true scientific sense. Accordingly, no attempt was made to set up or approximate the conditions of an experiment, that is, random assignments of participants or groups to the satellite activities, use of control groups of any sort, or attempt to measure changes in attitude, behavior or performance over time

Evaluators who go into the field learn very quickly (if they were not already aware of it) that research in the real world calls for some compromises in both design and methodology. The fact that one is unable to do a true experiment or even a powerful quasi-experiment (one with few threats to validity) does not negate the value of the evaluation findings. It does limit generalizability of the findings, but it is possible to have general confidence in the results by using (as the present evaluation does) multiple methods and multiple instruments (questionnaires, interview log keeping, etc.) to arrive systematically at useful answers from multiple techniques.

Data were collected in different ways, by questionnaires, interviews and personal observation and the keeping of logs. The data sources for the present evaluation and the type of measuring instrument used are summarized in Table 9.

TABLE 9

DATA SOURCES AND MEASURING INSTRUMENTS AS THEY RELATE TO ELEMENTS OF THE DEMONSTRATION

System Element	Data Source and Type of Measuring Instrument
The Technology	1. A technical log filled out by the technical operator at each site after every program -- Appendix Two.
	2. Technical notes kept by Technical Coordinators at Cave Hill and Mona on system reliability, breakages, outages, repairs and other maintenance problems.
The Activities	3. A questionnaire to students who received the satellite video lectures at Mona and Cave Hill -- Appendix Three.
	4. A questionnaire to participants in teleconferences who used the technology i.e., spoke via satellite at Mona, Cave Hill and Castries while being a member of a discussion or conference panel -- Appendix Four.
	5. An end of demonstration questionnaire which formed the basis for interviews with a list of key personnel of the University of the West Indies who took part or witnessed the demonstration activities -- Appendix Five.
	6. An informal group interview with the heads of the technical and production teams at Mona.
	7. Personal observations.

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3.3.1 The Technical Log: (Appendix Two)

The technical log was filled out by the technical operator at each site within minutes of the conclusion of every program. The log was used to provide an on-going record of received signal quality, amount of interaction among sites and the type of technical problems encountered. Technical operators also recorded attendance figures and any action that was needed to correct problems before the next transmission.

The received signal quality was rated on a scale of 5 to 1 according to the following code: 5 = excellent, 4 = good, 3 = fair, 2 = poor, 1 = unusable or unreadable. Interaction was grouped into four categories: no interaction, 1-5 times, 5-10 times, more than 10 times. Technical problems refer to picture fades, loss of transmission on either satellites, and problems related to earth station equipment.

3.3.2 Technical Notes

The Technical Coordinator at Mona and Cave Hill kept notes on what item of equipment was faulty or needed repair, amount of downtime, and any other maintenance problems related to the equipment. During technical coordination sessions on ATS-3, technicians exchanged notes on problems and assisted each other in diagnosis and repair work.

In St. Lucia there was no formal note taking for the few transmissions there but note was made at Mona and Cave Hill of any equipment problems reported by the St. Lucia technical operators during formative evaluation sessions on ATS-3.

3.3.3 The Student Questionnaire: (Appendix Three)

The student questionnaire was administered to each student for whom the lecture had some significance. Observers were not given questionnaires,[10] and in any event there were very few observers. The questionnaire was filled out in a group setting within minutes of the completion of the lecture. Any typographical errors, missing letters or faint prints were pointed out and corrected. Questionnaires were collected before students left the building.

The student questionnaire used three-item scales to assess student attitude to the satellite video lectures, student evaluation of lecture performance, student learning from the satellite video lectures compared to traditional classroom methods, utility of the lectures to coursework and student willingness to take satellite video courses in the future.

The questionnaire was constructed to take into account the fact that student lectures at UWI are about 10- to 15-minutes apart, which means that respondents to our questionnaire had very little time to answer the questions. Three-item scales (e.g., good, fair, poor) were used. In addition, the questionnaire was made relatively simple.

3.3.4 The Teleconferencing Questionnaire: (Appendix Four)

This instrument was filled out by persons who actually used the technology, i.e., spoke on the system while being part of a panel preselected for the conference, within minutes of the end of each program. On some occasions a respondent asked to take the questionnaire

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[10] In a few cases this was done in error.

away for completion because of pressing engagements around the time the program ended. These questionnaires were subsequently returned to the local coordinators as promised.

Questionnaires were filled out in a group setting usually right where the panelist had been sitting. Once again, graphical errors and faint prints were corrected.

The teleconferencing questionnaire sought to determine, using many 5-item scales: attitude to programs and to the technology; tech nical quality of reception from both satellites; adequacy of signal quality for the tasks to be accomplished; utility of satellite teleconferencing for specific tasks related to problem solving; success to accomplishing conference objectives; benefits to users; and participant willingness to use satellite technology in the future on a regular basis.

Teleconference participants came from all over the Caribbean. For the first 75 percent of the demonstration only persons at the two campuses of Mona and Cave Hill made use of the satellite system. But during the remainder of the demonstration, the two in-person outreach seminars in St. Lucia provided an opportunity for participants from non-campus territories of the Leeward and Windward Islands as well as Bahamas, Belize, the British Virgin Islands, and the Cayman Islands to use the satellite system. This means that the answers to the tele-conference questionnaire come from the full constituency of the University of the West Indies (although not fully representative of it).

3.3.5 The Post-Demonstration Interviews: (Appendix Five)

End-of-demonstration interviews were conducted with 15 UWI top-level personnel who had participated in the demonstration activities and so had first-hand experience with using the technology. With the exception of one lecturer who preferred to make an overall comment, identical interviews, using the open-ended questionnaire referred to in Table 9 were conducted with every respondent.

In all cases the interviews were done on a one-to-one basis, mostly in the office of the UWI official in question. One official completed and returned the questionnaire, and a follow-up interview to elaborate and/or clarify points was done on the telephone. Some interviewees requested confidentiality which is being respected when quotes are made in this report.

The primary objectives of the post-demonstration interviews were:

1. To ascertain whether the demonstration had in fact accomplished the original stated objectives as laid down by the University.
2. To investigate the applicability of satellite communication to participants' own work within the University.
3. To assess what benefits to the UWI were derived from the demonstration.
4. To determine how these policy level UWI personnel felt about the use of advanced communication technology in the service of development, and particularly satellites as one option.

5. To obtain further information with regard to willingness to use satellite technology on a regular basis and more specifically the type of programs and outreach activities that should be considered as well as the regional institutions and agencies that should be involved.
6. To get some idea of the overall effect of the demonstration on the University.

3.3.6 Informal Interview with Heads of Technical and Production Crews

A very informal interview for about 1-and-½ hours was held with Mr. Tony Walling, Technical Coordinator, Mona; Mrs. Alma Mockyen, Director of Productions; Mr. Oval Lue, Senior Engineer, Jamaica Broadcasting Company, a key member of the technical team and Mrs. Lucella Bailey, Floor Manager for Productions. They all spoke frankly of the problems, the tremendous learning experience as well as their disappointments. We spoke about the level of effort and resources utilized to service the demonstration and they volunteered helpful comments and suggestions for a possible future operation.

Chapter 4

EVALUATION: STRUCTURE AND FINDINGS

4.1 Structure

The structure of the evaluation findings is one in which measures taken on dependent variables are grouped into categories, appropriate to the objectives of both the demonstration and the evaluation. Foote, Parker, and Hudson (1976) provide a precedent for the conceptual framework for this type of approach which appears to have much utility when dealing with short duration feasibility or exploratory demonstrations that do not lend themselves readily to the imposition of any single research design.

The categories of dependent variables are:

A. The technical performance of the system

B. Attitude of users

C. Benefits to users

D. Task accomplishment

E. Effect of the demonstration on the University

F. Resources necessary for an operational service.

A few sample questions covered under each of the above categories gives a clear picture of the dimension of each topic area.

4.1.1 Technical Performance: Organization of Results

To be useful, the system must be available and be used. The findings on technical performance relate to:

1. What was the received signal quality at each location?

2. Was the signal quality adequate for the tasks?

3. How reliable was the equipment?

4. What kinds of breakdowns were encountered, and how quickly did the system recover?

4.1.2 Attitude of Users: Organization of Results

User acceptance of the technology is usually regarded as one of the criteria for success in innovations dealing with new technology. The findings on attitudes have to do with the following:

1. Did users like/dislike the system?

2. Did attitudes vary across locations, type of users?

3. How did participants feel about unequal video capability at all sites?

4. Did unequal video capability affect participation, or have any other effect?

5. Was video important?

6. Was color important?

4.1.3 Benefits to Users: Organization of Results

The findings on benefits to users are related to dependent variables that help to answer the following:

1. What benefits did students, teleconference participants, co-ordinating teams, derive from using and servicing the system?

3. What was the value of the teleconferences to the professionals' own work?

3. What were the benefits to the University as an institution, over and above the benefits to individuals?

4.1.4 Task Accomplishment: Organization of Results

A vital evaluation component of any satellite teleconferencing

system is related to success in accomplishing one's objectives using the teleconferencing mode. The findings on this section cluster around the following:

1. Were teleconferences successful in accomplishing their objectives?

2. For what type of tasks is satellite communication suitable in users' work or professions?

3. How useful were the satellite teleconferences for specific tasks?

4.1.5 Effect of Demonstration on UWI: Organization of Results

Subjective responses of UWI policy and top-level personnel are used to respond to the question: What has been the overall effect of this demonstration on the University?

In addition, a variety of personal observations of the author during the demonstration as well as press publicity of the University's undertaking will be drawn upon to arrive at a useful assessment of effect.

4.1.6 Resources for Operational Service: Summary

The major goals of feasibility testing and experimental pilot projects are to arrive at an estimation of the nature and level of resources needed for an operation system if a decision is later taken to implement one. The present evaluation will provide answers to:

1. What human resources that were identified during the demonstration can the UWI draw upon for an operational service and what level and type of additional human resources will be necessary for a permanent service?

2. What is the level of willingness of participants in the

demonstration to use satellite technology for similar purposes in an operational system?

3. What type of programs should be developed?

4. What part should the LDC's play in such a project?

5. Which regional institutions should be involved?

6. What would be the cost of hardware and software in such a system?

Organizing the evaluation results around clusters of information that are themselves organized around topics irrespective of where the data came from is a useful technique, especially when the topics contain the information decision-makers need to make intelligent choices about potential projects.

4.1.7 The Technical Performance of the System

The two satellites used for the demonstration, ATS-6 and ATS-3, did not "view" the Caribbean islands equally well. ATS-3 is in orbit at 105° West, while ATS-6, after servicing the SITE project in India, has been maneuvered into its present position, 140° West. Barbados and St. Lucia can barely see the satellite above the horizon, the angle of elevation being approximately 0-6° and 1.5° (approximately) respectively. Being on the edge of the ATS-6 footprint, Barbados and St. Lucia were expected to experience more problems with reception quality than Jamaica, which had a better elevation angle of 17° to view the satellite.

4.1.7.1 ATS-6: Video

The pre-test in Barbados in August 1977 warned that fades of the ATS-6 picture of a fairly severe nature could be expected for durations

of 30-90 seconds several times per hours. One projection was that roughly 4-5 minutes of picture loss could be expected in a ninety minute period. During the opening ceremony on January 20th, there were 5 fades (but not total picture loss) of average duration of 3 minutes, which was better than expectation, and this occurred because the ATS-6 receiver antenna in Barbados was positioned for maximum signal 15-20 μ amps and there were no more complete fades for the remainder of the program. Indeed, the ATS-6 transmission quality for Cave Hill (Barbados) during the demonstration was considerably better than expected.

For the first 4 weeks (50 percent of the demonstration), there were only 2 fades of 1 minute average duration. During the second 4 weeks Cave Hill received fairly good pictures.

Table 10 shows that the overall ATS-6 picture quality rated by technical operators and participants across locations was 2.58 on a scale of 1 to 3 with "1" = poor, "2" = fair and "3" = good.

The weighted average of the means (justified by the vastly unequal N's) was used.

A good to fair signal of 2.6 for the entire demonstration is impressive given the particular problems encountered in St. Lucia. Picture loss in St. Lucia was frequent on the six occasions of formal transmission to that territory. The reason for this is not clear. After installation of the equipment and a few days of observation the NASA contracted engineers returned to the United States so there was no one with the required expertise to experiment with repointing of the antenna and to trouble-shoot the equipment to determine the cause of fades, eight times as frequent as Barbados where the angle of elevation was much lower.

TABLE 10

ATS-6 Picture Quality Rated by Technical Operators and Participants

ATS-6 Picture Quality

Location	Teleconferences		Student Lectures		Weighted Mean
	Rated by		Rated by		
	Technical Operator	Participants	Technical Operator	Participants	
	Mean	Mean	Mean	Mean	
Mona (N=179)	2.80 (n=15)	2.92 (n=43)	2.75 (n=7)	2.21 (n=114)	2.45
Cave Hill (N=255)	2.73 (n=15)	2.67 (n=50)	2.70 (n=7)	2.67 (n=183)	2.67
Castries (N=24)	2.40 (n=5)	2.46 (n=19)	*	*	2.45
Weighted Mean	2.71 (N=35)	2.73 (N=112)	2.73 (N=14)	2.49 (N=297)	2.58**

Code 1 = poor
2 = fair
3 = good

*Castries did not take part in lectures to students

**Weighted overall mean

As can be gleaned from another look at Table 10, Cave Hill's mean is the highest while Mona and Castries (with an extremely small n) are equal. The technical operators at Mona and Cave Hill are consistently close in their ratings of signal quality for both teleconferencing activity and guest lectures. The principal source of variance is the rating by the students at Mona of received signal quality for the guest lectures. This mean of 2.21 is the lowest rated figure.

At a post-demonstration meeting with the technical team on the Mona campus it was discovered that one of the monitors which behaved erratically had been used for viewing about half the students' lectures. This accounts for the high discrepancy between the mean of 2.75 rated by the technical operator and 2.21 by the students.

The best signal quality was received at Mona during the teleconferences. The means of a 2.8 and 2.9 are remarkably high. Because of the low rating of the Mona students, Cave Hill emerges with a better overall signal quality to Mona (mean of 2.67 and 2.45 respectively) which lends further evidence to the earlier statement that the picture quality received at Cave Hill was better than predicted.

Reliability tests were performed on the raw scores (ratings) of the technical operators and participants, and among technical operators across sites. The reliability coefficient of $r = .94$ among technical operators was quite high, but the corresponding statistic for technical operators and participants was lower, $r = .88$.

4.1.7.2 Picture Fades

Technical operators were required to keep a log of the numbe of fades as well as the duration of the fades of the ATS-6 picture.

Table 11 summarizes this aspect of the demonstration across locations.

TABLE 11

ATS-6 Picture Fades by location for the Two Halves of the Demonstration

	First 50% of Demonstration		Second 50% of Demonstration	
Location	Number of Fades	Duration of Fades	Number of Fades	Duration of Fades
Mona (N=21 progs)	1	3 minutes	1	30 seconds
Cave Hill (N=21 progs)	2	1 minute	9	2.44 minutes*
Castries (N=6 progs)	-	-	76	1.67 minutes

*There was one fade on one day which lasted 7 minutes.

The large number of fades in Castries account for the poor rating of signal quality by both teleconferencers and the technical operator (Table 11). Frequent fades occurred during installation and during the two programs witnessed by the NASA engineers, so it was assumed that little could be done about it. Only 9 fades of 2.44 minutes average, or put another way, loss of picture for 22 minutes out of approximately 1850 minutes, is quite impressive for Cave Hill considering its marginality for ATS-6 reception.

Mr. Roy Braithwaite, the technical co-ordinator at Cave Hill made the following overall observations in his draft report to the University of the West Indies on the ATS-6 reception.

There were few complete fades and when these did occur they were of short duration.

Only one 'long fade' occurred. That was on March 8th at 1540 GMT; this lasted for seven minutes.

The general pattern (if any) of reception/signal strength was as follows:

1430	Normal/Average Signal Strength	16 μ A
1505-1515	- do -	22 μ A
1545-1600	- do -	14 μ A

Except during the transmission from Denver on 27th February, 1978 when a peak of 35 μ A was reached and average strength was higher than Mona:

The picture quality during this transmission was also much better than any received during the test of August 1-6, 1977, when the antennae was on the Library roof with a much better view of the sea.

For the 'General Pattern,' a better signal strength could be obtained at the start of the programme using a dish elevation of 1°.

e.g. on January 20, 1978 (Jim Meenen) using 1°
1430 GMT Signal Strength 20 μ A
1515 " " " 4 μ A

This could be due to atmospheric refraction and bending of the electromagnetic waves causing the satellite beam to reach us at '1°' when the atmosphere is cool.

However as the atmospheric temperature increases with the rising sun (average temperature at 15-1600 GMT, 20°C) there is less bending of the beam and elevation has to be decreased.

<u>Solution</u>: By setting dish at 0.5° elevation our signal is weaker at start, but there is no need to change elevation during the programme, i.e. average elevation: 0.5°.

<u>Draw Back</u>: The weaker signal at 1545+ could be due to reflection and interference off the sea. (Hence the poor signals on Library in August 1977).

<u>NOTE</u>: The Cave Hill site is approximately 70 m. above sea level and about 3 km from the shore.

