The Use of Technology to Improve Teacher Education in Jamaica: Reform of Secondary Education (ROSE II)

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    Curriculum and Support Service
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    Faculty of Arts and Education
    Institute of Education
UWI Distance Education Centre, Ocho Rios
UWI Distance Education Centre, Montego Bay
Wolmer's Girls' School, Kingston
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Abbreviations

ADSL	Asynchronous Digital Subscriber Line
CXC	Caribbean Examinations Council
GOJ	Government of Jamaica
IDB	Inter-American Development Bank
ICT	Information, Communication, and Technology
IRI	Interactive Radio Instruction
JBTE	Joint Board of Teacher Education
JTA	Jamaica Teachers Association
MOEYC	Ministry of Education, Youth, and Culture
NGO	Nongovernment Organisation
PESP	Primary Education Support Project
POTS	Plain Old Telephone Service
ROSE I	Reform of Secondary Education
TC	Teachers' Colleges
UWI	University of the West Indies
UWIDEC	University Distance Education Centre

Table of Contents

Executive Summary

The purpose of this document is to guide readers in the creation of a distance education programme in Jamaica that has as its objective the strengthening of teacher quality in secondary schools across the island. The need for heightened teacher quality at the secondary level emerged as a result of two main factors.

First, in 1999-2000 there were approximately 12,000 teachers teaching a combined enrolment of 227,330 students in 594 secondary schools of all types. During that academic year, student pass rates in mathematics and English were only 35 and 44 percent respectively in the Caribbean Secondary Examinations (CSEC) of the Caribbean Examinations Council (CXC).

These low pass rates added weight to the perspective that upper secondary school teachers lack sufficient pedagogical training to teach content-heavy subjects and brought into question the level of their classroom management, student assessment, and evaluation skills. Indeed, while studies have shown that teachers with university training impact positively on students' performance in external examinations, only 27 percent of teachers had university training at the secondary level while 53 percent were college trained.[1]

Second, the Government of Jamaica's decision to implement a policy of universal secondary education for students entering the formal education system in the year 2003 and thereafter has also significantly increased the current and projected demand for qualified secondary school teachers. Through the Reform of Secondary Education (ROSE I) project, for example, some 38 all age schools were upgraded to primary and junior high status in 1998.

As a result, the MOEYC, in collaboration with the World Bank, commissioned a study to:

1. Evaluate the present methods used in the delivery of teacher training;
2. Identify alternative strategies for providing training including the use of technology; and
3. Assess the implications for the education system.

Specifically, the study asks the question of whether distance education programs can be created to relieve the supply constraints in the system and offer current teachers or prospective teachers a means for receiving or upgrading quality training at the secondary level.

The use of technology to train teachers must be viewed as a means to an end rather than an end in itself. The focus of this study is not to train teachers in the use of technology. Rather, it is to train teachers in content and pedagogy using technology as a medium for the training. The use

[1] MOEYC *Educational Digest 2000-01,* Statistics Section, Planning and Development Division, January 2002.

of a distance education programme, when designed and implemented well, has the potential to reach a greater number of teachers in a more cost-efficient way while maintaining or strengthening the quality of the training

Two missions to Jamaica were undertaken during 2002, to assess both the teacher training capacity and technological infrastructure in the country. During these visits, interviews were conducted with key educational stakeholders in the governmental, nonprofit, and for-profit arenas. The study's major findings and recommendations are based on the interviews conducted in Jamaica and other relevant research.

While there is insufficient data available about the specific training needs of teachers in the system (human resource constraints in the system have delayed correlation of the results of a 2000 survey of training needs), the perception is that vast needs exist. The field research conducted provided evidence to support this perception. Some of the key findings identified are as follows:

1. As a result of "rationalisation," three teachers' colleges no longer prepare students to teach at the secondary level. This has led to primary-trained teachers teaching in secondary schools and secondary-trained teachers teaching in primary schools.
2. Many teachers' college tutors hold Master degrees in areas where they are not teaching.
3. There is a need to streamline instruction at both the teachers' college and university levels to ensure that students receive an appropriate mix of content-based and methodology instruction.
4. Many students are performing poorly in the math and science areas because of basic deficiencies in reading, yet the problem is too large to be addressed solely by a group of reading specialists.
5. The existing manpower resources of the MOEYC's Professional Development and Media Services Units now limit capacity to incorporate a range of technologies into in-service training.

In addition to identifying training needs in the system, the report addresses a wide range of issues that must be considered in the planning of a distance education programme such as what transmission modality(ties) should be used and what target audience(s) should be beneficiaries of the training.

A market analysis of national and internationally based distance education programmes, and key learnings ascertained from these programmes, is provided to highlight the range of design and delivery options for distance education programmes. A basic cost overview of different transmission modes used in the delivery of a distance education programme follows.

The report then looks more closely at the role of Jamaican universities, teachers' colleges, and the Ministry of Education, Youth, and Culture (MOEYC) in teacher training. The budgetary allocation of teacher training and private and public costs of training is also discussed, followed

by a review of the proposed distance education package offered by the University of the West Indies.

The report concludes with a set of recommendations to the World Bank and the MOEYC regarding the creation of a distance education programme for secondary school teachers in Jamaica. The recommendations stress the need to use modes of transmission that encourage active rather than passive learning among participants (i.e., interactive video streaming over videocassettes). However, the exact type of modality used should be based on the availability of a particular transmission mode by region (for example, cable television in region 6).

The use of Interactive Radio Instruction across the country is also recommended for its low cost of usage and large reach. While this method is often bypassed because it lacks the modern appeal of more high-tech options, it must be considered as a viable way to quickly and efficiently train large groups of teachers.

Model centres of excellence are proposed for each of the six regions, to encourage innovation of distance education programmes and expand the country's experience with a range of high-tech modes of delivery. The need to develop these centres via collaborative partnerships with nonprofit, public, and private institutions is highlighted to offset the costs borne by the Ministry of Education.

Teachers working in newly upgraded secondary schools and specialised training in reading instruction for all secondary school teachers are two target areas identified for the training.

Other aspects addressed in the recommendations section include location of training (to encourage teacher buy-in and retention), and management of training to optimise quality and ensure operational effectiveness.

It is the hope that the complete report on the study provides a road map for the types of distance education programmes that would best address the training needs of the target audiences in the most cost-effective manner.

1. Introduction and Rationalisation

In 1999-2000, there were approximately 22,000 teachers at the primary and secondary levels of Jamaica's school system, with 12,000 at the secondary level. These 12,000 teachers taught in a total of 594 secondary schools[2] with a combined enrolment of 227,330 students. While studies have shown that teachers with university training impact positively on students' performance in external examinations, only 27 percent of teachers had university training at the secondary level while 53 percent were college trained.[3]

During the 1999-2000 academic year, student pass rates in mathematics and English language CSEC exams were only 35 and 44 percent respectively, adding more weight to the perspective that upper secondary school teachers lack sufficient training to teach content-heavy subjects. In turn, teachers with university degrees often lack sufficient training in teacher pedagogy, raising further questions about classroom management, student assessment, and evaluation skills.

Through the Reform of Secondary Education (ROSE I) project, some 38 all age schools were upgraded to primary and junior high status in 1998. The Government of Jamaica's (GOJ) policy of universal secondary education for students who enter the system in the year 2003 and thereafter continues to increase the demand for qualified secondary school teachers.

As a result, the MOEYC, in collaboration with the World Bank, commissioned a study to: (1) evaluate the present methods used in the delivery of teacher training; (2) identify alternative strategies for providing training including the use of technology; and (3) assess the implications for the education system. Specifically, the study asks the question of whether distance education programs can be created to relieve the supply constraints in the system and offer current teachers or prospective teachers a means for receiving or upgrading quality training at the secondary level.

Two missions to Jamaica were undertaken during 2002, to assess both the teacher training capacity and technological infrastructure in the country. Interviews were conducted with key educational stakeholders in the governmental, nonprofit, and for-profit arenas.

The following findings are based on those interviews conducted in Jamaica, and other relevant research.

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[2] Includes all age, P&JH, high schools, technical highs, and vocational/agriculture schools. *Jamaica Survey of Living Conditions, 2000.*

[3] MOEYC *Educational Digest 2000-01*, Statistics Section, Planning and Development Division, January 2002.

