

***An investigation of the perceived benefits of
Agricultural Learning Experiences through a case
study of Lindsay Rural School***

Jillian Clare Cormack

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Declaration

I hereby certify that the work embodied in this thesis
is the result of original research and has not been submitted
for a higher degree to any other University or Institution.

Jillormack

Jillian Clare Cormack

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Abstract

This research reports on the benefits of teaching Agricultural Learning Experiences, at a rural school currently operating within Australia's education system. It has been claimed that Agricultural Learning Experiences offer students the opportunity to develop an understanding of the vitality of agricultural industries, as they are economically, socially and politically important to local, national, and global success. Agricultural Learning Experiences provide an array of authentic teaching methods for facilitating the development of individual talents and capacities, consistent with the Adelaide Declaration on National Goals for Schooling.

A case study methodology was employed in order to identify the existence of educational benefits of Agricultural Learning Experiences at *Lindsay Rural School*. The use of both qualitative and quantitative data collection techniques offered a range of perspectives while at the same time allowing the identification of specific benefits. The results clearly show that Agricultural Learning Experiences contribute to students' personal development and academic performance. Parents, teachers and students consistently reported that attending *Lindsay Rural School* has developed students' skills in problem solving, responsibility and teamwork. Numerous other benefits were also identified by the participants, which are also important to national education goals.

Chapter 1

Introduction to the Study

Introduction

This research reports on the benefits of teaching Agricultural Learning Experiences, at a rural school currently operating within Australia's education system. It has been claimed that Agricultural Learning Experiences (ALE) offer students the opportunity to develop an understanding of the vitality of agricultural industries, as they are economically, socially and politically important to local, national, and global success. Agricultural Learning Experiences provides an array of authentic teaching methods for facilitating the development of individual talents and capacities, consistent with the Adelaide Declaration on National Goals for Schooling (Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA), 1999), and generic "key" competencies regarded as essential to the workplace (Australian Education Council and Ministers for Vocational Education & Training, 1992). Agricultural Learning Experiences also offer teachers an avenue through which students can be exposed to the importance of a sustainable future.

The claimed benefits of Agricultural Learning Experiences described within this thesis are based on research that has primarily been conducted in the United States. By contrast, research into the possible benefits of this learning approach has not been conclusively conducted within Australian. In order to determine what benefits are evident, it is necessary to identify what benefits are reported within an Australian school context.

The concept of integration of Agricultural Learning Experiences involves

more than just the inclusion of discrete agriculture subjects, commonly offered only to students during their secondary education. Integrated Agricultural Learning Experiences are therefore less commonly available for research purposes, which limits the availability of a large sample sizes suited to quantitative data collection and analysis. For this reason this research has used a case study methodology. Therefore, this thesis describes the investigation of the benefits of Agricultural Learning Experiences, as perceived by teachers, parents, and students, through a case study of *Lindsay Rural School*.

Context of the Current Research

Historically, Australia's success as a nation was dependent on the stability and productivity of its agricultural industries for the provision of an adequate, continuous food supply, and employment opportunities. These industries later facilitated the development of Australia's export markets despite the fluctuating stability of primary industries over numerous decades. According to the Australian Bureau of Statistics (ABS) (2003-2004), agricultural industries employ 345,700 people each year, equating to 3 - 4 % of the population and contributes an estimated total gross value of \$36.6 billion to the economy (ABS, 2005). The National Farmers Federation and Australian Farm Institute dispute the ABS figures, and claim that agricultural industries account for 12% or an estimated 1.6 million Australian jobs, and \$72 billion to the economy (NFF, 2005a). Peachy (2005) stated that in 2003-04 "the value of Australian food exports was \$22.3 billion ...one-fifth of total Australian merchandise exports, [and] we are a net exporter of food to the tune of some \$16 billion a year" (p.1).

Agricultural industries continue to play an essential role in the social structure of Australia's rural and remote communities. Current social trends indicate increasing numbers of individuals and farming families leaving employment in rural communities (ABS, 2003a). This drift away from rural communities is therefore reducing the number of young people in contact with agricultural industries, which is contributing to labour shortages in many of these areas. The Kondinin Group a not-for-profit organisation of farming and associated professionals, state that from a national school survey in 2001 "18 % of children believe that people living in cities don't need farmers, 46% of children in metropolitan areas consider farmers are important in daily lives compared to 62 % of kids in country areas" (Kondinin, 2001, p.1).

