

Chapter 5

Science Teacher Education in Pakistan *Policies and Practices*

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Abstract: The chapter addresses the problems faced by science teacher educators in Pakistan. We first discuss the historical background of science education development to give readers an understanding of the Pakistani perspective. We argue that teacher education programs are caught up in a vicious cycle. On the one hand, increasing the number of qualified teachers is a natural need for the expanding system of education, and, on the other hand, there is a genuine concern for the maintenance of quality in the education imparted. Obviously, if teacher education programs are not carried out with care, quality aspects will be compromised as in the past. This requires an overall improvement in (a) the quality of course content, (b) the minimum duration, and (c) the admission requirements for different programs of teacher education. We discuss the disparity between pronounced policies of teacher education and their actual implementation and suggest methods to improve science teacher education.

Science teacher education in Pakistan is confronted with many problems. Some problems are common to many other countries in the world, while some are unique to a developing country like Pakistan, whose education system has not yet been established on realistic footings. These problems can be fully understood in the historical and social perspectives of the education system in general. Pakistan as an independent state came into being just half a century ago. The nation celebrated its 50th anniversary on August 14, 1997.

Thus the education system of the country does not have a long history, although it is older than the nation itself. The British rulers introduced this education system during the second half of the nineteenth century when Pakistan was still part of the Indo-Pak sub-continent. This does not mean that there was no education system in the sub-continent prior to the establishment of the English education system. The fact is that the

indigenous system of education was replaced by the English system of education. The British system was installed to achieve colonial purposes. This system was designed to produce a literate manpower to assist the colonial rulers at the lower levels of governmental and economic administration. Higher level jobs were reserved for English men only. As Hayes (1987) pointed out, such an education system was meant only for the privileged few, who were supposed to govern the masses rather than to serve them. Because the real intention was to produce white-collar workers, undue emphasis was placed on liberal arts and non-professional education. This system served the narrow utilitarian purpose of the colonial rulers very well, but had no room for nourishment of the individuality, creativity, or intellectual capacities of learners. The same was reflected in the curricula and textbooks, which were rigidly oriented towards memorization and passing examinations.

Science as a school subject was not introduced in the British system of education in Pakistan at the beginning, although it had been fighting for its recognition for quite a considerable time. Later, science subjects were introduced from top-down, first at the higher level and then at the lower level. The science taught at the secondary level was didactic and theoretical in nature. As far as the primary and middle school levels were concerned, practically no science was taught until the 1950s. The main emphasis at this level of education was upon reading, writing, and arithmetic--the traditional three R's (Government of Pakistan, 1975). Because science education had very little or no emphasis in the curriculum, there was no clear policy or system of education for teachers in science.

Soon after independence, it was realized that Pakistan's education system was not based on realistic objectives. The system, with an emphasis on the three R's and liberal arts, was more geared to serving colonial purposes. In order to serve the purposes of an independent state, the education system needed an overhauling and restructuring, with a greater emphasis on science and technology. It was also realized that the curricula at various level of education lamentably ignored science, technical, and vocational subjects. The first Pakistan Education Conference, held in 1947 in Karachi, prepared the ground for major changes in the education system of the country. The conference received a message from the founder and first Governor General of Pakistan, Muhammad Ali Jinnah, emphasizing the need for giving the education system of the country a scientific and technical base in order to build up the economic life of the newly liberated state. It was believed that a strong science and technological education was imperative for achieving economic development and prosperity. During the same conference, a Committee on Scientific Research and Technical Education was convened. The committee discussed the problems and issues of science and technical

education and recommended that every effort be made to promote fundamental as well as industrial research (Government of Pakistan, 1947). Ironically, the agenda before the committee was to discuss problems and issues of science, technology, and research at the higher level. These deliberations were not related to science education, particularly at the school level, nor was the issue of science teacher preparation placed on the agenda of the conference.

The second effort in this regard was the setting up of a commission in 1959 that was assigned the job of recommending measures to improve the system of education in Pakistan. Observing the condition and status of science education in the country, the commission recommended that, "In an age when science and applied technology determine the rate of progress of the nations, the teaching of science and mathematics be given a strong base in our schools" (Government of Pakistan, 1959, p. 122). The commission recommended that science and mathematics education be made compulsory for grades 6-10. The commission also noted an imbalance between different components of the curriculum at the primary level. The commission recommended that an equal emphasis be given to science, mathematics, and the liberal arts at the primary level. Following the recommendations by the commission, nature study was introduced at the elementary level to familiarize students with the environment by direct observation. The component of science, however, remained very weak, and in actual classroom practice the major emphasis still remained on the three R's. Theoretically, in the late fifties and early sixties, science education was made a compulsory part of the curriculum for grades 1-8. However, the quality of instruction in science at all levels remained far from satisfactory. The reason for this poor quality of instruction can be traced to the lack of proper education of science teachers.