2. Basic Design Issues of a Distance Education Programme

When designing a distance education programme, four key stages must be considered: design, course delivery, instruction, and learner support. The structure chosen for each of these stages will impact both the cost of, and the success of, the programme. In deciding what type of distance education programme to offer in Jamaica, there are several strategic choices that must be taken into consideration. Specifically, the following questions must be considered:[4]

What are the learners' needs?
What is the content of the course?
What are the learning outcomes or objectives of the course?
What is the course structure?
What kind of interaction will there be?
How will the course be evaluated?
What delivery technologies are available to the learner?
Which of these technologies is most suitable to the learner and the course objectives?
What exercises and assignments will the student be given?

2.1 Target Group

The target group chosen will influence the delivery mode(s) and content base selected for the training, and as such, is one of the principal decisions that must be made in the design of a distance education programme. Through a series of focus groups and interviews conducted with key educational stakeholders in Jamaica, the following feedback regarding the selection of target groups was obtained:

- The importance of incorporating sound pedagogical techniques into any content-based training. It is not enough to upgrade teachers' knowledge of a content area. Teachers must be given sufficient training to effectively incorporate added content into classroom lessons.
- The need to place greater emphasis on building the competence of subject area teachers (especially mathematics and science) to teach reading skills within the context of their own lessons. Many students are performing poorly in the math and science areas because of basic deficiencies in reading, yet the problem is too large to be addressed solely by a group of reading specialists.
- The insufficiency of data available about the training needs of teachers in the system. The MOEYC conducted a survey on training needs in the schools in 2000,

[4] World Bank Global Distance Educationet website, Teaching & Learning: Design, http://www1.worldbank.org/disted

but the results have not been correlated due to human resource constraints in the system.

The following table summarises potential groups identified through conversations with educational stakeholders in Jamaica.

Table 1: Potential Target Audiences for Teacher Training Programme

Target Audience	Estimated Population[5]	Access Target Audience Via	Needs of Target Group	Organisation Best Positioned to Address Needs
Upper secondary teachers with Bachelors Degree (B. Ed, B.A., B.Sc.) but no Teachers College diploma	813 (6.7% of total)	Place of employment (secondary school); JTA	B.A. /BSc: Upgrading of pedagogy; in some cases, upgrading of content. B.Ed: Upgrading of content only	Teachers College and Universities for content upgrading especially.
Upper Secondary teachers with Teachers diploma but no Bachelors	6,405 (53.1% of total)	Place of employment (secondary school); JTA	Upgrading of content	University or Teachers College
Upper secondary teachers with neither Teachers diploma nor Bachelors degree	825 (6.8% of total)	Place of employment (secondary school); JTA	Upgrading of content and pedagogy	Teachers College and/or University
Upper secondary teachers with both Teachers diploma and Bachelors degree	2,662 (22.1% of total)	Place of employment (secondary school); JTA	Upgrading of content and/or pedagogy	Teachers College and/or University and professional development unit, MOEYC
Students in final year of secondary school with interest in teaching upper secondary math or science	undetermined	Targeted secondary schools; other youth-oriented groups	Teaching of content and pedagogy	Teachers College and University
University graduates working in math or science in private sector in Jamaica with interest in teaching upper secondary math or science	undetermined	Professional associations of math or science; place of employment	Teaching of pedagogy	Teachers College

The decision of whether or not teachers in a particular type of school should receive priority for training upgrades (e.g., all age school, primary and junior high, or traditional high school) might also be considered. The following table indicates teacher qualifications by school-type:

[5]Jamaica MOEYC, Statistics Section, Planning & Development Division. *Educational Digest 2000-01*. January 2002.

Table 2: Secondary School Teachers By Qualification and School Type[6]

School Type	Trained University Graduates	Untrained University Graduates	Trained College Graduates	Untrained Tertiary Level Graduates	Trained Instructor	Untrained Secondary School Graduates	Total
All age (7-9)	108	7	490	32	9	154	800
Prim. & jnr (7-9/11)	138	12	768	69	17	92	1,096
Secondary high	2,191	724	4,575	682	375	530	9,077
Technical high	211	67	555	99	5	46	1,028
Voc/agriculture	14	3	17	15	3	3	55
Total	2,662	813	6,405	897	454	825	12,056
Percentage	22.1	6.7	53.1	7.4	3.8	6.8	

2.2 Content and Structure of Training

After the target group by teacher classification and school type has been established, questions impacting the content and structure of the training can be more easily addressed.

Content of training. Currently the collaboration between the Teachers Colleges and universities in the system needs strengthening. The TCs focus primarily on methodology-based instruction and the universities focus primarily on content-based instruction. If the training is to address deficits in both content and pedagogy, the issue of collaboration and training responsibilities at the college and university levels must be addressed.

Furthermore, it is estimated that 100 hours of preparation time are required to prepare one instructional hour for online usage. This compares to 10 hours of preparation time for one hour of in-class instruction.[7] This fact is often overlooked when developing and budgeting for the content preparation of online courses. As a result, instructors are often asked to work more, for little or no compensation. Incentives must be built into the content development phase of an online programme, which must be accompanied by realistic budgets and production schedules.

Structure of training. The decision of whether to make the training preservice, in-service, or both will impact the reach of the training and if the training is in-service, raise questions about the extent to which student teachers receive a similar level of preparation in the teachers' colleges or universities. While many TCs felt it was critical to offer preservice training to ensure solid preparation of student teachers, a lack of continual in-service training in the schools has led

[6] Jamaica MOEYC, Statistics Section, Planning and Development Division. *Educational Digest 2000-01.* January 2002.

[7] William Saint, *Tertiary Distance Education and Technology in Sub-Saharan Africa* (World Bank Education and Technical Notes Series, vol. 5, no. 1, 2000).

to declines in quality standards among teachers. As such, any training offered should aim to incorporate both preservice and in-service elements where appropriate.

Location of training. The location of the training site (e.g., at the secondary school campus, the TCs, universities, distance education centres, or other location) will impact both the level of involvement and collaboration occurring among various educational stakeholders in the system. It will also impact the relative ease by which teachers can access the training services. These factors can impact both the participation rates of teachers and overall quality of the training programme. Given the high dropout rates of some distance education programmes, it is important to maximise the ease of participation for teachers in the programme. In addition, when selecting the type(s) of institutions to host the training, the level of fit between the institutional capacity/expertise in a particular mode of transmission and the mode of transmission selected for the training must also be assessed.

Trainer qualifications. In order to ensure quality of the training programme, a minimum set of trainer qualifications must be established. In addition, pools of potential lecturers should be identified from nationally based universities and TCs. If there is a lack of qualified, available trainers at the national level, and the decision is taken to hire trainers at the international level, steps must be taken to ensure that an appropriate transfer of knowledge occurs between international and national trainers during the first year of the training. This knowledge transfer is crucial to ensure expansion of the MOEYC's own intellectual capital, and minimise any dependence on international trainers in ensuing years of the programme.

Management of training programme. To ensure the creation of a quality training programme, a sustainable management structure must be put into place prior to the onset of the training. Management is more difficult in a distance education programme because of several factors including a dispersed student body and tutors, unreliable communication services, time-sensitive production and distribution of learning, and detailed student records.

When creating a distance education programme, a decision must be taken regarding what entity(ies) will take responsibility for managing the programme (e.g., university, Joint Board of Teacher Education, teachers' colleges, collaborative initiative among several institutions. . .). Traditionally, the incorporation of distance education programmes into more traditional educational systems helps to reduce resistance to innovation and avoid the perception that distance education is an inferior product. However, care must be taken to ensure that the managerial skill base needed to run a distance education programme exists or is nurtured within the traditional institution. In addition, it is critical to align the incentives of the MOEYC and the managing entity(ies) up front to ensure that all collaborating entities share a common mission and objectives for the training.

3. Market Analysis of Distance Education Programme

A study of existing teacher education programmes both in Jamaica and internationally can prove useful in helping to determine the optimal mix of instructional media to be used in the delivery of a distance education programme in Jamaica. The following section provides an overview of a range of distance education programmes operating at the national and international levels, with particular emphasis on the type of technology used for the programme.

3.1 Potential Delivery Modes

The instructional media selected will define the extent to which the training is accessible to the target audience or in cases where it is not accessible, the distribution costs involved in making it accessible. This section will highlight the range of modalities available for teacher training programmes, as well as the perceived benefits and challenges associated with the various modalities.

