AN ANALYSIS OF OBJECTIVES OF SCIENCE EDUCATION IN VENEZUELAN ELEMENTARY SCHOOLS

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ABSTRACT

AN ANALYSIS OF OBJECTIVES OF SCIENCE EDUCATION IN VENEZUELAN ELEMENTARY SCHOOLS

By

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This study investigated the evolution of the official objectives of the 1944 elementary school program in science education, as prepared by the Ministry of Education. In addition, this study generated the mechanisms for arriving at a new set of objectives for the elementary school science program in Venezuela.

The elementary school program in science was created by a general executive decree in 1944. Since that time, the school system has been following that program and its set of objectives. The rapid progress of science and technology during the same period raises a question of the adequacy of the 1944 objectives for the science education program of Venezuela.

This study was conducted as an historical research. The data were synthesized in relation to the evolution of objectives. This study established the facts, and determined trends which the data suggested; generalizations were derived from the data. The collection, synthesis, and application of

the data followed three steps: a) consideration of known data, b) seeking new data from known sources, and c) seeking new and previously unknown data. The procedure used to obtain primary and secondary resources was direct correspondence with agencies in the United States of America and Venezuela. In addition, the investigator made two trips to Venezuela, where he contacted government agencies and commissions; visited educational institutions; and collected papers, books, and official documents. The sources of data were official Venezuelan publications, UNESCO publications, publications of the Organization of American States, unpublished papers of the Ministry of Education of Venezuela, Venezuelan books, and American books.

Among the findings of this study were the following:

There was essentially no science subject-matter in the Venezuelan curriculum during the period from 1492 to 1943; education was theological, scholastic, humanistic, and dogmatic. The elementary school science plan of 1944 was prepared by a commission composed of foreign and Venezuelan scholars. The major purpose of the science program was to help the student-citizen to understand his relationship to the environment; to teach him basic scientific principles; and to generate, encourage, and stimulate his interest in science. The external influences of American-French education and internal educational forces were the sources of the objectives. The 1944 science program objectives were suited to the general and particular needs of the country.

The role of the Ministry of Education has been the main impetus in the development of education in Venezuela. The 1944 plan was carried out by the Ministry of Education from September 7, 1944, until July, 1971. During this period, Venezuelan elementary education had some problems. The number of teachers and schools was not sufficient to meet adequately the educational needs of the student population. Furthermore, the schools available were poorly equipped and the staff frequently lacked the necessary preparation to carry on a satisfactory program.

The 1944 educational plan was actually known by only 800 teachers during the nineteen years from 1944 to 1963. Studies on the implementation of the 1944 plan have shown that even these teachers did not apply the educational objectives of the plan, and there was little the Ministry of Education could do, with a lack of personnel and facilities and an inadequate educational budget.

A mechanism was formulated which described the creation of a National Science Education Commission (NSEC) and a Science Education Commission (SEC) in each school region or community. By analyzing the present needs of Venezuela and its students, the school's environment, and the educational system, one can arrive at a set of science education objectives for the Venezuelan elementary schools.

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By

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DEDICATORIA

Para mi esposa, María, y mis
hijos, Marlon, Patricia, y Luis.

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CHAPTER I

INTRODUCTION

This chapter begins with a general description of Venezuela: its history, government, economy, demography, and manpower. The nature of the problem; the need for this study; the methodology; and procedures, limitations, and organization of the study are also presented.

Venezuela

Venezuela was discovered by Columbus on his third voyage to America in 1542, when he found the mouth of the Orinoco River.[1] Venezuela has 1,750 miles of coastline,[2] and is located on the north coast of South America, within the Tropical Zone, and between latitudes 0°45' and 12°12' North, and longitudes 59°45' and 73°09' West of Greenwich. The area of Venezuela is 352,150 square miles. It is the sixth largest country in South America and is approximately one and one-half times the size of Texas.

Physically, Venezuela may be divided into several quite distinct regions. The most simple division is into

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[1] José Gil Fortoul, Historia constitucional de Venezuela (Caracas: Editorial Las Novedades, 1942).

[2] Venezuela Up-to-Date, Winter, 1971-1972.

the Cordilleras, the lowlands and uplands of the northwest, the Llanos lowlands reaching to the Orinoco, and the uplands and highlands of the Venezuelan Guiana beyond. Within these regions, subdivisions such as the Orinoco delta may be distinguished.[1] There are four principal climatic zones -- tropical, moderate, cool, and cold. The temperature rarely exceeds 95° Fahrenheit anywhere in the country, and the capital city, Caracas, has an average temperature of 69° Fahrenheit.[2] In certain mountainous areas, however, there is perpetual snow.

Formerly, Venezuela was a part of Gran Colombia, which was formed of four political and geographical units: Venezuela, Colombia, Panama, and Ecuador. Gran Colombia became an independent country in 1811, when a group of patriots declared the country's independence from Spain. Venezuela became an independent nation by secession from Gran Colombia after 1830. Several internal revolutions disrupted the young country and some twenty constitutions and many dictatorships followed before much stability developed.[3] Since 1958, Venezuela has had a democratic government.

Venezuela is a Federal Republic, politically divided into twenty states, one Federal district, and two Federal Territories. The president is elected by direct popular

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[1]Preston E. James, Latin America (4th ed.; New York: The Odyssey Press, 1959), pp. 63-98.

[2]Venezuela Up-to-Date, op. cit.

[3]Gil Fortoul, op. cit.

vote for a five-year term. The legislative branch is bicameral and is comprised of the Senate and the Chamber of Deputies, which together form the National Congress. Like the president, senators and deputies are elected by popular vote. Proportional representation is provided for each state. The judges of the Supreme Court are named by the National Congress.

Venezuela today has approximately eleven million inhabitants, and its population is increasing at the rate of 3.4 per cent annually. The economic statistics of Venezuela include a birth rate of 44.2 per thousand, and a death rate of 6.7 per thousand, with a life expectancy at birth of sixty-six years. The above figures clearly indicate the fact that the Venezuelan population consists mostly of youths.

Venezuela has petroleum, iron ore, gold, diamonds, copper, bauxite, manganese, coal, salt, marble, timber, and fisheries among its natural resources. Agricultural products are coffee, cocoa, corn, rice, sugar, tobacco, cotton, sisal, and sesame.[1] Venezuela's livestock production reached seven million cattle in 1971.[2] Important industries are found, such as the production of textiles, cement, steel, petro-chemicals, building materials, food and pharmaceutical products, fats and oils, cigars and cigarettes, beer, tires,

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[1]Ministerio de Fomento, Dirección General de Estadistica y Censos Nationales, Anuario Estadístico (Caracas: 1962). See also: Venezuela Up-to-Date, op. cit.

[2]Ibid.

tubes, auto parts, shoes and clothing, electrical appliances, and most consumer goods. Can manufacturing, packing, sugar refining, flour milling, and automobile assembly plants have developed. Venezuela exports some of these products, the most important of which are crude petroleum and refined products, iron ore, coffee, cocoa, canned fish, corn, sisal, gold, diamonds, hides, steel pipe, and shoes.[1] The gross national product of Venezuela was fourteen billion dollars in 1962.[2] The annual gross per capita income in 1970 was 820 dollars.[3]

According to official reports, 52.2 per cent of the present Venezuelan population is under twenty years of age.[4] In 1969, the utilization of natural resources gave employment to 29.1 per cent of the active population, industry employed 24.6 per cent, and government and commerce employed 46.3 per cent. The rate of unemployment is 7 per cent.

The Venezuelan educational system is structured into four levels of education: pre-school, elementary school, secondary school, and higher education. The pre-elementary school (age 3 to 6) is of three years' duration; the elementary school (age 7 to 14) six years; the secondary school

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[1]Ministerio de Fomento, Anuario Estadístico (Caracas: 1970).

[2]Ministerio de Fomento, Dirección General de Estadística y Censos Nacionales, op. cit.

[3]CORDIPLAN as reported in El National, August 3, 1971, p. D-2.

[4]Ibid.

[5]Ibid.

five years; and higher education requires two to seven years of schooling, depending on the major field of study.

At the secondary school level, several types of preparation are found: regular high school, elementary school teacher training, industrial education, commercial education, social education, agricultural education, arts education, and musical education. In Venezuela there are four types of institutions of higher education: universities, pedagogical institutes, military schools, and politechnical schools.

The Problem

Educational development in Venezuela has been expanding so rapidly that it could be described as explosive. In the past twelve years, elementary school enrollment has tripled, and five times as many students are now pursuing a higher education.[1] Even if Venezuela had developed a superior educational planning office ten years ago, the country would still not be able to attend to the expanded educational needs.

The present elementary school program in science was created by a general executive decree in 1944. Since that time, the school system has been following that program and its set of objectives. The rapid progress of science and technology during the same period raises a question as to the adequacy of the 1944 objectives for the science education

[1] Memoranda of the Ministry of Education, 1958-1970.

program of Venezuela. Thus, it appears to be important to conduct an historical study of the evolution of the official objectives of the 1944 elementary school program in science education, as prepared by the Ministry of Education. In addition, this study will attempt to generate the basis for a new set of objectives for Venezuelan elementary school science, which can be assessed in terms of their potential consequences.

In development of the argument, this study seeks to answer the following specific questions:

1. What was the elementary school science plan of 1944 and how did it originate?
2. How well was the 1944 plan suited to the general and particular needs of the country?
3. What was/is the role of the Ministry of Education?
4. How well has the 1944 plan been carried out?
5. What mechanisms can be used to arrive at a set of science education objectives for the elementary school?
6. What new objectives of science education are needed for Venezuelan elementary schools?
7. What conclusions and recommendations evolve from this study?

Need for the Study

No previous study has dealt with an evaluation of the objectives of the 1944 elementary school science program in Venezuela. Without such a study, the educational

literature of Venezuela is incomplete and a critical analysis of the curriculum is nearly impossible. Furthermore, since it is important to generate new science objectives to enable Venezuela to obtain a better product from its elementary schools, the base for any new ideas must be carefully established.

The establishment of a new set of objectives draws its justification from the fact that:

> . . . it becomes apparent that the traditional elementary school science curricula are seldom adequate in concept or purpose to help children meet the demands of our modern scientific-technological-industrial society. Without new approaches to elementary school science teaching we run the danger of having children become strangers within their own culture.[1]

The following are crucial questions that should be periodically asked and adequately answered by any society that places utmost value on the development of its young: What should we choose to teach from all the science that is known? To what ends? How should it be taught? Under what instructional conditions?

By carefully delineating the historical context of the elementary school effort, condensing the fabric of present-day Venezuela, and examining the best of current educational practice, one can approach answers to these questions. This study is planned to provide the needed analysis.

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[1]Paul Hurd and James J. Gallagher, New Direction in Elementary Science Teacher (Belmont, California: Wadsworth Publishing Company, Inc., 1968), p. 2.

Methodology

This study has been conducted as historical research[1] on the evolution of objectives of the 1944 elementary school science program in Venezuela and focuses on the mechanisms for arriving at a new set of objectives for the elementary school science program in Venezuela.

Historical data are synthesized in relation to the evolution of objectives, rather than merely accumulated or summarized. The goal of this study, then, is not only to establish the facts, but also to determine trends which the data may suggest and generalizations which can be derived from the data.

The collection, synthesis, and application of the data follow these steps:[2]

I. Collection of data

1. Consideration of known data (sources such as official Venezuelan publications, UNESCO publications, OAS publications, unpublished papers of the Ministry of Education of Venezuela, and U.S.A. publications)

2. Seeking new data from known sources

a. Primary sources (Official Program of 1944 for the elementary schools)

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[1] George Mouly, The Science of Education Research (New York: Van Nostrand Reinhold Co., 1970), pp. 207-232.

[2] David Fox, The Research Process in Education (New York: Holt, Rinehart and Winston, 1969).

b. Interviews and discussions with Ministry of Education Office of Planning

c. Teachers in the public school of each state capital

d. Secondary sources (papers from EDUPLAN)

3. Seeking new and previously unknown data

a. Internal memoranda of the Ministry of Education

b. New materials published by UNESCO and OAS

c. Interviews and discussion with new agencies; for example, the Sub-Commission on Science Education of the Ministry of Education.

II. Synthesis of data

III. Interaction of synthesis and additional search for data or examination of data, including two extensive trips to Venezuela during the period of the study

IV. Completion of descriptive phase of research

V. Completion of interpretative phase of research

VI. Application of findings to present and future curriculum objectives.

Procedures

Primary and secondary resources were gathered by corresponding with agencies in the United States and Venezuela. A preliminary visit to the offices of the Organization of American States in Washington, D. C. gave several important leads to sources of information. The basic

literature search was expected to include the Venezuelan Ministry of Education and specifically the Office of Planning. Accordingly, a trip to Venezuela was arranged early in the study, during August, 1971.

One initial contact made during the original Washington visit was with Mr. Ismael Rodriguez, a member of the Science Education Sub-Commission. Therefore, his office was made the first stop in Venezuela. He indicated that the major planning had just begun in science education and directed the investigator to the Office of Educational Research within the Planning Office of the Ministry of Education. There Mr. Ramon Pĺnongo was able to provide statistical data on the public schools. Mr. Pĺnongo also pointed out that there was a lack of basic research information on the effectiveness of Venezuelan science education, and encouraged the investigator to pursue a more general course than that represented by a limited historical study. He further promised to forward what material was available on the present school program.

The investigator was invited to participate in a major meeting of the entire Science Education Sub-Commission. This session enabled one to identify the progress of the Commission to date, and to understand the problems they found in planning for an effective science program. The members of the Sub-Commission had arranged a meeting with CONICIT for later in the week and they asked the investigator to accompany them to this session.

At the CONICIT meeting the Science Education Sub-Commission was joined by representatives from industry, pedagogical institutes, universities, and staff members from CONICIT, including Dr. Olinto Comacho. At this session the investigator was asked to review the present situation in Venezuela and to sketch his proposal. The group encouraged him to pursue the ideas presented, through his study, and, hopefully, to be able to suggest a mechanism for implementing the concepts. Dr. Comacho was sufficiently impressed to offer a CONICIT scholarship towards the completion of the study.

The Sub-Commission offices had collected a great deal of general information on the history of the 1944 plan and other documents. The investigator began a systematic study of these materials while planning for a series of actual site visits throughout the country. Funds to conduct the visits were obtained through the Vice-Minister of Education, Mr. Pedro Contreras, after he heard of the purposes of the study and the need for current information.

The visitations included most state capitals and a number of elementary schools located in rural areas. Among the places visited were Caracas, Valencia, Maracay, Cumaná, La Ascunción, Coro, Barquisimeto, Maturín, Ciudad Bolívar, Corpito, Valera, Mérida, San Cristóbal, Maracaibo, Machiques, and Comibos. Altogether, over 100 schools were visited and though it was the vacation period, more than 200 educators were interviewed.

In addition to the materials examined at the Sub-Commission offices, several days were spent at the Biblioteca Nacional in Caracas. This source provided the original documents needed to establish the historical context of the 1944 plan and the evolution of Venezuelan science education objectives.

A shorter second visit was possible in December of the same year. Little additional data were gathered; however, it was possible to visit some schoolrooms in action. Two useful books on educational law were located during this trip, and a few points were confirmed with the Planning Office staff.

Delimitations of the Study

1. The study was limited to the elementary level science education program.
2. All the elementary schools visited and discussed are located in Venezuela.
3. The study was limited to the information provided by the primary and secondary sources, and by the author's personal observations.
4. The study was limited to description of the findings and observations.

