

Rural Education In Bolivia & The Potential Of Educational Technology

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Introduction

This paper describes the present status of rural education in Bolivia including the constraints to improvement and proposes strategies for attenuating those constraints. Data were collected from site visitations, from earlier experiences in Bolivia, and from studies performed by a variety of agencies. The major recommendations include the application of instructional technology in the systematic design of instruction, in the production of instructional materials, and in the use of media devices.

The Problem

This paper reports part of an investigation to describe the rural Bolivian educational system in terms of the major constraints impeding improvement. The data collected from the investigation provided a base from which alternative

strategies could be suggested for minimizing those constraints. The research model employed followed the investigation class of inquiry and consisted of an observation or assessment of a single subject. It was essentially a capture and record activity. An investigation has much less control concern than does the pure experimental classes of inquiry and no practical claim to external validity. However, even a brief study of the different classes of inquiry available to the researcher will reveal that control for internal validity in an investigation is substantially the same as a two-cell study or a carefully conducted survey.¹

Data Collection

Data were collected from three general sources. The first source consisted of the researcher's earlier experiences and studies in Bolivia. The second major source was a 30 day series of site visitations to rural schools and rural normal schools in eight of the nine "Departamentos" or states of Bolivia, and a data collection trip to ISER, the Instituto Supremo de Educacion Rural (The Superior Institute of Rural Education). The third source was studies previously conducted by the Government of Bolivia, UNESCO, and the United States Agency for International Development.²

A General Description of Bolivia

Bolivia is roughly the size of the United States east of the Mississippi River, excluding Maine and Florida. It's 520,000 square miles is populated with an estimated six million people. It's population density is very uneven with 20% to 30% living in urban centers and 70% to 80% living in rural areas. Population density varies from 100 to less than 4 persons per square mile.

The country is physically divided into three major regions; a high plateau area called the "Altiplano" nestled between two mountain ranges running the full length of the country on a curved north-south axis, the eastern foothills of the Andes called "Valles" (Valleys), and the eastern grassland plains and jungle areas referred to as the "Oriente".

Bolivia is located entirely in the tropical zone, but the spread of altitude from 300 feet to 21,000 feet above sea level produces an extreme variation in climate from the continuously moist heat of the amazonian rain forest to the glacial slopes of the Andes.

Bolivia's resources are varied and considerable but largely undeveloped. The country's foremost industry is mining. Bolivia mines tin, antimony, tungsten,

lead, silver, zinc, bismuth, copper, sulfur, gold, and iron. Bolivia also has a substantial petroleum and natural gas industry. The processing of meat and other animal products is a minor industry in Bolivia as is the production of textiles and cement. The country is extremely poor economically, as evidenced by the estimated average annual income of four thousand pesos Bolivianos (\$200 U.S. currency). Most of the rural population relies heavily on bartering systems.

Because of Bolivia's diversity of climate, vegetation, and topography (including some of the tallest mountains in this hemisphere), communication and transportation are difficult and unpredictable. Large sections of the country are inaccessible during certain seasons of the year and even the major cities are accessible primarily by air. In jungle regions, rivers and machete trails are still used by travelers, and in the valley areas it is not unusual for student teachers to travel, with provisions and bed rolls, four days by horseback to arrive at their student teaching assignment.

Culturally, Bolivia is divided into three main groups and a variety of smaller subcultures. An estimated 35% of the population speaks Spanish as their native or second tongue. Spanish speaking people are generally of European or mixed European descent who live in the urban areas and in the eastern plains. Another 30% of the population speaks Quechua, the language of the ancient Incas. These Quechua-speaking indians live primarily in the valleys, usually in the rural areas, and are a separate culture in terms of food, dress and values. The third large cultural group is known as the Aymara indians and comprises approximately 30% of Bolivia's population. The Aymara are descendents of a pre-Inca culture which probably developed the Tiahuanaco civilization thousands of years ago. They live in the Altiplano areas of the country, their ancestral lands, where they doggedly maintained their language and cultural identity through both Inca and Spanish conquests. The remaining 5% of the population belongs to over twenty three different language and cultural groups that live principally in the eastern part of the country.