Hence at 1600 when the beam from ATS-6 is coming to us from just over the horizon' there is possible intereference from the reflection off the sea.

Clouds: Weaker signal strengths than normal were obtained whenever rain clouds passed. Fortunately/unfortunately we did not have any rainy days for the duration of the programme. However, dark rain clouds out to the horizon would correspond (occur simultaneously with) a 10-14 μ A reading.

Stray/Spurious Interference

Black interference could be seen and heard whenever an 'old car' passed or whenever the lawn mower was working nearby.

4.1.7.3 ATS-6 Audio

Table 12 shows that the overall signal quality of the ATS-6 audio which accompanied the ATS-6 picture was 2.6, very close to the ATS-6 video. The main source of variance in the table lies with the rating of the St. Lucia teleconference participants with a mean of 2.84. This mean is significantly different ($p < .01$) than that of the technical operator at the same site (mean = 2.50).

It is possible that the technical operator's judgement is a more accurate estimate of the signal strength since part of his job was to observe quality closely, while participants, having to rely on the audio for comprehension when the video went, might tend to overrate it. (Picture fades were not always accompanied by loss of audio. Loss of audio only occurred when there was total picture loss). Reliability between technical operator and participants was an acceptable $r = .88$.

Cave Hill's ATS-6 audio quality was virtually the same for teleconferences (mean 2.56)[11] and guest lectures (mean 2.58)[11]. Participants in the teleconferences at Mona could not rate the ATS-6 audio as they would be hearing their own voices coming back down a 1/2 second later which would have created all sorts of feedback problems. For guest lectures,

[11] These means are the averages of tech. operators' and participants' ratings.

TABLE 12

ATS-6 Audio Quality Rated by Technical Operators and Participants

	ATS-6 Audio Quality				
	Teleconferences		Student Lectures		
	Rated by		Rated by		
Location	Technical Operator	Participants	Technical Operator	Participants	Weighted Mean
	Mean	Mean	Mean	Mean	
Mona (N=129)	2.60 (n=15)	—*	2.50 (n=7)	2.57 (n=107)	2.57
Cave Hill (N=255)	2.53 (n=15)	2.60 (n=50)	2.50 (n=7)	2.60 (n=183)	2.59
Castries (N=24)	2.50 (n=5)	2.84 (n=19)	-	-	2.77
Weighted Mean	2.56	2.67	2.50	2.59	2.59**

Code 1 = poor
2 = fair
3 = good

* Participants at Mona only spoke via ATS-6 audio so could not rate the received quality of their own voices.

**Weighted overall mean.

Mona students and the Mona technical operator estimated the ATS-6 audio in pretty much the same way (means of 2.57 and 2.50 respectively.)

4.1.7.4 ATS-3: Audio

The ATS-3 signal was mostly poor. Table 13 shows an overall mean of 1.58. Later in the section some reasons are advanced for this. Basically it had to do in part with possible interference from the two sets of earth station antennas of ATS-6 and ATS-3, for it was observed that on some occasions the ATS-3 signal would be clear before the program started but would deteriorate when the two satellites were operative. Another factor was the inability of the ATS-3 transmitting equipment in St. Lucia to generate optimum power for three out of the six transmissions involving St. Lucia.

To understand Table 13 fully, it is important to note that during teleconferences Mona did not speak to Cave Hill and Castries on ATS-3.[12] All sound from Mona was received over ATS-6, so all estimates of ATS-3 in Table 13 are received ATS-3 quality from Cave Hill and Castries. Accordingly, Cave Hill and Castries would be rating each other while Mona would rate the two without differentiating between them. The non-estimate for ATS-3 sound from Cave Hill for guest lectures occurred because student questions from Mona were relayed over ATS-6 sound for some lectures, in others there was some difficulty with the ATS-3 mike extension.

Best estimates (mean 1.72 and 1.62) which only approaches fair quality, came from Mona participants during teleconferences and Mona students during lectures.

[12]There was one exception to this: During the Solar Energy Teleconference Mona spoke once on ATS-3 when Denver originated on ATS-6 and on that occasion the ATS-3 Mona signal was reported unusable by Denver, Castries and Cave Hill.

TABLE 13

ATS-3 Audio Quality Rated by Technical Operators and Participants

	ATS-3 Audio Quality				
	Teleconferences		Student Lectures		
	Rated by		Rated by		
Location	Technical Operator	Participants	Technical Operator	Participants	Weighted Mean
	Mean	Mean	Mean	Mean	
Mona (N=177)	1.50 (n=15)	1.72 (n=62)	1.38 (n=7)	1.62 (n=93)	1.64
Cave Hill (N=20)	1.40 (n=15)	1.43 (n=14)	-	-*	1.41
Castries (N=24)	1.60 (n=5)	1.37 (n=19)	-	-	1.42
Weighted Mean	1.47	1.61	1.38	1.62	1.58

Code 1 = poor
2 = fair
3 = good

*There were problems at Mona with the equipment for the student to speak on ATS-3 and responses to that aspect of the questionnaire were unreliable.

4.1.7.4.1 Possible Reasons for Poor ATS-3 Reception

1. Intermittent interference between ATS-3 uplink and ATS-6 receive antennas. This was first observed during the Barbados test in August 1977. At that time the VHF 149 MHz uplink Yagi antenna of ATS-3, connected to the 140 watt amplifier, was located only 20 feet away from the 10 foot 860 MHz UHF downlink antenna of ATS-6. It was recommended by NASA that these antennas be separated by at least 100 feet.

At all sites this specification was observed but it might be that the critical distance could be more than 100 feet.

This is essentially speculative, but speculation based on repeated observation by the author, Mr. Braithwaite, and Mr. Walling that:

a. When the ATS-6 satellite was not in use, for example, during non-formal program planning and formative evaluation among sites, the ATS-3 receive quality on all sites was consistently better, usually "good" using the normal codes.

b. On three successive program days the ATS-3 signal was good among all sites while setting up the programs, minutes later when ATS-6 came on, the signal deteriorated.

2. Low power from the DC supply resulting in weak transmission. This was true of Castries for the first of the two weeks. Regulated Power Supply (Model PS-25c) was capable of outputting up to 15 volts, 13.5 V DC was the most Barbados could get out of theirs and it was not until a whole week had gone by that it was observed that in the St. Lucia equipment the voltage dropped on transmission from 12 volts to 9 V, resulting in a weak transmitted signal.

Some trouble-shooting, initiated and engineered remotely by technical co-ordinator Mr. Roy Braithwaite via ATS-3 at Cave Hill, enabled

CD

Mr. Michael Brown, technician on the Castries site, to repair the unit and a signal as good as Cave Hill's (13.5 V DC on transmission) was observed. Cave Hill, who had reported a totally unintelligible receive signal from ATS-3 the week before, reported a slightly better receive quality, though some interference (for whatever reason) was still present.

3. Atmospheric interference and time of day. Mr. Roy Braithwaite, technical coordinator at Cave Hill, observed that reception dropped whenever a rain cloud was in the path of the signal and that reception appeared to worsen from about 11:30 a.m. Barbados time, which is 10:30 a.m. Jamaica time (about 1 hour after the start of the day's program). Mr. Tony Walling at Mona observed a similar pattern, but by then it was nearing the end of the demonstration.

4.1.7.5 Adequacy of Signal to Tasks

Signal strength is one dimension of system performance, the relationship of signal quality to the task to be performed is quite another. The latter allows us to estimate the level of signal considered adequate or tolerable for the particular day's activity. At each location and for each teleconference, the adequacy of the satellites' signals were rated by participants. The scale used ranged from "1" to "5", where "1" meant completely inadequate, "2", inadequate, "3" neutral, "4" adequate and "5" completely adequate.

For the UWI demonstration the signal quality of the satellite channels taken together was deemed to be adequate. The percentage of participants who rated the system adequate or better was just about 60%, a high figure considering the problems already described. A further 25% were neutral while only 16% felt it was inadequate.

x 21

TABLE 14

Percentage Distribution, Means and Standard Deviations of Ratings of Adequacy of the Received Signal Quality of the Two Satellites

Satellite Channel	Percentage Distribution					Mean	Standard Deviation
	Categories						
ATS-6 Video (N=108)	1	2	17	43	37	4.13	.82
ATS-6 Audio (N=74)	0	3	27	50	20	3.87	.76
ATS-Audio (N=89)	15	29	32	15	9	2.74	1.10

Code 1 = completely inadequate

2 = inadequate

3 = neutral

4 = adequate

5 = completely adequate

Table 14 demonstrates clearly that the ATS-3 performance was the least adequate and is responsible for dropping the overall mean down to 3.52. The ATS-6 performance, i.e., video and sound together, had a high mean of 4.04, clearly adequate.

Table 15 provides a more elaborate breakdown across sites and communication channels. The combined performance of the ATS-6 satellite, picture and sound, was much better than the ATS-3. A t-test of the means 4.04 and 2.57 assuming a null hypothesis (no difference) shows the difference between means to be statistically significant. at the $p < .005$ level.

4.1.7.6 Reliability of the Equipment

With so much equipment involved it was inevitable that some would fail and affect system performance. Fortunately, in this UWI demonstration, breakdowns of earth segment (mostly studio) equipment occurred at periods when they could be repaired in time with the result that every program went off on schedule and with the exception of the first 10 minutes of the final closing ceremony, lasted the entire 90 minutes without breakdowns of any sort. During that final session both Cave Hill and Castries failed to get an adequate picture at the start and Mona retuned the ATS-6 transmitter for a few minutes.

The major setback in equipment performance was the inadequacy of the DC power supply to take the necessary load on transmission. The KLM amplifier takes 22.0 Amps; the Clegg unit takes 3.2 Amps in transmission for a total of 25.2 Amps.

However, the power supply could only provide 20 Amps continuously and 25 Amps intermittently. The result was that the power supply overheated

TABLE 15

Percentages, Means and Standard Deviations of Adequacy of the Satellite Channels for Tasks across Locations and Channels

Location	ATS-6 Video			ATS-6 Audio			ATS-3 Audio		
	% Rating Channel Adequate or Better	Mean	Std. Dev.	% Rating Channel Adequate or Better	Mean	Std. Dev.	% Rating Channel Adequate or Better	Mean	Std. Dev.
Mona (N=103)	91% (n=44)	4.39	.81	-	-	-	29% (n=59)	2.98	1.20
Cave Hill (N=111)	73% (n=45)	4.02	.82	68% (n=47)	3.83	.80	27% (n=11)	2.46	1.40
Castries (N=57)	74% (n=19)	3.90	.81	74$ (n=19)	3.95	.71	10% (n=19)	2.26	.81
Weighted Average Across Sites	80.5%	4.15		69.7%	3.86		24.7%	2.76	

Code 1 = completely inadequate

2 = inadequate

3 = neutral

4 = adequate

5 = completely adequate

during any transmission of more than 8 minutes continuously. This severely limited the originating capabilities from Cave Hill and Castries where advance plans had been made for originating lectures and presentations varying in length from 15 minutes to a half an hour.

The solution which was arrived at by the technical teams was to attach a fan to the power supply and to adhere strictly to no more than 6 minutes continuous transmission.

4.1.7.6.1 Breakdowns

At Mona, where a log of all breakdowns were kept, Mr. Tony Walling, technical coordinator, Mona Campus, reported the following downtime of equipment and the average length of time faulty items of equipment were out of action. His reports are summarized in Table 16.

At Cave Hill, the power supply broke down on two occasions during tests but was not out of action for more than a day . No items of equipment broke down at the St. Lucia end.

TABLE 16

Breakdown of Equipment, Nature of Faults and Average Downtime

Equipment	Nature of Fault	Average Downtime
1. Clegg Transmitter/Receiver Power Amplifier	Front end faulty	One day
2. Color Monitor	Faulty cover board	Two days
3. Color Monitor	Flashover on color tube socket	Two weeks
4. Color Monitor	Line board	One day (on two occasions)
5. Video Recorder	Record circuit faulty	Two days
6. Video Recorder	Mechanical stringing mechanism faulty	Four days

Technical problems were discussed daily and have been recorded by Mr. Walling.

The following are general observations on problems:

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(1) The inadequacy of ATS-3 resulted in poor sound reception from Barbados much of the time.

(2) Most people, panelists and students alike, felt it a disadvantage not to be able to see the persons speaking, especially when the sound was poor.

(3) The limitations imposed on them by the sound problem and the time limitation for the recharge of batteries, appeared to irk some of the participants in Barbados who did not feel they were allowed adequate opportunity to participate.

(4) The use of tapes to overcome the participation difficulty was not always successful when the tapes originated in Barbados because of the time involved in converting the tapes with the assistance of the local radio station. This was also aggravated by the airline strike which caused delays in receiving tapes from Barbados, resulting, in at least one instance, to inability to use a prepared tape.

(5) The physical conditions of the area in which the students/observers at Mona were housed and the shortage of equipment made it difficult to arrange for provision to be made for audience participation, i.e., question and answer periods. As the area was also wide open there was a certain amount of distraction of noise nuisance.

(6) Technical expertise for repairing and adjusting colour TV equipment, and an adequate supply of spare parts is a must.

In spite of all the difficulties listed, the programmes went well on the whole. Interest and enthusiasm among those participating in the lectures and panel discussions were very high and the majority of those taking part appeared to think it a very worthwhile experiment which could well be followed up on a long term basis if better accomodation, equipment, facilities and staffing were available.

Mrs. Claudette Lowe, a key member of the coordinating pool at Mona reported the following general observations on problems.

When the programmes went well they went very well indeed and this was so in a surprising number of instances in view of the inexperience of the crews, the inadequacy of the equipment, and the makeshift conditions under which the programmes had to be produced. Equipment was constantly having to be removed and replaced because the room used is the one in which all important or large University meetings are held.

4.1.7.7 Use of the Satellites

ATS-6 was used on Mondays, Wednesdays and Fridays for 90 minutes. ATS-3 was used every day, Monday through Friday for 2 hours, the 90 minutes synchronization with ATS-6 plus a preliminary half-hour for last minute program and technical coordination. In addition, on some Saturdays and Sundays for varying periods of time from 1 to 3 hours, ATS-3 was also used for technical consultations with NASA and among UWI sites to iron out problems as well as to plan the following week's program.

In all, there were about 34 hours of ATS-6 transmission, and approximately 90 hours of ATS-3 satellite time utilized, 65 percent of which were for formal program activities.

One important non-formal use of the ATS-3 satellite was for formative evaluation among coordinators at each site as well as for program and logistics coordination.

4.2 Attitudes of Users

Any teleconferencing or lecture activity via satellite has two components which should be differentiated from each other in any investigation of attitudes. They are:

a. Attitude toward the programs

b. Attitude toward the technology.

User attitude was measured in many ways. Firstly, we tried to determine how users felt about the satellite programs; whether they liked them, were neutral, or disliked them. As explained earlier, for students, a three-point scale was used and a five-point scale for teleconferencers.

To compare the two types of participants in Table 17 the five-point scale was collapsed to fit nicely into the like/neutral/dislike categories used by the students.

Secondly, an effort was made to secure responses of attitudes to certain aspects of the technology. Did participants who spoke on the system find the technology easy to use? How did they feel about satellite teleconferencing compared to face-to-face conferences? One sought to determine also participant feeling towards the unequal video capability across sites and any possible effects on participation. Another attitudinal domain had to do with feelings toward the importance or otherwise of video, the importance or non-importance of the color component.

The information presented here comes from the analyses of the structured questions on attitudes as well as a summary of responses to open-ended questions about unequal video capability and its effect on participation.

4.2.1 Attitude to the Programs

Did users like the satellite programs? The overall mean of 2.74 (maximum is 3) in Table 17 attests that they did. In St. Lucia, despite setbacks, respondents "liked" the teleconferences a great deal. The n of 19 is small compared to Cave Hill (54) and Mona (63). Later in this section, however, the observation is made that there were many special characteristics of the "teleconferences within seminars" in St. Lucia that shed light on the fact that 18 out of the 19 respondents there liked the system.

Mona respondents were also very positive in their attitude (mean 2.8); Cave Hill participants were a bit more conservative (mean 2.6). This might

TABLE 17

Ratings of Attitudes to Satellite Programs by Participants across Locations

	Attitude of Users		
	Teleconference		Student Lectures
Location	All	St. Lucia only	
Mona	2.79 (n=63)	2.75 (n=12)	2.74 (n=173)
Cave Hill	2.61 (n=54)	2.40 (n=8)	2.73 (n=178)
Castries	2.94 (n=19)	2.93 (n=15)	-
Weighted Mean	2.74	2.75	2.73

Code 1 = disliked

2 = neutral

3 = liked

have been in part due to the frequent complaint by Cave Hill that Mona tended to "hog" the show, with the result that persons at Cave Hill felt they were given unequal opportunity to state their views and make their contributions.[13] The guest lectures by satellite got an equal nod of approval from students at Mona as at Cave Hill.

We compare the means across locations for the teleconferences related to the St. Lucia seminars to determine how attitudes to those teleconferences varied. Mona remains consistent at about 2.8 while Cave Hill dips further to 2.4.

