

## Chapter 2

# The Development of Preservice Elementary Science Teacher Education in Australia

Ken Appleton<sup>1</sup>, Ian S. Ginns<sup>2</sup>, and James J. Watters<sup>2</sup>

<sup>1</sup>*Central Queensland University, Australia;* <sup>2</sup>*Queensland University of Technology, Australia*

**Abstract:** This paper describes the emergence of the contemporary structure of preservice primary and elementary science education in Australia. We present an historical account of the development of current programs and an analysis that reveals the major trends and influences that have molded the current situation. Major changes have occurred since the late 1970s but the last decade has seen revolutionary restructuring. We discuss the relevant literature, drawing on research reports, reports of national and state governments and other reviews. We analyze how these trends and influences have shaped education policy and preservice programs in universities. We explore as well, emerging trends and implications for future developments.

Teacher preparation in primary and elementary science in Australia has undergone a major transformation over the last thirty years, particularly during the last decade. Like all education, teacher education is influenced by political processes, both within the profession and within the community. In this chapter, we trace the changes that have occurred, the political and educational contexts that have framed these changes, and the effects they may have had on the teaching of science. Most notable has been the increasing intrusion of community politics into teacher preparation, moving it from an activity largely controlled by the teaching profession to the political arena.

The chapter assumes the form of an historical narrative, recounting key events both internal and external to the profession which have shaped elementary science teacher preparation, and a critical analysis of the changes that have resulted. The narrative is told from the perspective of the authors, who have been involved in the field over the period discussed. Since our main area of interest lies in the preparation of teachers for primary and elementary teaching, we have concentrated our story on this aspect of

science teacher preparation. Our story may also be colored by the fact that we live in the state of Queensland, so our account may not reflect fully events in other Australian states and territories.

## **THE CONTEMPORARY SITUATION**

Currently, preservice elementary teacher education in Australia is undertaken mostly in Faculties of Education in the majority of the 39 universities. While there are some subtle differences in the broad structure of programs, the commonalities outweigh the differences. Most teachers in early childhood settings and elementary schools are accredited through a four year Bachelor of Education degree program. Alternatives for students who have completed a bachelor's degree in a discipline and subsequently decide to follow a teaching career include a one year Graduate Diploma of Teaching, a graduate two year bachelor's program, or a two year master's program. Therefore, the majority of commencing teachers will have undertaken at least four years of university study, often wholly within a Faculty of Education. By comparison the standard entry into the profession in 1960 was completion of a one year certificate of teaching awarded by a teachers college.

Before we explore the background to the development of teacher education fully, we provide for the reader a brief overview of the demographic and political contexts of education in Australia up to and including this point in time.

### **The Demographic and Political Context**

Australia is an island continent with over 18 million inhabitants. Although Australia occupies a large area, much is desert to semidesert, resulting in concentrations of population around the more fertile southeast, along the east coast, and in the southwest corner of the continent. The remainder is sparsely populated. Predominant industries are agriculture, mining, and tourism.

The system of government in Australia evolved from the establishment of colonies in different geographic locations. The first was in Sydney in 1788, and over the ensuing decades other colonies began either as British penal settlements, or as centers for settlers who spread rapidly in search of new lands. The main settlements eventually became centers of government for separate states: New South Wales, Victoria, Tasmania, South Australia, Western Australia, and Queensland. Each state provided basic services such as public education, though churches had originally assumed the sole

responsibility for this. In 1901, the Commonwealth of Australia was established as a federation of states. The power and influence of the federal government have increased progressively in terms of its influence on national policy, particularly through taxation and distribution of revenue.

## **Education in Australia**

The provision of free compulsory education was an early initiative of the colonies and continues to be the responsibility of each state and territory (a territory is an area not originally party to the formation of the Commonwealth but separate from the states). Currently, the Commonwealth government provides supplemental funds to the states and territories for the elementary and secondary sectors, and assumes funding responsibility for the tertiary sector. Free tertiary education was introduced in 1974 but partial tuition fees were reintroduced in 1989.

Elementary education, or primary school as it is called in Australia, covers Years 1 to 6 (ages 5 to 11) in most states and territories, and Years 1 to 7 in two others, including Queensland. Compulsory schooling extends to 15 years of age, usually to the end of Year 10, with upper secondary covering Years 11 and 12. On completion of high school students may achieve some form of tertiary entrance score which Universities use to determine entrance eligibility. Primary education, or early childhood education (ages 3 to 8) as it is called in Australia, also varies from state to state. Child care and kindergarten are often available for children under 4 years of age, and most states and territories have preschool available for children from 4 years of age.