Organization of the Study

Presented in this chapter were Venezuela and its educational system, a statement of the problem, the need for

the study, methodology, procedures, and limitations and organization of the study.

Chapter II contains a discussion of curriculum development in Venezuela from 1492 to 1943.

Development of curriculum from 1944 to the present is described in Chapter III, with emphasis on the 1944 Science Education Program for the Venezuelan Elementary Schools.

Chapter IV contains a discussion of the present needs of Venezuela and its students, new ideas in science education, and mechanisms for arriving at a new set of objectives for the elementary school science program in Venezuela.

In Chapter V are found a summary of the findings, the conclusions, recommendations for further study, and implications for curriculum development in Venezuela.

CHAPTER II

THE DEVELOPMENT OF THE EDUCATIONAL SYSTEM IN VENEZUELA FROM 1492 TO 1943

In this chapter, the growth of the educational system in Venezuela from 1492 to 1943 is described. Special attention is given to the role played by leading thinkers in Venezuelan education, and to the growth and development of facilities, enrollment, and curriculum during this period. Emphasis is given, insofar as possible, to development of the science curriculum within the overall system.

Education During the Period from 1492 to 1800[1]

For the first sixty years after the discovery of Venezuela, the only educational program available to the residents derived from the rudimentary efforts of the Catholic missionaries. This missionary education was segregated in that two different approaches were used, one for the white population, and the other for the Indian population. The elementary school curriculum was limited to a few subjects,

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[1]Angel Grisanti, Resumen historico de la instrucción pública en Venezuela (II edición; Bogotá: Editorial Iqueima, 1950). See Antonio Arrais, Historia de Venezuela, Tomo I (Caracas: Fundación Eugenio Mendoza, 1954), pp. 280-284; and Miguel Angel Mudarra, Historia de la legislación escolar contemporanea en Venezuela (Caracas: Ediciones M.E., 1962).

such as Catholic doctrine, grammar, mathematics, writing, and reading. There was essentially no science subject matter in the curriculum.

Science was only taught at the university level, and there the method was inductive. During the eighteenth and nineteenth centuries, Venezuela's most eminent educational thinkers understood the need to link politics with education.[1] They gave strong support to education, because they believed education to be a way to develop the social order. Most of them learned the ideas of European philosophers. The ideas of Descartes, Malebranche, Spinoza, Leibnitz, Lavoisier, Berkeley, Locke, Condillac, Tracy, Hartley, Lamarck, Kepler, Newton, Volta, Huyghens, Franklin, Humboldt, Davy, Buffon, Bails, Kirwan, Bailly, and Brisson were discussed.

Venezuelan education at this stage could be defined as theological, scholastic, humanistic, and dogmatic. Schools were located in churches and monasteries and generally, the schools had very few books and few students. The first monastery school was founded in 1560, and its curriculum was limited to the study of Spanish grammar, morals, and the rudiments of Latin. The students were drawn from the higher social classes. The first public school was

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[1]See Virgilio Tosta, Ideas educativas de venezolanos eminentes (II edición; Caracas: Ediciones Villegas, 1958); Luis Prieto and Luis Padrino, La escuela nueva en Venezuela (Caracas: 1940); Armando Rojas, Ideas educativas de Simón Bolívar (Madrid: Autores Venezolanos, Ediciones Edime, E. Sanchez Leal, 1955); and José Gil Fortoul, op. cit.

not established until some forty years later, when one was opened in Caracas.

Several educational thinkers contributed their ideas to Venezuelan educational reform.[1] Miguel José Lanz prepared a report of public education for the Municipal Government in 1800, and in this report he proposed certain reforms. He asked for an educational system in which the learning process was gradual and logical. He also asked for technical and vocational training, giving emphasis to agricultural education. Lanz believed in education as a fundamental factor of development. He criticized the schools for their verbalism and for their failure to attend to the agricultural and mechanical sciences. Simón Rodríguez, a tutor of Simón Bolívar, was also dissatisfied with the state of education in Venezuela.[2] He was convinced that the Western Hemisphere transformation would have to be based on public education and that education should develop "according to nature."

Another important early educational leader was Andrés Bello, also a tutor of Simón Bolívar.[3] His ideas in education blended beautifully into the broadest concept of humanism. He believed that the educative process is an

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[1]Virgilio Tosta, op. cit.

[2]Emilio Vázquez, Simón Rodríguez (Ica, Peru: Tipografía La Cultura, 1952); and Pedro Grasses, Los escritos de Simón Rodríguez (Caracas: Ediciones de la Sociedad Bolivariana de Venezuela, 1953).

[3]Pedro Grasses, Andrés Bello, El primer humanista de América (Buenos Aires, Ediciones de Tridente, S. A., 1946).

integral one, wherein science and letters are blended for the attainment of the highest enlightenment and which insures the greatest social good. Like Rodriguez and Lanz, he gave a strong emphasis in the curriculum to the natural sciences, mechanical sciences, and agriculture. Naturally, Simón Bolívar, as the student of both teachers, would be expected to hold advanced ideas about education, and he did.[1] He believed that the provision of popular education was the first and most basic responsibility of government. José Maria Vargas, Firman Toro, Juan Vincente Gonzalez, and Cecilio Acosta were other countrymen who pioneered efforts to improve Venezuelan education.

Education During the Period from 1801 to 1870[2]

Between 1801 and 1870, important gains were made in educational reform. The history of this reform indicates that a few influential educational thinkers provided much of the impetus. The predominantly religious nature of the curriculum began to be modified towards the inclusion of knowledge with more practical significance. More civilians began to enter the teaching profession, which before had been dominated by the clergy.

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[1] Rojas, op. cit.

[2] Grisanti, op. cit. See: Angelina Lemmo, La educación en Venezuela en 1870 (Caracas: Universidad Central de Venezuela, 1961); and Alexis Márquez Rodríguez, Dontrina y proceso de la educación en Venezuela (Caracas: 1964).

Describing popular education during the nineteenth century in the Western Hemisphere, Montovani wrote:

> The idea of popular education was the basic idea which helped to build the Western Hemisphere towns. Before the Revolutionary War, there was not a clear idea in popular education; however, some intellectual persons had it. The doctrine of popular education has been the intellectual support of the democratic foundations.[1]

In 1811, the new government made several executive decrees designed to create public schools. The fundamental objective of these decrees was the development of a curriculum including the arts, mechanical vocations, and family education.[2] Implementation was not to occur, however, for there were not enough schools nor teachers. In 1821, another executive decree created elementary schools to precede the public schools in an educational program. Bolívar did provide some financial aid for the implementation of school objectives.[3]

At this time, the main purpose of education was to develop good citizens. In order to achieve this purpose, it was necessary to provide good teachers and develop good school programs. Yet by 1831, there were still fewer than 100 schools.[4] According to Antonio Leocadio Guzmán,

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[1]Juan Montovani, La educación popular en América (Buenos Aires: 1958), p. 20. Quoted by Angelina Lemmo, op. cit., p. 11.

[2]Lemmo, op. cit., p. 12.

[3]Ibid.

[4]Gil Fortoul, op. cit., Tomo II, p. 133.

Minister of Internal Affairs (1830-1840), the elementary schools could not improve because they lacked necessary funds.[1]

By 1844, Venezuela had 1,218,000 inhabitants, and only 11,969 students.[2] In 1848, Caracas had 121 schools, most with insufficient educational materials to carry on a satisfactory program.[3] During this period, science subject matter was found only in the university and generally was taught only for the medical students.[4]

In 1858, just before the outbreak of the civil war in Venezuela, the same educational problem existed and the majority of the population was still illiterate. During the following ten years, the war continued, and educational conditions worsened. On June 27, 1870, Antonio Guzmán Blanco, the new President of Venezuela, issued an executive decree which provided free and compulsory education for all Venezuelan students and considerable expansion of the number of schools.

The science education problem in Venezuela was described by President Guzmán as follows:

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[1]Memoria del Ministerio del Interior y Justicia, 1838-1839-1840. As expressed in Lemmo, op. cit., p. 14.

[2]Pedro Grasses, Temas de bibliografía y cultura venezolanes (Buenos Aires: Editorial Nova, 1953), p. 193.

[3]Memoria, op. cit., p. 16.

[4]Laureano Villanueva, Biografía del Dr. José M. Vargas (Caracas: Edición del Consejo Municipal del D. F. Imprenta Nacional, 1954).

> It is not justifiable that Venezuela, with its many natural resources, is not able to provide a botany course, a physics course, and a chemistry course which can be applied to our agriculture and cattle raising. Schools do not have a program of natural history and natural science in relationship with Venezuelan necessities.[1]

Before this decree, in 1856 Cecilio Acosta, another Venezuelan countryman, said in his book, Cosas sabidas y cosas por saberse:

> Venezuelan universities are plants which produce many wretcheds and academics. They have more formalities than production. The teaching method is question asking and the exercise is the answer to that question. Graduate students, with their degrees, are poor in scientific knowledge.[2]

Education During the Period from 1871 to 1936

Angel Grisanti[3] summarized the period from 1871 to 1936 in his book, Historia de la instrucción publica en Venezuela. During the academic year 1870-1871, 300 elementary schools, accommodating 10,000 students, were in operation. The Executive Decree of 1870 had provided compulsory and free education, and for an expansion in the number of schools. The effect of this decree became evident by 1885-1886, when the number of schools had increased to 1,957 (1,312 federal and 645 municipal), with a total enrollment of 99,466 children.

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[1]Gil Fortoul, op. cit., Tomo III, p. 28.

[2]Cecilio Acosta, Cosas sabidas y cosas por saberse, Obras completos, Tomo III (Caracas: Empresa El Cojo, 1909), p. 264.

[3]Grisanti, op. cit.

On December 18, 1881, Guzmán issued an executive decree which created the National Colleges. These colleges provided secondary education and higher education programs. They prepared professional people in the fields of engineering, medicine, law, and teacher education.[1]

In 1885, another type of school, called the Territorial Institute, was created by executive decree.[2] In this institution, there was a special practical course of natural science, taught during the weekends.

The educational budgets during the periods from 1869-1870 to 1887-1888 are shown in Table 1.

Table 2.1.--Educational budgets in Venezuela from 1869-1870 1887-1888.*

Year	Allocation (Bolivars)
1869-1870	Bs. 112,716.00
1876-1877	Bs. 447,984.84
1880-1881	Bs. 1,624,465.20
1881-1882	Bs. 1,639,354.40
1883-1884	Bs. 2,500,621.00
1885-1886	Bs. 3,287,399.88
1887-1888	Bs. 3,343,991.88

*Miguel Angel Mudarra, Historia de la legislación escolar contemporanea en Venezuela (Caracas: Ediciones M.E., 1962).

[1]Leyes y decretos reglamentarios de los Estados Unidos de Venezuela, Tomo VII (Caracas: Congreso Nacional, 1899), p. 863.

[2]Gazeta Oficial, No. 3482 (Abril 8, 1885), 1-2; in R. González Baquero, Analysis del proceso historico de la educación urbana (1870-1932) y de la educación rural en Venezuela (Caracas: U.C.V., 1962), p. 24.

According to Table 1, the greatest allocation of funds for education occurred during the 1887-1888 period. However, this increment in the budget did not fit the educational needs of the country.

Teachers were now trained in the Education schools created by the government. Their curricula included the following subjects: writing and reading, with emphasis in declamation; economy; methods of teaching; and history and geography of Venezuela. The only requirement for admission to these schools was the possession of an elementary school certificate.[1]

There were three teacher education schools in Caracas in 1876, and these were later divided by the government to form others. However, these schools did not provide good results, primarily because the federal schools were not attended during these years.[2] This was due to faulty organization and administration of the educational enterprise, and because of other national conditions, the teacher preparation problem, the lack of school programs, and lack of educational materials.[3]

In 1893, the government observed that: "The Federal Schools do not give the required education."[4] In 1894, the

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[1]Mudarra, op. cit., p. 62.

[2]Baquero, op. cit., p. 92.

[3]Ibid., p. 27.

[4]Leyes y reglamentos de los Estados Unidos de Venezuela, Tomo VII, p. 845; in Márquez, op. cit., p. 80.

government devised another school program, with emphasis on reading, writing, the metric system, geography, history and constitution of Venezuela, physical education, civic education, and agronomy (for rural schools). Methods of teaching were suggested by the government for use in this program; however the government did not supervise the proposed methods and therefore the teacher continued to use the methods of teaching he preferred.[1]

Table 2 shows the educational budgets during the periods from 1890-1891 to 1899-1900.

Table 2.2.--Educational budgets from 1890-1891 to 1899-1900.*

Year	Allocation (Bolivars)
1890-1891	Bs. 3,758,696.75
1893-1894	Bs. 3,447,088.92
1894-1895	Bs. 3,242,513.60
1895-1896	Bs. 2,723,095.76
1898-1899	Bs. 2,693,682.00
1899-1900	Bs. 2,854,880.00

*Mudarra, op. cit., p. 82.

According to the figures in Table 2, there was a major decrease in the educational budget during the period from 1890 to 1900. Little improvement took place in the educational system during this time.

According to the Laws and Regulations of Education published by the Venezuelan Congress on January 3, 1899:

[1]Leyes y Reglamentos, op. cit., Tomo VII, p. 834.

> Learning must be a practical exercise; books are only guides in the learning process. The teacher must prepare his lessons, and he must ask questions of his students; correct answers must be demanded. The teacher must teach his students methods of mental analysis.

A setback in Venezuelan education was the executive decree of February 18, 1903. The result was the closing of all first-level schools (grades one through four).[1]

In contrast to the learning process propounded by the Venezuelan Congress in the Laws and Regulations of Education in 1899, José Gil Fortoul, the Minister of Education, explained the characteristics of the Venezuelan educational system in 1912:

> The routine of the Venezuelan elementary school does not follow the rational education. It goes against her. There is no scientific learning nor intellectual work. This type of method impedes the school from its proper functions. Books are read by students who learn sentence by sentence, and repeat after the teacher. There is no relationship between the environment and the students' learning.[2]

Gil asked for constant supervision and a revision of the program of study. However, this idea was not applied. One year later, Guevara Rojas, the new Minister of Education, said the elaboration of the school program is the main function of the teachers,[3] leaving supervision and any revision for a later time.

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[1] Gazeta Oficial, No. 8,773 (Febrero 18, 1903), p. 2; in Baquero, op. cit., p. 40.

[2] Memoria de Instrucción de 1912, Vol. I, pp. xxxix-xli; in Baquero, op. cit., p. 52.

[3] Memoria de Instrucción, 1913, Vol. I, p. xxiii; in Baquero, op. cit., p. 54.

In 1918, 37,000 students were enrolled in the elementary schools, but only 191 students obtained their elementary school certificates. Thus, practically no students were able to reach the fourth grade.[1] Three years later there were 55,000 children of elementary age in two Venezuelan states, yet of these only 25 per cent were registered in the elementary schools and only 11 per cent attended school.[2] Nothing was done by the government to solve the problem. Between 1924 and 1932, there was no change in the educational system.[3]

The educational budget for the 1924-1925 academic year was Bs. 2,699,610; in 1927-1928 it was Bs. 4,348,218; and by 1935-1936 it had been increased to Bs. 6,000,000. During the 1935-1936 academic year there were 1,349 elementary schools, with an enrollment of 137,000 students from a potential student population of 689,288. This means that only 19.9 per cent of the potential student population attended school.[4]

Education During the Period from 1936 to 1943

In the sixty-six years from 1870 to 1936, the condition of Venezuelan education showed no real improvement. A

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[1] Memoria de Instrucción de 1919, pp. xvii-xviii.