Table 3: Potential Delivery Modes of Training in Distance Education Programmes[8]

Media	Perceived Benefits	Implementation and Sustainability Challenges
Print	Reinforce lessons received during training. Can be shared with teachers not currently enrolled in training.	Cost of production. Delivery of materials.
Radio	More energy sources Radio receiver is technologically robust, low cost, easy maintenance. Lower recurrent costs (US$2-3 per student).	Higher fixed costs. Radio can lack interactivity if programme design is poor.
Audiocassettes	Lower cost of production. Ease of use. Medium to high penetration rates.	Encourages passive approach to learning and as such should only be used as supplemental aide to reinforce instruction. Tape players are higher fixed cost.
Television/ Videocassettes	Medium to high penetration rates of TVs and VCRs in secondary schools. Experience developing educational	Greater energy requirements (100x that of radio) makes alternate energy sources difficult. Complex, expensive, high-level

[8] The list of perceived benefits and challenges in this table is not meant be exhaustive. The distance education programme could be constructed from a variety of instructional media listed above. Information in this table is synthesised from a range of documents listed in the bibliography.

Table 3: Potential Delivery Modes of Training in Distance Education Programmes[8]

Media	Perceived Benefits	Implementation and Sustainability Challenges
	videos in Jamaica (CPTC, Media Services Unit).	skills to repair. Encourages passivity if not designed well. Insufficient inventory of TVs and VCRs in the schools.
Cable	Free programming time as mandated by legal contracts between GOJ and cable operators.	Complexity/costs of connecting cable operators to network system nationwide (approx. J$500,000 per operator x 47 operators). Cost of monthly cable service.
Teleconferencing	Existing experience through UWIDITE system can be leveraged to benefit secondary schools. Decreased travel costs of lecturers and students.	Insufficient bandwidth to link schools; ISDN not available nationwide. Incompatible technologies puts limitations on visual screenings. Terrain-based transmission problems.
Computer/CD-ROM	Range of training software available in market at low cost.	Low computer literacy rates of teachers. Insufficient inventory of computers in schools. Maintenance costs of computer lab.
Internet	24-7 access. Convenience. Increases international collaboration opportunities. Community sharing between and among schools. Improved access to information.	Implementation and sustainability challenges. Low computer literacy rates of teachers. Installation and maintenance costs. Insufficient bandwidth; ADSL not available islandwide, Internet access costs.

3.2 Nationally Based Offerings and Resources

A range of private, nonprofit, and governmental institutions have played some role in the development of distance education services in Jamaica. A review of these offerings is useful for two key reasons. First, the knowledge captured by these agencies through their own development processes can aid the MOEYC in the development of its own distance education programme for teachers. Second, a review of these programmes can minimise the likelihood of a duplication of efforts in the education field and potentially offer new avenues for collaboration. The following table provides an overview of education technology projects that have operated or are currently operating in Jamaica.

Table 4: Mixed Modes of Teacher Training: An Overview of Nationally Based Offerings

Offering Institution	Mode of Instruction	Description
MOEYC , The Primary Education Support Project (PESP), funded by the Inter-American Development Bank (IDB)	Print and computer based	Provides useful information on the costs associated with launching a computer-based training programme for teachers, as well as implementation challenges associated with said programme. The focus of the training is on instructional technology, including the use of the computer to deliver curriculum, and training children to use computers.
Jamaican Teacher Association	Computer	Computer literacy courses to teachers at cost of J$10,000-12,000; also offers loans to teachers for second-hand computer purchases.
FutureKids	Computer	Private organisation that teaches computer skills to Jamaican youth.
Heart Trust NTA	Various	Advocate for education community to support increase of technology in the schools.
Jamaican Computer Society	Computer	Sponsoring several pilots to increase use of computer in the classroom.
Cable TV Operators	Cable TV	The Jamaican government (GOJ) has mandate with all cable operators requiring them to dedicate one channel to educational programming. However, operators lack content for programming and GOJ hasn't provided it so channel goes unused in vast majority of cases.
MOEYC, Media Services Unit	Internet portal	The MOEYC, through its Media Services Unit and contractor PanMedia, are developing an educational portal complete with nine core institutional websites. This portal could serve as a launch pad for a teacher-training project. The site will include online projects for teachers to use in their classrooms, with a focus on math, literacy, special education, and early childhood classes. Each core site will be equipped with chat rooms, bulletin boards, and other collaborative elements. However, distribution would again be a major problem if desktop and laptop computers were not made accessible to teachers in the school or community setting.
	CD-ROM	The MSU accepted a bid from an outside contractor to develop educational CD-ROMs but no products have been delivered to date.
	Videocassettes	Through ROSE, the Media Services Unit developed a series of Foundation Reading Tapes for the schools. However, distribution problems abounded as few schools had access to VCRs. If the use of videocassettes for teacher training at the secondary school level were to be a viable option, this distribution problem would first have to be addressed.
UWIDEC	Videoconference	Offer range of degree programs, including M. Ed Administration via telecentres across the island; currently only have audio capacity; video has been outmoded and costs to acquire updated technology are prohibitive.*

Table 4: Mixed Modes of Teacher Training: An Overview of Nationally Based Offerings

Offering Institution	Mode of Instruction	Description
Joint Board of Teacher Education	Microwave system	Launched pilot to link all of the TCs to a microwave system to facilitate the digital transfer of information between UWI and the TCs**
Jamaica Adult Literacy programme (JAMAL) in collaboration with Mt. St. Vincent University of Nova Scotia, Canada	Online instruction with face-to-face summer component	Graduate programme leading to a Masters in Adult Education. Projects are done (100 hrs) which enable the participants to apply theory to practice and these yield a significant component of the overall grade. During summer, they come together in an Institute in Jamaica or Canada. The 2½ year programme costs J$300,000. The programme will graduate its third cohort of students this summer.
University of the West Indies	Online instruction	In its first year of offering an Online Masters degree programme with specialisations in Teacher Education and Educational Administration, using the Virtual U system from Simon Frasier University in Canada. There are currently 32 students enrolled in the M Ed programs, which began in September of 2001 and costs US$500 per course or US$4,000 for the complete set of 8 courses plus an additional US$1,000 for project supervision. The total cost of US$5,000 covers all uploaded materials and one textbook.**

* Per Cable & Wireless, the provision of videoconference services would require three ISDN lines at a cost of US$100 per month per line. However, only 30 percent of the island has ISDN and the available network is almost at capacity. This limitation will require the DEC's to find alternative means for transporting video between the main MONA university campus and the distance education centres. Cable & Wireless indicated that the group Princeton Technologies provides the videoconference equipment for many DECs.

** For further details, see section 5.3, *Role of Universities in Teacher Training.*

3.3 Internationally Based Offerings

There are numerous examples around the world of operating distance education programmes. This section only attempts to capture a few of them, in many cases because more specific information was available on these programmes because of the World Bank's direct involvement in their launch. In general, research shows that *how* the media is used is even more important than the *type* of medium used. This section attempts to provide the reader with a heightened perspective on the range of potential uses available for transmission modes and instructional media in the teacher training process.

3.3.1 Radio

Guinea's USAID-supported project is aimed at improving teaching and learning and includes 180 hours of teacher training over a three-year period. The training model uses a one-week in-person workshop at the beginning of the academic year and is supplemented by 66 half-hour interactive radio instructional programs aimed at students but with instruction for teachers modeled through the IRI lessons and printed teaching guides. It also includes lessons for head teachers in instructional leadership.[9]

3.3.2 Audio and Video-Cassette

The Open University of Tanzania (OUT),[10] begun in 1993, graduated its first group of 136 students in 2000. Its mission is to upgrade teacher qualifications at the secondary level while expanding access to higher education. OUT is run by 35 academic staff and 50 administrative staff, but it also makes extensive use of short-term consultants and private sector contracts for services such as printing. Instruction is based mainly on the use of printed materials; however all courses for the B.A. with Education are now on audio cassettes, along with 100 audio cassettes available as study material for other courses. OUT enrols 5,700 students and operates 21 regional study centres to support them. Notably, students have established an additional 56 local study centres on their own initiative. A foundation course is offered to enable unqualified applicants to acquire the qualifications they need to enter degree studies.

LessonLab[11] is an integrated technology platform designed to support teacher professional development both face-to-face and over the web. The company is headed by James Stigler, author of *The Teaching Gap* and *The Learning Gap* and Professor of Psychology at UCLA. LessonLab's software enables teachers and administrators to study videos of classroom lessons, and collaborate with colleagues in their efforts to improve teaching. At the same time, LessonLab is amassing the largest archive of videotaped classroom lessons and related artefacts in the world, and building a knowledge base for the teaching profession.