A Description of Bolivian Rural Education

Description of Resources: Finances The total annual budget for both rural and rural normal schools in Bolivia is smaller than the budget of most school districts

in the United States. Of that limited amount approximately 90% is used to pay salaries. There is, practically speaking, no money available for construction, for maintenance of existing facilities, for purchasing supplies, for research, for the development of instructional materials or anything other than administrative costs. The predictable result of the severe limitation of resources is a very high attrition or drop-out rate. Approximately 87% of the students of the rural educational system leave school by the third year. Ten percent leave by the end of the sixth year and another 2% leave by the end of the ninth year.

Duplication of educational systems in Bolivia is a drain on her limited resources. Education in Bolivia consists of two formal systems; the Urban Educational System, which is designed and intended to serve urban centers, and the Rural Educational System, which is a complete duplication of the first system in terms of teachers, administrators, and government officials. The history of the two systems is unequal; urban education has consistently received more attention in terms of budget, buildings, training, and personnel incentives.

Description of Resources: Facilities Instructional facilities in rural normal schools and rural schools are both inadequate and inappropriate for most instructional needs. The rural schools are usually built by local citizens with government donated materials. A typical rural school is an adobe structure, usually without windows, without heating of any kind, without a well, and without sanitary facilities. Furniture inside the rural school generally consists of benches composed of planks supported by adobes, and where there are writing tables, they, too, are usually planks supported by more adobes to place them at the proper level. Some schools have no more than a chair and a table. There are a few rural schools built with donated monies which are considerably better in construction and have cement slab floors, adobe/plastered walls, two or three windows and homemade benches and tables. Such a school may have a blackboard or two, but frequently will not have chalk.

The rural normal schools are in better condition than the rural schools and consist of cement slab floors and adobe buildings. These schools usually have: a cafeteria which doubles as an assembly hall with a small stage, a small kitchen, half a dozen classrooms, a garden plot, a

well which is usually inoperable, and restroom facilities which are not used due to the lack of water. A small library, consisting of outdated maps and old books (few of which have direct application to either education or appropriate subject matter areas), is typically a part of each normal school. A principal's office, a girl's dormitory, a boy's dormitory and sleeping quarters for the normal school faculty complete the physical plant. Neither rural nor rural normal schools boast of running water or electricity. In the few normal schools where this is the exception, electricity is available from sundown until 10:00 p.m.

Description of Resources: Instructional Materials Instructional materials of any kind, including textbooks, are hardly in existence in rural Bolivia. Where they do exist, they are generally created or purchased by the teachers. Texts used in Bolivia are produced for use in Spain, Mexico, or Argentina and are frequently 20 or 30 years old. Clearly, such materials are not readily adaptable to the multi-cultural, multi-lingual reality of rural Bolivia. Of the few instructional materials that do exist, most are print.

Description of Resources: Personnel Many of the administrators and teachers involved in Bolivian rural education are dedicated individuals interested in improving themselves and the system in which they work. However, a major constraint to improvement of Bolivian rural education is the lack of competence — the lack of individual expertise. This is largely due to the fact that teachers and administrators are themselves products of the rural education system where the mode of instruction is primarily dictation, the learning activity being memorization-recitation. Other causes for undeveloped competence are reflected in the student demographics. Most of the students preparing to become teachers have had one or perhaps two years of high school before they enter the normal school (71%); many normal school students are graduates of the sixth or eighth grades (15%); a small percentage (3%) have only completed their primary education (5 grades); and a scant 11% have completed high school. The outcome is that rural normal schools produce teachers that are ill prepared to effectively handle the peculiar and demanding needs of rural education.

Administrators generally do not receive any special preparation or training and are chosen from among the teacher ranks as political appointees. Both teachers

and administrators are frequently required to live in the isolated rural schools away from their families, enjoying only limited contact with the outside world for months at a time. The lack of preparation, of instructional resources and facilities, the spartan living conditions and separation from family and urban centers tend to discourage and demoralize even the most devoted, the most committed teachers and administrators.

A Description of the Constraints to Development and Improvement

Political Atmosphere Until recently, Bolivia has been a very unstable country experiencing nearly 150 revolutions or *coups* in nearly as many years. This lack of stability has, in the past, made long-range planning and concentrated, longitudinal efforts impossible. With each new *coup* came a new set of administrators, new goals, new policies and a redirection of effort.