[2] Memoria de Instrucción de 1921, pp. vi-vii; in Baquero, op. cit., p. 64.

[3] Baquero, op. cit., p. 70.

[4] Ministerio de Educación Nacional, Memoria, 1940.

report from Dr. Alfredo Smith, the first Minister of Education after the Gómez regime, summarized the state of elementary education:

> At least 80 per cent of the population are illiterate and they are scattered throughout the country. They are abandoned by the government, and a Ministry of Public Education which is deaf to all private initiative that might lead toward the cultural settlement of the Venezuelan people. All ideas for improvement are frowned upon, and all independence of judgment or of action persecuted. The schools are without furniture and instructional materials; the towns have few schools; the teachers are without any protection whatsoever and are submitted to the saddest kind of routine since, for many years, no study has been given to the technical aspects of school organization. The Ministry administers the schools without taking into consideration the improvement of teachers through vocational courses. The Technical Inspectors are chosen by simple favoritism and without any consideration to the formidable task which they have in the improvement of the teacher and, thereby, of the schools.[1]

And he added:

> Our primary school could be defined as: a teacher who is more or less competent. The pupils lack even a pencil or a table and find it lucky to get boxes to sit on. As to methods, they are mostly varied, completely rudimentary, mechanical, and for the most part memorization work. And the teacher acts with the most absolute indifference. He is subjected to condemnation and discharge in the face of failure when he is not properly sponsored.[2]

In 1936, the new government increased the expenditures for elementary education by 82 per cent, to a total of 9,000,000 bolivars. It created 694 new schools and added

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[1] Ministerio de Educación Nacional, Labores y proyectos para la reorganización de la instrucción publica (Caracas: Cooperativa de Artes Graficas, 1936), pp. 3-4; translated and paraphrased.

[2] Ibid.

1,178 teachers. The Venezuelan government contracted the services of a mission of Chilean educators to serve as technical consultants to the Ministry of Education and to organize courses in the field of teacher education.[1]

A new Minister of Education, Dr. Rafael Lopez, was appointed in 1937. In his preliminary report of October, 1937, Dr. López pointed out:

> The Venezuelan school consists, generally, of an indifferently prepared teacher, a generally inadequate classroom, and a set of furniture that in the majority of cases fails to provide the minimum of comfort that is necessary to make even modestly possible the work of the school. The supply of books and instructional materials, looked after with such preference in progressive schools, has been abandoned and relegated to that resulting from the private initiative of the teacher, and the individual sacrifice of the parents.[2]

Dr. López explained the grave nature of that educational situation:

> The result of this state of things is the almost total absence of instructional materials and reference works in the schools. Those children whose parents have some financial means acquire some textbooks, but the majority must be satisfied with the meager diet of explanations by the teacher. The gravity of the problem is accentuated in an environment like ours, where there are no satisfactory public libraries and where the books and the magazines are beyond the economic possibilities of our population. If to this state of things is added the deficient preparation of the teachers, the urgency of remedying the situation somewhat will become evident, if the large sums that are being paid for salaries, house rentals, and school furniture are not to prove somewhat less than unfruitful.[3]

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[1]Ministerio de Educación Nacional, Memoria, 1938.

[2]Ministerio de Educación Nacional, "Plan de trabajo" (Caracas: Ministry of Education, October 18, 1937); translated and paraphrased. (Mimeographed.)

[3]Ibid.

Dr. Rafael López was a good evaluator of the Venezuelan educational problem. He tried to improve Venezuelan education through special reforms, and by selecting special personnel to help him develop a better education for Venezuelans.

Specialists from other countries were brought to Venezuela by the Ministry of Education. George Sánchez, a former student of the Julius Rosenwald Fund of Chicago, was named General Technical Advisor and Director of Instituto Pedagógico Nacional. At the same time, he was Chief of the Research Division, which had two foreign specialists in Elementary Education and School Administration.[1]

These foreign specialists made a great contribution to Venezuelan education by completing the national system of examinations, developing a more practical curriculum, and establishing coeducation in all schools. However, the strong influence of tradition limited the implementation of their proposals.[2]

A quantitative development of elementary education took place during the period from 1936 to 1945. Many schools were founded, and many teachers were hired by the government. There were 5,420 elementary schools in 1936, representing an increment of 150 per cent over 1935. In 1937 there were

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[1]Ministerio de Educación Nacional, Memoria, 1937, p. xxii.

[2]Ibid.

1,594 elementary school teachers and 137,126 students, and by 1945 these figures had increased to 9,786 elementary school teachers and 338,907 students.[1]

In 1936 and 1938, the Ministry of Education brought two Chilean educational missions to Venezuela. The importance of these missions was reflected in the improvement in the quality of education. Their main purpose was to develop new planning strategies and a secondary teacher training school. The elementary schools received a new type of program. The concept of the new school was built in two experimental schools, "Gervasio Artigas" and "Venezuela." Courses for teachers and principals in new methods of teaching, seminars for technical inspectors, elaboration of new techniques in the collection of statistical data, courses in the development of educational materials, and teaching of pre-school courses were given.[2] To change the curriculum, the group used as basic criteria the reports of some teachers, the opinions of some representatives of the community, and the economic conditions of Venezuela. But, this study was not a scientific investigation in which conclusions were of some significance. The reforms were not

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[1]Ministerio de Educación, Memoria, 1936; and Ministerio de Educación, Anuario Estadistico, 1951; in Márquez, op. cit., p. 108.

[2]Márquez, op. cit., p. 113.

produced by a normal curriculum construction procedure,[1] and it is not reported how the curriculum group developed the new strategies for elementary education in Venezuela.

It is important to examine Dr. López's report of 1938 in order to understand some characteristics of Venezuelan education which are still present.

> It is no secret that the current organization [of schools] does not respond to the modern concept of education. Our school is essentially academic. It does not prepare the child or the youth for the exercise of civilian life. It limits itself to filling his mind with information which, if it has value at all, is not the only value, nor much less, the principal objective.[2]

Referring to the teaching method, Dr. López said:

> The system of teaching reflects the system of examinations. In these nothing is required other than the repetition of that which is found in the texts. As a consequence most students, confiding in their memory, leave until the last day of school the acquisition of the barest information.[3]

Two years later, Dr. Arturo Uslar Pietri, then Minister of Education, analyzed the educational system of Venezuela. His research presents a clear definition and analysis of Venezuelan education from 1800 until almost the present time, if we compare his ideas with those of other Venezuelan educational thinkers, such as Miguel José Sanz,

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[1] Normal curriculum construction procedure is defined by several American scholars and institutions as the finding of students' needs, community needs, and environmental conditions as bases for the establishment of new approaches in curriculum.

[2] Ministerio de Educación Nacional, Memoria, 1937, p. 4.

[3] Ibid.

Simon Rodriguez, Dr. Alberto Smith, and others. Dr. Pietri pointed out:

> Many causes converge to frustrate, in part, the high mission of our secondary studies. Among them, we enumerate the short duration of the program and the defects of the curriculum, but there are certainly others of greater weight. Our system of studies has had, by uninterrupted tradition, a marked unilateral character. From the primary level up to the university there is a kind of continuous channel which denies to the pupil any efficient exit other than that of the liberal profession. This country -- essentially agricultural, ranching, mining, and seafaring by imposition of its economic reality and its human geography -- in its system of education has never turned, in efficacious ways, toward preparing the human capital which those activities need. The men who could have gone to the country or to the crafts, with multiple aptitudes and clear sense find themselves dragged without any creative decision, to the Liceo and later to the university, or they remain among the discarded ones who then will try out, without previous guidance, any old job. The defect is an old one, but it stems from very old roots. Attempts have been made to correct it, insofar as current law allows, by creation of schools of arts and crafts and introducing agricultural work in the rural schools, but the effective reform would have to begin through a complete diversification of primary education -- to the end that the schools not empty themselves completely in Liceo. But, in the meantime, the current situation is taking to secondary education an increasing contingent of nonvocational students who, in large part, fail or complete the cycle in a mediocre way, occasioning innumerable inconveniences, among which the grave moral and pedagogical decline of the level of education is not the least.[1]

Summary

This chapter has contained an examination of the nature and development of Venezuelan education during the period from 1549 to 1943. Chapter III contains a discussion of the 1944 Science Education Program of Venezuela.

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[1]Ministerio de Educación Nacional, Memoria, 1940.

CHAPTER III

THE 1944 SCIENCE EDUCATION PROGRAM

Previous science education reform programs proposed for the Venezuelan elementary schools, and the general inadequacies of Venezuelan education prior to 1944 were discussed in Chapter II. This chapter deals with a description of the 1944 Science Education Program. To accomplish the purpose of this chapter, the objectives of the 1944 Program, the sources of these objectives, their implementation, the role of the Ministry of Education, and the relationship of objectives to the needs of students and the country are presented.

Objectives of the 1944 Science Education Program

As a result of the urgent needs of Venezuelan education, the Ministry of Education published a new elementary school program on September 7, 1944.[1]

The purposes and objectives of the basic science portion of the 1944 Venezuelan Elementary Education Program were quite modern. The major thrust of the program was to

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[1]Ministerio de Educación, "Programas de educación primaria," Gazeta Oficial, No. 98 (September 7, 1944).

help the student-citizen to understand his relationship to his environment; to teach him basic scientific principles; and to generate, encourage, and stimulate his interest in science. Specific objectives for the teacher to aid in the administration of the program were provided. These were designed so that the student could logically analyze his own basic body functions and understand the interdependence and ecology of all forms of life. Such basic information is intended to benefit both the student and the Venezuelan nation by contributing to higher standards in health and agriculture. As far as modern educational programs can be compared among nations with different degrees of industrial and social development, the 1944 Venezuelan Basic Science Educational Program was very progressive in the scope of its objectives and purpose. (See Appendix A for a complete list of the 1944 Basic Science Program objectives.)

Source of Objectives

The preparation and formulation of the 1944 science education objectives resulted from the external influences of American and French education and internal social forces, such as proposals from Venezuelan educational organizations, ideas of Venezuelan political parties, government policy, and Venezuelan legislation.

American-French Educational Influence

The improvement in the means of social communication has promoted the diffusion of ideas. Many Venezuelan educators received their educational background from American and French educators. American-French methodological approaches, as well as American-French pedagogical innovations, were widely practiced. The ideas of Claparede, Decroly, Kirpatrick, Dewey, and others were discussed within the educational system. Some educational innovations such as the Winnetka plan, the Dalton plan, and the ideas of Cusinet and others guided the thinking of Venezuelan educators.[1]

Proposals by Venezuelan Educational Organizations

Several Venezuelan educational organizations prepared proposals for the study and change of the educational program. The Venezuelan Teacher Federation (Federación Venezolana de Maestros), The Secondary School Teacher Union (Unión de Profesores de Venezuela), The Student Federation (Federación de Estudiantes Venezolanos), and the Writer Association (Asociación de Escritores) asked the government to study new pedagogical ideas, review the overall educational program,

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[1]Mudarra, op. cit., p. 149.

improve teacher training, develop new schools, and improve teacher income.[1]

Government Policy

The determination and regulation of Venezuelan educational development have been important functions of the Venezuelan government, and the educational system reflects the desires and motivations of the government. Thus, it is important to recognize that the Venezuelan government was particularly receptive to new ideas concerning educational matters in 1944. This circumstance was an important factor in the governmental decision to bring foreign education specialists to Venezuela once again, to improve and modify the school programs.

A new education law was approved by the Congress in 1940. This law established the philosophy that education must improve the physical and mental level of Venezuelans, and must train all Venezuelans to develop their inventive ability, intellectual capacity, and technical training. This law also established the concept that the teacher must take into account the students' environment and his social needs in developing his classwork.[2]

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[1]Prieto and Padrino, op. cit.

[2]Ministerio de Educación Nacional, Memoria, 1940.

Venezuelan Legislation

The Venezuelan Constitution establishes the fundamentals of education. Since the 1936 constitution, similar articles have been included in each revision. The following is typical:

> Education would have as its main purpose the total development of personality, the formation of good citizens who are able to practice Democracy, improve culture, and develop the spirit of human cooperation. The State will guide and organize the educational system to fulfill the requirements pointed out above.[1]

The special relationship between the sources of the objectives, discussed above, and the objectives themselves can be seen in the process by which objectives are determined. In this case, Venezuelan Science Education Program objectives were developed by the Ministry of Education's official commission, which was composed of foreign and native scholars. This group formulated objectives based on an analysis of the skills needed by pupils and their deficiencies. The analysis was made using opinions provided by community representatives, and from an analysis of the adult activities for which the learners were being prepared.

Implementation of Objectives

When the 1944 Official Program was approved by the Ministry of Education, there were 4,904 elementary schools, 298,349 students, and 9,070 teachers in elementary education. (See Appendix B.) The situation of the Venezuelan elementary

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[1]This statement can be found in the Constitution of 1936, Education Law of 1940 and 1948, and Provisional Law of 1949 and 1955.

school was described by the Minister of Education, Humberto Garcia Arocha, as follows:

> In our country, according to the last census, there are 787,812 children of school age. There are schools for only 281,938; more than 505,000 children are unable to enroll; 6,300 children go to Federal, State, Municipal, or private schools where there are no desks, where a majority of the children sit on boxes, on boards, or on the floor. Many of the schools lack water filters, blackboards, and even maps of Venezuela. Furthermore, there are only 3,969 teachers in service today. Only an irresponsible person or a demagogue could promise a solution to these problems in five or even ten years.[1]

The conditions of elementary education in Venezuela were analyzed by William Vogt, Chief of the Conservation Section, Division of Agricultural Cooperation, in 1946:

> . . . Here, in Venezuela, the low educational level of the vast majority of the country's citizens is one of the highest stumbling blocks that an effective erosion control program will have to clear. "Illiteracy" is a relative term. It is estimated that 70 per cent of Venezuelans are unable to read and write. It is probable that at least 90 per cent are possessed of such a limited education that natural resource conservation will have to be strongly emphasized over a period of several decades if the great mass of the people is to understand the necessity for soil and water conservation.[2]

He added:

> . . . Venezuelan education in preparing men to cope with problems of the land is gravely hampered by what might be called its nationalistic point of view. Science is inescapably international; yet a high proportion of even trained technologists in Venezuela are unable to read English, German, or Russian, three languages of

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[1]Humberto García Arocha, Minister of Education, Fall 1945; in Delia Goetz, "Education in Venezuela," U. S. Office of Education Bulletin Number 14, 1948, p. 2.

[2]William Vogt, The Population of Venezuela and Its Natural Resources (Washington, D. C.: Pan American Union, December, 1946), p. 16.

> extremely great importance to technical workers. Many people seem to think that when a man has his college degree, he is educated. Science is developing and progressing rapidly in many parts of the world, and large numbers of the scientific workers in Venezuela are as rapidly being left behind. They do not read technical journals in even their own limited fields. Indeed, outside of Caracas, facilities for them to keep up with science are often nonexistent -- and I have heard many complaints that facilities in Caracas are far from satisfactory. Students emerge from Venezuelan schools, or even from foreign institutions, with degrees and titles, but without the student's habit of mind that would not only keep them abreast of scientific developments throughout the world, but also continue to develop their own innate capacities as they mature.[1]

That was the situation of learning in Venezuela during the first two years of the 1944 Program. Lack of educational materials and books was a problem of great importance. Many schools did not have textbooks, maps, charts, or libraries. For manual training, few schools had materials with which to work.