Table 18 gives an idea of the percentages of respondents who expressed a definite liking for the satellite activities. Ninety-five percent of the St. Lucia participants liked the teleconferences even if the signal quality was erratic. The programs in which St. Lucia participated were rich in content, well planned and attracted persons from all over the Caribbean. Organization, content, presentation and subject matter seems to have overridden difficulties with reception. In addition, NASA engineers and local coordinators explained the technical configuration of the demonstration and the expectation of picture fades, etc., before every program. The 95% rating suggest participants understood that message.

4.2.2 Importance of Video

"How important was the video in today's activity?" was the question which elicited the responses summarized in Table 19. All sites felt video was important in some way, Mona 87 percent, Cave Hill 86 percent,

[13] Stated in interview with author and written on questionnaires.

TABLE 18

Percentage of Respondents who 'Liked' the Satellite Activities by Location

Location	Percentage who 'Liked' it	
	Teleconferences	Guest Lectures
Mona	84% (n=63)	75% (n=118)
Cave Hill	59% (n=54)	73% (n=183)
Castries	95% (n=19)	-

TABLE 19

Importance of Video by Activity by Location

Location	Activity	Video not Important	Video somewhat Important	Video very Important	Mean
Mona N=49	Teleconferences	16% (n=8)	35% (n=17)	49% (n=24)	2.33
N=106	Student Lectures	12% (n=13)	33% (n=35)	55% (n=58)	2.43
Cave Hill N=49	Teleconferences	18% (n=9)	45% (n=22)	37% (n=18)	2.19
N=169	Student Lectures	11% (n=19)	45% (n=76)	44% (n=74)	2.32
Castries N=19	Teleconferences	11% (n=3)	47% (n=9)	42% (n=6)	2.31
Overall Average		13%	41%	46%	2.30

Code 1 = not important
2 = somewhat important
3 = very important

Castries 89 percent.[14] Indeed overall, more people rated the video as "very important" (45 percent), than "somewhat important" (41 percent).

Careful scrutiny of Table 19 shows very little difference between guest lectures and teleconferences (87 percent and 84 percent) in terms of respondents' ratings of video being of some importance. Neither do the figures differ to any real extent across locations, 86 percent at Mona, 86 percent at Cave Hill and 89 percent at Castries. Once again it is observed that people at Mona felt the need for video more than their counterparts in Castries or Cave Hill, the means being 2.43, 2.32 and 2.32.

A chi-square test on the "importance of video" frequencies for Mona and Cave Hill was found not to be statistically significant within the .05 level $X^2 = 5.7$ $p < .10$ $df = 2$.

There was very little difference in students' perception of the importance of video for the individual lectures. They rated the video component extremely high for every lecture, the average being 89 percent (N=275). The split between Arts and Science subjects was 88 percent to 91 percent respectively.

These findings imply for future planning that video is important for attitudinal reasons, if lectures similar to the demonstration and teleconferences are planned. Of course, the use of video might be just a luxury, if it is only preferred, and does not produce better learning (as it is more costly than audio only).

One pointer to whether video is crucial to the teleconference can be gleaned by the responses of teleconference participants to the question:

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[14]Obtained by averaging teleconference and guest lecture percentages, then adding codes 2 and 3.

"Could you have carried out today's activity effectively without video?" (the same was not asked of the students). They replied:

Yes	Not Sure	No	
37%	34%	20%	N=132

There was very little difference between Mona and Cave Hill, but in St. Lucia, the majority, 53 percent, were not sure, 32 percent, however, said "yes" with only 16 percent saying "no."

4.2.3 Attitudes to the Technology

Attitudes to the technology are not always easy to discern from attitudes to the programs unless the questions asked are specific to the technological components of the system.

The preceding section dealt with programs; we now present respondents' feelings with regard to the technology in respect to three dimensions related to use of the technology. Participants who spoke on either of the satellite systems were asked whether they agreed or disagreed with the following statements that:

1. The technology is very easy to use.

2. The telecommunications equipment distracts from the real content of the proceedings.

The measure used was an attitude scale graded 1 to 5 where:

1 = strongly disagree

2 = disagree

3 = no opinion

4 = agree

5 = strongly agree.

Table 20 shows that 82 percent of respondents feel the technology is easy to use, while 75 percent feel the telecommunications equipment does not distract from the real proceedings. Clearly there was user acceptance of the technology.

4.2.4 Attitudes Towards Unequal Video Capability

Mona could both transmit and receive ATS-6 video while Cave Hill and Castries could only receive video. All sites had two-way audio capability using ATS-3. Participants were asked whether the unequal video capability

a. affected them

and more specifically did it

b. inhibit their participation

It is clear from Table 21 that while a mere 17 percent felt their participation was inhibited by the fact that only Mona could transmit video, a substantial number of respondents (49 percent) were affected in one form or another. Cave Hill felt inhibited more strongly (30 percent) than the other two. Indeed during the teleconferences where the author was present, Cave Hill repeatedly stated that the lack of video prevented them from giving cues to Mona to split the discussion more equitably. Cave Hill did have the capability of interrupting Mona on ATS-3 (audio only) but either through politeness or awe used this tactic infrequently.

However, perhaps the most striking thing about Table 21 is the fact that Mona felt "affected" more intensely than anyone else . Since Mona had two-way video capability and the rest did not, a chi-square test of significance on the frequences of Mona and the rest (Cave Hill and Castries combined) was performed. There was no significant difference.

TABLE 20

Percentage Responses to Questions on Use of the Satellite Technology for Teleconferencing

	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
The technology is very easy to use (N=127)	18%	64%	7%	9%	2%
The telecommunications equipment distracts from the real proceedings (N=123)	4%	15%	6%	63%	12%

TABLE 21

Effect of Unequal Video Capability Across Locations

	"Affected Me"			"Inhibited Participation"		
	Yes	No	#	Yes	No	#
Mona	61%	39%	(n=59)	11%	89%	(n=54)
Cave Hill	55%	45%	(n=49	30%	70%	(n=44)
Castries	32%	68%	(n=19)	10%	90%	(n=19)
Weighted Average	54%	46%	(n=127)	18%	82%	(n=117)

Although participants were "affected", the unequal video capability did not inhibit their participation. Eighty three percent of respondents (N=117) said so. If they were affected but participation was not inhibited, in what ways were participants "affected?" The questionnaire also requested respondents to explain in what way the unequal video capability affected them. Table 22 summarizes some responses given by more than one person. Here are some of the responses that were given by only a single individual.

4.25. Importance of Color

It had been anticipated at the time of questionnaire construction that the UWI would have gone ahead with a short course of lectures in a science subject[15] and one from an arts and general studies faculty. For a science subject, color might have been important and since it costs much more to use color equipment than black and white, the question of color's importance to the lecture was pertinent to any future operation. Although these were only guest lectures there was a mix of science, medicine and arts subjects which made the color question still important.

How important was color? Most students felt it was somewhat important but only barely so, 49 percent felt it was not important.

	Color not important	Color somewhat important	Color very important
Mona	49% (n=52)	23% (n=25)	28% (n=30)
Cave Hill	48% (n=76)	33% (n=55)	21% (n=35)

The UWI in planning a future video lecture series might wish to take into consideration the close margin between the important/not important dichotomy, so close that it might not be prudent to spend extra money on color.

[15] Botany or chemistry had been discussed.

TABLE 22

Similar Statements About Unequal Video Capability
Made by More than One Participant

1. Need to see persons, their facial expressions and get non-verbal signals (N = 7)
2. Need similar facilities at all sites. (N = 6)
3. Would love to see Barbasos' panel. (N = 5)
4. Affects interation. (N = 4)
5. As Mona couldn't see other sites, couldn't pick up cues. (N = 4)
6. Video on all sites brings the discussion close to a face-to-face type of situation. (N = 3)
7. If only one site can transmit video, need much more preparation. (N = 3)
8. Only one microphone for the entire panel is inadequate. (N = 3)
9. Affects attitudes. (N = 3)
10. Tendency for Mona to forget us. (N = 2)
11. One-sided video does not enhance interaction and discussion. (N = 2)
12. Affects balance and control. (N = 2)
13. Makes program less effective. (N = 2)
14. Made St. Lucia seem insignificant. (N = 2)

Given that color was important to at least 51 percent of students, for what lectures was it deemed to be somewhat or very important? This is a useful pointer to the future as well.

Table 23 shows a crosstabulation between the type of lecture and the students' rating of the importance of the video being in color. For both English and Law Two,[16] the majority rated color not important. However 61% of medical students deemed color to be important. On a whole students felt color was more important for Science subjects than Arts subjects, the percentages being 58 percent and 49 respectively. There was greater use of visuals and graphics for the Science subjects than for the Arts lectures, and color enhance such displays.

4.2.6 Additudinal Comments

Quite a number of comments made on the various questionnaires and during interviews are interesting in terms of the depth of perspective with which participants viewed the demonstration.

The statements are organized into praise and criticism categories. One avoids the terms positive and negative since someone who says, "Keep an eye on priorities" (as was said) could be categorized as having given a positive response by some and a negative one by others.

Praise	Criticism
1. Very good programs. (N = 7)	1. Time too short to cover all the materials. (N = 4)
2. We hope for it on a permanent basis. (N = 2)	2. Not a substitution for real inperson lectures. (N = 3)

[16]This was the second part of the Law lecture.

TABLE 23

Crosstabulation of Type of Lecture by
Student Rating of Importance of Color

	Importance of Color			
Type of Lecture	Color not Important	Color somewhat Important	Col Important	
1. Botany	42%	29%	29%	N = 7
2. Law One	44%	31%	25%	N = 36
3. Law Two	57%	34%	9%	N = 44
4. History	48%	26%	26%	N = 19
5. Chemistry	45%	15%	44%	N = 55
6. English	52%	24%	24%	N = 46
7. Medicine	39%	45%	16%	N = 56

3. Very useful for UWI. (N = 2)
4. Organization and presentation surpasses what we have at Cave Hill.
5. A fascinating experiment which should be developed.
6. Novel and refreshing.
7. Commencement of a marvelous horizon in the field of medicine regionally.
8. Learned more in half an hour than in the normal lecture room (a student).
9. Lecture was good, slides were excellent.
10. Very meaningful experience and exciting as well.
11. The oftener I become involved the more I am prepared to recommend its use (after his third teleconference).
12. Once a week for the future perhaps?
13. A very successful experiment.
14. Opens up avenues for greater concentration of such needs of LDC's.
15. Continue to work, it is a new and interesting way to learn (student).
16. I think it is a grand idea

3. Please keep an eye on priorities. (N = 3)
4. Lectures ended too abruptly. (N = 2)
5. Need clearer diagrams and labels and longer display of visuals. (N = 2)
6. Teleconferences were too structured. (N = 2)
7. People were too conscious of camera.
8. One needs to question the cost of using satellite technology to do this.
9. Why were there no lectures from the faculty of social science?
10. Comparison of costs of satellite conferences and other ways of doing this should be made.

4.3 BENEFIT TO USERS

Four types of benefits are considered:

1. Benefits to students;
2. Benefits to teleconference participants;
3. Benefits to coordinating personnel;
4. Benefits to the University as an institution.

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The fourth is differentiated from the others in that the first three relate to benefits to individuals while the last concerns UWI as a whole. In one sense every benefit, be it individual or institutional, it is a benefit to UWI and furthers the University's objectives; the distinction is subtle but functionally efficient.

4.3.1 Benefits to Students

Benefits were measured in terms of student learning, utility of the satellite lectures to students' coursework and comments made by students in the student questionnaire. If students learned from the satellite video lectures they benefitted from it. Since these were guest lectures rather than a course in a particular subject area, it was not possible to measure learning objectively, i.e. through examination tests, achievement tests, and so on. Students were asked to compare the amount they learned in the one-shot lecture given by satellite to a normal classroom lecture on a three-item scale where 1 = less, 2 = same as normal, 3 = more.

Sixty-four percent of all students (n = 265) felt they learned the same as normal, 19 percent learned more and 17 percent stated they learned less. The overall mean is 2.1. There was very little difference between Cave Hill students and Mona students, the means are 2.1 and 2.0 respectively. There is some variation across lecture types and the distribution of reported learning crosstabulated with individual lectures is presented in Table 24. The main source of variation are the English and Medicine lectures where more students felt they learned "more," an average of 36 percent compared to the average for the other five subjects of 12 percent.

TABLE 24

Crosstabulation of Lecture Type by Student Learning

Lecture to Students	Percentage of Student who Learned		
	Less	Same as Normal	More
1. Botany	17 (n=3)	72 (n=13)	11 (n=2)
2. Law One	24 (n=9)	99 (n=25)	10 (n=4)
3. Law Two	21 (n=9)	65 (n=28)	14 (n=6)
4. History	20 (n=4)	70 (n=14)	10 (n=2)
5. Chemistry	22 (n=11)	61 (n=31)	17 (n=9)
6. English	7 (n=3)	60 (n=25)	33 (n=14)
7. Medicine	8 (n=4)	53 (n=28)	39 (n=21)
	16%(n=43)	62%(n=164)	22%(n=58)

4.3.1.1 Utility of Lectures to Students' Coursework

The video lectures by satellite were delivered to a specific student audience, (mostly first-year students) and the lecturers chose topics that were related to some degree to the students' coursework. On the questionnaire students were asked to rate the utility of the lecture to their coursework on a three-point scale of 1 = not at all valuable, 2 = somewhat valuable, 3 = very valuable.

Forty percent of all students felt the lectures were "very valuable" to their coursework, another 56 percent rated it somewhat valuable. In all, 96 percent of students (n = 256) attested to receiving such a benefit by rating the video lecture by satellite as being of some value to their main purpose at the university. There was little variation across locations (Mona 97 percent, Cave Hill 96 percent) and with individual lectures.

4.3.1.2 "Other" Comments by Students

Some students gave some final comments, some of which relate to benefits they felt they received from the satellite video lectures. "Very good," "very beneficial to me," and "I really learned" were common. One student stated, "It is a most interesting change and could be quite beneficial to future effort." Another said, "Personally useful because no campus where a good lecturer is based will enjoy an advantage." Some of the critical commends made by students have already been presented in the section on "attitudinal comments."

4.3.2 Benefits to Teleconference Participants

Two sources are used to gauge benefits to the users of the teleconferencing system. One is user response to an item on the questionnaire which asked participants to rate the value of the day's

teleconference by satellite to their own work on a three item scale of 1 = of no value, 2 = somewhat valuable, 3 = very valuable, the other is drawn from participants' comments about the teleconferences.[17]

The value of the day's teleconference to personal work was only asked of the teleconferences involving UWI academic and administrative staff in an effort to determine that particular form of benefit to UWI personnel. The responses show that 90 percent (n = 41) felt there was some value to their own work; of that 90 percent, 22 percent felt it was very valuable to their own work. The mean was 2.12 and there was almost no difference across locations. Clearly, UWI academic and administrative personnel felt there was personal benefit to them in the teleconference.

When asked to comment in any way about the teleconferences, participants volunteered the following statements which reflect benefits they derived from the satellite demonstration.

"Personally very beneficial to me but would like to see more preparation of material;" "valuable and exciting;" "I found it stimulating and valuable and feel it should be part of the undergraduate teaching programme in medicine."

In general, teleconference participants had the benefit of obtaining first-hand experience of using satellite technology for educational services, the first time this has been done in the Commonwealth Caribbean.

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[17] Every questionnaire ended with an "any other comments" category.

4.3.3 Benefits to Coordinating Personnel

Informal interviews were held with members of the coordinating teams at Mona, Cave Hill and Castries based on the end-of-demonstration questionnaire (Appendix 5). In addition, a short interview (unstructured) was held with the key technical and production persons who administered to the demonstration at Mona about one week after the closing ceremony on March 10th. The following remarks about benefits are drawn from the above mentioned interviews.

"It has been a lot of work, but I have enjoyed it and learned about the system;" "We got a good opportunity to experiment with space-age technology and that can only be useful." A more detailed response by Mr. Tony Walling, the Technical Coordinator at Mona, summed up the feeling of the technical crew. He said:

> For the Engineering and Technical Staff taking part in this Satellite Project, it was a worthwhile learning and implementation exercise. The coordination and assistance between University groups and external establishments was effective in that once the team was formed there were no signs of the difference of origins in the teamwork carried out to achieve the goals.

Mrs. Alma Mockyen who headed the production crew stated, "A great deal of learning by those who participated as production crew with the project took place, and we are grateful to Professor Lalor and the US-AID personnel, who afforded us this wonderful learning opportunity."

Reward should always follow effort. The coordinating personnel at all sites worked hard and long to make the demonstration work. It is fitting and right that they feel there was some personal benefit to themselves over and above the benefits to the university which they helped in no mean manner to bring about.

4.3.4 Benefits to the University

The benefits to the university as an institution can be seen in many ways. There is no direct measurement of all benefits, so interview responses are used, among other indices, to gauge benefits. The indications come from the value to the UWI of:

a. successfully accomplishing the stated objectives of the demonstration measured by end of demonstration responses;

b. regional publicity, which was very favorable.

4.4 Success in Accomplishing the Demonstration Objectives

Fifteen high ranking UWI officials and some members of the coordinating pool (Appendix 8) were asked whether they thought the UWI had accomplished the stated objectives. Their responses are given in Table 25 which also shows the significance level.

Table 25 shows clearly that respondents thought the university was very successful in accomplishing the demonstration objectives. UWI personnel were also asked to state in what specific ways they felt objectives were or were not accomplished. Table 26 classifies the findings. The answer is a resounding "Yes" for the university.