Top Heavy Administration and Resource Constraints Education in Bolivia is organized with a top-heavy, centralized administration. This centralized, bureaucratic maze makes it virtually impossible for schools in remote areas to receive needed attention and support.

Rural education is supported with government monies. The rural education budget for all of Bolivia for 1976 totaled slightly less than one million dollars. As was noted, 90% of the rural education budget is typically expended on salaries, leaving a scant 10% for administrative costs and none for building maintenance, purchase of materials, research, remodeling, or new construction.

Geography and Communication-Transportation Systems As pointed out earlier, the geography of Bolivia varies drastically and includes major mountain ranges. The country does not have sufficient resources to build hard surfaced, well graded roads, the result being that major regions of the country are isolated or inaccessible during different seasons of the year. The communication system within the country reaches limited areas with teletype terminals only. Transportation within the country exists primarily between larger urban centers.

Instructional Materials and Equipment

As suggested above, the availability of instructional materials and equipment is, for all practical purposes, non-existent. Where instructional materials do exist these generally consist of out-dated

maps and texts or teacher produced graphics. Three of the rural normal schools had audio-visual equipment and 5 or 6 filmstrips or audio tapes. However, because of the lack of electricity and technical support of AV equipment (in terms of trained repair technicians, spare parts inventories and supplies) the equipment is seldom used. The distance to urban centers where self-trained repair technicians may exist, the difficulty in securing spare parts, the inaccessibility of electricity, the extreme climatic conditions, and the inability to produce software, all combine against the use of audio-visual equipment in rural Bolivia.

Language and Cultural Differences

There are a number of distinct cultures and languages in Bolivia which makes communication and dissemination of materials and methods very difficult. Any instructional materials produced for use in Bolivian elementary grades should be prepared in Aymara, Quechua and Spanish. Any multi-lingual attempts to produce instructional materials should also be multi-cultural attempts that will take into account the diversity of taboos, symbolism, value systems, etc., of the three main cultures.

Personnel Competence Without question, the most serious constraint to improvement of instruction in Bolivia is the lack of competence on the part of rural educational personnel. With very few exceptions, the teachers and administrators in the rural educational system have not had the opportunity, experiences or training that would enable them to successfully execute their roles. Most are products of the rural education system, have had limited schooling, limited access to out-dated resources, and have had very limited experience with any special purpose tools or facilities such as laboratories or audio-visual equipment. From personal visits to rural schools it was determined that a substantial portion of the subject matter content communicated by teachers was inaccurate. These limitations, combined with the isolation that many rural teachers feel, make motivation and the overcoming of negative attitudes a constant concern.

Teachers tend to teach as they were taught and the primary mode of instruction is recitation-dictation-memorization and recall of fact. With the exception of one rural normal school (Caiza D.), no other methodology was in evidence. Teachers are not prepared in instructional methodologies, curriculum devel-

opment, systematic instructional design, nor in the design and production of instructional materials. The local development of curricula and the local or regional development and production of instructional materials is non-existent.

The Major Constraints Summarized

To summarize the constraints it may be useful to view them as being grouped in general areas. These general areas were derived from: the fact that Bolivia is an underdeveloped country with severely limited resources; the fact that Bolivia has severe environmental/situational limitations; and the fact that a combination of limitations produce still other constraints, many of which tend to be self-perpetuating. Viewing limitations by their respective groups we have:

Bolivia, An Underdeveloped Country with Limited Resources

1. The existence of inadequate, inappropriate facilities, furniture, support supplies and specialized equipment.
2. Centrally controlled, severely limited budgets.
3. The lack of systematically designed curricula, of instructional materials and of equipment and supplies for producing instructional materials.
4. The lack of audio-visual instructional equipment (the indigenous cultures have strong aural-visual communication traditions).

Situational or Environmental Limitations

1. The existence of a diverse and difficult terrain in Bolivia which makes for very poor transportation and communication.
2. The existence of a largely rural population scattered unevenly throughout remote areas.
3. The existence of a diversity of languages and cultures.
4. The existence of strongly centralized administration of education.