Relevance and Significances of the Current Research

According to international research there is considerable evidence to suggest the importance of educating students about agriculture through a variety of Agricultural Learning Experiences. Researcher Meichtry (1992, cited in Mabie & Baker, 1996) reported that Agricultural Learning Experiences assist students in developing essential life skills such as problem solving, critical thinking and science processing skills. In addition, a synthesis of the research under taken Dyer and Williams (1997) indicates that important outcomes of Agricultural Learning Experiences include, career preparation, building character, and the development of responsibility. The same skills are among those described as important aims for all Australian students, as specified in the Adelaide Declaration on National Goals for Schooling (Ministerial Council on Education, Employment, Training and Youth

Affairs (MCEETYA), 1999) and generic “key” competencies (Australian Education Council and Ministers for Vocational Education & Training, 1992). These educational goals and competencies describe specific areas of development that students should exhibit before leaving school. These include problem solving, communicating, planning and organizing, self-confidences, high self-esteem, accepting responsibility, and development of potential life roles including becoming community and workforce members (employment related skills). Students should also have an understanding of career options, and exhibit a positive attitude towards vocational training, and life-long learning (Australian Education Council and Ministers for Vocational Education & Training, 1992; Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA), 1999). Researchers state that a well-established agricultural program can facilitate students’ academic achievements (Dyer and Williams, 1997), and develop skills that can be successfully transferred to other situations (Dailey, Conroy & Shelley-Tolbert, 2001), while enhancing the curriculum (Knobloch & Martin, 2000).

Australian agricultural education syllabii are focused on educating students about the importance of agriculture, while developing lifelong learning skills and individual talents and capacities (Board of Studies NSW, 2003; Queensland Studies Authority, 2005). The Queensland Studies Authority (2005) characterises a life long learner in its Agricultural Education Syllabus and Guidelines as, “a knowledgeable person with deep understanding, a complex thinker, an active investigator, a responsive creator, an effective communicator, a participant in an interdependent world [and] a reflective and self-directed learner” (p. 4).

Agricultural Learning Experiences also facilitate authentic pedagogy similar to those forms of learning which are highly endorsed by the New South Wales Department of Education and Training (2003), within the *Quality Teaching in NSW Public Schools*. In addition, agricultural education provides an excellent opportunity for students to become environmentally aware of their surroundings through investigating agricultural practices and processes. Agricultural education offers institutions a foundation for teaching students about the importance of a sustainable future. This goal is consistent with the Adelaide Declaration (MCEETYA, 1999) and has been further emphasised through a major focus by the Australian Department of the Environment and Heritage, based on the initiative of the United Nations, to declare 2005-2014 the Decade of Education on Sustainable Development. The goals of the initiative are to heighten awareness of the critical need to achieve a sustainable future, and it seeks to teach students ways to minimise the problems that detract from achieving sustainability (Department of Environment & Heritage, 2005).

This research will therefore seek to establish whether the Agricultural Learning Experiences at *Lindsay Rural School* support the claimed educational benefits reported in international research, particularly from the USA. Findings from this case study will help to ascertain whether agricultural programs are worth recommendation.

Research Questions

The following research questions were formulated to assist in the investigation of perceptions among students, parents and teachers as to the benefits

of the Agricultural Learning Experiences offered at *Lindsay Rural School*.

Following the specification of the research questions, the research instruments used in this thesis were developed (i.e., student writing task, parent survey, teachers' survey, and structured independent observations). Collectively, each of the questions aims to identify whether the perceived benefits of Agricultural Learning Experiences at 'Lindsay Rural School' can be identified.

Questions:

1. Do students report benefits of learning through Agricultural Learning Experiences?
2. What are the perceptions of parents towards Agricultural Learning Experiences?
3. What are the perceptions of teachers towards Agricultural Learning Experiences?
4. Do independent observations confirm claimed advantages of Agricultural Learning Experiences?
5. Do the claimed benefits of Agricultural Learning Experiences contribute to the national goals of education in Australia?