Administration and the providing of resources for primary and elementary education is influenced by differences in population distribution, political ideology, and physical distance so there is considerable variation in educational structure and curriculum among the states and territories. However, within each state, curriculum development is a responsibility of a central body and while individual schools have some flexibility, programs and structures are relatively uniform.

Our historical account of developments in elementary science teacher preparation in Australia follows.

## **THE SITUATION PRIOR TO THE 1980s**

Approximately thirty years ago the main political processes influencing science teacher preparation in Australia were those emanating from within

the profession, such as teachers, teacher educators, and the elementary science curriculum itself.

### **Elementary Science Education**

Before the 1960s, the only science component of the elementary school curriculum was nature study. About this time, each state began to introduce a more general science syllabus. However, these programs were not well resourced, teachers were not aware of how to teach science, and as a relative newcomer to the curriculum, science teaching received a low priority. The states had their own science syllabuses with consequential differences in emphasis. Elementary science syllabuses produced during the period 1960 to 1990 tended to be based on curriculum development ideas from other countries (e.g., SAPA, SCIS, ESS from the US and Science 5/13 from the UK), and often did not take account of contemporary Australian developments and research findings. In the 1970s, concerns began to be expressed about the quality of elementary science teaching (Symington, 1974; Varley, 1975).

### **Elementary Teacher Preparation**

Forty years ago, the main route to being an elementary teacher in Australia was to receive several years of apprenticeship under the supervision of an experienced teacher after completing Year 10. However, as demand for more and better trained teachers increased, governments began to introduce scholarships as an incentive to boost enrollments. Training was conducted in teachers colleges, where the typical program was one year in length following completion of Year 12. This later increased to two years in the 1960s, and scholarship holders were bonded to work in government schools for several years after graduation. An effect of scholarships being available was to increase the number of men entering the profession to 40 or 50 percent.

In 1971, as a result of a review of higher education (Martin, 1964), the Commonwealth government negotiated a financial arrangement with the states to fund tertiary education. A binary tertiary system was established, consisting of the established universities, and a new group of professional colleges called Colleges of Advanced Education (CAEs). The teachers colleges and industry-training colleges, such as Institutes of Technology, were transformed into the new CAEs, and were encouraged to broaden their program offerings into other professions and fields of study such as business. At this time, elementary teacher preparation became a 3-year diploma program following Year 12. Inservice upgrading qualifications also became

available for practicing teachers to obtain a diploma or degree. Some CAEs offered a preservice 4-year degree, but this was the exception. Programs in CAEs were nationally accredited through state committees, which maintained monitoring and advisory roles. Other state committees had a role in registering teachers in those states where teacher registration legislation was introduced. Teachers were well represented on the accrediting and registering bodies and most education staff at CAEs were drawn from the teaching force, so the shape and overall content of teacher education programs were largely in the control of the teaching profession. Thus teacher education at that time was firmly embedded in local issues and modeled on apprenticeship training.

## **Research in Elementary Science**

There was little interest in research into elementary science education or elementary science teacher education until academic staff specializing in elementary science were appointed to CAEs. However, the amount of research conducted was limited, since CAE staff were expected to be engaged in teaching and were not encouraged or funded to undertake research. Research was therefore seen as the prerogative of the universities, though none were then engaged in elementary teacher preparation. Despite this, a small number of CAE staff regularly attended annual meetings of the Australian Science Education Research Association<sup>1</sup> (ASERA), which became an important professional link for them, and as such was to later exert considerable influence on elementary science teacher preparation. Several research reports by these people focused on elementary teachers' practices in science teaching (e.g., Appleton, 1977; Henry, 1977; Skamp & Power, 1981; Symington, 1974; Varley, 1975), painting a fairly dismal picture of large scale avoidance of science teaching, and teaching dominated by teacher lectures, television, and whole class discussion.

## **THE SITUATION IN THE 1980s**

Since 1980, a number of related influences have had considerable impact on elementary science teacher preparation. In many cases these influences can be associated with specific events.

<sup>1</sup> The Australian Science Education Research Association (ASERA) was formed in 1970, and renamed the Australasian Science Education Research Association in 1990.

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