TABLE 25

Response Categories and Significant Tests of Success in Accomplishing Objectives

Objective	Response			
	Yes	No	Chi-square	Significance level
Testing technical feasibility	n=13	n=2	$X_1^2 = 8.07$	$p < .005$
Overcoming communication bottlenecks	n=8	n=3	$X_1^2 = 2.27$	$p < .20$ n.s.
Permit lectures to reach a wider student audience by use of TV lectures	n=9	n=2	$X_1^2 = 4.45$	$p < .05$
Experiment with outreach programs	n=12	n=1	$X_1^2 = 9.30$	$p < .005$
For all objectives	n=42	n=8	$X^2 = 23.12$	$p < .001$

TABLE 26

Some Responses of UWI Personnel Who Felt the Objectives Were or Were Not Accomplished.

Objective	In what specific way respondent felt it was accomplished	Reason respondent felt it was not accomplished
Testing technical feasibility	- The demonstration clearly showed that two-way voice and one-way video could be well received. - The TV pictures were good and clear. - We know that even at 0.5^{o} look angle at the satellite TV pictures were good most of the time. - We now know that local technical capability was good enough to do most chores. - Surfaced the technical expertise required.	The two respondents who said no did not wish to elaborate.
Overcoming communication bottlenecks	- Helped to clarify arrangements for library conference. - Assisted in making quick decision on action connected with a delayed technical report and to expedite the answering of reference and research inquiries. - Contact via ATS-3 was much easier than by telephone. - Use by student affairs to resolve exam problems was great, even "dramatic." - Was possible to clarify matters within hours or days instead of weeks.	- Dominance of one site cannot be good administratively -- created more problems. - The potential for this was not really exploited. - The bottlenecks are more "human" than anything else.

TABLE 26 continued

Objective	In what specific way respondent felt it was accomplished	Reason respondent felt it was not accomplished
Permit lectures to reach a wider student audience by use of TV lectures	- Cave Hill students received lectures from Mona that they would not otherwise have been exposed to. (N = 5)	- Not enough was done to make students aware of the program. - St. Augustine did not participate, student body was not as wide as it could be.
Experiment with outreadh programs	- The St. Lucia activity is proof N = 2 - Because there were many outreach programs in this experiment. (N = 2) - We have several exciting outreach programs. - Persons in the LDC territories who participated must have felt more of a part of the UWI system. - Both Agriculture and Engineering reported favorable response to their prospects and hope for follow-up of some kind.	- Not enough "outsiders", i.e. non-UWI persons were involved in the outreach programs. - Nothing was done in the islands, only St. Lucia.

4.5 Publicity

The university received a great deal of publicity, the vast majority of which was very favorable. Some clips from the press in the region are shown on pages 92-95. The only unfavorable publicity on radio and in the press had to do with the Trinidad situation. Even there, one newspaper was for, another against.

The university did not send out releases, most of the publicity came from the press' own initiative, which according to one top UWI official, "Makes it doubly sweet." The good publicity was beneficial in another sense. Many of the persons who travelled from the non-campus territories (NCT's) to St. Lucia for the two seminars mentioned the fact that they had read or heard on the media about the demonstration and very much looked forward to taking part.

4.6 Task Accomplishments

The satellite technology was used for various tasks, student lectures, teleconferences, formative evaluation and technical coordination sessions. In this section we look at participants' ratings and statements about the suitability of satellite technology for what type of tasks, utility of the satellite teleconferences for certain tasks, and success in task accomplishment using a satellite teleconferencing mode.

4.6.1 Suitable Applications of Satellite Technology

Teleconference participants were asked, "For what type of tasks do you see communications by satellite as being particularly suitable in your own work?" Table 27 (p.96) contains the responses of over 60 participants, many of whom gave more than one answer.

DAILY GLEANER, JAN: 21, 1975

Gibbs photo

LAUNCHING: Mr. A. Z. Preston, Vice Chancellor of the University of the West Indies, delivering the main address at the launching of the Experimental Satellite Communication Programme by the UWI in collaboration with the United States Agency for International Development (US/AID), and the U.S. National Aeronautics and Space Administration (NASA) at the Mona Campus yesterday morning. Others (from left) are Professor Reginald Murray, Senior Dean at Mona; Mr. Fred Irving, U.S. Ambassador to Jamaica; Pro-Vice Chancellor and Co-ordinator of the Project, Professor Gerald Lalor; Mr. Eric Bell, Minister of Education and Mr. Carl Jackman, Registrar.

UWI satellite programme

Continued from Page 1

ration. This experiment, he said, might point the way to reducing the costs of university education which was already too high for some territories. The success of any restructuring and rationalization of the university administrative and academic services may very well depend on the feasibility of the use of satellite to open up new teaching and outreach opportunities as well as administrative communication, he added.

The Minister of Education, the Hon. Eric Bell in applauding the project spoke of the significance of communications in education. He congratulated the University and its collaborators on the successful launching of the satellite and wished further success in the project.

Other speakers at the function included Mr. Fred Irving, U.S. Ambassador to Jamaica; and the Senior Dean for the UWI at Mona, Professor R. N. Murray, Mr. Delisle Barrow acting Minister of Education, Barbados and Mr. John Eddy, of USAID in Barbados spoke from the Cave Hill Campus in Barbados, and videotaped speeches of the Pro-Vice-Chancellor of St. Augustine, Mr. Lloyd Braithwaite and of the Pro-Vice Chancellor of Cave Hill, Barbados, Mr. Sydney Martin were transmitted.

The Co-ordinator of the Project and Chairman for the function, Pro-Vice-Chancellor, Professor Gerald Lalor, in his message explained the background and workings of the satellite programme.

PUBLICITY IN DAILY GLEANER (JAMAICA)

DAILY GLEANER - JAN. 21 1977 Page 1 JAN 21 1977

UWI launches satellite programme

An Experimental Satellite Communication Programme to link the campuses of the University of the West Indies had a successful launching yesterday at the University's Mona Campus from which transmissions were made.

The programme which was launched in collaboration with the U.S. Agency for International Development (US AIL) and the U.S. National Aeronautics and Space Administration (NASA) will provide a link between Jamaica and Barbados and Trinidad. St. Lucia will also be included in the transmissions during the final weeks of the project which will last initially for two months.

During that time there will be colour television broadcasts from the Mona Campus to the other two campuses. The broadcasts will include programmes such as teleconferences, both for academic and administrative purposes, outreach programmes in community health, nursing education, and a variety of teaching programmes in various inter-campus faculties. A portion of the programme includes an international teleconference on solar energy.

During the final two-week period, the regional nature of the University campus will be even more strongly emphasised with a shift to the University Centre on the Morne complex in Castries, St. Lucia. There, two regional conferences, one in agricultural extension and the other on the education of the deaf will be organised. The three campus territories will participate using satellite links.

Delivering the main address at the launching ceremony yesterday, the Vice Chancellor of the University, Mr. A. Z. Preston, said that the University in a developing country must play a major role in building among low income and disadvantaged groups the capacity to promote change, to generate and apply thought and systems, to their practical working lives.

Mr. Preston said that the launching of the satellite programme was an experiment which could have important effects on how a regional educational programme was operated, with implications for the efficiency of academic programmes and adminis-

(Cont'd on Page 15 Col. 1)

X 113

The Jamaica
Daily News
Vol. 5 No. 229 TWENTY-FIVE CENTS Saturday, January 21, 1978

Breakthrough: TV link-up via satellite

The inaugural programme in the experimental satellite link-up of all campuses of the University of the West Indies was carried through with partial success yesterday morning.

The plan was to broadcast the official ceremony from the Mona campus, via satellite, to Trinidad's St. Augustine Campus and Barbados's Cave Hill. However, CANA reports that a delay by the Trinidad Government in granting permission, resulted in St. Augustine being excluded from the ceremony.

It is understood that reception at Cave Hill was fair, except for some voice fading. Technicians said that this was due to a combination of unfavourable conditions at this time of year, and the low angle at which the signal was being beamed to Barbados.

More than 300 guests and university personnel attended the event, which was chaired by Pro-Vice Chancellor Gerald C. Lalor who is directly responsible for the project.

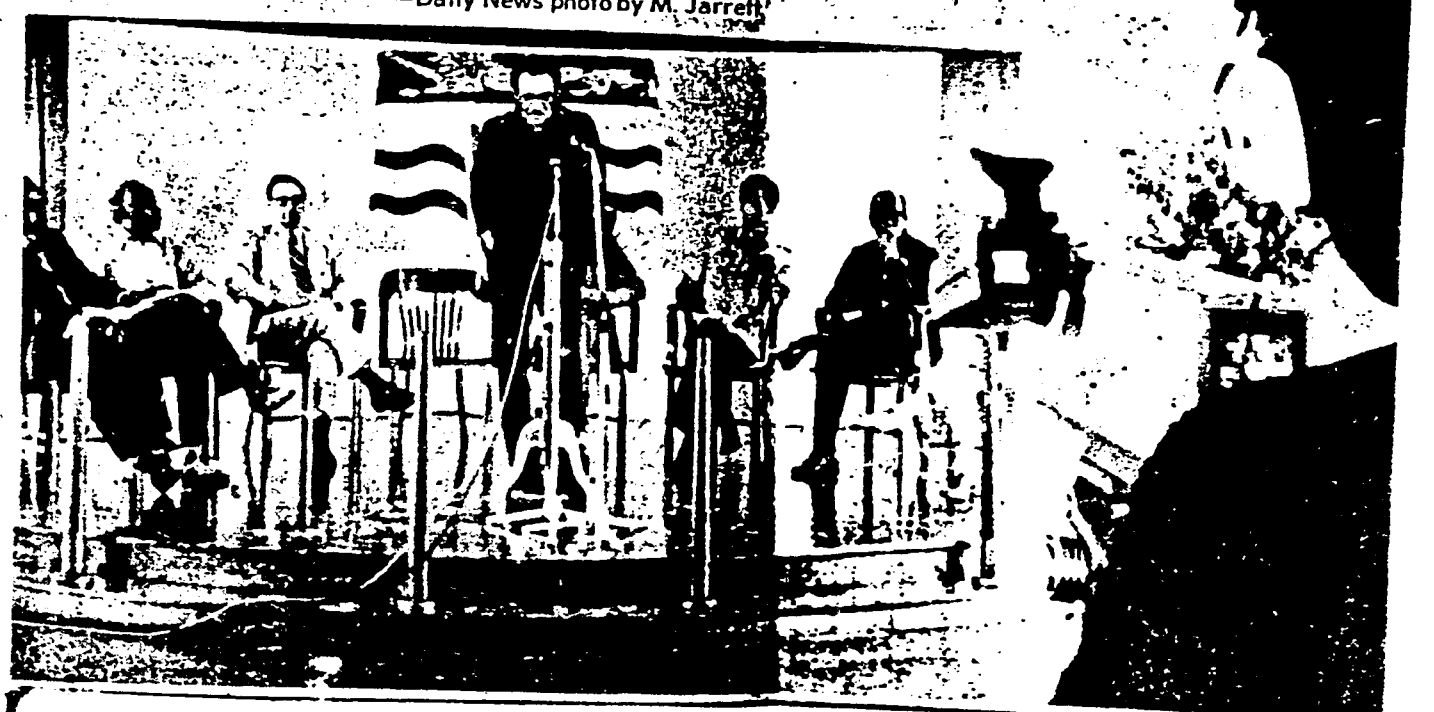
He expressed disappointment in not having Trinidad linked up on inauguration day, but said he expected the present problems to be overcome by next week, at which time St. Augustine campus will be able to receive signals from Jamaica.

In this experimental stage, it will only be possible to broadcast television from Jamaica, since the transmitting equipment is installed here. However, Cave Hill, and St. Augustine (and soon St. Lucia) are able to send audio signals to Jamaica. If the programme is expanded, all campuses will be able to transmit and receive television signals.

All speakers at the ceremony hailed the event as a breakthrough and the beginning of a new era in regional communications and education.

The ceremony was staged at the undercroft of the Mona campus' Registry building and guests were able to see the televised programme (off the air) from monitors set up for the purpose.

Speeches and messages were delivered by US Ambassador to Jamaica Fred Irving, Barbados' acting Minister of Education Delisle Bradshaw, Minister of Education Eric Bell and Senior Professor Reg Murray.



ON CAMERA — UWI Vice Chancellor Aston Preston delivering the main address at yesterday's inauguration of the satellite link-up of university campuses. Seated (from left) are Pro-Vice Chancellor Robinson; Professor Reg. Murray; US Ambassador Fred Irving; Minister of Education Eric Bell and the University's Registrar.
—Daily News photo by M. Jarrett

Satellite experiment comes in for University praise

STON, Jamaica, Mon- ANA) — Part One of sity of the West Indies communications experi- using two American for live inter-campus n link-ups ended on with UWI top brass at pony here singing the praises and consider- wider application in n development.

g UWI administrators dignitaries — including ing force behind the Pro-Vice Chancellor or — gathered here in a makeshift studio — actually the main conference room of the Mona Campus — to participate in the final colour TV programme of the two-month series.

Like the other 20 programmes of lectures, seminars, "tele-conferences" and other out-reach sessions, Friday's presentation was beamed from specially installed equipment at Mona to the Cave Hill Campus in Barbados and the Extra-Mural Department in St. Lucia. There was only audio feedback from those territories.

Describing "Project Satellite" as a splendid and valuable effort, UWI Vice-Chancellor Aston Preston said that the next step was to determine "the extent to which satellite technology may assist our human efforts to contribute some solutions to some of the region's problems."

UWI Chancellor Sir Allen Lewis was not here for the telecast — he watched in St. Lucia — but in a pre-recorded message was full of praise for the trials and all those who contributed.

The experiment was undertaken with technical assistance from the United States Agency for International Development (USAID) which provided the special transmitting and receiving equipment, and the National Aeronautics and Space Administration (NASA) whose satellites were used.

Trinidad and Tobago was the only UWI campus territory not taking part, following complaints from the Government that it was not consulted on the programme.

"The crux of the matter as I see it is to determine the extent of the need of the adoption of satellite technology in the University and in the Caribbean region," Mr. Preston said in his brief address.

He went on: "My answer clearly must be that at this stage I still do not know ... but I will say this: we are going to answer this question, although that itself will take time and much effort and, let me add, further assistance.

"We must remember that we are a regional institution — we owe responsibilities to 14 territories — that in the main these territories lack wealth resources and skilled persons.

"We must remember that we share a common heritage, a similar culture, similar aims and aspirations and that our needs — food, health, social services, education and many others — though they differ in scale from territory to territory, have certain commonalities."

Pointing to the need for sharing skills, knowledge and facilities in the region, Mr. Preston said: "This need not of course be limited to University programmes, but if the human co-operation throughout the region can be won and the project shown feasible, the University with its regional campuses, its many centres and its always keen manpower, is ideally placed to take the first step."

FROM BARBADOS ADVOCATE NEWSPAPER

● MR. ASTON PRESTON

Registrar Carl Jackman put in a plea for the permanent establishment of the satellite link-up to facilitate inter-campus administrative tele-conferences.

"For this reason I would personally value the establishment on a permanent basis of the facility provided by this satellite experiment and I know that I can also speak for my colleagues in this respect," he said.

"Opportunity for a regular link-up with the administrators on the other two campuses — even once a week only — wou'd enable us to make enormous strikes administratively and would considerably speed up the process of administering a three-campus university," Mr. Jackman added.

Dr. Cliff Block the USAID representative at the ceremany, was sure that funding for a more institutionalised project could be made available, provided a workable presentation is made to and approved by the agency.

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" Mr. Savarin said.

He concluded: We are
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a trade union to protect an
ember of the union...."

Mr. Savarin said he was amazed at some of the statements made by Rev. Gumbs on the issue.

"What we (the "CSA") are concerned about is that when a religious minister declares that the church is being attacked by a trade union, is he trying to mobilise the church to deal with the trade union?

"The former headteacher is a member of the association. That she has now been dismissed, is a matter which the

Diplomatic complex

GEORGETOWN, Guyana, Monday (CANA) — The Guyana Government will soon as-

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TABLE 27

Applications of Satellite Communication as Seen by Respondents

1. Information exchange. (N = 13)
2. Training of teachers. (N = 8)
3. Regional workshops and seminars (N = 8)
4. Similar tasks as are being carried out at UWI. (N = 7)
5. Outreach activities in Windwards and Leewards. (N = 7)
6. Faculty meetings. (N = 6)
7. Intercampus consultation. (N = 5)
8. Rapid communication. (N = 4)
9. Teleconferencing. (N = 4)
10. Planning for conferences and meetings in many territories. (N = 4)
11. In emergencies when quick contact is needed. (N = 3)
12. Regional training of health professionals. (N = 3)
13. Facilitate inter-library activities, loan and resource sharing. (N = 3)
14. Challenge exams to LDC's. (N = 3)
15. Monitoring of epidemics in the region. (N = 2)
16. Facilitate the transfer of scarce skills. (N = 2)
17. Useful in planning a more unified approach to development

Asked for what tasks they thought satellite communication to be particularly unsuitable, respondents offered the following, "Confidential work," "work related to demonstrations in the laboratory and in the field," "controversial information exchanges" (N = 7), "teleconference of many countries," "oral examinations," and "major policy decision making."