Definition of terms

1. Agricultural Learning Experiences (ALE): incorporate authentic hands-on activities involving the study of both animal and plant biological processes, in association with farm to consumer processes.
2. Agricultural education: "focuses on agricultural systems, agricultural mechanics and construction, and the relationships between agriculture and society. It provides opportunities for students to explore the relationship between agricultural productions and sustainability within contexts ranging from local area enterprises to global agricultural systems" (Queensland Studies Authority, 2005, p. 3).
3. Life skills: are essential skills required throughout life and include the following; problem solving, communication skills, and teamwork.
4. Lifelong learning: education encourages the continuation of learning throughout life, for intrinsic value, and for the opportunity of future career changes (Bryce, Frigo, McKenzie and Withers, 2000).

Organisation of the Remainder of the Thesis

The remainder of this thesis covers the review of literature surrounding the benefits of Agricultural Learning Experiences (Chapter 2), followed by Chapter 3 which outlines the methodology used to collect the data from a range of sources, consistent with the case study approach. Chapter 4 describes the results of the participant's perceptions of the value of Agricultural Learning Experiences. Chapter 5 discusses the results of chapter 4, as they relate to the nationally agreed goals of education such as those outlined in the Adelaide Declaration (MCEETYA, 1999). Finally, Chapter 6 reports on the conclusions and recommendations for further research within this topic of study.

Chapter 2

Literature Review

Introduction

This chapter reviews the research literature relating to the value of agricultural industries and agricultural education. It includes an outline (a) contextualising agriculture in Australian history, (b) describes the economic value of agriculture, and (c) indicates the social significance of agriculture. It also summaries (d) aspects of agricultural education within Australia both past and present, (e) the role of education relative to Australia's sustainable future, (f) the current need to educate society about agriculture, and (g) the claimed benefits of teaching using agricultural concepts. These areas of the research literature link to provide an argument that establishes the importance of agriculture to Australia's society and future, and includes reasons for considering the inclusion of agricultural education within a wider variety of educational institutions.

The Importance of Agriculture

The Historical Perspective

The arrival of European settlers in 1788 (King, 1957) facilitated Australia's development as an agricultural nation. Captain Phillip, as Governor of the first settlement, brought a variety of livestock and cropping seeds over on the voyage from England; these included horses, cattle, sheep, pigs, rabbits, turkeys, geese, ducks, and fowls (ABS, 2002a), as well as wheat, barley, maize and other vegetable seeds. Upon arrival to Port Jackson, Captain Phillip ordered the initial clearing of an estimated nine acres of land for the first attempt at sowing wheat in Australia. Disheartened by the production of only a single bushel due to the "imperfect clearing, the presence of weevil in the seed, and the destruction of the sown wheat by mice and ants" (Wadham &

Wood, 1939, p.7), Captain Phillip led an expedition which explored land north of the settlement. At this time the majority of military personnel within the settlement were assigned small plots of land to begin farming vegetables and grain crops in order to feed the colony (Wadham & Wood, 1939).

Within the first two years of settlement many convicts serving short-term sentences were offered land grants providing independent farming opportunities under a government scheme. These land grants greatly increased the number of farming families and individuals living in a variety of areas outside the original settlement (Wadham & Wood, 1939). The urgency in establishing additional farms was due to the increasing “danger of obliteration by starvation” (King, 1957, p.18) that many convicts faced, as they were proven ineffective as farmers. The effects of drought, insufficient equipment, and poor soil quality, were also to blame for farming failures (William, 1967). Regardless of their level of farming success, within seven years of the first settlement, one third of the New South Wales population was employed in the production of wheat, sheep, and later cattle (Fletcher, 1976; King, 1957).

Although developments in agricultural knowledge and food production were increasing, John Macarthur, a prominent leader with Australia’s early history, believed that Australia’s economic security remained unsure. Macarthur was convinced that wool production would fulfil the requirements of a profitable export industry. By 1797 he had obtained six Merino sheep from the Cape of Good Hope, which were found suitable to the Australian conditions. Despite the initial limited success, the first official commercial export sale of wool to England in 1807, marked the beginning of Australia’s wool export industry (Wadham & Wood, 1939; Wadham, 1967; Williams, 1967).

