

THE IMPORTANCE OF SECONDARY EDUCATION

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Contents

- 1. Introduction
- 2. Educational Data
 - 2.1. Classification of Educational Level
 - 2.2. Reliability of Data
 - 2.3. Quality Parameters
- 3. Purposes of Secondary Education
 - 3.1. Secondary Curricula
 - 3.2. Access to Secondary Education
 - 3.3. Gender Issues in Secondary Education
- 4. Global Secondary Education Today
 - 4.1. Trends and Indicators of Change
 - 4.2. Relationship of Secondary Education to Life-Support Systems
- Glossary
- Bibliography
- Biographical Sketches

Summary

In developed countries, the education and training that children receive during their teenage years has long been recognized as crucial to development of job skills and other attributes that affect the ability to function productively as a member of society. In less-developed countries, economic pressures typically force children into the workforce at a much earlier age. Consequently, fewer individuals are well enough educated to make significant contributions to the economic and social development of their countries. Data from UNESCO and other international agencies suggest that some secondary education is becoming more widely available in some less-developed countries; however, the formal education of children in countries ravished by civil war, natural disaster, disease, or widespread economic hardship is often virtually nonexistent. As a world civilization, it is not clear that any significant progress is being made toward the education of the population.

1. Introduction

Secondary education is informally regarded as the education children receive during their teenage years, although the average ages of entrance and exit vary considerably among various nations. The distinction between lower-secondary education and upper-secondary education is useful in a global context, because developing countries are

sometimes able to provide some access to lower-secondary education, while upper-secondary education is still beyond the national reach. In this article, lower-secondary education is considered to generally target eleven- to fifteen-year-old children, and upper-secondary education to target fifteen- to nineteen-year-olds.

In the context of life-support systems, secondary education systems in both underdeveloped and developed nations will be considered in this article. The objective is to identify key aspects of secondary education that may be essential contributors to national self-sufficiency. There is danger in examining and evaluating national education systems in less-developed nations because it is too easy to reach the conclusion that they should mimic the education systems of developed nations. In fact, attempts to emulate educational systems that have worked elsewhere may impede economic and social progress in a less-developed nation.

2. Educational Data

Educational systems are enormously varied throughout both the more-developed and less-developed regions of the world. For many years, UNESCO and other international organizations have attempted to gather and interpret educational data, but the successes of those endeavors are limited by the difficulty of obtaining reliable information in a useful format. Particularly in less-developed countries, mechanisms for gathering and processing educational data either do not exist or are largely ineffective. Even in more-developed countries, variations in funding mechanisms, national priorities, historical precedents, and the role of education in the social infrastructure influence the type and quality of data available. Unbiased comparisons among countries require comparable data, and comparable data are particularly difficult to obtain for education.

2.1. Classification of Educational Level

Recognizing the problems associated with gathering and analyzing educational data, UNESCO developed an International Standard Classification of Education (ISCED) as an organizing tool in dealing with disparate educational data from around the world.

While this classification scheme does not alleviate problems associated with quality or reliability of data, it does enable national education officials to better categorize the data they do furnish UNESCO. The latest iteration of the classification scheme defines lower-secondary education as that education beyond the first six years of schooling and continuing to the end of compulsory education, which is frequently in the student's fifteenth or sixteenth year. Subject-oriented instruction with more specialized teachers characterize lower-secondary education and distinguish it from the preceding basic education.

Subject-oriented instruction continues throughout the upper-secondary education years, but in the ISCED classification scheme, education at that level is noncompulsory. The curricula are designed to prepare students for direct entry into the workforce, for post-secondary vocational education, or for tertiary education.

While this distinction between lower- and upper-level secondary education is useful for

perhaps most countries, many educational systems do not fit this model. Some less-developed countries have no compulsory secondary education whatsoever. At the other extreme, and usually in more-developed countries, compulsory secondary education may continue until students are qualified to undertake post-secondary studies.

2.2. Reliability of Data

Many international organizations harvest education data worldwide, but UNESCO is the primary gatherer of such data. UNESCO has collected information in a fairly consistent way for decades, and that data is the foundation for most analyses of world educational trends. Reliance upon statistical information as a guide in the formulation of public education policy is a fact of life in the developed world, and UNESCO's continuing quest for data is consistent with that model. For the most part, UNESCO has traditionally relied on responses to questionnaires from national education officials as the source of desired information. Unfortunately, many officials in less-developed countries see little use for statistical data in formulating public education policy. In this environment, mechanisms for collecting desired data are often casual, seriously flawed, or nonexistent. The complicating factor among more-developed nations is that routinely reported national data often fails to coincide with UNESCO's classification schemes. The intrinsic unreliability of much of the existing data limits justifiable conclusions concerning the present state of global educational systems.

Despite the uncertainties in reliability of the underlying education data, *trends* can be discerned with some confidence, provided national education officials are reasonably consistent across time in their reporting of education data.

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Biographical Sketches

Dwaine Eubanks is the Director of the American Chemical Society's (ACS) Division of Chemical Education Examinations Institute and Professor of Chemistry at Clemson University. Before coming to Clemson in 1992, he was a faculty member at Oklahoma State University. He was a visiting professor at the University of California at San Diego in 1990/91 and at York University in 1981. He was a research chemist at Du Pont's Savannah River Laboratory from 1963 until 1967. His professional contributions include numerous scientific presentations, journal articles, and the text *Chemistry in Civilization*. He presently is one of the lead authors in the new ACS curriculum project *General Chemistry*. He has extensive experience as a consultant to evaluate chemistry departments, and has been an active participant in local, regional, national, and international conferences dealing with chemistry education. He served as Chair of the Division of Chemical Education in 1985.

Lucy Eubanks serves as Associate Director of the ACS Division of Chemical Education Examinations Institute and is a Lecturer in Chemistry at Clemson University. Before coming to Clemson in 1992, she was Professor of Chemistry at Southwestern College in Chula Vista, California. She is a 1984 winner of the national CATALYST Award for Excellence in Community College Chemistry Teaching. Her professional contributions include numerous presentations and publications, and her texts are *Environmental Chemistry*, *Introductory Chemistry for Health Professionals*, and *Chemistry in Context*, 3rd ed. She also serves on the editorial/writing team for the new ACS curriculum project *General Chemistry*. She served as Chair of the ACS Division of Chemical Education in 1992 and is currently Chair of the Western Carolinas ACS Local Section. She has been an active participant in local, regional, national, and international conferences dealing with chemistry education. She presently is pursuing initiatives in small-scale chemistry and alternative assessment strategies, and has an active role in the South Carolina Center of Excellence for Advanced Technological Education.