There were six specific task areas for which teleconference participants were required to rate the usefulness of the satellite video teleconferences. This was responded to only by the participants in teleconferences with an "outreach" topic. The areas were:

1. Idea exchanging and sharing experiences with colleagues;
2. Presenting new materials in the topic area of teleconference;
3. Clarifying current issues in the topic area;
4. Providing a better insight into problem solving in the particular field;
5. Identifying possible applications to one's own work;
6. Increasing one's awareness of problems others are facing in the particular topic area of the teleconference theme.

Table 28 summarizes the findings. Respondents see teleconferences as being most useful for idea exchanges (Mean 2.59) and for gaining an awareness of problems others face in the field subsumed by the teleconference theme (Mean 2.53). The participants in St. Lucia and Mona rated all the stated tasks more highly, i.e. they saw the teleconference system as more useful for the tasks than Cave Hill. For every task but one, Cave Hill's mean response is much lower than Mona and Castries. The overall mean for Cave Hill of 2.13 (compared to Mona 2.49 and Castries 2.52) still makes a positive statement about

TABLE 28

Usefulness of Satellite Teleconferencing for Specific Tasks across Locations

	Entire Sample					Mona					Cave Hill					Castries				
	No. of Cases	Percent & Code 1	2	3	Mean	No. of Cases	Percent & Code 1	2	3	Mean	No. of Cases	Percent & Code 1	2	3	Mean	No. of Cases	Percent & Code 1	2	3	Mean
1. For idea exchange	79	5	30	65	2.59	37	0	30	70	2.70	26	15	39	46	2.31	16	0	19	81	2.81
2. For presenting new material	76	8	61	32	2.24	37	3	60	37	2.35	23	17	61	22	2.04	16	6	63	31	2.25
3. For clarifying issues	79	6	57	37	2.30	37	3	57	40	2.38	26	15	54	31	2.15	16	0	63	37	2.38
4. For better insights into problem solving	75	8	48	44	2.36	36	3	50	47	2.44	23	22	48	30	2.09	16	0	44	56	2.56
5. For identifying applications to own work	75	9	55	36	2.27	35	6	46	48	2.43	24	21	62	16	1.96	16	0	63	37	2.38
6. Awareness of problems others face	77	4	39	57	2.53	36	3	31	66	2.64	25	8	60	32	2.24	16	0	25	75	2.75

Code 1 = of no use at all

2 = somewhat useful

3 - very useful

usefulness, but it isn't clear why participants there were consistently lower than the other two sites.

4.6.2 Usefulness of Satellite Teleconferencing for Specific Tasks

There is a growing literature on social evaluations of video teleconferencing. In this section we draw from the UWI evaluation to add to that body of knowledge.[18] Table 28 is only part of that contribution. One of our findings, that video teleconferencing is percieved as useful and satisfactory (mean 2.59, roughly 87 percent of sample) for idea exchanges, is supportive of two prior findings, Champness (1973), and Williams and Holloway (1974). Champness used survey questionnaires on 200 British Post Office personnel in a group-to-group video teleconference system, while Williams and Holloway replicated the work in Canada with 190 senior and middle-level personnel from Bell Canada and other Canadian organizations. They both arrived at a similar conclusion, that video teleconferencing was satisfactory for information and idea exchanges.

The present evaluation results on attitudes to the UWI satellite teleconferencing system as examined earlier found that about 80 percent of all participants had positive feelings about the system. This is consistent with much previous work on attitudes of new users on video teleconferencing. Duncanson and Williams (1973), Williams and Holloway (1974), British Columbia Telephone (1974), Champness (1973), and Ellis, McKay and Robinson (1976) all found that new users typically have positive feelings towards the use of video teleconferencing.

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[18] For a detailed review of video and audio teleconferencing see R. Johansen's "The Camelia Report, " Institute for the Future, Menlo Park, California, 1977.

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The British Columbia Telephone study was a field test using video in a group-to-group conferencing arrangement involving 134 British Columbia Telephone employees, businessmen and students, while the Ellis, and others, study (sponsored by the Swinburne Institute of Technology), used the video Telecom Australia System, and surveyed 21 users of the Confravision service.

Two of the medical teleconferences held during the UWI satellite demonstration (See Appendix 1) were very successful in terms of respondents' ratings of success in accomplishing the day's objective, the mean of 4.21 is higher than the mean for all teleconferences of 4.10. This result confirms Bashshur's (1975) findings that teleconferencing can serve as a medium for collegial interaction among distantly located health professionals.

4.6.3 Success in Task Objective

One of the aspects of the demonstration that interest the UWI is whether the academic and administrative teleconferences could accomplish the conference task and conferer objective using the satellite system. The 41 UWI academic and administrative people who participated at Mona and Cave Hill in the teleconferences were asked whether, in terms of accomplishing objectives, the teleconference today was successful or unsuccessful. A five-point scale was used, with 1 = completely unsuccessful, 2 = unsuccessful, 3 = neutral, 4 = successful and 5 = completely successful.

Respondents felt the teleconferences by satellite were successful in accomplishing the conference objectives. Overall 83 percent (n = 41) thought so, with 17 percent of that 83 stating it was

completely successful in accomplishing the objectives. The mean was 4.10 with very little difference between Cave Hill and Mona. There is no doubt that when participants observe conference protocol, share in the discussion and avoid time-wasting exchanges, satellite teleconferences can accomplish conference objectives. That only 2 persons out of 41 felt the system was unsuccessful in accomplishing its objective is very heartening in terms of any operational service.

4.7 Effect on the University

No attempt was made to assess effect on the university in any objective fashion in terms of before and after measurements, or in other systematic ways. The assessment of effect presented here is based on a small sample of 14 demonstration respondents, many of whom are top-level UWI personnel; and one cannot easily generalize from that purposive sample. Other statements on effect are based on personal observation or drawn from pertinent comments made on the various questionnaires.

Of the fourteen UWI persons who were asked what they thought was the overall effect of the demonstration on the university, eight felt the effect was good or beneficial, three were more guarded, stating it was too early to tell, and three felt there was little visible effect. Here are some of the typical comments made.

"There is very little effect."

"Participating sections of UWI benefitted tremendously."

"Definitely beneficial."

"Opportunity to see how we can more efficiently serve all sectors of the university."

"Mona gave no one else a chance in the early stages."

"Had demonstrated alternative means of grappling with problems

"Very healthy."

"Bad effect -- Trinidad, a discordant note."

"An enlightening and beneficial one."

"Little. Just a nice demonstration."

"Good effects -- cooperation at many levels, utilizing a variety of skills."

"Good, a successful experiment was mounted and a group was mobilized to involve themselves in the demonstration; much enthusiasm was generated."

From personal observation, I would attest to the fact that the satellite demonstration had a tremendous impact on the university. Catalytic in many ways, it brought to the fore a hitherto unheard of level of cooperation between the university and outside institutions. In Jamaica, there was the willing cooperation of the Jamaican government whenever called upon to support the project in any form. Institutions such as the Jamaica Adult Literacy Program, The Association for Public Information, and the Jamaica Broadcasting Company made employees and resources available to the university. The effect on UWI was to establish a rapport with these institutions that can only augur well for the future.

In Barbados, the government, the telecommunications entity (Cable and Wireless), as well as institutions like the Caribbean Development Bank, assisted in many ways to make the demonstration work, there too establishing a goodwill with the Cave Hill branch of UWI which must rebound to the good of the University.

In St. Lucia, the government and many groups, including Cable and Wireless and the Society for the Deaf, worked closely with the

University Centre. Throughout the last two weeks of the demonstration, when St. Lucia was involved, a university presence was felt throughout the capital, Castries, and the satellite demonstration dominated the week's events. Many people expressed the view that it was a long time since they had felt the university so close to them, notwithstanding the fine efforts of Mrs. Pat Charles and her staff in normal University Centre activities. The satellite demonstration was something special and above everything else had the effect of demonstrating to UWI's constituencies that the university is not afraid to experiment with innovations and is forward-looking in its unenviable role of catering to fourteen different territories.

4.8 Personal Observations

Most of the remarks in this section could not be put under categories of dependent variables and are presented because they help to pinpoint further dynamics and effects of the demonstration.

There are many aspects of the demonstration that went on remarkably well, notably most lectures and a large proportion of the teleconferences, and few that fell short of expectation, the most obvious example being the ATS-3 receive signal quality whenever the ATS-6 was also in coeration. As an exercise in cooperation between international institutions, it was a fascinating experience. There were hardly any periods of real anxiety once the project got going.

Both within the project itself in the Caribbean and in Washington many persons devoted a high level of energy towards project implementation and success. The coordinating teams of the

UWI were enthusiastic and dedicated throughout and my admiration for the redoutable P.V.C. Lalor never ceases. Technical coordinators were quick in diagnosing faults and repairing faulty equipment which enabled every broadcast to take place as scheduled throughout the demonstration.

The indirect supervision from A.E.D. in Washington, their alertness in responding to service requests, the contribution of their consultants and the ever willing assistance of NASA personnel in Maryland in a number of ways assisted in making the demonstration work.

Participants were full of praise for the university's foresight in agreeing to explore possible uses of advanced communication technology to help solve some of its problems and possibly create new services. New technology is often fascinating and one noted a degree of infatuation with the technology on the part of many users, but this also assisted in sustaining the enthusiasm and interest of these same users. Not everyone I spoke with was pleased with the satellite initiative. Some felt such technology will be forever priced out of reach of the UWI or even the governments, now going through hard economic struggles in their quest for self-determination and improvement of the quality of life for their peoples.

A particularly disappointing feature was the lack of extra ATS-6 time requested twice by myself to try to have the technicians repoint the antenna in St. Lucia or experiment with different positions to improve reception. ATS-6 had a rather strict schedule and could not be spared. While frequent fades did not affect either attitude or willingness to use satellite technology in the future by persons in St. Lucia, I often felt very discouraged when pictures were poor quality and the ATS-3 sound erratic.

Generally there was much more to enthuse than to depress, and a large number of persons involved in planning and implementing the project remarked that it was not only a rewarding learning experience but an unforgettable one.

Chapter Five

5.0 Resources for Operational Service

What did the demonstration tell the UWI about resources that would be needed for an operational service? The evaluation findings suggest that a great deal has been learned about both the nature and level of resources necessary to carry out a similar type of satellite project operationally. However, two caveats are in order.

1) The demonstration is only partially helpful in determining resources for a much larger project, such as one involving all fourteen territories of the UWI. Little is known about how the governments and people of the ten territories which did not have an earth station during the eight-week demonstration feel about use of satellite technology for education, the amount of technical expertise in the islands, etc. Participants gathered in St. Lucia from the non-campus territories were enthusiastic about the system but the one or two persons from each island who were in Castries may not be representative of their homeland.

There is need for both a needs assessment survey and an inventory of technical expertise and support infrastructure in each territory before any large scale project planning.

2) The question of using a satellite system operationally by the UWI is a matter still to be decided. There is a potentially troublesome issue yet to be resolved within the university that could affect that decision. It concerns the possible future participation by Trinidad in demonstration or operational satellite activities. If Trinidad is still unable to participate, the result might be that 40 percent of the UWI would be out of the project.[19]

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[19] Trinidad's input constitutes 40 percent of all university resources.

While lecturers in the faculty of Agriculture and Engineering at the Trinidad Campus continued to support the demonstration, it is stretching optimism a bit far to expect that they would do so if the Trinidad government decision on a continued basis, to meet the demands of an operational service. That is not to say that UWI might not proceed to offer satellite services to the 60 percent who wish to participate. It is to say that it would be wise to involve Trinidad in the early planning of any future activity.

There is quite a difference between an experimental demonstration and an operational service. The demonstration was largely exploratory, mostly testing feasibility with two satellites (ATS-3 and ATS-6) that will not be used for an operational service. It was short-term; thus, project coordinating teams could be deployed to service the demonstration without too much disruption of their other duties. An operational service requires much more commitment and continuity of effort, more people dedicated full time to handle the project, more production effort than that done in the demonstration, more permanent facilities and the likelihood of many more participating territories.

The present evaluation will contribute to an operational scheme in two important ways. Firstly, it assists in determining the human, technological and other resources that the demonstration showed the UWI could draw upon to carry out a similar project of lecture and teleconferences operationally.

Secondly, we hall draw on the evaluation data and interview responses to suggest the type of programs that respondents feel can be developed to service the UWI's constituency, although some of the suggested programs were not tried in the demonstration.

The question of a cost-effective model of using satellite technology operationally can be addressed when the UWI has completed both its needs assessment survey, inventory of expertise and local support infrastructure, as well as when there is an indication that there will be users in the territories served by the university. In interviews with the author, some UWI personnel expressed the view that they hope the university will get its economists involved in a cost analysis, if it intends to "go operational." Many persons felt there should be a proper survey of needs in the territories, identification of potential users and a subsequent costing of alternative strategies for meeting those needs, before there could be an operational service.

5.1 "Operational Resources" to Draw Upon

There are both tangible and intangible resources that the UWI could call on for an operational service. There are the human resources in terms of technicians, production personnel, and the physical technical resources in terms of locally available equipment and building facilities, as well as intangibles such as potential commitment measured in terms of declared willingness of participants to utilize satellite technology on a continuing basis in the future.

The subtopics considered in this section are:

1) Climate of Receptivity
2) Technical and Production Expertise
3) Institutional Cooperation
4) Type of Satellite System
5) Software: Program Development
6) Cost Considerations

5.1.1 Climate of Receptivity

The evaluation findings show conclusively that attitudes were positive toward the use of satellite technology for the purposes engaged in during the demonstration. Such user acceptance is a good base on which to build. Dissatisfaction with ATS-3 reception was taken flexibly and did not dampen attitudes to any significant extent, probably because the ATS-6 reception was frequently good enough to compensate for the ATS-3. Further, a paid-for service will not utilize two different satellites which interfere with each other, but one satellite, most likely one of the Intelsat series.

A second major pointer to a favorable climate for planning a future service is the fact that the majority of the fifteen UWI officials surveyed felt the demonstration had had a beneficial effect on the university. The good regional publicity and the feeling of hope expressed by the LDC participants who were in St. Lucia that the UWI was now likely to make a bigger effort to reach out to them, is yet another indication that follow-on plans might be welcomed regionally.

A more tangible expression of potential commitment to future utilization of a satellite system, however, came from participants during the teleconferences (who were asked whether they were willing to use satellite technology in their work in the future), and students (who were asked how willing they would be to take satellite delivered courses in the future).

Table 29

Willingness to participate in satellite activities in the future

	Not willing	Willing
Students	41% (n = 60)	59% (n = 87)
Teleconference Participants	3% (n = 3)	97% (n = 114)
	$X^2 = 70.80$	$p < .001$

Table 29 is a combined dichotomization of a three item scale for students and a five item scale for teleconference participants (see student and teleconference questionnaires). It is clear that students did not give as good a commitment to future participation as the resounding one by teleconferencers. In a sense this is understandable since the guest lecturers were not as well prepared as the majority of the teleconferences. Each lecturer, when asked "in what ways do you think you could have improved on today's lecture presentation," named more preparation time and more and varied use of graphics and visual aids as the major room for improvement. Further, despite the fact that lectures were deemed to have much utility to coursework, the lectures were not course lectures and students might perceive that they would be substituting course lectures as they now receive them for lectures patterned on the one shot guest lecture they got by video. Even so the 60/87 percent split is significant at the p .05 level.

A cross-tabluation of the dichotomized student responses in Table 31 across locations is very revealing. The relationship almost disappears for Mona while it is "specified" (Rosenberg 1968) for Cave Hill.

Erratum: Page 111

Table 30

Crosstabulation of Willingness to Participate in Satellite Activities in the Future by Location

	Not Willing	Yes Willing	
Mona	48% (n=25)	52% (n=27)	$\chi^2 = .08$ n.s.
Cave Hill	37% (n=35)	63% (n=60)	$\chi^2 = 6.58$ $p < .01$

corrected page.

Table 30

Crosstabulation of willingness to participate in satellite activities in the future by location

	Not Willing	Willing
Mona	48% (n = 25)	52% (n = 27)
Cave Hill	32% (n = 35)	68% (n = 76)

$X^2 = 6.84$ $p < .01$

These data show that Mona students (who are exposed to essentially a conventional instructional situation), are indifferent to the satellite delivered lectures while Cave Hill students (who only have TV), and really experience the remote teaching, like the satellite activity.

This might mean that the more distant the location the more the students are likely to want satellite delivered courses, which has important implications in terms of LDC's and challenge exams.

5.1.2 Technical and Production Expertise

While the campus at Mona is well endowed with trainee technicians and qualified staff in the electronics unit, the same is not true of Cave Hill. Such persons are also unlikely to exist at the university centres in the non-campus territories. That is another reason for survey and inventory of NCT technical capability prior to planning of an operational service. In the case of St. Lucia a trainee technician was sent from Mona to cater to the technical needs of the system in St. Lucia and he received assistance from a junior trainee from Radio St. Lucia who could only be spared for the two week duration of the St. Lucia involvement.