Curriculum was not standardized throughout the school system, and not all schools applied the same method of instruction. In some schools, the teacher selected his books and required the students to give a word-for-word recitation, which resulted in nothing but memory work.[2] In a typical school, the student found an anachronistic environment, one in which the teacher's actions and style of conduct were different from his own. He had to solve problems and do assignments which had not been explained by the teacher.

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[1] Ibid., p. 20.

[2] Goetz, op. cit., p. 25.

The school did not seem to have a well-defined function, and it did not give him an education he could relate to his own needs. As a result, the student did not have an opportunity to form a clear concept of his role within society.[1]

Only 800 copies of the Official Program were originally published. Therefore, during the nineteen years following the inception of the Program, only 800 of the 30,000 teachers throughout Venezuela had a copy of the Program as a guide by which to prepare their lessons.

A majority of the present Venezuelan teachers have been educated by the old type of school, and their traditional methods of teaching have a strong influence on the quality of education received by their students. Besides, the Venezuelan schools do not have the necessary educational facilities which would facilitate the learning process according to modern requirements. The student and the teacher use imported books, which do not coordinate with the school program, and which represent yet another type of approach to the study of science.

Many educational movements were undertaken in the 1960's, in an effort to improve the quality of Venezuelan education.

In November and December, 1962, the Directorate of Elementary Education conducted extensive meetings and

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[1]Hilda López, La escuela venezolana: Una institución en conflicto (Caracas: Pensamiento Vivo, S. A. Editores, 1962), pp. 52-60.

interviews with supervisors, regional councils of supervision, principal councils, teacher councils, and teachers to assess the implementation of the Official Program. As a result of those activities, the following conclusions were drawn:

a. Improper use of Official Program is widespread; the teacher does not teach the course content and he does not apply the methodological recommendations;
b. It is important to distribute the Official Program to the teachers;
c. It will be necessary to provide facilities to implement the Official Program.[1]

In 1963, a study was made of the educational materials used in Venezuelan schools.[2] The study evaluated copybooks; that is, the children's own records of day-to-day class activities. The findings showed that the copybooks of second grade students often contained sentences which had not been explained by the teacher. There were no summaries about the subject, nor explanations of experiences. The students merely transcribed books from the teacher's dictations, and the content of these writings was far beyond their grasp.

Teachers apparently did not follow the program recommendations on methodology, either. The science program

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[1]Ministerio de Educación, Resumen General, Revisión y actualización de los programas de educación primaria (Caracas: Dirección de Educación Primaria y Normal, 1965), p. 14.

[2]Gladys de Acosta, Investigación sobre materiales de la escuela venezolana (Caracas: Universidad Central de Venezuela, Instituto de Psicología, 1965).

suggested direct observation, experimentation, and contact for children with the natural environment. It was found that the copybooks were full of theoretical lessons, technical names, and word-for-word transcriptions of the science books.

It is interesting to point out some conclusions of a study conducted at that time by the National Council of Universities.[1] The results were drawn from an evaluation of secondary school students, who reflect the science preparation they received in elementary school.

> Capacity of reason of Venezuelan student: He repeats the lesson as it was dictated or written in mimeographs. He does not read the textbook. Generally, he studies in memory work; he does not analyze the importance of ideas. After a few days, he forgets what he has read.
>
> Aptitude for practical work: When the student has to make a laboratory experience, he does not start his work with enthusiasm. He does not have aptitude for cooperation, and he prefers to be a passive agent.[2]

These evaluations of the elementary curriculum have resulted in the development of better teacher training programs, the preparation of new educational materials and books, and some experimentation with new methods of teaching.

One progressive step in the coordination of the science curriculum was the publication of the second edition

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[1] Consejo Nacional de Universidades, "Un estudio acerca de los programas de bachillerato y de la proporción de materia vista cada año en relación a su contenido," in Olinto Camacho, "Bachillerato y universidad," Educación, No. 116 (1965), p. 23.

[2] Ibid.

of the Official Program in 1963. This step provided for the distribution of sufficient copies of the Program to science teachers throughout the country.

During the 1970-71 academic year, a revised curriculum was put into operation in the first, second, and third grades. One aspect of the revised curriculum was the preparation of a timetable of twenty-five class hours per week, of which about two hours were devoted to science instruction. The Ministry of Education is now working toward the improvement of the curriculum at all other levels of education.

The following statement, given in 1970 by Hector Hernández Carabaño, Minister of Education, summarizes the revision and implementation of the objectives set forth in the 1944 Official Program. For a complete report of the revision and implementation of the objectives of the 1944 Official Program, see Appendix C.

> These [revised programs] have subject-content and methodological suggestions in which the learning process is determined by the motivated initiative of the child.
> . . . . . .
> Objectives of the new program are:
> 1. To give solid foundations to develop the learning of instrumental subjects.
> 2. To make the child learn by himself all the indispensable and useful ideas.
> 3. To develop active learning.
> 4. To emphasize objectives rather than content.
> 5. To improve the teacher-student relationship.
> 6. To make an up-to-date program.
> 7. To make methodological recommendations according to the newest approaches.
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> The structure of programs is determined by the education law.[1]

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[1]Ministerio de Educación, Memoria, 1970, p. xxxiv.

The Role of the Ministry of Education

It has been shown that since 1870 the Ministry of Education has been directing the educational enterprise of Venezuela, although its role has been subordinated to the political and educational ability of the government members. In qualitative terms, the real improvement in Venezuelan education and the special attention which has been given to improving the quality of education have occurred during the past twelve years.

In 1966, the Curriculum Center of the Ministry of Education was created.[1] Since 1969 this office has been working on plans and programs of education from kindergarten through ninth grade. It developed the 1970 revision of the curriculum, with the main focus on teachers, administrators, needs of the educational system, and educational materials. This curriculum revision was preceded by several educational research studies to evaluate various experimental and revised programs. Special attention has been given to teacher and administrator training, to administrative reforms, and to the acquisition of curriculum material, in order to adapt the school system to its requirements.

According to the curriculum personnel, there is a need for understanding and cooperation on the part of the teaching personnel. The lack of cooperation on the part of

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[1]Ministerio de Educación, Dirección de Planamiento, Departamento de Curriculum, "Reporte de Actividades" (Caracas: Ministry of Education, 1971). (Mimeographed.)

the teaching staff is a result of their training, which was developed under old-fashioned patterns of teaching methods.

Several activities were developed by the Ministry of Education to improve the quality of education. A course on the development of elementary school programs for the first, second, and third grades was given in the Centro Interamericano de Capacitación Rural and in El Mácaro. Research on books and science education materials for the elementary school was started in the Centro de Capacitación Docente El Mácaro. This activity is helped by OAS. On July 15, 1970, the President of Venezuela issued an executive decree which established the evaluation of every teacher who applies for a job in the educational system.[1]

The Ministry of Education conducted courses to prepare 126 principals and thirty-four advisors for elementary schools. Workshops on modern mathematics, science methodology, evaluation of classwork, and other areas of concern were also provided. Fifty teachers were trained in textbook illustration, and 18,031 teachers were trained to instruct pupils in the new programs.[2]

The Ministry of Education has recently formulated a four-point plan, in which the goals for the elementary schools include: 1) An increase in the number of students

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[1]Ministerio de Educación, Memoria, 1970, p. 372.

[2]Ministerio de Educación, Nuevos aportes a la reforma educativa, by Hector Hernández Carabaño (Caracas: Ministry of Education, 1971), p. 33.

from 410,619 to 2,006,889 by the 1974-75 school year,[1] and 2) An increase in the rate of retention by 50 per cent from first grade to sixth grade. If successful, the program should enable the rate of retention for the elementary schools to reach 90.7 per cent by 1974-75.[2]

An executive decree was issued on June 12, 1970, establishing a scheme for elementary pupil evaluation. A uniform scale of nine points is now used to determine the grade-point evaluation of the student. Promotion in the first three grades can be determined by attendance. If a student has a 75 per cent attendance record or a 50 per cent record, and has learned the basic ideas of the program, he should be promoted to the next grade. From the fourth to the sixth grades, the student must have at least a four-point average. In any case, the student can only repeat an academic year once, and will then be promoted automatically to the next grade.

Teacher training is another aspect of the educational program which is supervised by the Ministry of Education. The Ministry recognizes that today's Venezuelan teacher does not have adequate training according to present technological and scientific knowledge. The Ministry named a commission in 1970 to study the curriculum for a new kind of science

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[1] Ibid., p. 86.

[2] Ibid., p. 87.

teacher.[1] The Ministry of Education has made contact with the National Council of Technological and Scientific Research (CONICIT) to work on the development of science programs, science books, and science educational materials.[2] They hope to determine the relationship between programs of study and educational materials, highlight salient characteristics of textbooks, and establish rules by which to select textbooks.[3]

A report of the Science Education Commission at CONICIT on the needs of science education at the elementary and secondary levels described the revised elementary school programs. The report found that it is necessary to have special personnel to apply the experimental programs, and enough educational materials and well-equipped laboratories. However, the elaboration and application of the new programs have not been supported by systematic research to determine a given set of hypotheses. (See Appendix D for the complete text of the Report of the Science Education Commission at CONICIT.)

Present Experimental Elementary Science Program

The Office of Educational Planning has been working with the revision and implementation of the Elementary

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[1] Ibid., p. 33.

[2] Ibid., p. 52.

[3] Ibid., p. 53.

Science Program. In September, 1966, the Commission of Programs[1] pointed out that a good program is one which offers the teachers the necessary guides by which to interpret, develop, and evaluate the curriculum. Therefore, it is important to take into account the qualifications of educators, the resources of the school system, and the nature of the curriculum in order to determine the characteristics of effective learning programs.

Consequently, the Commission suggested the following criteria for a usable program: The objectives of the program must fit the social aspirations and behavior of the students. The objectives have to be formulated according to the students' needs, and must satisfy their individual differences. These objectives must be clearly stated, and articulated by ordinal importance. The program needs basic suggestions which serve as methodological guides for teachers and must contain evaluation procedures, recommendations for educational materials, and a bibliography. The program must be concise. The Commission followed most of these recommendations in preparing the revised programs.

In November, 1969, the Office of Planning undertook a project to review the curriculum of the elementary school. As a result of this study, the Office of Planning made these recommendations: a) To maintain the elementary school

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[1]Ministerio de Educación, Oficina de Planeamiento Integral de la Educación, Comisión de Planes y Programas, "Reporte de actividades: Recomendaciones sobre programas para la escuela venezolana" (Caracas: 1966). (Mimeograph.)

curriculum according to the education law; b) To introduce the orientation of each area according to the results of experimental curriculum; c) To include physical education and religious education in the curriculum; d) To divide the elementary school into two cycles, one instrumental and the other cultural; and e) To divide the classwork time into two periods of 162 minutes each.[1]

Nature and Scope of the Revised Program

Four years of revision have been planned by the Office of Planning in order to identify the nature of the program. The kindergarten through third grade program was revised during 1969-1967. During the 1971-72 academic year implementation of the program from fourth grade to sixth grade was started.

The revision was developed by the Commission as follows: 1) Determination of subjects of the 1944 elementary school program, 2) Determination of the organization of subjects, 3) Assignment of a time-period for each subject, 4) Assignment of 60 per cent of the time to language and mathematics, and 5) Implementation of objectives.

In the revision of the elementary school curriculum, the Commission made some criticisms about the nature of the curriculum, and introduced the idea of specific objectives.

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[1]Ministerio de Educación, Oficina de Planeamiento Integral de la Educación, Comisión de Planes y Programas, "Reporte de actividades: Revision de los programas de educación primaria" (Caracas: April, 1970). (Mimeographed.)

The Commission tried to avoid objectives which did not correspond to the culture and introduced the vocabulary of the new curriculum.

Three steps were used by the Office for the introduction of the revised curriculum. The first was to obtain support from society, the second was to analyze the 1944 Program of study, and the third was to use the revised curriculum.

In 1971, the Sub-Commission of Science made a report of its activities, in which are found the following aspects of the science curriculum.

In Venezuela, science had been taught using the French model of teaching -- in other words, understanding science as a conjunct of knowledge under different approaches, in which the teacher lectured his students and they made memory work of the material.

Science as a process should be understood as knowledge by experience. So, the student will learn science in the same way the scientist does. This idea has been developed by the American Association for the Advancement of Science (AAAS), and the science program of Venezuelan elementary schools has been developed following AAAS recommendations. Many advantages in this approach were seen by the Sub-Commission of Science. The student learns science by process, and he is an active person in the classroom. Also, the student learns methods and techniques of work. However, it is important to have adequate teachers and personnel in

order to apply the new science programs. Thus far, only the teachers of experimental schools have received the necessary intensive training in the new methods through seminars, workshops, and courses given by the Instituto de Mejoramiento Profesional del Magisterio and the Sub-Commission of Science.

The Science Sub-Commission formulated a special course of science teaching methodology for the senior year of the teacher training program, in the hope of developing better teacher motivation for the teaching of science. This Commission asked for the collaboration, as well as personnel and financial support, of the CONICIT in implementing the special methodology course.

The science education projects which have been developed in the United States (See Appendix E) have been the basic foundation for the improvement of the science education program in Venezuela. Various American organizations, such as the University of Wisconsin, Ford Foundation, University of Colorado, Florida State University, The Ohio State University, the Agency for International Development, OAS, and UNESCO, are the most important collaborators in the development of the new curricula in Venezuela by the Ministry of Education.[1]

Several Venezuelan studies are using the educational product-approach, measured through a national assessment

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[1]Ministry of Education, Directorate of Planning, Department of Educational Research, "Educational Research and Curriculum Reform: The Case of the Venezuelan Assessment Programs" (paper presented at the American Educational Research Association, February, 1971).

program. The quality of educational output is related to school expenditures, teacher characteristics, and community characteristics.[1] This national assessment approach was developed by the Ministry of Education, following the ideas of R. W. Tyler.[2] The sampling techniques were developed using the criteria of F. M. Lord, and specifications of the methodology were prepared by D. M. Miller and R. G. Wolfe.[3] Content validity, with respect to the curriculum program, was prepared by R. F. Conry and the content analysis and codification of the curriculum content were structured following the recommendations pointed out by Benjamin Bloom in his book, Taxonomy of Educational Objectives.[4]

As we have seen, American scholars have been helping the Ministry of Education improve the curriculum of the elementary and secondary schools. The Ministry of Education reported the bibliographical support and the collaboration of some American scholars and universities, as well.[5]

The Relationship of Objectives to the Needs of Students and the Country

Looking at the needs of Venezuelan students, it is found that they need to understand their physical world, and

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[1] Ibid.

[2] Ibid.

[3] Ibid.

[4] Ibid.

[5] Ibid.

have a scientific background which permits them to possess the minimum requirements to start the secondary, technical, and vocational courses of science. They must also be able to develop an attitude of inquiry.

Venezuela needs citizens with a scientific attitude, who are able to find answers for daily problems -- citizens who are able to protect their natural resources, who help to improve technological development, who practice scientific sanitary behavior, and who improve the social institutions of the country.

Analyzing these needs and the objectives of the 1944 Program, it was found that there is a direct relationship between objectives and needs. However, during the period from 1944 to 1968, implementation and application of Program objectives had no relationship to these needs. As a result of review and revision of the original Program, it is expected that student needs and the application and implementation of Program objectives will more closely coincide.

CHAPTER IV

MECHANISMS FOR GENERATING NEW OBJECTIVES FOR SCIENCE EDUCATION IN VENEZUELAN ELEMENTARY SCHOOLS

In this chapter, the present needs of Venezuela and its students, as well as mechanisms for arriving at a set of science education objectives, are described.