3.3.3 Cable and TV

The case study below serves as an example of a potential use for this programming time. Cable penetration rates are widespread in Region 6 of the country, which could serve as a pilot example for other regions.

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[9] Joanne Capper, *Case Studies of Innovation in Teacher Training and Technology* (World Bank *infodev* Programme and the Institute for International Education, 2001).

[10] William Saint, *Tertiary Distance Education and Technology in Sub-Saharan Africa* (World Bank Education and Technology Technical Notes Series, vol. 5, no. 1, 2000).

[11] *Ibid.*

China Satellite Teacher Training Centres.[12] In July 1987, the China Central Radio & TV University set up a teachers college (CCRTVTC) to increase teachers' knowledge and teaching skills, and to speed up the training of primary and secondary school teachers and headmasters. Satellite teacher training centres, scattered throughout the country, are all staffed with subject and grade-level coaches who work with teacher's in-group sessions to view and discuss the TV shows. Since January 1991, CCRTVTC has produced 572 hours of TV programs of continuing education for primary school teachers and 1,450 hours for secondary teachers. Between 1986 and 1997, the focus was on training unqualified primary and middle school teachers. Two million teachers and one million headmasters have received training through these satellite TV programs, and one million received certification.

Shoma — a private-sector contribution to South Africa's teacher development.[13] The Shoma Education Foundation is a nonprofit, social investment initiative of the South African satellite digital television broadcast company, MultiChoice Africa. The foundation has as its primary goal the support of teacher professional development in South Africa. MultiChoice is an entertainment provider that purchases air space from satellite providers and delivers purchased content from providers around the world. It currently offers 53 video and 48 audio channels throughout most of the African continent. MultiChoice supports the development of video and computer-based content for teachers' professional development and delivers the content through its satellite delivery technology; it also has contributed a range of hardware and software to 11 teacher development centres throughout the country, primarily in rural areas and townships.

3.3.4 Computers

Brazil's Proinfo programme is providing 100,000 computers to states for distribution to schools. About 60% of the Proinfo budget is allocated to teacher training. States are responsible for providing training and technical support to teachers in how to use computers in the classroom. As a result, approaches to training teachers vary. One approach has been developed by staff in a cognitive science research laboratory (LEC) based at the Universidade Federal do Rio Grande do Sul. The research team's current model involves groups of teachers using computers and the Internet to create learning activities with their students and with each other. The researchers observe the teachers, discuss what they are doing, and provide coaching.[14]

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[12] Joanne Capper, *Case Studies of Innovation in Teacher Training and Technology* (World Bank *infodev* Programme and the Institute for International Education, 2001).

[13] Summarised from Joanne Capper, *Shoma — A Private Sector Contribution to South Africa's Teacher Development: A Case Study* (World Bank, 2001).

[14] Capper, *Case Studies of Innovation in Teacher Training and Technology.*

3.3.5 Internet

Athabasca University in Canada offers Bachelor degree programmes entirely by distance. A computer studies lecturer from a Jamaican Teachers College discussed his own experience with this programme. It was not online in the real sense. However, participants were sent books, CDs, video and audio-tapes. There were scheduled conference calls on the telephone routinely and when help was needed. All this at a cost of CDN $600 per three-credit course, excluding Internet costs. There was heavy dependence on text messages through the Internet, and chat sessions were arranged through the use of special software. There was an opportunity for visiting the university for face-to-face contact, but the programme was primarily by distance. He successfully completed his programme.

A second education technology initiative using the Internet as its primary source for transmission of information is **World Links for Development (WorLD).** WorLD began in 1997 as a philanthropic pilot initiative of the World Bank in response to widespread requests from developing countries to assist them in preparing their youth to enter an information age and participate effectively in the global economy of the next millennium.

WorLD provides sustainable solutions for mobilising the equipment, training, educational resources, and school-to-school, NGO, and public-private sector partnerships required to bring students in developing countries online and into the global community.

In countries where papers, pencils, and textbooks are rare, WorLD provides access to information and opportunity. By linking schools across the globe through collaborative projects and educational networks, WorLD enriches the experience of educators and students in industrialised as well as developing countries. Youth gain the knowledge and technological skills they need to succeed in the twenty-first century, and to contribute to their country's development as part of a global economy. WorLD projects are directed at five primary groups: teachers, policymakers, school leaders, community learning centres, and youth initiatives.

WorLD currently reaches over 130,000 students and teachers in more than 20 developing countries in Africa, Latin America, the Middle East, and Asia. To meet continued and growing demand from governments and communities, a separate nonprofit, nongovernment organisation (NGO) called "World Links" (www.world-links.org) was spun-out of the World Bank Institute in 2000 to prepare to carry out the mandate of the programme once the pilot phase of the project ended in 2002. Working in coordination with the WorLD programme in the World Bank Institute, all teacher training and professional activities of the WorLD programme are handled by the World Links NGO, with funding assistance from other public, private, and nonprofit organisations, including the World Bank.

4. Comparative Costs of Transmission Modalities

Budget constraints are one of the key factors to consider in the selection of a transmission mode(s) in a distance education programme. The cost elements of the various modes of transmission can provide a useful reference point in this budgeting process. In this section, the cost elements, both fixed and variable, associated with the different transmission modalities, are reviewed.

4.1 Print

There are four main elements to the cost of print[15]:

1. Development

Development costs, which include the costs of writing, editing, and graphic design, can vary substantially. The choice to hire full-time academics versus contract-based consultants to develop the materials can influence both the costs and quality of the materials. Full-time academics tend to cost more but the quality produced may be superior. The cost of hiring consultants to write the materials can vary with the supply and demand of qualified consultants in the marketplace.

2. Text setting (fixed print)

The costs of text setting vary with the method of printing used. Offset lithography from typed originals is generally cheaper than letter press printing from hot metal typesetting. Use of illustrations can increase costs but this increase can be minimised by integrating word processing with design and page setting packages.

3. Printing (variable print)

Paper costs vary by country but there are also differences in the cost of printing. For example, the costs of the offset litho process are affected by whether paper or metal plates are used. While paper plates are less expensive, they are less durable and cannot process more than 500 copies. The use of colour print will also increase costs.

[15] Greville Rumble, *The Costs and Costing of Distance/Open Education* (World Bank Global Distance Educationet, 1988).

4. Distribution

Distribution costs vary according to the amount of materials being distributed, and the number of distribution points (for example, to local centres for group pickup versus to individual students).

4.2 Interactive Radio Instruction (IRI)

Interactive radio instruction (IRI) is essentially a "large group tool" characterised by higher fixed costs and lower recurrent costs. The fixed costs are associated with the creation of management and training systems, and the production of audio and print programmes. The average annual recurrent costs for radio instruction are estimated to be US$2-3 per student,[16] and include such costs as permanent staff salaries, dissemination, training, maintenance of IRI system, airtime, distribution of supplementary materials, batteries, and radios.[17]

Table 5: Major Cost Areas of Sustainability in Interactive Radio

External Costs	Internal Costs
Radio Transmission (Cost of broadcast studio, actual transmission, and storage and handling of tapes	Management
Teacher and student materials	Technical coordination
Radio repair/replacement	Timely inputs
Programme management, supervision and training	Training Supervision
	Evaluation
	Long-range planning and budgeting

Source: Interactive Radio Instruction, 4(1) 1999, The World Bank? (LearnTech)

4.3 Television/Video-Tape Lectures/Closed Circuit Television/Film[18]

The two main elements to the cost of broadcasting and video are production costs and transmission or distribution costs. Production costs of video-tape lectures and closed circuit television are much cheaper than broadcast quality television. Broadcast quality TV tends to be more expensive for several reasons including higher staff and equipment costs.

[16] Interactive Radio Instruction, 4(1) 1999, The World Bank? (LearnTech)

[17] Andrea Bosch, *Interactive Radio Instruction*, 1997.

[18] Greville Rumble, *The Costs and Costing of Distance/Open Education* (World Bank Global Distance Educationet, 1988).

The costs of terrestrial transmission over the air depends on whether a system has (1) to set up its own network, run it, and maintain it, or (2) can transmit on someone else's network. The cost of transmitting on anther network will also vary depending on whether the system is charged (a) an economic cost per hour, (b) a marginal cost per hour, or (c) gets free access to airtime.