To service an operational scheme the university would have to supply their own technical staff; co-opt (perhaps part-time) technical persons from local engineering firms, radio stations; or hope for secondment of government technicians. It is not vital that such technicians should know beforehand all the ramifications of the satellite earth station and equipment. Most of this could be learned on the job. It is important taht such persons be able to diagnose and repair simple faults, like broken leads, replace transistors and condensers and be able to read circuit diagrams to respond to technical instructions to effect repair work.

If the level of cooperation during the demonstration can serve as a guide, the university has good reasons to expect governments and organizations to assist with technical expertise. It would nevertheless be a wise procedure to have one or two senior technicians attached to NASA or INTELSAR for short periods of, say, a month,[20] to learn as much as possible about satellite technology.

The video production team was mostly inexperienced. There was no one in the crew with trained expertise in producing as much live programming as was required for the teleconferences. During productions they learned from their mistakes, some of which were compounded by the fact that crews were changed very often to allow as many of the mass communication students as possible an opportunity to gain firsthand experience with production teamwork. Again the fact that CAST and JBC, etc., were able to loan

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[20] A month is suggested since the UWI can hardly spare staff for long periods of time without too much disruption to services.

personnel to attend to the project requirements can be taken as a good pointer to future cooperation, but such persons should not be relied upon to give the same amount of their time and energy on a continued basis.

An effort should be made to train a pool of personnel at all sites which are expected to originate material, especially video. Depending on what the University decides after its assessment of needs, resources and potential utilization within each territory , originating stations might well be Mona, Cave Hill and St. Augustine.

Television stations exist in many of the territories served by the UWI. In what can be a useful symbiotic exercise, production crews can help train UWI recruits while themselves gaining experience on a hitherto unexploited dimension of their work, the production of educational television programs. At least two production officials, one at Trinidad and Tobago Television, and the other at CBC Television in Barbados, told me they would welcome such teamwork.

UWI would find it very useful to train an overall production manager who could visit sites in the U.S. where satellite production software takes place and later have that person flexible enough to assist the three campuses that might originate video and audio material.

5.1.3 Institutional Cooperation

Throughout this report we have pointed out the large number of organizations and institutions, some national, some regional, that have cooperated with the university to stage the demonstration.

In a few cases where an institution or organization did not have a hand in planning (e.g., CARICOM), personnel from that organization took an active part in one or more programs as the official representative of that body.

Since the UWI is a regional institution its overall objective and the objective of other institutions in the Caribbean -- improving the quality of life of the Caribbean peoples -- converge. While each institution might be concerned with a specific aspect of that overall goal, one thing that virtually all have in common is an extremely close relationship to the governments of the region. In some cases, like CARICOM and the Caribbean Development Bank, they exist to service many governmental needs regionally. Others, such as the Caribbean Broadcasting Union, an institution made up primarily of government-owned or government-operated media, have direct government mandates. Still others, like the Airline Industries, British West Indian Airways, (BWIA) and Leeward Islands Air Transport (LIAT) are owned wholly by governments, or governments have a majority of the shares of such companies.

The cooperation of governments is vital to any regional enterprise, especially so in the case of satellite based services, since satellites are often regarded with much suspicion in a number of Caribbean circles. The fact that two governments have the majority of shares in two out of the three INTELSAT member countries in CARICOM can be turned to advantage, especially if use is made of INTELSAT satellites.

Respondents to our questionnaires identified quite a range of institutions that the University could invite to participate, (including

the sharing of costs) in a future operational service. They were both specified by exact title and loosely specified in terms of functions. Among the list were

- The Caribbean Community (CARICOM),
- The Caribbean Broadcasting Union (CBU),
- The Caribbean Development Bank (CDB),
- The Caribbean Meterological Institute (CMI),
- The Caribbean News Agency (CANA),
- British West Indian Airways (BWIA),
- Leeward Islands Air Transport (LIAT),
- Sixth form colleges, nursing schools, public health bodies, library associations, and
- The non-regional, most international bodies like UNESCO, WHO/PAHO, UNDP and USAID.

What roles the indidivual bodies would play is unclear. That is a matter for UWI to decide in conjunction with each body. One useful strategy might be to involve them initially in a needs assessment survey to determine in what way those needs can be satisfied by a regional satellite-based education and information delivery service.

5.1.4 Type of Satellite System

The governments in the Caribbean region which are parties to the INTELSAT agreement through their appointed telecommunications boards are hardly likely to approve of a competing satellite system to service the same area. The entities concerned are the Jamaica International External Telecommunications Company (JAMINTEL) which in 1971, after Jamaica joined the Intelsat Global Telecommunications

system took over 51% of operations from Cable and Wireless Ltd; the Trinidad External Telecommunications Company (TEXTEL) which in 1974, two years after joining Intelsat did similarly and Barbados whose telecommunications operations are still in the hands of Cable and Wireless West Indies. The best option for the UWI might be to utilize the existing INTELSAT capacity in the region and add to it by using ground stations with small earth stations capable of receiving video and accommodating 2-way voice channels on islands where no INTELSAT earth station currently exists. The INTELSAT Agreement is broad and flexible in the range of services the organization can provide. Article III of the INTERSAT Agreement authorizes INTELSAT to provide domestic service not only to its signatories but to nonsignatory users as well.

The existing INTELSAT system itself can be adopted to provide certain forms of this service today. For example, Nigeria is currently experimenting with a 4.57 meter antenna in a TV receive only mode.

From a recent paper by the Director General of INTELSAT (Astrain, 1978), the following is worth noting.

> There have been some discussions within the last few months concerning the possibility of extended tests and demonstrations in South and Central America, in Africa, the South Pacific and Asia for the purpose of demonstrating current and future capabilities of the INTELSAT system to provide a wide range of telecommunications services to rural areas. Such services might include educational television distribution, slow-scan or slow-frame educational television, two-way telephony, facsimile, as well as other data services such as remote access to international data banks. The tests would be expected to have a number of specific technical objectives including, but not limited to:

1) Determining television reception performance (video quality, etc.) using either an INTELSAT IV or IV-A transponder operating to 4.57 meter antennas, operating under ranges of elevation angles. The television signal would be transmitted from a central city with a suitable e.i.r.p.

2) Determining feasibility and performance of slow-frame television transmission using ¼ or ½ of an INTELSAT IV or IV-A transponder operating to 4.57 meter antennas.

3) Testing 'optimized' antenna characteristics and designs suitable for operation in remote areas with INTELSAT satellites for the following services: (i) data transmission and reception; (ii) reception of educational radio programs; (iii) two-way telephony.

4) Check side lobe and other characteristics of antennas described in (3) above, for conformance to INTELSAT criteria that are designed to safeguard services in other satellites belonging to INTELSAT, as well as other entities, from harmful interference.

If the cost of an all satellite system turns out to be economically unattractive or not the least cost solution, the UWI might also wish to consider a hybrid system involving satellite and microwave systems. Recently Cable and Wireless increased its capacity in the Caribbean by introduction of an 800 mile Caribbean microwave system that links islands as far north as Puerto Rico through the Leewards and Windwards chain down to Trinidad and Tobago in the south.

The new system which began in 1977 carries 960 high grade voice channels and for the first time has the capability for the reception and transmission of international television.

To move from its previous 80-circuit troposcatter system to a 960 voice channel represents a twelve-fold increase, but Cable and Wireless state that the inter-Caribbean traffic is now much more substantial and still growing.

The complete Caribbean microwave system is linked into the global telecommunications network through cable and microwave links from Tortola to Bermuda, and in the south from Trinidad by both satellite earth terminals and terrestrial radio links, and in the centre via the satellite earth terminals on Martinque and Barbados.

Different master uplink terminals then the existing Standard B Intelsat type (10 meters) in Jamaica, Barbados and Trinidad would have to be used since INTELSAT would lease transponder capacity (for such venture) on a spare satellite rather than the ones currently in use for international telecommunications.

5.1.5 Software: Program Development

Video produced lectures delivered by satellite to remote campuses are a new phenomenon for the University of the West Indies. There is very little expertise currently available in video and audio coursework production in the Caribbean. Such software production calls for a production centre on campuses which are to originate programs. A media production center will soon be in operation on the Mona campus, equipped with up-to-date studio facilities capable of doing live or video tape lectures. St. Augustine, Trinidad, has a small production center which can be upgraded to meet the demands of production of live lectures and the making, dubbing and distributing of video tapes. Cave Hill, Barbados, has very little by way of production facilities, and urgent attention would have to be given to Cave Hills' requirements if they are to play a part in originating or even reproducing and distributing material to the islands. Barbados is extremely favorably placed to distribute materials to the Windwards

and Leewards. The air traffic between Barbados and the islands is faster, cheaper and more frequent than between Trinidad or Jamaica and the other islands.

The question of what courses should be developed is once more a matter for the UWI. There is no way to judge from the demonstration which delivered guest lectures to only one remote campus, what courses would be in greatest demand in all the territories. One pointer might be an analysis of what courses are in demand in the recent experiment with challenge exams,[21] though this is only the beginning of the venture. The lectures were delivered in Arts subjects such as English and History, Science subjects such as Botany and Chemistry, in Law, and in Medicine. There were grumblings by some students and at least two faculty members that the social sciences should not have been left out. An operational service should heed that observation. The final decision as to what is offered depends on many factors. One is demand, another is availability of lecturers to present satellite delivered lectures.

Not every lecturer might be a "media" person. Presentation and organization of a lecture can be useful predictors of attitude towards the lecture and evaluation of the lecture itself by students. In the UWI satellite demonstration students who "liked" the lectures covaried with those who thought the presentation and organization was "good;" they also comprised most of the students who rated the lecture very highly.

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[21] Challenge exams are a system where candidates in a non-campus territory receives the syllabus for a first year University course, does the work in whatever way possible, through local library books etc. and sits the identical exam as the student resident on a campus.

There can be quite an "intellectual shock" for a lecturer who all his or her academic life has lectured in a face-to-face mode, closely observing his/her audience for cues, facial expressions, non-verbal postures, verbal feedback and questions, to be plunged into a distance learning media situation and be expected to accommodate easily to the requirements of mediated instruction delivery. UWI will probably have to spend some time in preparing lecturers for the new mode of teaching. One smooth way of handling the situation might be to produce lectures on site where the lecturer does have an in-person classroom but lectures to remote situations as well and responds to questions by them. The problem here is the desirability for either portable cameras and attendant equipment or otherwise equipping lecture rooms with the necessary equipment to carry out such an exercise.

The other programs that were tried during the demonstration - conferences on a variety of topics, some outreach in nature, others academic and administrative - do not require much more software production than was experienced in the demonstration. The chief shortcoming of that exercise was the frequent complaint by participants of inadequacy of planning and non-circulation of advance documents which would have led to more productive use of satellite time. If the lessons from the demonstration are learned in terms of sites with video transmit capability being reminded to share the discussion with receive-only video locations, some of the "top-down communication" indictment can be overcome. Proper planning and possibly built-in adherence to conference protocol are all part of the program production tasks which will have to be mastered.

Because the demonstration was primarily concerned with testing technical feasibility, much work is still needed to demonstrate the range of uses of the technology. There were no attempts during the eight week demonstration to use the system for facisimile transmission or slow scan television, or transmission of data. An operational service should include such services to maximize system performance as well as to derive maximum value for money.

In end-of-demonstration interviews respondents identified the following as programs or areas of program developed they would like to see put into practice in a satellite-based operational service in the region.

Table 31

Likely Future Program Areas Identified by Respondents

General	Specifically "Outreach"
1. Facisimile, data transmission (N=4)	1. Agriculture seminars. (N=5)
2. Teacher training. (N=3)	2. Lectures for challenge exams. (N=3)
3. Intercampus conferences. (N=2)	3. Continuing education to profes-ionals in LDC's. (N=3)
4. Library seminars. (N=2)	4. More use of UWI's Agriculture and Engineering departments. (N=3)
5. All services to LDC's not now provided. (N-2)	5. Family planning, especially in rural areas. (N=3)
6. More use by student associations	6. Rebroadcast of programs with a rural development theme by national radio and television stations. (N=2)
7. Epidemics monitoring	7. Medical student teaching in rural areas. (N=2)
8. Enrichment programs, culture, music, poetry, sports	8. Marketing seminars. (N=2)
9. Any program that can transfer scarece skills in the region to make these more accessible to as many persons as possible.	9. Support for challenge examin-ation programs in non-campus territories
	10. Agriculture, health, engineering seminars and exchange of ideas in newly emerging areas
	11. Discussions on new ideas in delivery of health services.

5.1.6 Cost Considerations

The full cost of the UWI demonstration is unavailable. But this is not a setback because the cost of the experiment is unlikely to bear any true relation to the cost of an operational service. Firstly, in general, the cost of a demonstration or experiment is not always a very sound base on which to generalize to an operational service (Klees and Wells 1977; Cowlan and Foote 1975; Foote, Parker and Hudson 1976; Strover 1978). In particular, the UWI demonstration costs would be misleading if used as the base for projection to an operational service since the substantial input by the university to administer to the project was all donated in kind. Further, two satellites were used instead of one, which is unlikely operationally; and satellite time was given free. Because it was an experiment, more production and technical crew were used at Mona than would be necessary for an ongoing full time operational effort. Outside services donated free to the University (e.g., JBC engineers, API equipment, Radio St. Lucia technicians) would all have to be paid for.

During the demonstration and at varying points during end-of-demonstration interviews many persons repeated the same message in different forms: "What will it cost later on?," "we can only do it if cost-effective," "keep an eye on costs," "whatever the benefits it is cost-effectiveness that will sell it to the politicians;" "UWI must make its cost study at the end of the experiment." There is little doubt that, when the policy-making body or interim committees of the university meet, there will be much advocacy for the university to do its cost study. Such an analysis one hopes will not only look at cost-effectiveness but cost-benefits as well.

It is both inopportune and perhaps futile to get into the arguments by economists over the two terms. Suffice it to say that most researchers agree that cost-effectiveness compares input to output, so it involves costs per unit of outcome or results, such as improved agriculture crop yield, level of education attained etc. and compares the one way of achieving the desired outcome to another method of doing so. In the present context a cost-effectiveness study might compare a satellite-based delivery of courses to doing the same thing face-to-face, or a comparison of using satellite technology as opposed to microwave or terrestrial technology or shipping of videotapes to meet the desired goals.

Cost benefit on the other hand tries to relate output to societal goals. The problem is not an easy one since social goals are not always easily defined and are difficult to quantify, or to attach a dollar value to. Klees and others (1977) in referring to cost-benefit analysis said,

> No studies exist which compare the societal costs and benefits of communications technology based educational systems with those of traditional educational systems, although Wells (1976), Carnoy (1975), Carnoy and Levin (1975), Gandy (1975a, 1975b), and Klees (1975) raise a number of considerations directly relevant to this area. The primary problem is that cost-benefit analysis as applied to educational systems in general is still in its infancy in many ways, and is beset with some serious theoretical and methodological problems (see Carnoy (1973) and Blaug (1970) for discussions of this area from several differing perspectives)... There is little direct evidence of the benefits of instructional technology systems compared to traditional instructional systems, since the two have rarely, if ever, been utilized side by side for a sufficient length of time to permit comparative empirical analysis of their effects along such dimensions as income, employment and productivity.

While this is true, the UWI would not be looking to replace its traditional instructional modes for mediated ones, but rather to extend its scope of operation by offering services it has hitherto found extremely difficult and, in some cases, impractical.

5.1.6.1 Cost of Software Development. It is difficult to estimate how much it will cost the UWI to upgrade the production studios at Cave Hill and St. Augustine because we do not have an inventory of what equipment exists there. Based on what the author observed personally, a rough estimate of the studio requirements (both originating and receive only sites) would be in the region of $100,000 U.S. to equip all 14 territories for software production and distribution.

Costs of estimates of software vary a great deal across projects. Table 32, adapted from Klees and Wells (1977), presents a wide range of hourly programming costs for TV-- from $91 for the Stanford system to $13,700 for the Ivory Coast system. Such cost ranges reflect many differences between projects, the authors note. Differences relate to factors such as grade levels covered, subject matter, length of programs, pedagogical format, technical virtuosity, television format, extent of locational shooting etc. It is not possible to cost software development for the UWI demonstration for reasons already advanced. However, there are some categories of costs that the university will face even if a dollar figure cannot be attached to them at this juncture. Assuming that studio facilities are included under capital costs, the other categories are costs associated with local coordination at each site, central coordination, production and course development, library

Table 32

An International Comparison of ITV Program Production Costs[a]

	Number of Programming Hours[b]	Annualized Facility Costs[c] (in 1000s of 1972 $)	Annualized Equipment Costs[d] (in 1000s of 1972 $)	Recurrent Costs (in 1000s of 1972 dollars)	Average Cost per hour[e] (in 1972 dollars)
Ivory Coast	201	252.3	302.1	1532.3	13700
El Salvador	333	22.70	231.0	540.0	3000
Hagerstown	1440	40.13	209.9	847.5	762
Korea					1704
Stanford	6290	47.25	34.06	489.9	91
Telesecundaria	1080	12.6	44.3	472.8	490
Open University	288				9600

[a]This table is derived from Jamison, Klees and Wells (1976, Table IV.2)

[b]This is the number of hours produced or revised in a year. It is not necessarily equal to the number of total hours broadcast to students.

[c]Facility costs are annualized at 7.5% with a 20-year life.