The Present Needs of Venezuela and Its Students

Venezuela, as an underdeveloped country, needs citizens with basic technical, vocational, and agricultural skills, which will provide the manpower to develop a better economy for the country. It needs an educated people who can help support and improve its democratic institutions, who can improve the social interactions between institutions and their constituents, and who are able to improve the quality of Venezuelan life. Citizens with sufficiently broad educational foundations can also better international understanding and cooperation, and contribute to the progress of the hemisphere and the larger world community.

According to the Central Bank of Venezuela, many variables contribute to the pace of economic development: the decisions of industry; the capacity of the market as a

determiner of production; the relationship between saving and income; the relationship between investment and product, importation and consumption; social and political conditions; the development of economic incentives; and most important, the inventive capability, work habits, and education of the population.[1]

Since the demography of any nation is an important factor in the economy, it is appropriate to begin with a review of the Venezuelan population. Venezuela has consistently had a high rate of natural increase (currently 3.5 per cent annually), which, when combined with a long life expectancy, results in a population characterized by a high percentage of youths. This circumstance has already had several implications for the economy, and it is this population that provides the base for great potential consumption.

During the 1968-1969 academic year, the student population was as shown in Table 4.1. The two major school age groups are clearly not all in school.

In Table 4.2, the estimate of the relative urban and rural populations, according to the Ministry of Development, are shown. The migration of large numbers of persons from the rural areas to the cities has produced the interesting situation where even though population generally

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[1]Banco Central de Venezuela, La economia venezolana en los ultimos veinticinco años (Caracas: Banco Central de Venezuela, 1966).

increases, the total rural population is stagnant. As time passes this will be aggravated by the growth within the urban areas. The effects of this situation are considered later in this section.

Table 4.1.--Venezuelan student population during the 1968-1969 academic year.*

Age	Population	In School	Out of School
0- 4	1,869,236	...	...
5-14	2,715,504	1,625,654	1,089,850
15-19	1,040,954	377,091	633,853

*José Rafael Revenga, "La eficacia de la educación en Venezuela," in Venezuela panorama 1969. Una mirada al futuro (Caracas: Creole Petroleum Corporation, 1970), p. 48.

Table 4.2.--Estimation of the urban and rural population of Venezuela.*

Year	Total Population	Urban Population	%	Rural Population	%
1961	7,612,327	5,164,125	67.84	2,448,202	32.16
1965	8,722,212	6,240,544	71.55	2,481,668	28.45
1970	10,398,907	7,874,763	75.73	2,524,144	24.27
1975	12,433,970	9,866,623	79.35	2,567,347	20.65
1981	15,202,626	12,582,459	82.77	2,620,167	17.23

*Ministerio de Fomento, Dirección General de Estadistica, in Tomas Carrillo, Población y desarrollo economico (Caracas: Banco Central de Venezuela, 1967), p. 121.

Table 4.3 shows another compounding phenomenon of the population shifts, which bears heavily on the schools. Not only are people moving to the cities, the number of school age and pre-school age children is increasing more rapidly in the cities than in the country. The resources to educate these additional children are not available to the extent necessary in the urban areas.

Table 4.3.--Estimated rural and urban population, according to age group.

Year	Age	Urban Population %	Rural Population %
1961	0- 4	65.36	34.64
	5- 9	61.52	38.48
	10-14	63.29	36.71
	15-19	69.53	30.47
1965	0- 4	68.65	31.35
	5- 9	64.45	35.55
	10-14	67.48	32.52
	15-19	72.67	27.33
1970	0- 4	72.20	27.80
	5- 9	69.13	30.87
	10-14	70.62	29.38
	15-19	75.71	24.29

There is still another relationship which should be examined in connection with the school age groups, which is the number of such youths engaged in active employment. In 1961, the general census gave the following statistics:

86.7 per cent of the active population was employed and 13.3 per cent was unemployed. The employment situation for 1975 is projected to be 94.7 per cent of the active population employed and 5.3 per cent unemployed, while the employment by economic areas is expected to be: agriculture, 20 per cent; petroleum and mining, 1 per cent; industry, 35 per cent; and services, 44 per cent.[1]

During the 1969-1970 academic year, there were 1,681,947 students in the Venezuelan elementary schools. Of these, 1,396,103 students were in urban schools, and 285,844 students were in rural schools.[2] In the same academic year, 65,118 students were less than seven years old, 1,569,848 were between eight and fourteen years old, and 46,981 were fifteen years old and over.[3] In Venezuela, there were 10,755,000 inhabitants in 1970.[4] If one accepts the rate of activity of 47.7 per cent[5] for the total population of ten years old or over in 1970, it can be seen that only 20.3 per cent of the population between ten and fourteen years old could be actively working.

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[1]CORDIPLAN.

[2]Ministerio de Educación, Memoria, 1970, p. xvi.

[3]Ibid., p. xv.

[4]Tomas Carrillo, Poblacion y desarrollo economico (Caracas: Banco Central de Venezuela, 1967).

[5]United Nations, U. N. boletín estadistico de America Latina (New York: United Nations, 1969).

Tomas Carrillo, one of the foremost Venezuelan economists, disagreed with the preceding CORDIPLAN employment projection.[1] According to him, by 1975 the distribution of the active population by age should be as shown in Table 4.4.

Table 4.4.--Distribution of active population by age.

Age	Males	Females	Total
10-14	38,000	8,000	46,000
15-19	321,000	92,000	413,000
20-44	2,210,000	740,000	2,960,000

The population for 1975, as estimated by the same author, is shown in Table 4.5.

Table 4.5.--Estimated population for 1975.

Age	Males	Females	Total
10-14	960,000	755,000	1,715,000
15-19	643,000	617,000	1,260,000
20-44	2,242,000	2,181,000	4,423,000

According to these tables, the Venezuelan population will be 12,433,970 inhabitants in 1975. Of this population,

[1] Carrillo, op. cit.

3,419,000 persons will be working; 9,866,623 inhabitants (79.35%) will be living in the cities.

The CORDIPLAN (Presidential Planning Office) prediction has followed an evolution according to past economic development. The rate of employment for industry is high, and it is likely to increase still more as further industrialization of Venezuela occurs. The situation is agriculture is less optimistic, according to the pattern followed during the 1941-1950 period. Farm employment should account for 10 per cent of the total activity according to the CORDIPLAN. Carrillo, on the other hand, said that the CORDIPLAN projections should ideally be as follows: agriculture, 15 per cent of employment for 1975; petroleum, 1 per cent; industries, 35 per cent; and services, 49 per cent.

If the rate of activity[1] of the ten to fourteen year old group were to be zero, that is if all were in school, agriculture would support some percentage of sub-employment, and unemployment would not be high overall. If the fifteen to nineteen year old group is diminished, that is if more individuals are withdrawn from the labor market, the immediate effect will be a reduction in agricultural workers. After they have returned to the active population it is expected that a great increase in productivity will occur. However,

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[1]Activity means capability to work.

the overall effect on employment will be high unemployment for the entire population.[1]

The industrial area and the services area are expected to be the major sources of employment in 1975. For that year, the manpower provided from different levels of education is expected to be as shown in Table 4.6.

Table 4.6.--Manpower provided by different levels of education.*

Level of Education	Number	Per Cent
University	55,076	1.56
Secondary	164,563	4.67
Elementary	924,723	26.26
Others	2,377,638	67.51

*CORDIPLAN, Estudio de los recursos humanos de Venezuela, Caracas, 1968.

Persons with an elementary school education will provide the greatest percentage of manpower in relationship to the other levels of education. The manpower provided by "others" (which means persons without any schooling experience and persons without the elementary school certificate) represents the greatest percentage of the active population. It is evident that it is important to develop

[1]Carrillo, op. cit.

an elementary school program which will provide the basic skills needed for adaptation to any type of work training.

The quality of education is a determinant of the development of any country. The quantity of educational services is representative of any educational system. In the case of Venezuela, the quantity of educational services has been increased by the Ministry of Education year by year, yet the quality factor has stagnated.[1] This implies the use of a large volume of resources which do not contribute to the improvement of the quality of employees needed by the country. One of the functions of the elementary school is to guide the student for his future role within society, and the schools must move to recognize this function.

Taking into account the figures presented in Tables 4.4 and 4.6 and the CORDIPLAN projections, as modified by Carrillo, the need for technicians and agrarian workers in Venezuela is seen. The Venezuelan economy has depended upon the international petroleum exchange. However, the predictions point out that industry, agriculture, and services will be the most important areas of employment. If the elementary school is to prepare students for the country's future needs, it is important to develop a science program

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[1]José Rafael Revenga, "La eficacia de la educación en Venezuela," in Venezuela panorama 1969. Una mirada al futuro (Caracas: Creole Petroleum Corporation, 1970), p. 49.

in the elementary school which fulfills the minimum science requirements to start any technical and vocational education. The 15-19 year old group should be enrolled in vocational, industrial, or other secondary schools to gain more advanced knowledge and training. Finally, the present work force may need to be redistributed to maintain production in certain areas while this takes place.

To accomplish the goal of preparing students for the country's future needs, Venezuelan schools will need adequate educational facilities and personnel, which means well-trained teachers, good programs of study, laboratories, libraries, educational materials, buildings, and sports facilities.

Considerations in Arriving at a Set of Science Education Objectives

It is important to distinguish the meaning of goals and objectives in this study. Goals are the final products expected by the system, or its several major parts; and objectives are the ways to obtain these goals. The major relationship between goals and objectives will be demonstrated as specific goals and objectives are examined. The formulation of a set of science education objectives for the elementary school requires the analysis of two important factors which affect the school. These are the environment and the educational system.

It is impossible to omit an analysis of the environment when a set of science education objectives is prepared. This analysis should include the local natural resources, the community's goals, and economic goals of the system.

The educational system is another aspect to consider. This includes the administration's goals, the teachers' goals, national educational goals, and the determination of available educational facilities. Naturally, the main focus of education, the students, also has to be analyzed when a set of science education objectives is being prepared.

The School's Environment

The following map of Venezuela (Figure 1) depicts the educational regions. Table 4.7 shows the distribution of the population and educational facilities of Venezuela, according to region.

It is interesting to observe that the majority of the population is in the North-Central region of Venezuela. This has been caused by migration of the rural population to the urban areas. This migration has caused such population growth in these areas that local education facilities are not sufficient to provide adequate conditions of learning. At the same time, some regions which are rich in natural resources, such as the South and Guiana regions, do not have enough population remaining to exploit these

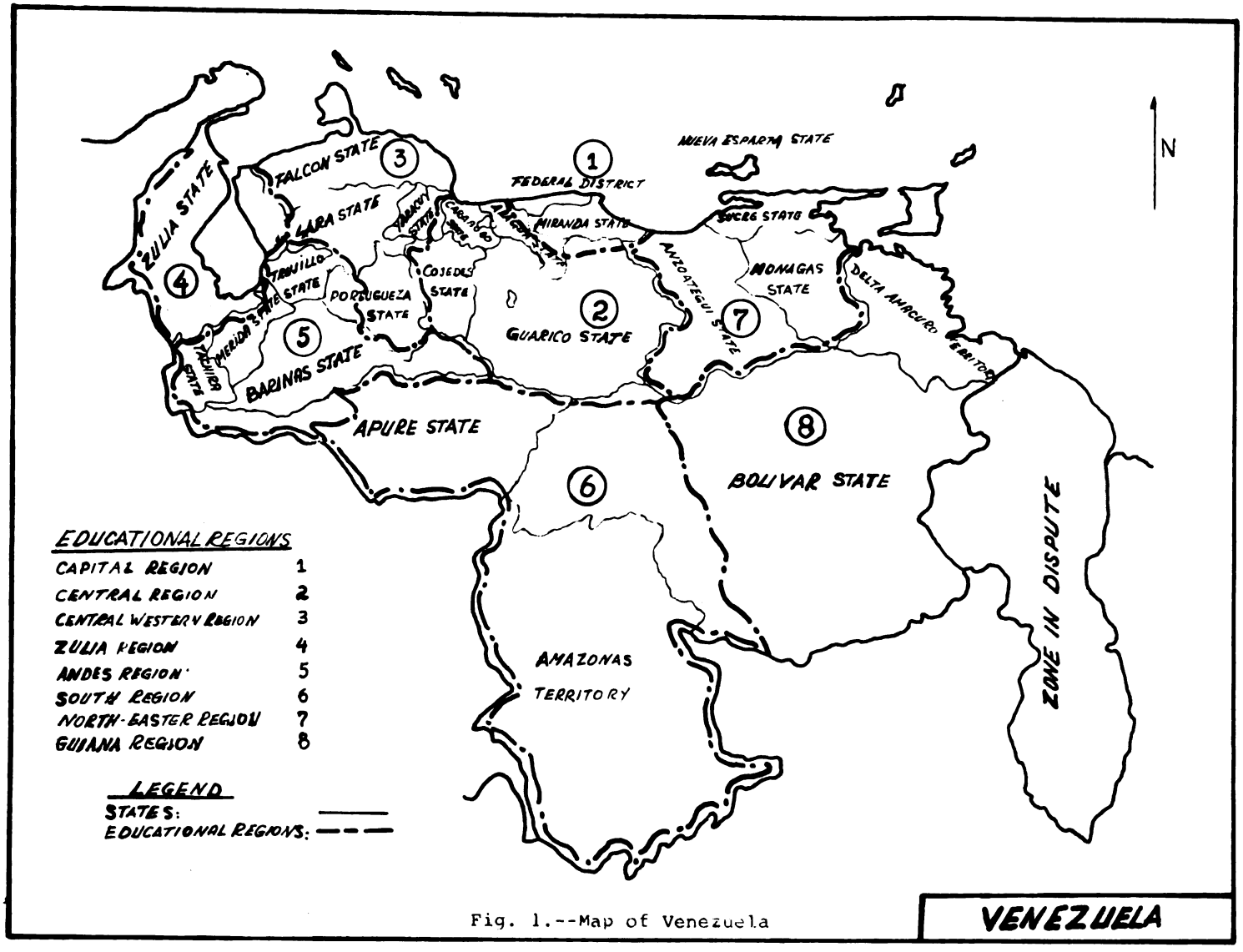

Fig. 1.--Map of Venezuela

Table 4.7.--Distribution of population and educational facilities by region.*

Region	Population	Students	Teachers	Classrooms	Schools
Capital Region	2,586,208	608,106	24,711	11,532	1,190
Central Region	1,323,680	356,319	11,020	6,411	1,710
Central-Western Region	1,391,816	335,500	10,692	7,438	2,420
Zulia Region	1,289,348	298,849	10,077	5,747	1,095
Andes Region	1,526,141	324,431	11,403	8,560	2,923
South Region	154,840	33,593	1,110	884	386
North-Eastern Region	1,387,344	324,744	10,185	7,057	2,072
Guiana Region	376,058	91,645	2,974	2,167	540

*Ministerio de Educación, Memoria, 1970.

resources. The development of schools with appropriate curriculum to provide the regional population with a education suited to the exploitation of their own resources is an important consideration. Additionally, one must provide a basic education, particularly in the elementary schools, to enable some mobility in the population. Venezuela cannot hope to reverse the migration to the cities, but perhaps it can reduce the rate of migration through a program of educational planning.

If a scheme to effectively combine local and national goals is to be considered, Venezuela will need a mechanism which can account for variation in facilities and other variations in the country.

Economic Goals

The whole strategy of development is determined by concentration on the human factor, which has opened up new approaches in development.

Venezuela has the following economic goals:

1. To develop a rate of economic increase which is greater than the rate of natural population increase. To accomplish this task it is important to use better educational and legal mechanisms to provide a better distribution of wealth.