For video, a range of other transmission and distribution options exist including:

- Satellite Direct Broadcasting Service. This involves costs of an uplink to the satellite, use of the satellite (at full or marginal cost), as well as the cost of reception dishes at each site (local or student's home). The major variables here are the cost of access to the transponder and the cost of and number of reception dishes.
- Satellite to cable head, and then to local centres and homes. Here the costs depend on the prior existence of a cable network.
- Use of video-cassettes, involving the cost of video-cassette players in either homes or local centres, and the cost of the cassettes themselves. The cost of video distribution services varies depending on whether videos are given to students or loaned to students on a returnable basis.
- Cost of TV or video reception is affected by the number of video-cassette players or TV sets required, and whether or not they run off electricity or batteries.

4.4 Computer

In his report entitled "Computers in Education in Developing Countries: Why and How?" author Luis Osin documents the five main components of a computer learning system. They include infrastructure, hardware, software, courseware, and personnel. However, the different stages which each of these components must travel through in the creation of a computer learning system are often overlooked. The stages include purchase, development, production, operation, maintenance, and administration. When evaluating the appropriateness of a computer learning system for a particular government, it is critical to assess the organisation's ability to launch and maintain this system from both a financial and human resource perspective.

4.5 Internet

Table 6: Internet Access in Jamaica

	Private Costs	Public Costs
Via Plain Old Telephone Service (POTS)	US$450 /month Internet access for 15 users, unlimited/ concurrent[a]	Per C&W rep, schools can receive 50% discount for group signups
	US$45, 8 users, 35 free hours/month (or approx 1hr/user/wk). Each add'l hour: US$1.25	Actual budgets from MOEYC Primary Ed IDB project indicate internet costs of US$18,000 per year for 120 hrs/month/school but number of schools included in this figure is unclear[b]
	Other: J$2,000 deposit	
ADSL (Limited geographic areas)	From US$50-150 one-time activation fee for 3-15 users	Undetermined
	Monthly rental from US$93-750	

a. Cable & Wireless Jamaica, Cable & Wireless Internet Services Brochure, July 2001.
b. Table 14 from IDB project within MOEYC....

Through the Heart Trust NTA, Cable & Wireless will offer a 50 percent discount to schools for Internet access dependent on the participation of a minimum of 300 schools signing up for the programme. Heart NTA is currently generating this group of 300 schools. The result would be a charge of US$20 per month per school or a total revenue stream of US$6,000 per month to Cable & Wireless. Through this scheme, the schools would receive unlimited Internet access during the hours of 6 am to 8 pm in addition to one email address per school.

5. Framework of Teacher Training in Jamaica: Role of the Teachers Colleges, Universities, and Other Institutions

5.1 Ministry of Education

The Professional Development Unit (PDU) within the MOEYC has responsibility for offering in-service training to Jamaica's primary and secondary schoolteachers. Yet the capacity of this unit to deliver quality training is limited. At the secondary level, the PDU has an average of 30 trainers per content area for the entire island (or 5 trainers per region). In the traditional content areas of math, science, and language arts, the trainer pool is identified and selected from experienced teachers working in the schools.

In areas such as information, communication, and technology (ICT), the PDU has had to outsource training to private-sector institutions or train teachers to become trainers in this area. While the PDU trained 32 trainers in ICT, the unit has lost 10 due to attrition, with some of the trainers leaving the school system to work abroad or with private-sector institutions. The PDU has also cited difficulty in identifying ICT trainers that have the prerequisite skills in both teacher pedagogy and technology.

While the PDU has access to the MOEYC's Media Services Unit (MSU) to incorporate a range of technologies into the training, the MSU indicates that the large percentage of requests they receive from the PDU are print-based, citing a severe under-utilisation of technology among the training offered. However, with only one information technology officer and one webmaster, the capacity of the MSU to deliver on more advanced requests is limited.

The MOEYC also offered ten fellowships through the Commonwealth of Learning (COL) to train Jamaican citizens in distance education. The training was offered in conjunction with Rajif Ghandi University in India, and fellowship applications were open to everyone, including teachers and doctors. The COL, through Athabasca University in Canada, offered additional fellowships. It is the hope of the MOEYC that the Jamaican fellowship participants will elect to return to Jamaica following completion of their studies to assist the country with distance education efforts.

5.2 Teachers' Colleges (TCs)

There are currently ten institutions offering teacher education at the diploma level (pre-university). Six of these are teachers colleges, two have become multidisciplinary, offering community college programmes, and two have teacher education departments. The combined enrolment for 2001-02 is 4,539. As a result of the rationalisation, a number of colleges no longer prepare students to teach at the secondary level. The TCs have also formed linkages with overseas universities

Each college offers specific programmes to students. The TCs have also been encouraged by the MOEYC to form linkages with local and overseas universities. Where relevant, these linkages, along with the enrolment and degree offerings by college, are indicated as follows:

Table 7: Distribution of Enrolment at the Tertiary Level

Institution	Location	Classification*	Enrolment, 2001-02*	Secondary Level Degree/ Diploma Offered	Linkage with National or Overseas University
Bethlehem Moravian College	Malvern	TC/CC	535	Diploma	Secondary programme in business education – business with computer studies. In the community college, they offer Business Studies and Hospitality, Entertainment and Tourism.
Church	Mandeville	TC	379	Diploma	Temple University, B.Ed
Edna Manley	Kingston	SC	47	Diploma, Degree	B.A. with UWI
GC Foster	Spanish Town	TC	327	Physical Education – Diploma, Degree	UCJ accredited degree
Mico	Kingston	TC	858	Diploma; evening division primary**	UWI, B.Ed, special education; Nova University, Florida
Sam Sharpe	Montego Bay	TC	577	Diploma	Central Connecticut State University
Shortwood	Kingston	TC	600	Diploma; Degree. Primary programme. Cancelled with rationalisation	University of South Florida, Masters in early childhood. B.Ed in EC, UWI
St. Joseph		CC	571	Diploma in primary and early childhood education only	
Moneague	Moneague	TC/CC	324 in teacher ed programme; 863 total	Secondary enrolment only in business education ; primary education offered.	
University of Technology	Kingston	UNI	788-T. Education (7,435 total) (figures for 2000-2001)	B. Ed in business education, home economics, industrial technology, or general technology	
CASE	Passley Gardens	CC	321	Diploma; Assoc. Degree; secondary and primary enrolment	College of Agriculture– Nova Scotia, B.Ed, in collaboration with Mt. St. Vincent and JAMAL
Northern Caribbean University	Mandeville	UNI	1,150 -teacher education (5,085 total)	B.A. primary ed.; secondary ed.; M.A., Ph.D.	
University of the West Indies	Kingston	UNI	1,009 - teacher education (10,951total) (figures for 2000-01)	B. Ed., M. Ed., M.A., Ph.D. (various education programmes)	

* Denotes teachers college, community college, or university.

** Only MICO and St. Joseph's offer part-time evening classes. After-school hours accessibility of the remaining six TCs would need to be researched to determine feasibility of holding training at the TC sites.

Traditionally, the TCs in Jamaica have responsibility for all preservice training of teachers while the MOEYC's PDU has responsibility for in-service training. However, administrators and staff at the teachers colleges have expressed concern that the failure to integrate the in-service training offered to teachers in the secondary schools into the preservice training for students at the TCs leaves students at a disadvantage when they graduate from the TC.

The TCs recognise the need for a continual upgrading of teachers' skills once they enter the system and would like to play a more integral part in this process. As a result of the ROSE programme, there has been some heightened involvement of TCs in the in-service process. The MOEYC provided trainers to instruct secondary school teachers in the new curriculum requirements. An integration model was adopted for this training with trainers integrated into the regional teachers college to provide in-service training over a three-year period to 40 secondary schools in the region.

While this model served to strengthen collaboration between the TC and secondary schools, many ROSE trainers were absorbed into the TC at the expense of the secondary schools or had excessive pressures placed on them to meet the demands of both secondary school supervision and TC professional duties. In addition, some ROSE trainers cited that a three-year in-service offering had proved insufficient due to teacher attrition in the schools and a shortage of training staff. As a result, some trainers have opted to continue focusing on the initial group of 40 schools for the following year rather than moving onto a second set of schools.

The majority of teachers currently on staff at a teachers college hold both the Teachers' Diploma and Masters degrees. However many have masters in areas where they are not teaching. E.g., several have masters in Education Subjects but are delivering instruction in content areas that may have been majors or minors in their Bachelor degree programmes. In addition, some TCs have made a strategic decision to build the technology experience of their staff. Of particular note is Mico College, which has supported several staff members to obtain PhDs in the fields of instructional technology and distance education.