[d]Equipment costs are annualized at 7.5% with a 10-year life. Videotapes are included as equipment but assumed to have a 5-year life.

[e]These figures do not take account of differences in program life.

tape storage, tape stock, distribution and mailing of correspondence, and supplementary printed material (optional). Participants in the teleconferences felt that mailing of background papers and sharing agenda topics in advance would have enhanced the quality and dynamics of the teleconferences.

5.1.6.2 Cost of Satellite Capacity and Earth Equipment. As was pointed out earlier, from both political and practical standpoints there 's much sense in using the esisting Intelsat system. A ground station utilizing a 15 foot dish currently costs around US $50,000 and can provide receive only video and two-2 way voice only channels. Use of small diameter antennas e.g., 4.57 meters with INTELSAT satellites will require special approval, but the sidelobe performance of these antennas (with minor modifications), should meet INTELSAT antenna performance criteria. The cost for a master link (to use the preemptible INTERSAT satellite) for originating campuses is in the region of $100,000 each.

Ten earth stations of the 4.57 antenna-type cost $500,000. To that half million would be added the cost of the terrestrial link from the university location to the nearest microwave connection or additional uplinks of slightly large size. It is evident that capital costs are quite high. Indeed satellite technology is capital intensive.

Rental of satellite capacity is another cost factor. INTELSAT leases transponder capacity to many domestic users. It is not clear whether the operating agreement is flexible enough to enable the various territories of CARICOM to enjoy the same type of tariff as a single entity would. The current leasing rate is US $1 million per

transponder, $1/2M for 1/2 transponder and $1/4M for 1/4 transponder. One transponder can carry 360 voice circuits.[22] However for Video, a full transponder is necessary.

The price to the end user is, of course, not the same as the tariff the INTELSAT member paid for the lease. The ratio between the two varv widelv and have been known to be as high as 10 to 1 in some countries. That is due to institutional arrangements that have to do with interconnections, overheads and the everyday business practice of making a profit. Even if a joint Caribbean INTELSAT approach resulted in leasing of a 1/4 transponder for special educational purposes for $250,000 per year, that does not necessarily mean that this is the price the university would pay. However, negotiated as a package deal there could be very good concessions.

If it proves impossible to lease 1/4 transponder capacity for the requirements of a UWI based operational service, rental of smaller amounts of satellite capacity at current rates might be the next most satisfactory option. Figures are not available for Barbados, but in a telephone conversation with an official of JAMINTEL, the figures quoted for 90 minutes of video with accompanying audio was in the vicinity of $4000 (Jamaica dollars, or close to $3000 U.S. dollars[23]). The uplink charges are about $1100 U.S. and the downlink roughly $1900.

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[22]This varies according to the size of the earth station.

[23]These figures are approximate and subject to change. They were actually calculated based on a request for satellite time for the Commonwealth games in Canada.

If UWI rented satellite time in 90 minute blocks, three times per week as it did during the demonstration, that would amount to about $450,000 (U.S.) per year. A generous 30% discount negotiated as a package deal might bring this down to around $300,000 (U.S.) per year. That is still an extremely high figure for islands grappling with foreign exchange problems.

These figures represent video with accompanying audio. For two-wav audio only the cost is about $150,000 without discount and close to $100,000 (U.S.) allowing for a 30% discount. Video is not necessary for every activity. Students in Law and History felt the video was not particularly important. A mix of video for some activities and audio only for the majority might be a useful hybrid for the type of program activities envisaged.

The UWI and the Caribbean region might need a great deal of international aid in the next few years if they are to develop such a satellite delivery system.

Chapter Six

SUMMARY OF FINDINGS: IMPLICATIONS AND RECOMMENDATIONS

This chapter is organized in a manner that is consistent with the presentation of the detailed findings in the two previous chapters. Each recommendation is the product of the findings and discussion in the sub-section in which that recommendation appears. For the benefit of policy persons and other decision-makers who might look at the recommendations in terms of priorities for action, the same recommendations are rank-ordered (by priority for consideration and further action) in the executive summary (pages xi and xii).

The two major types of activities engaged in during the eight-week demonstration, student lectures and teleconferences were both very successful. Every program went off as scheduled. Students rated the lectures highly, and participants were very satisfied with the teleconferences. In all 315 students received the lectures of whom 301 filled out the questionnaires, 183 from Cave Hill (Barbados) and 188 from Mona (Jamaica). During the fifteen teleconferences 137 participants spoke on the satellite system. Over 1500 persons attended the 24 events, which received favorable publicity throughout the Caribbean region. There were 34 hours of ATS-6 transmission and 90 hours of ATS-3.

6.1 Technical Performance of the System

The received signal quality of the ATS-6 satellite was mostly good at both Cave Hill and Mona, but many fades were experienced in

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Castries (St. Lucia). Overall the signal quality had a rated mean of 2.63 (maximum 3). The ATS-3 received signal quality was poor during formal programs, i.e. when operating simultaneously with the ATS-6 satellite, suggesting possible interference from the two antenna systems, although the 100-foot separation of the ATS-3 yagi antenna from the ATS-6 parabolic dish antenna was observed as specified. When not in simultaneous operation the ATS-3 signal was very satisfactory.

Despite the quality problems 60% of all participants evaluated the signal as adequate or better for the day's tasks. The erratic quality of the ATS-3 is mainly responsible for dropping the percentage down to just about sixty.

The system was highly reliable, the space segment behaved remarkably well. There were no outages. The major setback in equipment performance was the inadequacy of the DC power supply to take the necessary load on transmission resulting in a weak ATS-3 transmission. Breakdowns were moderate and did not prevent formal sessions from taking place. One color monitor was down for two weeks, but that apart, the average down time was one or two days.

The earth equipment stood up well to the use demand characteristic. The ATS-6 was used three times a week in 90 minute blocks in conjunction with ATS-3; the ATS-3 was used alone for 2 hours Monday to Friday and on some Saturdays and Sundays.

6.1.1 Implications

It was tested conclusively that the ATS-6 can beam a

reliable signal to a location with a look angle of the satellite of only 0.6^{o}, which should dispel any diffidence about experimentation in locations on the fringe of the footprint of ATS-6 in the future.

The received signal quality from a satellite system need not be perfect to be considered adequate for teleconferencing tasks. Participants can tolerate an unsatisfactory signal intermittently if other factors related to the satellite teleconference (e.g. topic and organization) are good. When two satellites are in operation simultaneously to service a teleconferencing system, if the signal quality from one is not up to mark, a compensatory mechanism seems to operate to cancel the adverse effect of the poorer signal resulting in an overall adequate one. For the future, the UWI might only use one satellite, but provided that there is a sufficiently adequate testing period to ascertain any sources of antenna interference and to effect optimum separation of the two systems, two satellites can be used simultaneously effectively.

6.1.2 Recommendation

> For satellite activities involving many locations, including some with marginal conditions of reception, time should be set aside before each program activity for system check of reception conditions which might necessitate realignment of antenna positions.

Extra time on ATS-6 could not be spared during the demonstration because a rigid schedule was in operation and was adhered to. The technicians were hesitant lest they upset authorities, to use scheduled time to trouble-shoot problems related to ATS-6 reception in St. Lucia. On the other hand, the extra time allotted on

ATS-3 allowed a number of equipment-related problems to be resolved without interference with formal programs.

6.2 Attitudes

Attitudes to both the programs and the technology were very positive. Students and teleconferencers liked the programs a great deal, rating them 2.74 on a scale of 1 to 3 in ascending order of affect. Feelings were positive at all locations with a high of 2.94 (out of 3.0) in St. Lucia where delegates from non-campus territories participated. Eighty-six percent of all participants felt that the video was of some importance, but not crucial with 37% of all respondents feeling they could have carried out the day's activity effectively without video. There was little difference across locations, twenty-nine percent were undecided. There was user acceptance of the technology, with 82% feeling it was easy to use and 75% stating that the telecommunications equipment did not distract from the proceedings.

The unequal video capability affected 49 percent of users, though it did not inhibit their participation. The affected ones were mostly concerned with the tendency for Mona to occupy a disproportionate amount of microphone time. Mona felt the most affected by not being able to see the other teams and lamented the fact that they could not perceive non-verbal cues. Further, the imbalance in communication, when they could be seen but not see to whom they were talking was upsetting.

Attitudes were weakly positively correlated to signal quality (the better the quality, the more participants liked the

activity). Color was deemed important by 51 percent of students, the remaining 49 percent rating it as not important. On a whole students felt color was more important for science subjects than art subjects. In the interviews and also on the open-ended comments sections of questionnaires, respondents showed positive affect toward the satellite demonstration. "Novel," "refreshing," "meaningful experience," and "exciting," were among the laudatory remarks. "Keep eye on priorities," "will cost too much," "too structured," and "lectures ended too abruptly," were among the indictments.

6.2.1 Implications

User acceptance of the satellite system is a strong base on which to build follow-on activities. The fact that video was considered important but not crucial allows the UWI some flexibility in planning. One strategy might be to start with audio-only activities and gradually phase in the video as the financial climate dictates. In such a case, the UWI should either gain some firsthand experience with the range of activities that are possible using audio only, such as the PEACESAT or University of South Pacific experiments in the Pacific using ATS-1, or should have its officials, including a technical hand, visit the Pacific basin to observe what is being done there.

Positive attitudes to a demonstration do not necessarily guarantee future favorable affect towards an operational system, especially when the demonstration did not make much financial demand[24] on the university. The UWI is its own best publicity

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[24]One is aware that there are real costs attached to services provided in kind, but these were not costed.

agent and if an effort is made not to lose the momentum and to keep the question of improvement of university services through the use of advanced communication technology in the fore, there exists a reasonable foundation on which to begin to build.

6.2.2 Recommendation

> AID should encourage and if possible facilitate a visit by UWI officials to one or two Pacific Basin members of PEACESAT and University of the South Pacific to observe at first hand the range of services that are possible using an audio-only satellite channel.

Such a visit might be undertaken by two officials at Mona, and one each from the other two campuses, one member of the team could be a technician who is likely to be attached to a future operational scheme. The PEACESAT operations, although making use of free satellite time by NASA's ATS-1, has many components that would be useful for the UWI to note as possible options. The basic plan of PEACESAT has been to provide an experimental system encompassing flexibility, mobility, low cost and two-way transmission suited to low income economies. The system has been successful in offering library networking, courses for credit, and educational extension work. There are no television broadcasts -- all locations transmit and receive audio only. Yet it is a highly effective system.

The spectrum of PEACESAT activities have been summarized as follows: (Misko 1975) (1) Classroom Instruction, (2) Decision-Maker Conferences, (3) Professional and In-Service Training, (4) Community Development Seminars, (5) Research Support, (6) Professional Consultation, and (7) Technical Development.

6.3 Benefits and Impact

The university benefited from the demonstration in a number of ways. In addition to benefits to students, teleconferencers and coordinating teams, the UWI as an institution successfully accomplished the stated objectives of the demonstration and received regional publicity, which was most favorable, thereby enhancing its stature in the region. Eighty-four percent of UWI top-level personnel interviewed (n=14) felt the university had been successful in accomplishing all objectives. More would have liked to have seen more effort in the area of overcoming bottlenecks in communication, but overall the UWI got a resounding vote of confidence.

Student benefits were measured in terms of student learning and utility of the satellite video lectures to their coursework. Eighty-three percent of all students (n=265) felt they learned the same as in a normal classroom situation or more, with no difference between Cave Hill and Mona students. Ninety-six percent of students received the benefit of lectures deemed by them as useful to their coursework to some degree.

Teleconference participant benefits were gleaned from ratings of value of the teleconferences to the respondents own work and solicited comments about the teleconferences. The findings show that 90 percent felt the activities by satellite were valuable to their own work with no difference across locations. Many remarked that they received personal benefit, that they found the activities stimulating and the biggest benefit of all was the opportunity to obtain first-hand experience in using satellite technology for delivery of education and social services, the first time such a venture had taken place in the Commonwealth Caribbean.

The full effect of the demonstration on the UWI is difficult to assess since no objective measures of changes in attitude or behavior were taken. However, from personal observation of the author and interview responses, it is fair to say that the impact was both catalytic and beneficial -- in that it brought out some hitherto unheard of levels of cooperation both within departments of the university and between the university and outside institutions. Eight of the fourteen persons interviewed said most positively that it was beneficial, three were more reserved, while three felt there was little visible effect.

6.3.1 Implications

Personal benefits to individuals (students and teleconferencers) and benefits to the university as an institution should further enhance confidence in planning a follow-on as soon as possible. It is unlikely that these benefits will be neutralized, if action towards future activity is initiated as early as possible.

The fact that the press and radio of the region provided free and favorable publicity means that a vehicle exists to keep constituencies informed of plans and prospects. Good relations with the press should be maintained.

6.3.2 Recommendation

> The UWI should capitalize on the favorable regional publicity and the declared beneficial impact of the demonstration, to activate urgent discussion across campuses on likely follow-on plans.

Future efforts might involve all territories served by the university. The planning process will require as many useful inputs

as possible. Soliciting views across campuses and departments of the university will not only assist UWI in formulating plans that encompass many schools of thought, but also will give faculties a feeling of involvement at an early stage, a feeling that their inputs count in the decision-making process.

6.4 Task Accomplishment

The satellite system was rated as suitable for accomplishing many specific and varied tasks. Over sixty participants saw applications of the technology in the Caribbean for tasks related to emergencies, regional medical training, teacher training, rural health care, general "outreach" activities, information exchanges including data transmission, curriculum sharing, and agricultural extension seminars. Teleconferences were seen to have particular strengths. The satellite teleconferencing system has utility for the following tasks, rated on a scale of 1 to 3 in ascending order of utility: Idea exchanges (mean 2.59), for presenting new material (mean 2.24), for clarifying issues (mean 2.30), for better insights into problem solving (mean 2.36), for identifying applications to own work (mean 2.27) and awareness of problems others face (mean = 2.53).

The university was particularly interested in whether academic and administrative teleconferences among UWI professionals could achieve the conference objective using the satellite system, for this has direct implication for the future. Of 41 UWI personnel responding to the question of success in task objective via teleconferences, 83 percent thought they had succeeded in achieving the day's objective using the teleconference mode. Only 2 of the 41 felt the system the objective was not successfully accomplished.

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6.4.1 Implications

Proof that "the system could deliver," that conference objectives could be satisfactorily accomplished through teleconferences, has important implications for a university that spends in excess of $200,000 (JA) on travel between territories to coordinate programs. While there are areas of work that cannot be handled remotely, which makes travel essential, there are many trips that lecturers and administrative personnel would avoid if they could. The teleconferencing system is an effective substitute. Some academics told the author that the travel is always welcome to them for a number of reasons including, "mentally invigorating," "keeping in touch," and "for subsistence which comes in handy." They also confessed that too much travel is often disrupting, takes them away from base at inconvenient times, and "there are too many meetings too often." The success of the teleconferencing system could enhance interest in substituting some travel (perhaps those regarded as a chore) for remote conferencing. Teleconferencing systems also would be useful because of the air travel problems in the region.

6.4.2 Recommendation

UWI should investigate the possibility of substituting remote teleconferencing for some travel.

There can be substantial savings in time, energy and money if a reliable teleconference circuit can be obtained for conferences and meetings where the nature of the business to be transacted is not confidential. Further, much premeeting coordination that often involve very small groups travelling hundreds of miles for a one day conference or meeting could be handled in a teleconference mode using audio only or audio plus video.

6.5 Resources for Operational Service

One of the more striking findings of the evaluation is the fact that a climate of receptivity towards a follow-on project exists. There was user acceptance of the satellite system, attitudes were favorable both across locations and across types of users, the university derived much benefit from the demonstration and there was hitherto unrealized cooperation both within some departments of the university and between the university and outside groups in servicing the needs of the project.

In addition, a large majority of all participants declared their willingness to use satellite technology in the future -- a climate of potential commitment.

However, it is unwise to generalize too much from what were basically purposive samples.

6.5.1 Recommendation

> AID should support a UWI effort to make, as early as possible, a needs assessment survey and inventory of local technical expertise of all the territories served by the university.

To make the use of satellite technology economically attractive, as many "units" as possible should utilize the system. Participants from virtually all of the fourteen territories that form UWI's constituency identified a wide range of applications to which satellite technology could be put to improve educational and social services in their countries. But these participants do not necessarily reflect national thinking. A needs assessment survey in each territory will provide a better base on which to plan.

The demonstration showed that there was adequate technical expertise at Mona (Jamaica) to service an operational system but the same cannot be said of Cave Hill, and that important technical input remains an unknown for the other territories. An inventory of local technical expertise that the university could draw on for an operational scheme appears to be necessary.

6.5.2 Recommendation

AID should be receptive to a UWI request for short attachments and training of UWI technicians and production personnel in the United States.

While the demonstration gave the UWI pool of technicians and production people experience with using satellite technology, it would be most productive towards a future endeavor if the UWI could select senior technicians and send them to the U.S. for short attachments to NASA Intelsat or other appropriate entity for further training in system servicing, maintenance and repair.

Of all the production staff at Mona, only one had previous experience full time with TV production. There is an urgent need to train a production manager for future operations. Such a person could be used to train others later on if there were more than one site originating programs.

