Chapter XX
The Significance of the Existence of Women's Colleges and Their Entry into Science-Related Fields

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ABSTRACT

This chapter discusses the importance of increasing the number of women who are active in science-related fields, especially in science and technology, because of the microlevel profit that will be derived by individual women and the macrolevel benefit stemming from the effective use of human resources in society. Furthermore, it considers whether women's colleges could play a key role in training and educating capable women in these fields. The chapter also stipulates the significance of women's colleges and their entry into science-related fields and investigates the educational practices adopted by such colleges. The conclusion drawn from the discussion is that it is essential for women's colleges that have entered into these fields to ensure that the significance of their existence is recognized, that their educational practices are based on this recognition, and that such a coherent and meaningful practice will enable these colleges to produce capable women who will play an active role in and contribute to society.

INTRODUCTION

Why is it important to increase the number of female students who major in science-related fields[1]—particularly, science and technology—in higher education? Is it possible for women's colleges to play a role in educating and training

female students in science-related fields? These two questions are addressed in this chapter.

Today, it is a well-known fact that the proportion of women in developed countries who are active in science-related fields—particularly in science and technology—is extremely low, and the clear gender difference that this situation reflects is considered an important issue in these countries for the following two reasons.

The first reason for paying close attention to gender differences in educational fields is that in today's globalizing world, it is essential for individual countries to retain citizens who are knowledgeable about and skilled in the fields related to science and technology in order to compete and cooperate with other countries. However, in many countries, there is a dearth of people with such capabilities. Therefore, some countries have taken measures to address this serious concern. For example, during the 1990s in the United States, under the Clinton administration, the improvement of mathematics and science education was considered a national project. Former U.S. President Bill Clinton regarded mathematics and science as extremely important subjects for retaining human resources and national power. The measures taken by the Clinton administration showed that the president considered that permitting a situation wherein many people are illiterate in the science-related fields, particularly in science and technology, would be a fatal loss for the country. Indeed, some studies suggest that training more women in these fields is essential for the empowerment of individual countries (Darke, Beatriz, & Ruta, 2002; Epstein, Elwood, Hey, & Maw, 1998; Kimura, 2005; Muramatsu, 1996; Ogawa, 2001). Moreover, in some countries, such as in the United States, United Kingdom, Canada, Australia, and Japan, various educational programs have been established to encourage women to enter the fields of science and technology. Girls into Science and Technology (GIST) in the United Kingdom, Women in Science and Technology in Australia (WISTA), and Creating Cultures of Success for Women Engineers (WomEng) 2002-2005 in the European Union (EU) are some examples of such programs.

The second reason for focusing on this issue is related to the first one: Many women in particular appear to be excluded from or sidelined in the labor market while only a handful of people, often men, are at an advantage, for example, in terms of employment, promotion, and income (Kress, 1998). The problem of the digital divide among people has been a serious global as well as domestic concern (Antonelli, 2003; Kimura, 2001), and the digital divide between genders is also a part of the problem. The main reason why women have not yet advanced considerably in science-related fields is that the proportion of female students majoring in such fields is significantly low in higher education. In fact, a number of studies have already pointed out the existence of this situation in higher education (Forgasz, 1998; Graetz, 1991; Kay, Lublin, Poiner, & Proser, 1989; Kimura, 2005; Nelson & Rogers, 2004; Organization for Economic Cooperation and Development [OECD], 2004). For example, OECD (2004) states the following, based on a study that surveyed 30 signatories:

> *….major differences remain among fields of study. In humanities, arts, education, health and welfare, more than two-thirds of the tertiary-type A graduates are females, on average in OECD countries, whereas less than one-third of mathematics and computer science graduates and less than one-fifth of engineering, manufacturing and construction graduates are females.* (pp. 81-82)

Moreover, according to the same report by OECD (2004), the proportion of females obtaining a first tertiary type-A qualification in mathematics and computer science is 30% on average in OECD countries, whereas it is only 9% in Japan, which has the lowest rate along with Switzerland. The low proportion indicates that the delay in the entrance of Japanese women into science-