5.3 The Impact on Training Needs of Rationalisation of Instruction at the Teachers College

As a result of rationalisation, some teachers colleges currently only offer preparation for primary school teaching positions. For example, three teachers colleges (Sam Sharpe, St. Joseph's and Mico Evening Division) will no longer prepare students to teach secondary school (effective 2003), while three other colleges (CASE, Bethlehem, and Moneague) will now offer both primary and secondary teacher preparation programmes. The rationalisation was undertaken to address the issue of excess supply in certain subject areas in the system, with the objective of strengthening specific diploma programmes across the island while minimising programme duplication.

It was also intended that students would travel to the TC offering their diploma of choice, yet the actual result of this rationalisation has had a rather different impact. Students, wanting to stay close to home to attend college, take the diploma offered by that college, but then go on to

teach in the schools at the grade or content-level of their choosing. While this phenomenon may have become more visible with the onset of rationalisation, it was common prior to the introduction of rationalisation as well. As a result, there are primary trained teachers teaching in secondary schools and secondary trained teachers teaching in primary schools.

At Bethlehem Teachers College, the principal indicated that the college has been getting large numbers of applicants who have the required qualifications — in fact applicants with a large number of Caribbean Secondary Education (CSEC) subjects, many with 6-8 subjects, at General Proficiency Level (when only four are required). The most recent set of applications numbered 1,000, while the school had a maximum capacity of 200 entrants. The school now has a waiting list of 200 qualified applicants from a range of parishes. This situation is not peculiar to this particular institution.

There are two points to consider when looking at how this situation fits into the context of a distance education programme:

1. The distance education programme could focus on providing instruction in secondary education in those regions where such training is not available at the secondary school level.
2. If a teachers college is selected as a site for a distance education programme, it must have lecturers that are currently teaching in the specified area of need for the training (i.e., content-specific math or science subjects or teaching methodology for the upper-secondary level). As a result of the rationalisation, some teachers colleges may lack the necessary skill base among their lecturers to participate in such training. However, this should not be the case as lecturers should have at least a first degree in the subject they are teaching. In the event where a lecturer lacks certain qualifications, scholarships and fellowships have been provided under the PESP programme to upgrade proficiency in subject areas at the colleges offering primary education.

5.4 Universities

The main universities in Jamaica are the University of the West Indies (UWI), the University of Technology (UTech), and Northern Caribbean University (NCU).

At UWI a Bachelor of Education (B.Ed) programme is three years in duration if the student does not have a teachers college diploma and two years with the teachers college diploma and teaching experience. University of Technology trains teachers in technical education to equip them to deliver instruction in home economics and industrial arts and business subjects. This university is in the process of moving their programme to the Bachelor of Science in Technology Education and a Bachelor of Education in Science Education

Facing increased competition from offshore universities' offerings, Jamaican universities have responded by launching online course offerings of their own, and, in the case of UWI and the University of Technology, Bachelors or Masters degrees. UWI, for example, is in its first year of offering an online masters degree programme with specialisations in teacher education

and educational administration, using the Virtual U system licensed by Simon Fraser University in Canada. The university also offers through the University Distance Education Centre (UWIDEC) a B.Ed by distance in Educational Administration and Curriculum studies, usually for in-service teachers. The system also supports discussions between teachers and tutors via teleconference for in-service courses across several Caribbean islands. Church Teachers College, while not currently engaged in distance learning, provides accommodation for the University of the West Indies (UWI) B. Ed. by distance programme as it is one of the 11 teleconferencing sites on the island.

The Virtual U package features asynchronous conferences embedded into online syllabi, as well as a video card to enable tape and voice features. While the project took 15 months to launch, students enroled within one month after the marketing of the programme.

There are currently 32 students enroled in the M. Ed programmes, which began in September of 2001 and costs US$500 per course or US$4,000 for the complete set of 8 courses plus an additional US$1,000 for project supervision. The total cost of US$5,000 covers all uploaded materials and one textbook.

According to course coordinators, the first six weeks of the course were challenging, as they coincided with a lot of power outages. Additionally, some students lacked sufficient computer literacy skills to benefit fully from the online offerings, while professors complained of insufficient levels of online student participation. As a result, the grading system has been refined to include a 20 percent participation rate in the final grade calculation, up from an additional level of 10 percent. UWI faculty members say that UWI is considering putting all first year teaching courses online. Print versions of these courses were developed in conjunction with the joint board and are available commercially to offshore institutions. As an initiative of the Ministry of Education, Youth, and Culture, the UWI will offer a B.Ed. distance programme for secondary school teachers (in-service) in core areas by 2003.

5.5 Joint Board of Teacher Education Microwave System

Through the Joint Board of Teacher Education (JBTE), a pilot to link all of the TCs to a microwave system to facilitate the digital transfer of information between the UWI and the TCs has been launched. The physical structure for the pilot, referred to as EDUCOMM, is as follows:

A Microwave Backbone, involving redundant paths, would be established across the island. The proposed main hubs of the backbone are: JBTE/IOE, Coopers Hill, Northern Caribbean University, Bethlehem, Sam Sharpe, Browns Town, and RJR/TVJ Oracabessa Site. This would permit the transmission of signals to the northern and southern coasts of the island.

Proposed secondary hubs would be established at other select colleges and universities across the island, with the goal of using these hubs to establish further connections with primary and secondary schools in the surrounding regions.

While the pilot could have a positive impact on the communications system among key educational stakeholders, financial and managerial challenges with the pilot have prevented its rapid rollout.

5.6 Secondary Schools

Teachers also receive training through staff development meetings at some schools, usually offered one time per month for a two-hour period. This training tends to be offered by staff at the school, and can cover a range of areas depending on the interests/needs of the teachers or specified by the principal. Examples given by teachers of the types of training they have received at recent meetings include professionalism, curriculum standards reviews, and literacy.

These training sessions sometimes achieve the desired benefit of promoting a collegial working environment among the staff or a new pedagogical method. Yet, they often lack the intensity or frequency needed to affect marked improvements in teachers' content-knowledge or methodology and as such do not serve as a viable substitute for other in-service training.

6. Budgetary Allocation of Teacher Training and Private and Public Costs of Training

The projected PDU budget for the training of secondary school teachers in the 2000-01 year is J$9,743,500, representing 20 percent of the total PDU budget of J$44 million for the year. The bulk of the remaining budget is allocated to training for early childhood, primary schools, special education, and administrative expenses. While the percent dedicated to secondary school training is significant within the PDU budget, it is insignificant when one considers the number of schools and teachers operating within the system. Types of training delivered by the PDU to secondary school teachers during the course of the school year are as follows:

Table 8: Overview of Selected Professional Development Unit Trainings

Training Title	Number of Participants	Number of Days	Cost of Training (J$)
Computer training	160	5	303,000
Integration of information communications technology into curriculum	300	2	769,000
Literacy workshop	60	2	730,000

Source: MOEYC, Professional Development Unit Budget, 2001-02.

At the teachers college level, students' cost is highly subsidised by the government. Subsidised costs include tuition and room and board. Students may be responsible for minimal transportation and book costs. Among the interviews conducted at the teachers colleges, several indicated they are reviewing tuition fees. Some principals expressed the very valid concern that buy-in among students into the academic programme is lower because the students have little economic stake in their own studies. The colleges are considering an increase in fees to raise buy-in while easing budget constraints.

At the university level, costs are higher and vary by university. In general, students are expected to cover a greater portion of their costs than at the teachers college. The following chart highlights costs of selected educational degree programmes.

Table 9: Costs of Education Degree Programmes at the University Level

Programme	Duration/Structure	Cost Per Year 2000-01*
University of Technology	B. Ed – 3 summers plus seminars 1 day monthly for four months	$58,710
UWI	BA, Arts & Social Sciences	$101,527
UWI	Online M.Ed	US$500 per course, or US$4,000 for all 8 courses, plus an add'l US$1,000 in supervisory fees (total US$5,000 is J$225,000)
UWIDEC	Online B.Ed	$1.1million per year per programme plus teleconferencing costs
Northern Caribbean University	BA	$93,600
Community colleges	In association with UWI/Utech; do not offer degrees alone	$6,000 per semester as of 1999-00
Teachers colleges	Vary by school	Mico: $53,500 (year 1), $45,400 (year 2); $18,440–$21,200 (evening college) Sam Sharpe: $55,000

Source: Gwang Jo, *Tertiary Education in Jamaica: Trends and Policy Issues for Development.*
* Jamaican dollars unless specified otherwise.