The establishment of agricultural companies and new banking businesses, brought a major boom in sheep and cattle production within the 1820's, which soon ended with a serious slump caused by drought, resulting in poverty and ruin for many respectable people (Williams, 1967). By the 1840s, transportation of convicts to Australia ended, contributing to labour shortages. This situation was assisted by the arrival of over one hundred thousand people from England between 1830 and 1850. This immigration facilitated the establishment of the Adelaide colony, where vine cultivation began, as well as the commencement of wheat exports by 1843 (Wadham, 1967; William, 1967).

The discovery of gold and the advent of the gold rush (1851-1860) continued the earlier immigration patterns. It was estimated that during this time the population growth was dramatic with the arrival of over six hundred thousand people. The gold rush while generating great wealth for Australia, disrupted farming practices and dislocated the economy (Williams, 1967). Developments in railway infrastructure at this time were of considerable benefit to not only the gold rush but to agricultural industries, as it allowed for the freer movement of livestock and other commodities (Wadham, 1967). Expansions in the rail network would again occur in the 1880's allowing for servicing of inland regions (ABS, 2002b). By 1891 farming inventions and the development of refrigeration technology (1881) opened a new era of export markets and improved agricultural production (ABS, 2002b; Dairy Good, 2003; Wadham, 1967; William, 1967). Farming industries were however, still at the mercy of pests (e.g., rabbits) and disease, causing disastrous losses for many farmers (William, 1967).

The 'Great Drought' (1895-1903), another significant event in Australian history, was widespread, affecting parts of Queensland and New South Wales with

greater severity, which significantly reduced livestock numbers (ABS, 2002b; William, 1967).

Further expansions in agricultural industries occurred from 1901-1931, in wheat, dairy products, sugar cane, fruit, and tobacco (ABS, 2002a; Wadham, 1967). Major world events such as World War I (1914-1918) and the Great Depression caused a number of setbacks at this time, where nearly all agricultural industries required financial assistance from the government. The effects of World War II (1939-1945) seriously handicapped many agricultural industries due to low world markets, labour shortages, and another severe drought in 1945 (William, 1967). Regardless of the challenges faced by farmers, agricultural commodities “accounted for more than 80% of the value of Australia’s exports” (ABS, 2004a) by the end of the 1950’s. This was however later superseded by exports in mining and manufacturing (ABS, 2004a).

The Economic Perspective

According to Australian Bureau of Statistics (ABS) during 2003-2004, agricultural industries contributed an estimated gross value of \$36.6 billion to the economy. According to Peachy (2005) who is the Chief Executive Officer to the government food regulatory body, Food Standard Australia and New Zealand, “the value of Australian food exports was \$22.3 billion ...one-fifth of total Australian merchandise exports [and] we are a net exporter of food to the tune of some \$16 billion a year” (p.1). On average Australia’s exportable food industries are growing an estimated 6 percent each year, which translates to “approximately 2.7% share of the world food trade” (Tan, 2005, p.1).

The National Farmers Federation (NFF), an organisation that operates within federal politics on behalf of farmers, disputes the ABS estimation of the total value of agricultural commodities. Instead they report that agricultural industries accounted for

“12.1 percent of Gross Domestic Produce (GPD) or \$72 billion...[and] provided 23.9 percent (\$26 billion) of our goods and services exports in 2003-04” (2005a, p.1).

Although these estimates indicate that there are discrepancies as to the total value of agricultural industries to the Australian economy, it can be clearly noted that they are essential in meeting the consumption needs of the current and future population.

The Social Perspective

In 2001, 66.3% of the population resided in Australia’s major cities, while 31.1% lived in the inner and outer regions and 2.6% in remote or very remote areas (ABS, 2004b). To a significant degree demographic distribution of the population reflects employment opportunities within each region around Australia. Current ABS data indicates that nearly fifty percent (four million) of employment is in retail trade, manufacturing, property and business services, and health and community services. Employment in agricultural industries ranged from 330,782 in 2001 to 345,700 in 2004, which mainly occurred in remote and very remote areas (ABS, 2001). In 2002, an estimated 119,100 of agricultural employment was comprised of women working directly on farms in management roles and stock care (ABS, 2003a). Statistics also identify that the “median average [age] of farmers in farming families increased from 47 years in 1986 to 51 years in 2001” (ABS, 2003a, p. 4). Again, employment figures collated by the Australian Farm Institute and the National Farmers Federation disputes the ABS figures, where NFF states that over 17% of all jobs are agriculturally related, which equates to 1.6 million jobs (NFF, 2005a).