The Results of Combined Constraints

1. Insufficiently prepared personnel in terms of their subject matter expertise and their instructional competence
2. The wide spread demoralization of personnel
3. The very high student attrition rates
4. The existence of a vast reservoir of undeveloped human resources — of untapped human potential

The Conclusions and Recommendations Derived From the Study

The study revealed the above listed problem areas and proposed the following general strategies.

1. That the administrative, budgetary and communications organization directing education in Bolivia be decentralized. With the decentralization of resources and authority, the difficulty with communication, transportation and dissemination will be reduced.
2. Substantially increase budgets for instructional purposes. If individuals are to be trained, instruction planned for and instructional materials designed, produced or purchased, resources will need to be made available. Here, the Government of Bolivia has begun to reassess priorities with the hoped for end result of reassigning some of the limited resources to rural education. In addition, Bolivia has sought grants and loans from foreign powers to assist in improving their rural educational system.
3. There is a need to develop appropriate curricular content for rural students as well as inservice curricula for rural teachers and rural normal school teachers. Such curricula should emphasize both subject matter content and methodologies for communicating that content.
4. There is a need to develop appropriate rural curricula, methods and instructional models. These curricular methods and models should be developed consistent with the needs of rural Bolivia and should become a part of inservice training for rural teachers.
5. There is a need for intensive, thorough and appropriate training of rural education staff. This includes administrators, rural normal teachers and rural teachers. This training would need to be planned and carefully coordinated with the development of curricular content and methods mentioned above.
6. There is an obvious need to design, develop and produce instructional materials for rural students and teachers. Such instructional materials should be developed consistent with curricular methods such that the content could largely communicate itself. This suggests the development of individualized instructional materials of some sort. The advantage of such materials would be that rural teachers could learn instructional content along with their students as a part of the inservice effort. This would help prevent the communication of inaccurate content.

7. There is a need to disseminate in a practical, regular and comprehensive way the curricula, methods and instructional materials listed above.

The Potential of Educational Technology

It is readily apparent that the above listed problems and general recommendations are the very areas with which the field of educational technology concerns itself. The facts that instructional technology is a systematic approach to solving problems, that it employs expertise from the areas of: instructional research; instructional evaluation; instructional design; production of instructional materials; the logistics of support and supply of instructional materials and equipment; personnel management; organizational management; information retrieval; and instruction; suggest the potential of instructional technology for rural Bolivia.

More specifically, instructional design steps and tools could be applied to very beneficial effect in Bolivia to help solve problems in the areas of: the need for appropriate curriculum content and methods; the need for thorough, intensive and appropriate inservice training; the need for the design, development and production of instructional materials, the need to disseminate curricular content and methods.

The Concept of Competence Among the different instructional design tools of potential benefit, the theory or concept of competence appears to have considerable promise as a tool of the planning process. When the theory of competence as described in an earlier article,³ is used in the instructional design process, instructional planners are forced to think in terms of competence, in terms of what is required of students. Instructional content and methodologies are then planned in terms of required knowledge, skills, abilities, judgement capabilities, attitudes and values. The concept of competence also requires student application of knowledge, skills and attitudes in order to verify acquisition of competence. The use of the theory of competence with instructional design steps would mitigate against the facts that: most rural and rural normal curricula (both content and methods) are not applicable to real life needs; curricula are not systematically planned; curricula are fact oriented; curricula require of students a recall familiarity of facts only; objectives are usually non-existent or are not expressed in measurable terms; most instruction does not require stu-

dents to apply their knowledge, skills, abilities, judgement capabilities or attitudes.

Curricular Development and the Need for Instructional Equipment It appears that a promising solution to many of the problems encountered in rural Bolivian education is the careful design and development of inservice and subject matter curricula, incorporating these in self-instructional packages. Such packages would necessarily need to be combined with regional inservice training and occasional supervisory observation of teachers in their classrooms.

Self instructional packages developed for Bolivia may require the use of instructional equipment (devices) which would need to be uniquely suited to the demands of the rural Bolivian environment. If vehicles of communication (instructional devices) could be discovered or developed that would not be seriously impeded by rural Bolivian constraints, then a possible, partial solution to the communication-education problems of Bolivia may have been found. The constraints that such communication devices would have to satisfy are listed below.