The first policy that focused science education as discipline of human inquiry was the National Education Policy 1979 (Government of Pakistan, 1979). This policy discussed science education as a separate component of secondary education and emphasized its development on sound footing. Regarding the quality of science instruction in the country, the policy observed:

In spite of several curricular reforms in science education, the quality of instruction in science education, particularly at the pre-university levels, has not improved considerably. This is so because science is still being taught as a "dogma". Very little curiosity in scientific inquiry, initiative and involvement in understanding the scientific concepts and processes are emphasized. (p.35)

This policy was different than other previously announced policies in the sense that, for the first time, the quality of pre-university science education was discussed and measures were recommended to improve it. In previous policies the main emphasis had been on the development and improvement of science and technology education at the university level. This was based on the assumption that to achieve economic progress, it was more important to give emphasis to secondary and higher education than to primary and middle level education. Measures adopted to improve school science education and their impact will be discussed subsequently.

THE CURRENT STATUS OF SCIENCE EDUCATION IN PAKISTANI SCHOOLS

The structure of the Pakistani education system is depicted in Figure 1. At present, science education in Pakistan is compulsory at elementary (primary and middle) and optional at the secondary levels. From grades 1-8, science is supposed to be taught in an integrated manner, comprising some components from biology, chemistry, physics, and Earth science. At the primary level, science should occupy about 12% of the total school time. At the middle school level, 13-15% of instructional time is allocated to science. At the secondary level, about 12-14% of the time is allotted to each science subject-- physics, chemistry, and biology--with a total time for science being about 40%. The purpose of science education at the elementary level is to familiarize students with nature and their environment. At the secondary levels, grades 9 and 10, science is taught in the form of separate subjects-- physics, chemistry, and biology. The main purpose of secondary and higher secondary levels of education is to prepare students for tertiary education in different scientific disciplines, largely in the engineering and medical fields. Very few students take science subjects with a particular interest and purpose of following pure science at the higher level. A large teaching force has been required to teach science, not only at the primary and middle levels where science is a compulsory component, but at the secondary level as well, where it is optional. Such a teaching force is not available even at this time, nor do teachers who have been entrusted with the job of science teaching have adequate preparation to meet the demands of teaching science in the changing world. A cursory look on the teacher education program in Pakistan will reveal this fact.

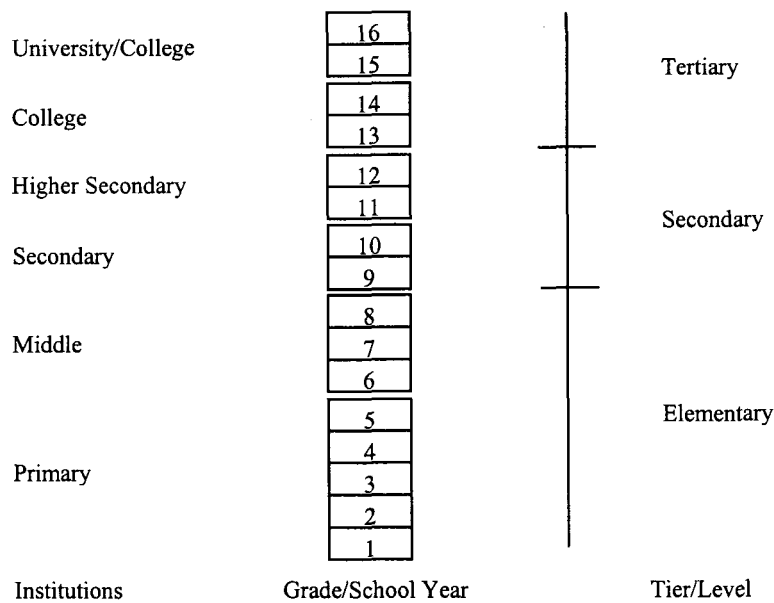


Figure 1. The structure of Pakistan's education system

Preparation and Qualification of Teachers

After independence, and as a result of recommendations made by various commissions, a rapid expansion in the education system in Pakistan was made. This speedy growth of the education system has been accompanied by important advances in teacher education. The general strategy in teacher preparation programs has been directed by two requirements: (a) increase the number of teachers, especially at the primary level, and (b) improve the quality of teacher preparation. On both accounts substantial progress has been made. Yet, when viewed from the overall requirements of teachers at various educational levels, teacher preparation programs have suffered from stagnation and slow growth. The Education Conference of 1947 emphasized the need for a properly educated and reasonably well paid teaching force, and recommended that provinces should take necessary steps in this regard. Similar emphasis has been placed on teacher education in all subsequent policies and plans. The report of the National Commission on Education (Government of Pakistan, 1959), in particular, identified the gaps in teacher preparation programs, and called for a massive increase in such programs. Regarding the preparation of teachers, the commission was of the view that the duration of preservice education of teachers at the primary level be extended to two years, instead of one year. However, the commission

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