2. To develop better levels of employment.

3. To develop new possibilities of exportation and improve the present exportations.[1]

Since 1917, Venezuela has developed a petroleum industry, in which foreign companies have made the major investments. The development of the petroleum industry brought as a consequence the transformation of the national economy. Coffee, cacao, and other agricultural products were formerly the main sources of export income. The increase in petroleum exports brought a decrease in the relative value of agricultural products, and an accompanying decrease in farm activities.

Even though the growth of agricultural production was 89.4 per cent between 1945 and 1964, and the yield per hectare (4.04 acre) was increased by 23.7 per cent, this is less than is needed to support a proper share of the economy.[2]

The growth of animal production was 218 per cent between 1945 and 1964. Fishing activities had a production of 55,000 tons in 1945, and this amount increased to 110,000 tons in 1964, an increment of 102 per cent.[3] However, according to the Central Bank, Venezuela has not yet reached

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[1]Julio Sosa-Rodríguez, "El desarrollo integral de Venezuela," in Venezuela panorama 1969. Una mirada al futuro (Caracas: Creole Petroleum Corporation, 1970), p. 12.

[2]Banco Central de Venezuela, op. cit., p. 28.

[3]Ibid.

adequate productivity. The main causes of this problem are the great percentage of the population living in urban areas, and inadequate agricultural and technical training.[1] Because of this lack of training, the bulk of the present production still is achieved by primitive methods of exploitation.

Petroleum production[2] increased 144 per cent between 1940 and 1964, petroleum exportation[4] increased 106 per cent, and refining[4] increased 421 per cent during the same time. The price of each barrel[5] of petroleum was $1.00 in 1944, and it reached a top price of $2.70 in 1957. The price per barrel has decreased since 1958, and in 1964 it was $2.04. The Venezuelan government has made some administrative policies to increase its control over the petroleum industry in order to get better benefits for the country. This measure was to counteract the strong influence of the petroleum industry on the Venezuelan economy. Ninety per cent of all foreign investment was in the petroleum industry, and 50 per cent of the Venezuelan income from this investment was paid out as interest on loans during the 1945-1964

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[1] Ibid., p. 29.

[2] Ibid., p. 50.

[3] Ibid.

[4] Ibid.

[5] Ibid., p. 52.

period.[1] Sixty-seven per cent of the total income tax was provided by the petroleum industry during the same time, but the petroleum industry has not provided a large amount of employment. It has only employed about 30,000 workers during recent years,[2] or less than 1 per cent of the active population.

The development of mineral production has had two defined stages, according to the Central Bank of Venezuela. The first step was characterized by the exploitation of gold, diamonds, coal, salt, and other minerals whose production has stagnated; and the second stage began with the exploitation of iron in 1950. As a consequence of this second stage, mineral production increased 30.6 per cent between 1950 and 1960.[3] The characteristics of this industry have determined an investment in production of one billion bolivars. There are no data which give a precise estimation of employment, but about 4,000 persons have been working in this area.[4] Seventy per cent of the mineral production currently goes to the U.S.A. It is hoped that the metallurgical industry will be increased, to obtain better economic results from mineral production.

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[1] Ibid.

[2] Ibid.

[3] Ibid., p. 73.

[4] Ibid., p. 74.

It is known that Venezuela has two billion metric tons of iron ore, and that it contains 62 per cent iron. The iron mines are characterized by facilities for extraction, transport, and reduction.[1]

Gold, diamonds, and coal exploitation showed a decrease in production during 1950-1964.[2] That circumstance has promoted the importation of these minerals to satisfy the Venezuelan industrial and domestic demand.

According to the figures pointed out above, it is seen that Venezuela has important resources, among them the petroleum industry and the steel industry, which contribute to the economy of the country in terms of money. However, the percentage of employment held by these industries is only 1 per cent of the active population. The situation of the gold, diamond, and coal industries is being evaluated, since these resources are not well exploited and the industries are potential sources of employment. Agriculture and livestock sources do not fulfill the needs of the country because of the lack of technical personnel.

Since the economic goals of the system are represented by the development of wealth, these considerations represent sources for real criteria to formulate science education objectives. However, in previous formulations of

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[1] Ibid.

[2] Ibid., p. 73.

science education objectives for the elementary school, these factors have not been considered. Consequently, it is important to determine the natural resources of the school's environment and take them into account when the science curriculum objectives are formulated. The idea is not to provide a community outlook on employment for local needs, nor to plan objectives designed to provide vocational training for jobs. The idea is to prepare science curriculum objectives, which take into account the environmental conditions in such a way that the students get basic science skills related to the environment.

Community Goals

The formulation of science education objectives should take into account the goals and aspirations of the community. Education is one of the values of the Venezuelan society, and the first concern of Venezuelan education is the educational objectives the school has for its children. The educational objectives of the science education program should be centered in the goals, aspirations, and ambitions of the people of the community. These goals have their origin in the customs, morals, and traditions of the community itself.

James B. Conant pointed out:

> One needs only to visit such a school to be convinced that the nature of the community largely determines what goes on in the school. Therefore to attempt

> to divorce the school from the community is to engage in unrealistic thinking, which might lead to policies that could wreak havoc with the school and the lives of children. The community and the school are inseparable.[1]

It is recognized that Venezuelan communities want citizens who can help them improve and develop. Since each community and social class has different needs and goals, it is necessary to determine these goals and needs when the science curriculum objectives are prepared. In order to determine the community's goals, the science curriculum committee should develop a series of meetings with the community and maintain continuous communication.

The goals of the different social groups of Venezuelan society are well known. The main goals of members of the higher social class of Venezuela are to increase their political power, to increase their participation in Venezuelan affairs, and to receive more money from their investments. This social class is formed of bankers, merchants, and industrialists.

The main goals of the middle class of Venezuela are to maintain political control, to develop better living and working conditions, to improve the Venezuelan economy using its natural resources, and to maintain democracy. This

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[1]James B. Conant, Slums and Suburbs (New York: McGraw-Hill Book Company, Inc., 1961), p. 21. As quoted by J. Galen Saylor and William M. Alexander, Curriculum Planning for Modern Schools (New York: Holt, Rinehart and Winston, Inc., 1966), p. 77.

social class is formed of professional workers, such as lawyers, engineers, economists, doctors, educators, and journalists.

The main goals of the lower social class of Venezuela are to have better working and living conditions, and to become educated. This social class is made up of farm workers, street workers, and unskilled people.

Taking into account the educational regions as geographical divisions, it is seen that each educational zone or region has well-defined natural resources and industrial characteristics.

The Capital Region is characterized by an agriculture in which lettuce, carrots, potatoes, and sugar cane are the principal products. Industries producing foods, dairy products, shoes, and clothes are present in this zone.

The Central Region presents different agricultural resources, such as sugar cane, tropical fruits, tobacco, corn, and beans; and industries which produce foods, dairy products, paper, tires, soaps, oil, petroleum, beef, and furniture.

The Central-Western Region has as resources rice, sugar cane, tomatoes, lettuce, beans, goats, and potatoes; and petroleum refineries, furniture plants, and dairies are important industries.

The Zulia Region is one of the rich zones of Venezuela. In this region, agriculture has several products, such as bananas, corn, beans, lettuce, carrots, tomatoes,

and tropical fruits. Dairy farming is productive enough to supply the other zones, and there are ranches devoted to the production of cattle, sheep, pigs, and goats. The petroleum industry produces a great volume of petroleum products. There are coal deposits in the northern section of the region, but these are not exploited.

The Andes Region has an agriculture formed by the cultivation of coffee, potatoes, cacao, sugar cane, corn, vegetables, and bananas. The livestock industry produces enough beef to supply the local demand. Industries which produce shoes and dairy products are also found.

The Southern Region is characterized by a rudimentary agriculture, a good livestock resource, and different kinds of wood used in construction and furniture.

The North-Eastern Region presents a variety of natural resources, with emphasis on the cultivation of different vegetables and tree crops. The principal products are coffee and cacao, and some forests which include groves of mangrove trees. This zone has a strong petroleum industry like that of the Zulia Region, and an asphalt lake. On Margarita Island, fishing is an important economic activity. The salt produced in Sucre state satisfies the national demand.

The Guiana Region is notable in terms of natural resources, but is the most sparsely settled in Venezuela. Many minerals, hydro-electric potential, and places for the

development of a good agriculture and livestock production system are found in this region.

Considering the natural resource characteristics of each region, one can see that it is impossible to divorce the school from its environment. One function of the school is to prepare each individual for adulthood in his society. This function should be provided by the school, taking into account the natural resources available. Therefore, the school should incorporate relevant environmental considerations into the curriculum. For example, the child who lives in the Zulia Region should have a science education curriculum oriented to the petroleum industry, as well as a basic science curriculum which permits him to acquire other types of skills which he can utilize in another environment, should he move. Increasing the experiences of the child in his environment will increase the economic potential of the community.

In summary, each community and social class has different needs and goals. The natural resources of each region are determinants of the needs of each community. The school should take into account these aspects when the science curriculum is prepared. This procedure should also give the community a better economic development.

Educational System Goals

The educational system has its own goals, determined by different components of the system, of which the education

law is the most important. However, the voice of curriculum specialists and educational psychologists should be taken into account and their ideas incorporated for better development of science curriculum objectives.

Many scholars ask for a basic teaching model,[1] in which instructional objectives, entering behavior (student's knowledge before instruction begins), instructional procedures, and performance assessment are the fundamental components. The educational objectives of any system are the general goals of education, while the instructional objectives represent specific behavior students acquire through instruction.[2] The instructional objectives must be stated in terms of observable human performance, and these objectives generally become explicit. The statement of explicit objectives is determined by the nature of the verbs used in the objectives themselves. Verbs of observable actions are desirable.[3]

The description and analysis of educational and instructional objectives are important factors in the development of objectives. When the teacher establishes an instructional objective, he has to identify the final performance in which the student accomplishes the objective.

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[1]John P. De Cecco, The Psychology of Learning and Instruction (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1968), p. 12.

[2]Ibid., p. 31.

[3]Ibid., p. 34.

Then the teacher must describe the conditions under which the performance should be attained by the student. Minimum requirements for the accomplishment of behavior must be described by the teacher.[1] Therefore, the teacher should identify classes of behavior associated with the objectives.

It is useful to include the ideas of important science organizations when a set of science education objectives if formulated. Three aspects of the scientific enterprise were identified by NSTA (National Science Teachers Association) as essential for the science curriculum. They are described as follows:

> 1. Descriptive science or natural history, because it provides the basis for scientific inquiry and plays so prominent a role in a child's conventional experience;
> 2. Science proper, because of its intellectual challenge, which should be a primary goal of scientific education; and
> 3. Technology, because it serves so well to illustrate the practical application of scientific principles and because of its impact on modern society.[2]

The organization and structure of Venezuelan education is determined by the Ministry of Education according to the education law. (See Figure 2 for a diagram of the organizational structure of the Ministry of Education.)

The Venezuelan educational system presents four levels of public and private education: pre-elementary

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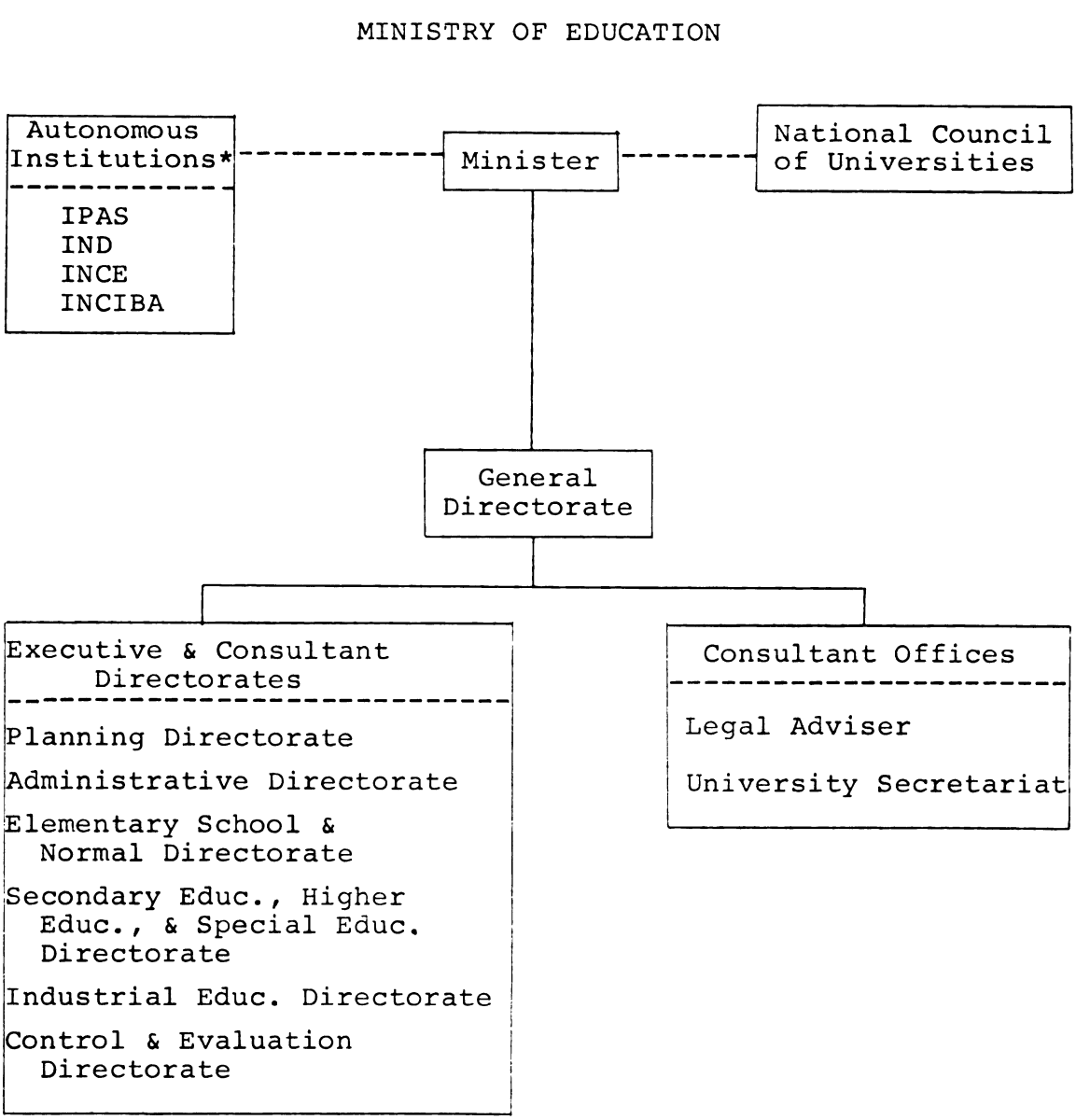
[1] Ibid., pp. 42-53.

[2] "The NSTA Position on Curriculum Development in Science," circulated by the Curriculum Committee of the National Science Teachers Association, as quoted in Beauchamp, op. cit., p. 145.



*Key: IPAS = Social Institution of Social Welfare of the Ministry of Education.

IND = National Institute of Sports.

INCE = National Institute of Cooperative Education.

INCIBA = National Institute of Culture and Arts.

Fig. 2.--Organizational Structure of the Ministry of Education.

education (ages 3 to 6), elementary education (ages 7 to 14), secondary education (ages 15 to 20), and higher education. The curriculum and function of each level of education are established by the rules of the Ministry of Education. Venezuela has a national curriculum which each school uses. The function of each member of the educational system is well defined by the Ministry of Education.