One public cost that appears to be increasing is the cost of attrition as trained teachers, particularly in the maths and sciences, choose to receive their training in Jamaica and then leave for work abroad. The MOEYC has expressed growing concern over attrition rates but actual numbers have not been measured. The bonding programme that requires teachers to complete years of service in Jamaica after receiving government-funded training has not been enforced.

Private costs are borne by both the teachers and other nonprofit, developmental, and corporate entities. Teachers for example, must pay J$10,000 for computer training sponsored by the Jamaica Teachers Association. Other organisations, including Heart Trust NTA and the Jamaican Computer Society, have raised significant amounts of funds used to address teacher training needs in Jamaica.

In terms of costs for distance education programmes, the trend has been for universities in Jamaica to charge more for their online offerings than for their offline offerings. This appears to be the case due to the significant fixed costs associated with the launch of an online programme, coupled with the fact that the universities have yet to reach significant online enrolment levels to obtain any economies of scale benefits. However, the concern is that if the universities and other institutions continue to charge more for the online offering, potential students will not perceive distance education to be an attractive option and economies of scale will not be obtained.

7. Review of the Proposed B.Ed. by Distance Package Offered by MOEYC/UWI

7.1 Background

The University of West Indies – MONA Campus has signed a 10-year contract in conjunction with the MOEYC to train 3,000 teachers over a 10-year period to reach university degree status. The contract, for J$460 million, is being financed by the government of Jamaica, and assumes a cost of J$153,000 per capita or J$38,250 per capita per year assuming a four year participation rate by each teacher. The first intake of students is scheduled for the year 2003. 2002 has been set aside for planning, with training of online course writers currently underway.

The need for this training is in part, a response to the upgrading of many secondary schools in Jamaica to high school status, which has caused a shortage of certified teachers at the upper secondary level. Among the stakeholders meetings conducted, there were concerns expressed that the current Bachelor of Education programme lacked sufficient grounding in content to effectively prepare upper secondary school teachers. The Online Bachelor of Education Programme is attempting to address this issue, placing particular emphasis on math and science subjects. Through the distance education programme, teachers will be able to access instruction across one of 10 core subject areas with the emphasis of the entire offering on content over methodology. It is assumed the teachers targeted for this training would have received sufficient methodology training in the teachers college and in on-the-job experience.

While the initiative between the UWI and the MOEYC has been repeatedly referred to as a "distance education" initiative, the bulk of instruction will be through print and teleconferencing, offered through UWI's network of eleven distance education centres (DECs) across the island (known collectively as UWIDEC). Information will be beamed through teleconferencing from lecturers at UWI's MONA campus to students in the other ten branch locations. The students will be able to access tutoring and resource support at the DECs. In some cases, students will attend face-to-face summer courses at the MONA campus.

The Faculty of Arts and Education within UWI has responsibility for organising the initiative but will collaborate with other faculties to deliver actual content. Where teachers need to do qualifying courses to meet entry requirements, the MOEYC has also expressed interest in having the UWI divest such courses to the community and teachers colleges .

The majority of costs for the programme will be subsidised by the MOEYC. Expenses covered include cost of accommodation during the face-to-face summer components, cost of tuition, and instructional materials. Enroled students will be responsible for food, transportation, and administrative fees.

7.2 Commentary

While the collaboration of the programme between UWI and the MOEYC is grounded in the common mission of strengthening the quality of teaching across the island, the current proposal raises a few concerns, addressed as follows:

1) In the cost estimates section of the proposal, the cost of the distance course increases by five percent annually. While this projection is based on current salaries and inflation rates, it ignores the economies of scale benefits that will come from having more students enroled in the distance education part of the programme after year one. Indeed, one of the great benefits of distance education is that it offers decreasing marginal costs as enrolment increases, as well as more efficient staff-student ratios.

Cost drivers[19] must be more accurately defined in the proposal to indicate when cost estimates relate to print material (which would increase rather than decrease overall costs), and when costs relate to audio-conferencing (which would decrease per student as the number of enrolled students increases). Correctly defining what is driving costs is crucial to costing expansion (or contraction) of a programme. This can aid in ensuring more efficient management of funds and avoiding unnecessary budget increases. As such, it is recommended that the proposal be reviewed to account more accurately for the relationship between costs and student enrolment.

2) The proposal does not clearly state how the different stages of virtual course development will be managed. The MOEYC has indicated that the course will initially be print-based with the intention of moving to a distance education format later in the ten-year period. However, if this intention is to be realised, planning and budgeting for the distance education phase of the programme must be laid out. Steps in the development and delivery of a distance education programme to be budgeted for include:

- Virtual course development (e.g. what personal incentives should be put in place for staff who develop online courses?)
- Distribution
- Tutoring
- Assessment

[19] A cost driver is anything that, following a change in its volume, causes the overall cost to change.

- Learner supports
- General administration

In any distance education programme, the recurrent costs must also be considered. Recurrent costs are those incurred for goods or services consumed in the course of a budget year, and which must be regularly replaced. Staff salaries are often the biggest single item of recurrent cost. Other recurrent costs include course materials, external access (i.e., Internet, videoconferencing, etc.), phone, and administrative costs. A study was conducted among distance education programmes in Asia to estimate the breakdown of recurrent costs among five different educational programs.

While the regional focus of the study must be taken into account when evaluating its relevance to the budgeting of other countries' programmes, the following chart nonetheless provides useful insights into the breakdown of recurrent costs in a distance education programme.

Table 9: Percentage Distribution of Recurrent Expenditure by Programme

Activity	STOU	UT	IGNOU	LNRTVU	CIET
Staff	70.1	52.7	42.0	85.2	37.7
Course materials	11.5	28.0	14.3	7.1	52.0
External access	9.2	0.0	0.0	7.2	0.0
Administration, phone, postage	6.1	18.4	18.9	0.5	10.3
Other nonsalary	3.1	0.8	24.7	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0

Source: Chris Curran, *Resource Factors: Recurrent Costs,* World Bank Global Distance Education Net, 1989.

3) The proposal's goal of upgrading the degree qualifications of 3,000 teachers over a ten-year period seems somewhat conservative. If the MOEYC can successfully convert the training to a distance education format, it will have the potential to reach many more students at minimal cost. The MOEYC could also consider opening up the training to other interested teachers on a fee for course basis to offset budgetary constraints.

4) Upgrading substantial number of teachers from college to university degree status has salary implications, which may have influenced the MOEYC's decision to limit the upgrade programme to 3,000 teachers. This short-term perspective overlooks the long-term benefits of such upgrading. By increasing the number of qualified teachers in the classroom, the opportunity for Jamaica's students to achieve increases significantly. In turn, numerous studies indicate that the economic potential for the country increases with the proportion of students educated at or above the secondary level.

These considerations should be factored into any decisions regarding the number of teachers to target with the distance education programme.

5) The MOEYC is upgrading the teacher qualifications at considerable expense to the government. Efforts must be made to reduce attrition rates for university trained teachers, particularly in mathematics and science areas. Teachers enrolled in this programme must be given incentives to stay in the Jamaican system and disincentives to leave it. First, the salary scale for university trained teachers should be reviewed to better correlate salary increase with years of work. Secondly, a stronger bonding programme must be built into this programme and costs associated with enforcement of this bonding must be budgeted into overall costs for the programme.

6) The proposal indicates that the distance programme will offer training across 10 subject areas including mathematics, biology, physics, chemistry, history, geography, computer science, English and literature, French, and Spanish. This offering may prove too broad to achieve any economies of scale in the programme and it might be difficult to maintain a high standard of quality across all 10 areas. As mentioned earlier in this document, the preparation time and associated costs of virtual course development are significant. As a result, the up-front fixed costs of distance education programmes tend to be significantly higher than the variable costs associated with the sustainability of the programme. It will be challenging to maintain quality development across all 10 areas.

7) There is discussion among MOEYC officials around the upgrading of the Bachelor of Education content at the UWI to make it more content-oriented and avoid duplication work done in the TCs. However, there is clearly a need to streamline instruction at both the TC and university levels to ensure that students receive an appropriate mix of content-based and methodology instruction. Among the stakeholders meetings conducted, there were concerns expressed that the Bachelor of Education programme lacked sufficient grounding in content to effectively prepare upper secondary school teachers.