1. Allow for instructional content to be developed or adapted for different language and cultural needs
2. Allow for the use of primarily aural and visual channels of communication (the problems with literacy combined with the indigenous cultures' oral traditions suggests this need.)
3. Allow for the production and mass duplication of instructional content at relatively low cost and within Bolivia
4. Include the use of instructional devices that do not require a large initial expense and whose maintenance would not be expensive or complex
5. Include devices that could operate within and be maintained by the available resources (considering here the necessity for small parts inventories, electricity and repair expertise)

One of the recommendations of this study was that media devices be developed or located that would satisfy these constraints. Some devices presently exist on the market that may satisfy these criteria (with possible modifications). These devices include: Small Talk, a small, battery operated record player with very creative possibilities; Mattell's "See-N-Say" line of toys, adapting these with necessary content and visuals; Fisher-Price's toy camera that is really an 8mm cartridge viewer requiring no

electricity; GAF Sound Viewer; the Vox-Com adaptor for cassette players that allows for the handling of Language Master Cards; the battery operated Language Master; the Sound Page; a combined use of cassette tapes and flipcharts; adapted filmstrip-cassette rear view machines with smaller lamps (and overexposed film to compensate) so that the machines can be operated on batteries.

Some of the questions that would need to be answered before such devices could be adapted or used in Bolivia would include:

1. What would the initial cost of such devices be?
2. What would the maintenance costs likely be?
3. What would the cost of producing software for use in the devices be?
4. What is the capability and practicality of local production of software for such devices?
5. Is the local production of masters for the software a possibility?
6. Is the mass duplication of additional copies from the master a local possibility?
7. What problems might be encountered in terms of technical repair expertise, small parts inventories electricity, etc.?

Personnel Development Another recommendation evolving from the study was that Bolivian personnel should be trained in the production of different media forms, including graphics production, printing, photographic production, and audio production. Such training would not necessarily include sophisticated and advanced techniques, but should treat the basics necessary for producing acceptable printed products, slides or photographs, and audio tapes. The study also recommended that Bolivian personnel be trained in the various aspects of instructional technology including instructional research, instructional design steps and tools, personnel management, organizational management, logistics of support and supply dissemination of instructional materials and equipment, and the development of information retrieval systems for diagnosing need and for long range planning.

Conclusion

The educational needs of Bolivia are great, as are the untapped human resources. The field of educational technology with its multi-disciplinary expertise and its emphasis on systematic prob-

lem solving could play a major, beneficial role in the improvement of Bolivian rural education.

Implications for Instructional Developers

Two major implications for other instructional developers were generated by this study. There is a definite need to use a comprehensive, thorough, and practical theoretical construct (some prefer the term "conceptual framework") that will provide continuity and a foundation for the complete instructional development process. A conceptual framework should be employed that is capable, because of its simplicity, logic and practical applicability, of being woven through all of the instructional development steps. Such a conceptual framework would be the base from which need is assessed, would provide the tinted glasses through which subject matter specialists would work in developing curricular content, would allow for practical ways of implementing methodologies, and would be the foundation from which most, if not all, evaluation would be planned. The conceptualization of competence mentioned above proved itself to be just such a tool, providing a valuable perspective during the study. This conceptualization of competence appears to be a very practical generalizable tool.

The second generalization affecting instructional developers is the obvious fact that need assessments are crucial to successful ID efforts. When carefully considered, assessments of need generally collect subjective data. On occasion, educators fool themselves applying procedures that give subjective data the appearance of objectivity. Rather than designing and following elaborate procedures which give the appearance of objectivity, but which, in fact, collect only subjective data, it would appear more useful to use a need assessment technique that would collect opinionnaire data and organize them into practical and logical categories from which in-service, preservice, and subject matter curricular program could be prioritized, planned, implemented and evaluated. The quadrant assessment model (QAM) does just this. In earlier applications in Bolivia, it has shown itself to be applicable to distinct situations.

Implications related to ID work abroad include the probability that the collection and use of need assessment data may help stabilize educational programs, their planning and implementation, in countries where change (through

Coups, etc.) is a regular occurrence. Also, apparent from working with foreign countries, is the fact that the more unknown the situation, (regardless of the cause of the lack of information), the more necessary a complete need assessment.

End Notes

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