Administrative goals.--The major goals of the government are to develop a better sense of responsibility on the part of its citizens, to decrease the drop-out rate, to increase the rate of retention within the school system, to improve the quality of education, and to use education in service to the community.

Teachers' goals.--The Venezuelan teacher has as his major goals the following: to provide better education, to be considered in curriculum construction, and to have freedom in selecting his own methods of teaching.

Students' goals.--The major goal of Venezuelan elementary school students is to finish their elementary education in order to be admitted to the secondary schools. They also wish to have better methods of learning and a different system of evaluation.

Educational facilities.--It is evident that the Venezuelan educational system does not have enough facilities to provide education to the total student population, despite the large expenditure provided by the government during the past ten years. Looking at the distribution of

educational facilities around the country, it is evident that it does not contribute to improvement of the quality of employees needed by the country. Therefore, determining the needs, adjusting the science curriculum to the materials available in the local environment, and sharing materials among regions will make it possible to provide an adequate science education to the elementary school students throughout the country.

In summary, the development of better citizens, the participation of the teacher in curriculum construction and development, the increase in the rate of retention in the school system, and the preparation of students for secondary school are the major goals of the elementary educational system.

It has been suggested that it is important to consider the educational system, and to analyze its goals and components. This analysis should provide the needed information to prepare a set of science education objectives for the elementary school. It is necessary to do these analyses in order to ensure national achievement, resolve conflicts, and develop appropriate science objectives for the elementary school to meet the goals of the system. To consider the factors of the school's environment and the educational system, a mechanism for the formulation of a set of science education objectives will be needed. The following mechanism is proposed.

Step 1. Create a National Science Education Commission (NSEC), with characteristics as outlined below.

1. The NSEC should be formed by representatives from social forces such as business, industry, military, church, school, universities, pedagogical institutes, and other scientific and educational organizations. The members of NSEC should possess the minimum requirements of a professional degree (B.A.), citizenship, experience in education (an advanced degree in curriculum or science education is desirable), and a certain degree of natural proficiency.

2. The NSEC should develop a general plan of study in which the major focal points should be curriculum construction and improvement, teacher training, philosophy of Venezuelan science education, and foreign science curriculum developments. The mechanisms for developing this plan should include provision for:

a. A determination of the natural resources.

b. Weighting priorities in relation to the development or exploitation of any natural resource. For example, if Venezuela wanted to increase mineral production, what curriculum moves would be best?

c. NSEC-sponsored workshops attended by Venezuelan educators and representatives of industry, commerce, and the community.

d. Interchange of ideas with the major representatives of U.S.A. science curriculum projects.

e. Subsidy of systematic experimentation, with trials of curriculum innovations under Venezuelan conditions.

f. Take into account: economic goals of Venezuela, educational goals, and students' goals.

Step 2. To maintain the local inputs to the NSEC, it is important to create a regional science education commission (SEC). This SEC should consist of the principal, representatives of science teachers, a representative of the Ministry of Education, and representatives of the community.

The functions of the SEC should be the determination of natural resources of the community, economic goals of the community, and the students' goals. To accomplish its functions, the SEC should organize meetings with the community and students to promote a climate conducive to the formulation of science education objectives. Conferences and meetings in which scientific and educational scholars point out their ideas should be prepared by the SEC.

The SEC should pursue the following steps in order to formulate the local science education objectives: a) Weigh the needs of the community and determine priorities. b) Identify the content and skills needed for science education. c) Take into account the national science education objectives formulated by NSEC. d) Formulate the objectives, considering the recommendations of educational psychologists and science education specialists. e) Promote a climate conducive to the implementation of science education objectives.

To promote a climate for the implementation of science education objectives, it is necessary to create an atmosphere in which the teachers and the community feel free to develop their ideas. The teacher should have the freedom to select his own teaching methods and to determine minimum requirements for the accomplishment of certain tasks.

The SEC should have regular meetings at the beginning of each academic year. It should review the science education objectives of the preceding academic year, then incorporate those objectives which were developed through the workshops, meetings, and conferences given during the vacation period.

The SEC should promote revision of subject-matter content, to improve the regional science education curriculum.

The SEC should work in direct relationship with the NSEC. The proposed relationship of the NSEC, SEC, and the Ministry of Education can be seen in Figure 3.

The NSEC should be advisory to the Minister of Education, and the Minister of Education should implement the recommendations proposed by the NSEC.

The General Directorate coordinates the activities of the other directorates under the direction of the Minister. Each directorate has a specific function. For example, the Elementary School and Normal Directorate takes care of the educational demand at this level of education in qualitative and quantitative terms.

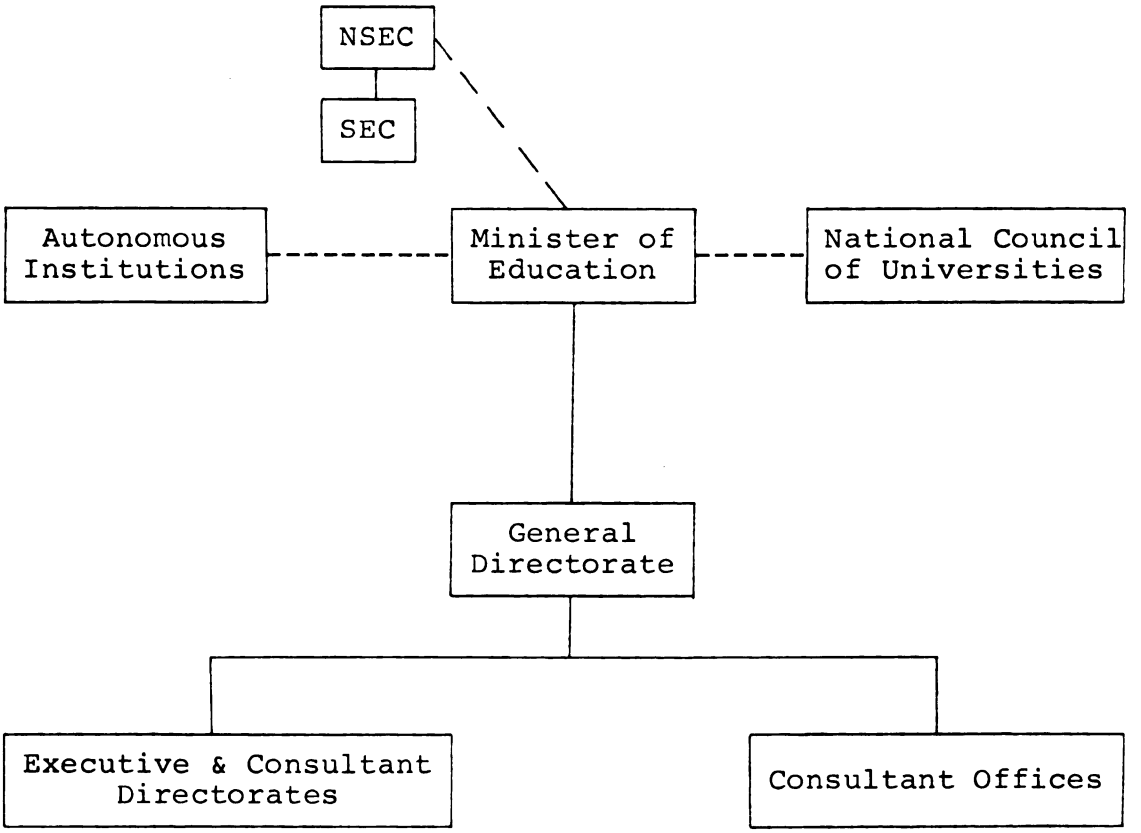


Fig. 3.--Relationship of the NSEC, SEC, and the Ministry of Education.

The Consultant Offices, such as Legal Advisor and University Secretariat, are aides of the Minister in the formulation of new executive decrees and laws, as well as in the determination of educational policy.

The autonomous institutions work in the areas which their respective names imply.

Summary

This chapter contains an examination of the present needs of Venezuela and its students, and the mechanisms for arriving at a set of science education objectives.

The demography of Venezuela, the distribution of student population, the distribution of working population according to economic activity and age, the relationship of employment to the school population, and the relationship of employment to the school curriculum are analyzed to determine the needs of Venezuela and its students.

To accomplish the goal of preparing students for the country's future needs, a mechanism for arriving at a set of science education objectives is proposed.

The analysis of the environment and the educational system are the principal elements which must be taken into account when a set of science education objectives is formulated. The creation of the National Science Education Commission and the regional Science Education Commission are the steps of the proposed mechanism for arriving at a set of science education objectives. The function of each commission

and the relationship between them and the Ministry of Education have been described.

CHAPTER V

CONCLUSIONS AND IMPLICATIONS OF THIS STUDY

The purpose of this study was to conduct an historical review of the evolution of the official objectives of the 1944 Venezuelan elementary school program in science education, as presented by the Ministry of Education. In addition, the study attempted to generate a mechanism for determining a basis for a new set of objectives for Venezuelan elementary school science.

In order to accomplish these goals, several questions were formulated:

1. What was the elementary school science plan of 1944 and how did it originate?

2. How well was the 1944 plan suited to the general and particular needs of the country?

3. What was/is the role of the Ministry of Education?

4. How well has the 1944 plan been carried out?

5. What mechanisms can be used to arrive at a set of science education objectives for the elementary school?

6. What new objectives of science education are needed for Venezuelan elementary schools?

The historical study was based on data obtained from official Venezuelan publications, publications of the Organization of American States, unpublished papers of the Ministry of Education of Venezuela, publications from the United States of America, and Venezuelan books. The data were synthesized in relation to the evolution of objectives; and trends suggested by the data were determined and generalizations derived from the data.

Conclusions

The first question was answered in Chapter II and Chapter III. In Chapter II the evolution of science education in Venezuela from 1492 to 1943 was described. There was essentially no science subject matter in the curriculum during these years, and education was theological, scholastic, humanistic, and dogmatic. During the later years of this period, the number of schools and teachers was insufficient to educate the student population, and there were not enough educational facilities in Venezuela.

The elementary school science plan of 1944 was prepared by a commission composed of foreign and Venezuelan scholars. The major purpose of the science program was to help the student-citizen to understand his relationship to the environment; to teach him basic scientific principles; and to generate, encourage, and stimulate his interest in science. The external influences of American-French

education and internal educational forces were the sources of the objectives.

The second question, "How well was the 1944 plan suited to the general and particular needs of the country?" was answered in Chapter III. The 1944 science program objectives were suited to the general and particular needs of the country. This was especially true since Venezuela clearly needed skilled personnel to develop better agriculture, ranching, and mining, and this program was aimed directly at these needs.

The third question was also answered in Chapter III of this study. The role of the Ministry of Education has been the main impetus in the development of education in Venezuela. Its major functions are to program, organize, and develop Venezuelan education. This role is provided for by the Venezuelan educational law.

The fourth question, "How well has the 1944 plan been carried out?" was discussed in Chapter III of the study. The 1944 plan was carried out by the Ministry of Education from September 7, 1944, until July, 1971. During this period, Venezuelan elementary education had some problems. The number of teachers and schools was not sufficient to adequately meet the educational needs of the student population. Furthermore, the schools available were poorly equipped and the staff frequently lacked the necessary preparation to carry on a satisfactory program.

The educational system is federally controlled, and any implementation or instruction used by a school is formulated by the Ministry of Education. The Ministry of Education has prepared school teachers with four years of schooling beyond the elementary school. Teachers with this level of preparation have been working in the Venezuelan schools since 1944. The Ministry of Education has tried to fulfill the requirements of Venezuelan education, and it has been working to increase the number of teachers and schools, as well as to improve the availability of educational materials. The 1944 educational plan was actually known to only 800 teachers during the nineteen years from 1944 to 1963. Studies on the implementation of the 1944 plan have shown that even these teachers did not apply the educational objectives of the plan, and there was little the Ministry of Education could do with a lack of personnel and facilities and an insufficient educational budget. In addition, the strong influence of local tradition limited the implementation of the recommendations made by foreign scholars, though a number of good proposals were made. Thus, even with a good plan, the schools were severely limited in reaching their goals because they lacked adequate school facilities and personnel, sufficient educational resources, and education specialists.

The answers to the fifth question are found in Chapter IV. A mechanism was formulated which describes the creation of a National Science Education Commission (NSEC) and a Science Education Commission (SEC) in each school

region or community. These commissions would follow a logical procedure in which the criteria pointed out in the following paragraphs would be accounted for in the establishment of school curriculum.

The mechanisms which can be used to arrive at a new set of science education objectives for the elementary school are found in Chapter IV. By analyzing the present needs of Venezuela and its students, the school's environment, and the educational system, one can arrive at a set of science education objectives. The analysis of available natural resources, community goals, and the economic goals of the system are included in the examination of the school's environment. Analysis of the educational system includes a consideration of the administration's goals and the teachers' goals, and an evaluation of local educational facilities.

Venezuela has a great need for skilled agricultural, technical, and vocational personnel to improve its economy. To supply this need, Venezuela must have new science education objectives which are adapted to the needs of the country and its students. Such science education objectives should be developed through an in-depth analysis of the school's environment and the educational system. These objectives could be formulated by national and cooperating regional science education commissions, which would take into account the ideas of educational psychology and modern

science education practice. The idea is not to provide a community outlook which focuses only on employment for local needs, nor to plan objectives which provide vocational training for specific jobs. The idea is to prepare science curriculum objectives which capitalize on local environmental conditions in such a way that the students gain basic science skills related to that environment.

From the work of educational psychologists it seems that the commissions should emphasize a "process" rather than a "content" approach when they formulate science education objectives. From previous experience in Venezuela, it seems individual student differences should be taken into account by the teachers, and the curriculum should permit them to do so. Above all, it is the responsibility of the Ministry of Education to provide for good teacher training, since better trained teachers are needed to implement any program effectively.

Venezuela needs a new educational law which will allow the development of a curriculum appropriate to the country's needs.

Implications and Recommendations of This Study

The conclusions of this study indicate several actions to be taken by the Ministry of Education and other Venezuelan institutions.

The Ministry of Education should develop a new educational law which provides for: the reorganization of the

educational system, a change in programs of study to suit new national and local needs, the training of new teachers at the higher education level, and the establishment of an educational tax to increase the educational budget.

The Ministry of Education, further, should promote a series of workshops; conferences; and television, newspaper, and radio programs to motivate the population to work for the development of a better educational system. To accomplish these goals, the Ministry of Education should hire educational specialists to formulate a new educational law and implement the action programs.

The pedagogical institutes, universities, and the Office of Planning in the Ministry of Education should cooperate in undertaking a study to determine the curriculum needs of the elementary school science teacher. This new curriculum should prepare the teacher to improve the science curriculum of his school. Also, the teacher education program should include a strong background in science and courses which provide the opportunity to learn and apply the new materials and methods.

The improvement of in-service teachers is another aspect to be taken into account by the Ministry of Education. The Ministry of Education should develop a five-year educational plan, in order to permit in-service teachers to achieve the higher education level of preparation. To carry out this educational plan, the Ministry of Education

should provide some kind of incentive to in-service teachers, such as an increase in salary related to their increase in education. This plan should be developed in cooperation with the pedagogical institutes and the universities.

A post-degree scholarship program should be developed to prepare curriculum planners, science education specialists, and specialists in different areas of knowledge. The scholarship program should be prepared by the NSEC in cooperation with the Organization of American States, UNESCO, a Venezuelan higher education institution, and an American university.