While the Online Bachelor of Education Programme is attempting to address the issue of content weaknesses among secondary school teachers, efforts must also be made to strengthen the traditional B.Ed programme at university campuses. It was noted that students often enroll in the B.Ed programme because they lack the necessary passes in the CXC exams to qualify for entrance into a Bachelors of Science or Arts programme. Policy changes should be considered to either

a) provide formal assistance to students enrolled in the B.Ed programme to obtain the necessary CXC passes at the Advanced Proficiency Level in order to jointly enroll in a B.S. or B.A. programme, or
b) Require students to complete a required number of classes with a passing grade in the department offering courses in their content area of specialisation to supplement their studies in the school of education.

8. Recommendations

Given the vast training needs in the system, the low penetration rates of selected transmission modalities on the island, and the budgetary constraints within the GOJ, the basis for these recommendations lies in the following question:

"What type of distance education programme is likely to best address the needs of the target audiences in the most cost effective manner?"

The following recommendations address the different aspects associated with the creation and maintenance of a distance education programme:

1. Transmission Modality

Based on the research conducted, it is felt that the MOEYC must take a mixed-modality approach to the distance education programme. However, the decision to use a particular type of transmission mode must be grounded in the penetration rates of various modes on the island. At present, there is a need within the MOEYC for a much clearer understanding of inventory numbers of instructional media at the schools. Preliminary data is available through the Ministry Census but many schools underreport numbers of equipment. The MOEYC, through the Media Services Unit, is currently accepting bids to have a national technology inventory conducted to address this issue.

Current inventory numbers account for only 72 TVs and VCRs in the schools, all of which were distributed to primary schools through the New Horizons Literacy Project. While all secondary schools, with the exception of all-age and junior high schools, have computer labs, the actual number of functioning computers at each school site is unclear.

Thus, while the decision to use a specific type of mode must be cross-checked against the national technology inventory to be completed, the following preliminary suggestions are offered:

a) First, a face-to-face and print component should be built into the programme to increase the likelihood of buy-in. Teachers in Jamaica are more accustomed to learning via direct instruction collaboration with peers, and as such, it is recommended that face-to-face instruction occur for a minimum of three days, at the onset of the programme, at the mid-term, and at the conclusion. Secondly, the print component will provide teachers with a greater sense of ownership and enable them to review new concepts learned at their own leisure.

b) The use of Interactive Radio Instruction (IRI) is a sound option for many of the school sites, particularly in the rural areas. IRI is a cost-effective means of reaching out to large numbers of teachers. Provided the design of the IRI programme encourages active discussion among the participants and a well-qualified instructor working on the other end of the radio, this modality has significant potential to upgrade the skills of teachers. When asked

about radio transmission or interactive radio, many educational stakeholders recalled the use of this medium in schools during the 1950s and 1960s in Jamaican classrooms. The Educational Broadcasting Service (EBS) was the organization responsible for these sessions. After the radio tutors finished their broadcast, the teachers in the schools would follow up with discussions, using the guides that had been prepared and sent to them. The stakeholders thought that this modality could be considered for use again for training teachers and that interactive sessions would even have a greater impact.

c) Studies show that the mode of transmission used is much less important than how the mode is used. The MOEYC should select a programme that encourages active rather than passive learning. The training modality should make maximum use of the technology available in the schools. Steps should be taken to build interactivity between trainers and teachers into the distance learning process. Training by videocassette might encourage passivity among learners. However, if this review is followed by active discussion periods as well as question and answer periods which utilise CD-ROMs or Internet messaging, the potential to increase learning among teachers will be heightened. The training example set by the Shoma Foundation in South Africa should be reviewed by the MOEYC to assist in the construction of a mixed-modality training in Jamaica.

d) **Model centres of excellence.** It is not fiscally realistic for the MOEYC to offer training to teachers across the island using the most up-to-date technology, such as ADSL-based Internet training, and interactive cable satellite training. However, to elect not to develop the island's experience with these training modes would be a strategic mistake. By developing smaller-scale models of teacher training using more advanced technology, the MOEYC and other educational stakeholders can develop their own knowledge of uses for educational technology and better position themselves to take full advantage of said technologies when the economy improves.

It is recommended that the MOEYC takes steps to develop one model of excellence for each of the six regions. The model should be based at a teachers college or secondary schools, and should provide educators with opportunities to enhance their content and pedagogical base using various modes of technology. The mode should be selected by the sponsoring institution in the region given the available resources in that region.

One centre developed should incorporate the use of interactive cable instruction. Such instruction is not yet possible at the national level because of the costs associated with connecting 46 cable networks across the island. However, cable is widespread in Region 6 and a model centre could be developed there to showcase the potential uses for cable TV in the education world. Such a model could have the added benefit of encouraging the cable operators to invest in the costs of connection as it would be tremendously beneficial to them from a public affairs perspective.

2. Location of Training

Given the vast training needs in the system, it is felt that training should occur on the school site to minimise incidental costs, encourage buy-in, and provide trainers with the chance to offer on-the-job feedback to teachers.

For example, major costs of trainings offered by the MOEYC's Professional Development Unit include transportation (J$600 per teacher) and food allowances (J$600 per teacher), print and paper costs (J$230 per teacher), and computer lab rental (J$2,000 per day for a group of 30 teachers). Significant cost savings could be attained if trainings were offered on the school site, thereby eliminating transportation and food costs. In addition, as the majority of secondary schools have computer labs on site, computer rental costs could be reduced if trainings were offered onsite.

3. Target Audience for Training

The target audience should be closely tied to the goals of ROSE II to ensure alignment of mission and focus within the MOEYC. During the focus groups conducted with educational stakeholders, the following target groups were most often cited as in need of training:

a) Teachers working in newly upgraded secondary schools, formerly known as all age schools, are in need of content-based training, particularly in the math and science areas

b) The teaching of reading by nonreading specialists is a weakness and must be addressed if students are to excel in all subject areas. Specialised literacy training should be developed and offered to secondary school teachers across the subject areas. However, in order to increase buy-in for this programme, the curriculum standards by grade level should be adjusted to include increased focus on literacy within the context of a particular subject area.

4. Content of Training

Training should not focus on the upgrading of content at the expense of sound pedagogical training. Rather, content should be taught in the context of appropriate pedagogical methods to be used in the classroom.

In addition, efforts must be made to ensure that all participants have the necessary prerequisite skills to take full advantage of the training using the transmission modality selected. For example, a training programme that relies heavily on computer instruction must incorporate computer literacy skills into the basic structure of the training.

5. Management of Programme

Further discussions among key educational stakeholders must take place to ensure optimal programme management. While many groups have a stake in the programme, including the

MOEYC, the teachers colleges, universities, and the secondary schools, decisions must be made as to the optimal management structure for the programme. Based on preliminary conversations with stakeholders, it is recommended that the MOEYC is responsible for the fiscal management of the programme while operational management is done at the regional level, possibly involving a consortium of teachers colleges, universities, and secondary schools.

The management structure chosen must encourage quality and fiscal and operational responsibility, and should minimise bureaucracy. A team approach to the development of distance education courses[20] should be considered. Such an approach would require a content specialist, editor, communications specialist, graphic designer, pedagogical specialist, librarian or info specialist, desktop publishing, and overall team leader. The management challenges associated with the distance programme, including course development, distribution, assessment, and learner support should not be underestimated. The structure chosen will indeed dictate the success or failure of the programme.

6. Cost of Programme

It is estimated that 100 hours of preparation time is required for every one hour of distance education instruction versus 10 hours of preparation time for every one hour of traditional instruction. This fact is often overlooked when creating a distance education programme, having the unwanted affects of an overworked staff and an insufficient budget.[21] The need for sufficient preparation and training time of staff must be incorporated into the budgeting of a distance education programme.

A willingness-to-pay analysis should also be conducted to determine what aspects of the programme private schools or other entities may be willing to pay for. Additional revenues from such entities could help to offset the up-front costs of starting such a programme and provide the MOEYC with a more stable revenue stream to ensure sustainability of the programme.

7. Administrative Buy-In

Efforts should be made to include secondary school administrators in a very active way in the training process. Administrators should take part in the training with the goals of learning how to support their teachers through the training process. They should aim to become stronger advocates for their teaching staff and the professional development needs of their teachers.

It is the hope that this document has provided its readers with a roadmap for how to better incorporate technology into the educational system to strengthen the quality of the teachers who work in it.

[20] William Saint, *Tertiary Distance Education and Technology in Sub-Saharan Africa*, 2000.
[21] William Saint, *Tertiary Distance Education and Technology in Sub-Saharan Africa*, 2000.

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