6.5.3 Recommendation

UWI should make an effort to resolve the impasse with Trinidad and plan to include that territory in future efforts, unless there is a firm statement to the contrary.

In any activity involving satellites, governments are likely to be sensitive. Irrespective of user wishes, enthusiasm or willingness to undertake a satellite-based delivery project, if governments do not approve the projects will not go on. Trinidad represents about 40 percent of the UWI's resources. Trinidad also did not participate in the demonstration and there is, up to now, no hard evidence to indicate Trinidad would not consider taking part, especially if:

a. Trinidad originates some of the programs and,

b. The satellite used be one of the INTELSAT series.

The Trinidad government through TEXTEL (the Trinidad and Tobago External Communications Company) is a signatory to the INTELSAT Operations Agreement. Other governments in the region have close ties with Trinidad and if it is perceived that no effort is made to involve Trinidad in early planning of an operational stage, the UWI may jeopardize its chances of roping in all other units in the venture.

The university's council, its most prestigious policy-making body, meets every February. Each government is represented at Ministerial level. It would be a useful strategy for UWI to have made its approaches to Trinidad and hopefully resolved differences before the council sits to approve of UWI's future plans.

6.5.4 Recommendation

For operational service UWI should utilize INTELSAT satellites as it is both politically important and practically sensible to do so.

Jamaica, Barbados and Trinidad and Tobago already possess INTELSAT Standard B (10 meter antennas) type earth stations. Belize was scheduled to have one by August 1978. In Jamaica and Trinidad and Tobago the government owns majority shares in JAMINTEL and TEXTEL, the entities that represent them on INTELSAT. It makes political sense to use capacity provided by INTELSAT in which governments have shares and it makes practical sense to build on a foundation that is already present in the region.

6.5.5 Recommendation

AID should consider the provision of a substantial amount of foreign aid for capital costs of installing earth stations for reception and transmission, a microwave link on each campus, upgrading of production facilities on each campus and rental of capacity from INTELSAT.

There is some indication that the UWI plans to undertake its own cost studies as soon as possible after determination of potential demand for satellite-delivered courses and other uses of satellite technology in the territories, and assessment of production of software capability. At least many interviewees suggested that this was the course they hoped the university would take before committing itself to an operational satellite system.

In this report we only scratch the surface in terms of costs. A proper cost study is clearly in order from experts in that field. We are content to provide pointers to some of the cost areas where AID might feel encouraged to assist the UWI.

There are two types of costs that UWI will have to consider. The first is capital cost of installation of earth stations and

upgrading of facilities. The second, variable cost, is rental of satellite time.

Cost figures for the demonstration are not available, and in any event do not bear much relation to costs of an operational service, since satellite time was given free, virtually all UWI services were donated in kind, and the earth stations used for the demonstration are not the same as the earth equipment likely to be used operationally. Using quotations from JAMINTEL, to do a similar exercise of 90 minute video with accompanying audio three times per week, would cost about $9,000 (U.S.) weekly. That figure does not include the cost of the link from the earth station to the receive location, and only takes into account two countries, Jamaica and Barbados, where Standard B type earth stations exist.

Small earth stations, using 4.57 meter antennas for receive-only video and 2 two-way voice channels are currently priced in the region of $50,000 (U.S.). Using the INTELSAT SPOT BEAMS or Zonal which have an EIRP (Effective Isotropic Radiated Power) satisfactory to INTELSAT criteria, 4.57 meter antennas and accompanying earth equipment could be used for television reception, television, telephony and broadcast radio. To equip 11 territories with this type of earh station will cost over half a million U.S. dollars. To equip the three major campuses with video uplinks might cost another U.S. $300,000.

Barely satisfactory capability for software production exists at Mona. Trinidad's small media center would need upgrading and Cave Hill, Barbados, has little to count on. After the inventory of production needs the UWI will certainlv need financial assistance to equip these centers to meet the demanding requirements of ongoing day-to-day cooperation and course development.

Costs of software are very much project-specific and it is futile to generalize using figures from other satellite experiments or operational services. However, the categories of costs for software development for courses are likely to fall into, (1) production and development of courseware, (2) course delivery, (3) local coordination and (4) central coordination.

Much work remains to be done if the Caribbean is to reap the benefits of using advanced communication technology to improve the standard of living of its peoples. The UWI took a bold initiative and has demonstrated the ability to experiment with innovations.

The next step is to approach future activities with both vigor and vision after doing the proper homework, to avoid the pitfalls which clutter the road to success. It is only in this way that we can ever arrive at the reality embodied in these words:

> A time is going to come when any student or scholar anywhere on earth will be able to tune into a course in any subject that interests him at any level of difficulty he desires. Thousands of educational programs will be broadcast simultaneously on different frequencies so that any individual will be able to proceed at his own rate, and at his own convenience, through the subject of his choice.
>
> Arthur C. Clarke
> UNESCO Address
> Paris, 1969

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APPENDIX ONE

Program Events During Demonstration

PROGRAMME FOR PROJECT SATELLITE

WEEK I

Date	Type of Event	Details
Mon. Jan. 16	Demonstration of Facilities	Demonstration of use of the equipment at each site.
Wed. Jan. 18 9.30 - 10.10	Meeting of Board for Postgraduate Studies Chairman - Prof. G. Lalor	Confirmation of minutes and confirmation of Grant requests.
10.15 - 11.00	Meeting of Dean/Vice-Deans, Heads of Departments, Faculty of Natural Sciences	New Degree Structure: Effects and implications.
Fri. Jan. 20 9.30 - 11.00	OPENING FUNCTION	Speeches include the Vice-Chancellor, Campus Principals, Ministers of Education, Ja. & Bdos U.S. Ambassador, Ja. Rep. U.S. Embassy, Bdos

WEEK II

Mon. Jan. 23 9.30 - 11.00	Medical Teleconference (Outreach) Chairman: Dr. O.D. Minott	Developments in Rural Medical Care in the Caribbean.
Wed. Jan. 25 9.30 - 11.00	Librarians' Conference Chairman - Mr. K. Ingram	Conference on topics relevant to Library Services in the University and the Caribbean.
Fri. Jan. 27 9.30 - 10.10	Natural Sciences Course Lecture Lecturer: Dr. L. Coke	Structure and Uses of Woods.
10.15 - 11.00	Faculty of Law Course Lecture Lecturer: Miss D. Whyte	English Common Law Connection and the Law of Public Mischief in some West Indian Territories. Part I.

WEEK III

Mon. Jan. 30	Agriculture: Outreach Programme Chairman: Mr. G.A. Southwell	Agricultural Extension Teleconference on - "Rural Integrated Development"
Wed. Feb. 1 9.30 - 10.10	Faculty of Arts Course Lecture Lecturer: Dr. H. Johnson	"Imperial Uses of Commissions of Enquiry - Moyne Commission of 1938."
10.15 - 11.00	Faculty of Law Course Lecture Miss D. Whyte	English Common Law Connection - PART II
Fri. Feb. 3 9.30 - 11.00	Administration Discussions	Discussion and clarification of simple administrative details.

/WEEK IV

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Date	Type of Event	Details
WEEK IV		
Mon. Feb. 6 9.30 - 11.00	Medical Telecon. - Outreach Chairman - Dr. Mary Seivwright	The Nurse Practitioner Programme in the Caribbean Context and its Value to Rural Clinics
Wed. Feb. 8 9.30 - 11.00	Teleconference between Educators of the Deaf	Co-ordinating teleconference for the St.Lucia Seminar on Education for the Deaf
Fri. Feb. 10 9.30 - 11.00	Extra-Mural Telecon: Social Welfare - Outreach. Chairman - Mrs. S. Francis	Seminar on "A new Approach to Family Life Education Techniques"
WEEK V		
Mon. Feb. 13 9.30 - 11.00	Conference on Education Co-ordinator: Prof. R. Murray	Teleconference involving Deans, Vice-Deans, and Faculty Executives.
Tues. Feb.14 12.30 a.m. - 1.20 a.m.	Radio conference with University of the South Pacific	Discussions between U.W.I. Administrators, Deans & Vice-Deans and their counterparts in the various islands in the University of the South Pacific.
Wed. Feb.15 9.30 - 10.10	Faculty of Arts Course Lecture Lecturer: Dr. M. Morris Reader: Mrs. Louise Bennett-Coverley	"The Poetry of Louise Bennett"
10.15 - 11.00	Faculty of Natural Sciences: Course Lecture in Chemistry Lecturer : Prof. W. Chan	Discussion on the Shape of Organic Molecules
Fri. Feb. 17	NO PROGRAMME (Council meetings at Mona)	Radio links used for Administrativ discussions.
WEEK VI		
Mon. Feb. 20 9.30 - 11.00	Extra-Mural Teleconference Social Welfare - Outreach: Chairman: Mr. Leonard Shorey	Early Childhood Education: "The Pre-School Child 0 - 4 years"
Wed. Feb. 22 9.30 - 11	Faculty of Medicine Course lecture - Prof. G. Alleyne Dr. Fraser	Diabetes Mellitus
Fri. Feb. 24 9.30 - 11.00	Engineering Seminar - Outreach Co-ordinators: Dr. M. Chin Mr. Arun Buch	Project Management for Small Contractors.
WEEK VII		
Mon. Feb. 27 9.30 - 11.00	International Panel Discussion on Solar Energy, Wind Energy, etc.	A teleconference involving Denver, Colorado; Barbados, Jamaica and St. Lucia
Wed. and Fri. Mar. 1 & 3 9.30 - 11.00	Agricultural Extension : 2½ day seminar with 90 minute satellite sessions Co-ordinator: Mr. G. Southwell Chairman: Mr. L. Coke	Participants to travel to St.Lucia. Jamaica, Trinidad, and Barbados interacting with St.Lucia participants.
Mon. & Wed. Mar. 6-8 9.30 - 11.00	Seminar on Education of the Deaf - Outreach 2½ day seminar with two 90-min. satellite sessions: Co-ordinators: Mrs. P. Charles Mrs. J. Robinson	"Education for the Deaf - a Caribbean Model". Similar to Agricultural seminar. Participar to include international resource persons.
Fri. Mar.10	CLOSING ACTIVITY Chairman: P.V.C. L. Braithwaite	Closing remarks by Chancellor, Vice-Chancellor, P.V.Cs., Registr

APPENDIX TWO

Technical Log Questionnaire

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APPENDIX THREE

Student Questionnaire

Appendix Four

Teleconference Questionnaires

6. Please rate the technical quality of the following: (please circle the appropriate response)

	excellent	good	fair	poor	unintelligible
TV Picture	5	4	3	2	1
Sound from Jamaica	5	4	3	2	1
Sound from other sites	5	4	3	2	1

Thinking back over the purpose of the meeting today, please rate the adequacy of the technical quality for the task at hand. (please circle the appropriate response)

	completely adequate				completely inadequate
TV Picture	5	4	3	2	1
Sound from Jamaica	5	4	3	2	1
Sound from other sites	5	4	3	2	1

7. (a) Did you find the amount of interaction between sites was:

_____ too great; _____ about right; _____ too little

(b) Compared to the other sites, did your site participate:

_____ more; _____ about the same; _____ less

(c) Did the moderator/chairman give each site sufficient opportunity to participate?

_____ Yes; _____ Not sure; _____ No.

(d) Did you have easy access to a microphone when you wanted to speak?

_____ Yes; _____ No.

(e) All campuses can transmit audio, but only the Mona campus can transmit pictures. Did this <u>affect</u> your participation?

_____ Yes; _____ No.

If yes, please explain: _____

_____

7. (continued)

(f) Did this inhibit your participation in any way?

_____ Yes; _____ No

If yes, in what way _____

_____

8. (a) How important was the video (TV Picture) in today's activity?

_____ very important ___ somewhat important ___not important

b) Could you have carried out today's activity as effectively without video?

_____ Yes; _____ Not sure; _____ No.

Comments if any: _____

_____

_____

(b) Did the technology affect you in any other way?

_____ Yes _____ No

If yes, please explain _____

_____

NOTE: If today's activity is an administration/faculty teleconference, answer questions 9, 10 & 11. If it is an outreach seminar, answer questions 12, 13 & 14 instead.

9. (a) In terms of accomplishing its objectives, the tele conference today was: (please circle the appropriate response)

completely successful	somewhat successful	neutral	somewhat unsuccessful	completely unsuccessful
5	4	3	2	1

(b) In terms of your own work, did you find the conference today:

_____ very valuable; _____ somewhat valuable; _____ of no value.

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NOTE: COMPLETE THE FOLLOWING QUESTIONS ONLY IF THIS WAS AN OUTREACH SEMINAR.

12. How useful was today's seminar by satellite for the following: (please circle the appropriate response)

(a) Exchanging ideas and sharing experiences with colleagues

_____ Very useful; _____ somewhat useful; _____ of no use at all

(b) Presenting new materials in this field

_____ Very useful; _____ somewhat useful; _____ of no use at all

(c) Clarifying current issues in this field

_____ Very useful; _____ somewhat useful; _____ of no use at all

(d) Providing a better insight into problem/solving in this field

_____ Very useful; _____ somewhat useful; _____ of no use at all

(e) Identifying possible applications to my work

_____ Very useful; _____ somewhat useful; _____ of no use at all

(f) Increasing my awareness of problems others are facing in this area

_____ Very useful; _____ somewhat useful; _____ of no use at all

13. (a) How useful would today's type of activity be to you on a continuing basis? (please circle appropriate response)

_____ Very useful; _____ somewhat useful; _____ of no use at all

(b) If the University and or the Caribbean region decided to use satellite communication on a regular basis, would you be willing to participate?

very willing	willing	neutral	unwilling	most unwilling
5	4	3	2	1

(c) For what type of tasks do you see satellite communications as being particularly suitable in your work?

_____

_____

(d) For what type of tasks do you see satellite communications as being particularly unsuitable in your work?

_____

14. Any other comments you care to give would be welcome _____

_____

_____

1. Name _____

2. Date _____

3. Occupation/Position with UWI _____

4. Location (attached to which Campus) _____

Now that the Satellite demonstration is over, the University as well as USAID would like to share your views about the project. Your considered response to each question will be very valuable in making a proper evaluation of the experiment.

The UWI sought to gain first hand experience with using satellite technology to, primarily,

(a) test technical feasibility

(b) try to overcome administrative bottlenecks by facilitating more communication and consultation among the administrative branches of the University situated on the campuses

(c) to permit lecturers to reach a wider student audience thru the use of television lectures

(d) experiment with some outreach programmes.

5. Were there any other objectives? _____

6(a) Now, with respect to (a), i.e. testing technical feasibility, do you think this was accomplished? YES_____ NO_____

(b) If yes, in what specific ways was the objective accomplished?

(c) If no, why do you think it wasn't accomplished? _____

(d) Any other comments on that objective? _____

APPENDIX SIX

Technical and Production Crew at Mona

UWI
MONA

"Project Satellite"

TIME TABLE (Effective Mon. 30/1/78 - Mon. 6/3/78)

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
TX Crew A 9 - 11 a.m.	Rehearsal Crew B 4:30 - 6:30 pm.	TX Crew B 9 - 11 a.m.	Rehearsal Crew C 4:30 - 6:00 p.m.	TX Crew C 9 - 11 a.m.
*Evaluation & Planning 11:15 - 12:30		*Evaluation & Planning		*Evaluation
				Training Mr. Manison 2:30 - 4:30
				Rehearsal Crew A 4:30 - 6:30

Regional Co-Ordinator P-V-C Lalor
Technical Co-Ordinator Mr.G.C.Walling
Technical Engineer Jamaica (Courtesy of the JBC)-Mr.Oval Lue
Consultants Mr.Michael Roberts /Dr.Dieter Dedeke/Mr.F.St.Juste
Producer (Mona) Ms.Alma MockYen
Research & documentation Ms.Laurette Johnson
Graphics (courtesy of the Educational Broadcasting Service, Ministry of Education Jamaica)
Secretaries - Ms.C.Lowe
Ms.J.Edwards
Ms.J.Walsh
I/c Project Training - Mr.K.Manwison

APPENDIX SEVEN

Basic System Layout at Mona

APPENDIC EIGHT

List of Interviewees

LIST OF END OF DEMONSTRATION INTERVIEWEES

Professor G.C. Lalor - PVC and Project Director

Professor L. Robinson - PVC, Mona

* Mr. T. Walling - Technical Coordinator, Mona

* Mrs. A. Mockyen - Production Director

Mr. O. Lue - JBC Engineer

* Mrs. L. Bailey - Floor Manager, Productions

Dr. D. White - Lecturer in Law

Dr. O. Minott - Organizer Medical Teleconferences

Dr. L. Coke - Lecturer in Botany

Mr. R. Henry - PRO St. Augustine (mailed his questionnaire)

Mr. G. Southwell - Coordinator Agricultural seminars and teleconferences

Mr. F. Blackman - Project Coordinator, Cave Hill Campus

Mr. M. Gill - Resourse person on coordinating team, Cave Hill

Dr. L. Shorey - Outreach Coordinator, Cave Hill

Mr. R. Braithwaite - Technical Coordinator, Cave Hill

Dr. N. Liverpool - Dean of the Faculty of Law

Professor M. Waldron - Faculty of Medicine coordinator, Cave Hill

Mrs. Pat Charles - Project Coordinator, St. Lucia

*Unstructured, informal interviews.