Areas for Further Research

The official program of study for the elementary school is a complex document for a classroom teacher to use. It should be the product of an in-depth analysis of many aspects related to the country, the development of new ideas in education, the availability of educational facilities, and the organization of the educational system. Many questions can be formulated for further research on this problem:

1. What kind of elementary school program does Venezuela need?

2. How can the elementary school activities be developed which will implement the program goals?

3. How can economic resources be channeled to accomplish the goals of the educational system, the community, and the students?

4. What aspects of the new science education programs developed in other countries can be adapted to the needs of Venezuela?

5. What is the status of the present educational facilities, and how can they be improved?

6. How can the Ministry of Education be reorganized for the effective introduction of innovative programs suited to the needs of the country?

This study is a first step in science education research in Venezuela. It represents the beginning of a series of actions to be taken in this area in the country. Many investigations need to be conducted by Venezuelan educators. Much effort will be necessary to get them done in a systematic and useful manner. The new studies should give a clearer understanding of Venezuelan educational programs and provide suggestions for improving the quality of the educational enterprise. This investigator hopes that this study calls the attention of Venezuelan higher education institutions to the need to promote educational research in Venezuela. May this study be an incentive for the development of many research projects in Venezuelan education.

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APPENDICES

APPENDIX A

THE 1944 SCIENCE PROGRAM OBJECTIVES

THE 1944 SCIENCE PROGRAM OBJECTIVES[1]

1. The student must understand that our helath depends upon some scientific principles.
2. The student must grasp that animals and plants must adapt to the enrivonment, or change it according to their needs, or abandon it to discover another one.
3. The student has to understand the reproduction phenomenon. He must identify different parts of his body.
4. The student must learn to differentiate habits, size, and structure of animals and plants.
5. The student must understand the interdependence of organisms.
6. The student must explain why animals and plants require certain conditions to live.
7. The student must explain and movement of planets and stars, and their influence over us.
8. The student must identify light, sound, electricity, heat, and magnetism as energy forms.
9. The student must explain the conservation principles.
10. The student must explain the importance of machines.
11. The student must identify each given object and define its properties.
12. The student must know how to analyze and synthesize any given problem.
13. The student must be able to formulate hypotheses.
14. The student must be able to reason, using various methods.
15. The student must be able to inquire and investigate the cause of certain phenomena.
16. The student must be able to develop aptitudes toward better living conditions.
17. The student must be able to live according to the natural law.
18. The student must be able to appreciate scientific work.
19. The student must be able to evaluate his environment.
20. The child must know how to prevent sickness and accidents.
21. The child must estimate the importance of health.

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[1]Translated and paraphrased from Ministerio de Educación, "Programas de educación primaria," Gazeta Oficial, Number 98, Caracas, Septiembre 7, 1944.

APPENDIX B

QUANTITATIVE EVOLUTION OF ELEMENTARY EDUCATION, 1944-1970

QUANTITATIVE EVOLUTION OF ELEMENTARY EDUCATION, 1944-1970[1]

Academic Year	Students	Teachers	Schools	Teachers Without Certification
1944-1945	298,349	9,070	4,904	...
1945-1946	338,907	9,786	5,420	...
1946-1947	360,531	11,650	5,805	...
1947-1948	326,291	11,650	4,951	...
1948-1949	485,668	12,286	5,755	...
1949-1950	491,799	13,455	5,977	...
1950-1951	515,737	14,020	6,983	...
1951-1952	536,212	15,924	6,404	...
1952-1953	570,286	16,726	7,241	...
1953-1954	596,382	17,436	7,014	...
1954-1955	623,083	18,278	6,896	...
1955-1956	646,835	19,222	7,100	...
1956-1957	694,193	20,221	6,791	10,923
1957-1958	751,561	20,914	6,676	10,529
1958-1959	916,764	24,856	7,480	12,602
1959-1960	1,094,604	30,889	9,650	17,442
1960-1961	1,243,948	35,267	11,957	19,070
1961-1962	1,298,427	36,287	10,734	17,787
1962-1963	1,339,663	38,086	10,950	15,927
1963-1964	1,370,665	39,629	13,030	13,277
1964-1965	1,421,959	41,469	13,088	9,065
1965-1966	1,453,310	43,387	10,922	5,930
1966-1967	1,510,373	44,904	10,853	5,871
1967-1968	1,550,190	46,535	10,733	5,876
1968-1969	1,602,443	48,382	10,775	5,729
1969-1970	1,681,947	51,032	10,665	...

[1]Ministerio de Fomento, Anuario Estadístico, 1951, 1957-1963.
Also: Ministerio de Educación, Memoria, 1970.

APPENDIX C

SUMMARY OF THE REVISION AND IMPLEMENTATION OF THE OBJECTIVES SET FORTH IN THE 1944 OFFICIAL PROGRAM

SUMMARY OF THE REVISION AND IMPLEMENTATION OF THE OBJECTIVES SET FORTH IN THE 1944 OFFICIAL PROGRAM[1]

In 1969, we started the revision and actualization of all elementary school activities. It is necessary to take into account that the Official Program was approved in 1944. The same program of study has been used for twenty-six years while society was changing according to natural development. A disparity between our objectives and needs could be the cause of low efficiency in our education. The work of revision and implementation has been accomplished by the Ministry of Education according to the Nation's Plan. In October, 1970, the new programs for first, second, and third grades were started. We are working with the programs of fourth, fifth, and sixth grades. We hope to start them in 1971. These programs have subject-matter and methodological suggestions to fit a learning process which depends upon the motivated initiative of the child. He has to understand the "processes" of science instead of becoming a passive receptor of products. We seek to have a school free from old and traditional methods of teaching. The school must provide the necessary instrumentation to develop a permanent process of renovation. The program of study is a guide which will help the teacher to accomplish the educational objectives. The program of study represents the resource needed to develop an integrated education for all Venezuelans. Our school must guide the formation of citizens who are able to understand their relationship to the environment, who like to learn and create, and who want to gain new knowledge.

Objectives of the new program are:

1. To provide a solid foundation for learning the instrumental subjects.
2. To enable the child to learn by himself.
3. To develop active learning.
4. To emphasize objectives rather than traditional content.
5. To improve teacher-student relationships.
6. To create an up-to-date program.
7. To recommend methodologies based on current research.

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[1]Translated and paraphrased from Ministerio de Educación, Memoria, 1970, p. xxxiv.

The structure of the program is determined by the education law. Students have language, mathematics, social studies, natural science, hygiene, esthetic education, physical education, and manual work. The program for each subject is presented in six columns, including: objectives, content, student activities, teacher orientation, educational resources, and evaluation.

The specific objectives serve as educational guidelines to help plan for the student learning process. The content is oriented from simple ideas to complex ideas. The student activities are suggestions of simple process which can help the student accomplish the objectives. The teacher orientation material should give the teacher some help in developing his classwork. Evaluation is based on the objectives. Some ideas about the use of educational resources and how to develop local materials which utilize the school environment are also presented.

The science program tries to develop the ability to do research, to stimulate creative thinking and critical analysis. In this way, the student can learn to explain the facts of his physical environment. It is hoped that the student will come to see science as a research procedure which will help him to discover causes and relationships between phenomena through its techniques and methods.

APPENDIX D

REPORT OF SCIENCE EDUCATION COMMISSION AT CONICIT

REPORT OF SCIENCE EDUCATION COMMISSION AT CONICIT

1. Today the Ministry of Education is making an effort to improve the quality of science education at the elementary and secondary school. In this way, there are experimental programs being applied in some experimental schools.

2. To apply these experimental programs, it is necessary to have special personnel. Therefore, there are special programs for in-service teachers through the Institute of Professional Improvement, Pedagogical Institutes, and the Planning Office of the Ministry of Education.

3. It is necessary to have enough educational material as well as well-equipped laboratories. Some elementary schools do not have these kinds of facilities.

4. The program formation has been elaborated by high-level personnel (scientific and pedagogical).

5. The elaboration and application of the experimental science programs has not been supported by systematic research. Rather, this has been the result of an exchange of ideas among professional teachers of different levels.

6. There has been no scientific study to determine the teachers' abilities to apply the new science programs, nor has there been a study in learning and maturation of those children to whom the programs have been applied.

ELEMENTARY SCHOOL PROGRAMS

1. The areas of study are the same as those required by law. They are: language, mathematics, social science, physical education, civic formation, health, and handicraft.

2. The fields of study are divided into three groups:
   Instrumental academics (Language and Mathematics)
   Noninstrumental academics (Social Sciences)
   Nonacademics (Physical Education)

3. The six grades have been divided into two cycles: the instrumental, in grades one to four; and the cultural cycle for the fifth and sixth grades. Sixty per cent of the school day is used to develop the instrumental academic courses (experimental) during the first cycle. In the second cycle this percentage is reduced to 50 per cent.

   The time distribution does not correlate with the instructional objectives. However, if we analyze the old programs and compare them with the new ones, we find that the amount of learning material has decreased in academic courses as well as in nonacademic courses. One basic idea in the program is that a quantity reduction will help the quality of accomplishment.

4. The objectives of the instrumental cycle (experimental) are:
   a. To provide a sound foundation for later experimental courses.
   b. To decrease the number of school dropouts.
   c. To give the teacher enough time to prepare his school work.
   d. To improve our educational program.

   This program is not static, nor does it have a time limit. A task which remains is the establishment of an evaluation procedure and the determination of the strengths and weaknesses of the approach.

APPENDIX E

SUPPORT OF THE U.S.A. AND INTERNATIONAL AGENCIES IN SCIENCE CURRICULUM PROJECTS

SUPPORT OF THE U.S.A. AND INTERNATIONAL AGENCIES IN SCIENCE CURRICULUM PROJECTS

It is well known that the impetus for science curriculum change was born in the United States of America in 1957, just after Sputnik. The need for curriculum revision was the main problem of the boards of education all over the United States. The Physical Science Study Committee, under Zacharias,[1] established the pattern of massive National Science Foundation funding for curriculum reform, and subsequently more than 100 projects were developed by different scholars around the world.[2] The U. S. Office of Education supported several research efforts on the teaching of science. The two most important studies concerned the grade or level placement of science concepts. One study was made by Lowheed, and the other by Mallinson and Sturm. Studies on the learning of science principles and concepts were made by Murray, Schultz, and Knight. Studies in the development of scientific attitudes and the ability of critical thinking or problem solving were made by Atkin, Rimaldi,

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[1] J. R. Killian, "The Return to Learning," in New Curricula, ed. by R. W. Heath (New York: Harper and Row, 1964).

[2] J. D. Lockard, ed. Sixth Report of the International Clearing House on Science and Mathematics Curriculum Development, 1968 (College Park, Md.: Univ. of Maryland, 1968).

and Stefaniak. Mallinson, Sturm, and Chamberlain also conducted studies of teacher training.

The U. S. Office of Education reported in its Bulletin of 1960 the ever-increasing volume of studies on 1) the purposes of elementary science, 2) the nature of the elementary science curriculum, 3) the types of learning experiences in elementary science, 4) teaching materials and aids in elementary science, and 5) teacher education as related to elementary science. Other studies also were developed during the decade following 1960.

Several science curriculum projects have been implemented by different organizations throughout the United States. One such project was the Physical Science Study Committee (PSSC),[1] established in 1956 under the direction of J. R. Zacharias of the Massachusetts Institute of Technology. Later, PSSC came under Educational Services, Incorporated, which also conducted a project called The Elementary Science Study (ESS). The ESS program deals with the natural flow of children's ideas, stresses inexpensive materials, and better methods of teaching. At the University of Illinois a project called Elementary Science Study Project (UIESSP)[2] was

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[1]G. C. Finlay, "PSSC: A Summary of Judgments Made by Teachers," Science Teacher, Vol. 26, No. 12 (1959), 579-581.

[2]J. Myron Atkin, "A Study of Formulating and Suggesting Tests for Hypothesis in Elementary Science Learning Experiences," Science Education, Vol. 42, No. 12, 414-422.

undertaken in 1958. IESSP deals with the basic mathematical concepts needed by students.

The American Association for the Advancement of Science (AAAS) Commission on Science Education also entered the field, and produced program material for grades K-3 in 1963. During the following years, materials for grades 4, 5, and 6 were developed.[1] The AAAS program emphasizes the process approach to the study of science.

The Science Curriculum Improvement Study (SCIS)[2] was begun by Robert Karplus in 1963. SCIS focuses on pupil activity and discovery. The Earth Science Curriculum Project (ESCP)[3] began in 1962, and developed teaching resource materials. Other projects such as Biological Sciences Curriculum Study (BSCS), Introductory Physical Science (IPS), and others were established during the decade of the 1960's. The BSCS program offers three different approaches to biology. IPS aims to improve basic skills and builds a useful atomic viewpoint for the student.

The scientific and economic support given by the Organization of American States (OAS) and UNESCO to Venezuela for its science curriculum projects has also been of major

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[1] A. H. Livermore, "Science -- Process Approach," Science and Child, Vol. 1, No. 8, 24-25.

[2] J. Myron Atkin and Robert Karplus, "Discovery or Invention?" Science Technology, Vol. 29, No. 5 (1963), 45-51.

[3] American Geological Institute, National Academy of Sciences, National Research Council, Geology and Earth Sciences Source-Book for Elementary and Secondary Schools (New York: Holt, Rinehart and Winston, 1962).

importance. The Organization of American States has within its organization the Council for Education, Science, and Culture. According to the Amended Charter, Article 11, of April 3, 1957, the function of the Council is defined as follows:

> The purpose of the Inter-American Council for Education, Science, and Culture is to promote friendship and mutual understanding between the peoples of the Americas through educational, scientific, and cultural cooperation and exchange between Member States, in order to raise the cultural level of the peoples, reaffirm their dignity as individuals, prepare them fully for the tasks of progress, and strengthen the devotion to peace, democracy, and social justice that has characterized their evolution.[1]

Article 101 establishes the periodic study and evaluation of efforts made by the Member States in the fields of education, science, and culture.[2]

In 1965-1967, the OAS put into operation various projects. One of them was the Inter-American Program for the Improvement of Science Teaching. This program was conducted under a budget of $238,353 during 1966, in Montevideo, Uruguay.[3] It should be pointed out that a program entitled Centro Regional de Educación Fundamental para Latino América is supported with the cooperation of UNESCO. This program

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[1]Organization of American States, Principles and Standards That Should Govern the Organization and Functioning of the Committee for Cultural Action; Approved by the Council of American States on April 3, 1957 (Washington, D. C.: Pan American Union, 1957).

[2]Ibid.

[3]OAS, Secretary General, Annual Report, 1965-1966; 1966-1967 (Washington, D. C.: Pan American Union, 1966, 1967).

was set up in Pátzcuaro, Mexico, in 1951. The other important program has been the Inter-American Rural Education Center in Rubio, Venezuela.

The OAS has been working to provide technical and economic support to the development of Venezuelan educational programs. OAS has a Regional Program of Educational Development for the teaching of science. It has various centers, including one in Maracay, Venezuela. The organization has prepared for the academic year of 1971-72 the following programs for Venezuela:

a. Curriculum for the Elementary School, special course. Instituto de Profesional del Magisterio, Caracas, Venezuela.

b. Development and preparation of science books and materials for the elementary school. Centro de Capacitación Docente. "El Macaro," Turmero, Venezuela.[1]

Scholarships and financial support are other methods used by OAS to improve Venezuela's educational programs.

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[1]Consejo Interamericano para la Educación, la Ciencia, y la Cultura, Programa regional de desarrollo educativo. Cursos y becas para el ejercicio fiscal 1971-1972 (Washington, D. C.: Secretaría General de la OEA, 1971).