In recent decades the ongoing effects of severe drought, economic hardship, and the increase in land and commodity values, has encouraged the amalgamation of farms, where by between “1986 and 2001 farming families in Australia decreased by 22%” (ABS, 2003a). In an attempt to assist regional farming communities, the Australian

government offered financial assistance to save more than 2,500 jobs from the effects of drought in 2003-04 (NFF, 2005a). However, according to Cornish (2005), “some 70,000 jobs have been lost in rural Australia” from the recent drought (p. 6).

Australia’s development as a young nation was clearly reliant on agriculture as an essential foundation in its economic development, but as time has passed the agricultural industry has gone through economic and social changes. Demographics indicate declining employment opportunities, the aging of the farming population and an economy struggling due to natural phenomena beyond farmers’ control. Educating young Australians about the importance of agriculture in history and the effects of reduced economic and employment opportunities, seems to represent a significant contribution to understanding the Australian context.

Agriculture and Education

Education within the early Australian colonies was heavily influenced by the British education system by the 1830’s, which deemed it essential to teach Christian values, respect, and acceptance of one’s position in life to the ‘lower orders’. By contrast, public schooling was established for people of higher social status, where academic subjects were a central focus. This system of education contributed to the maintenance of a privileged social sector seeking a more leisurely life and the esteem of church offices (Hyams & Bessant, 1972). Educational reforms by the beginning of the 1900’s included the provision of education for primary students in basic manual skills. This became a focus due to economic instability and effects of drought in the previous century (Hyams & Bessant, 1972; Logan, 1997). As a result a “teacher-farmer consultancy relationship” developed (Logan, 1997, p.72) where schools acted as experimental farms in order to improve agricultural knowledge (Hyams & Bessant, 1972; Logan, 1997).

By 1905, utilitarian perspectives on education were increasingly evident as new education syllabii included practical agricultural studies (Logan, 1997). Similar reforms occurred in New South Wales and Victoria where academic education was reduced in order to equip students for work within manual industries (Hyams & Bessant, 1972).

This focus changed after World War I to introduce secondary education to everyone in preparation for life. Although technical efficiencies were still regarded as important, new goals of education were emerging. Education again broadened in many states in 1927 to include programs that would assist students in making intelligent occupational choices. This was highly controversial as many educators were still focused on meeting the needs of industries (Hyams & Bessant, 1972; Logan, 1997).

The devastation of the Great Depression, which soon followed, resulted in many educational setbacks due to reductions in government funding. Post World War II saw an increased emphasis on post-primary education (1950s), and as a consequence of the availability of new university courses there was a decline in recognition of technical education, as it lacked prestige and importance to young people. Technical skills and education did however regain its social acceptance in the 1960s, as indicated by increasing enrolments in technical colleges (Farquhar, 1966; Hyams & Bessant, 1972).

Education within the 1990's again emphasised the importance of workforce and education connections. This arose through the increased significance placed on vocational programs for post-compulsory schooling (i.e., Years 11 & 12) and the demands of employers seeking school leavers with a workplace related competencies (Australian Education Council and Ministers for Vocational Education and Training, 1992). The increasing vocational focus however, did not extend to agricultural subjects taught within many NSW secondary schools. This was due to the lack of a formal agricultural education policy, and prioritising of government funding support toward

other subjects, indicating that agriculture was not “important enough to be educationally promoted” (Thomas & Spencer, 1996, p. 208). The lack of literature sources endorsing the value of agriculture seems to support the claim that agricultural education was no longer a priority.

At this time both the Federal and State governments encouraged students to elect careers in computing and hospitality, whereas agriculture was often not promoted as a career option. Universities also made recommendations against the study of agricultural subjects (as science subjects), as they were defined as technical subjects, rather than “Human Society and its Environment” subjects (Thomas & Spencer, 1996, p. 211). Although the Department of School Education later addressed this problem, the numbers of students electing agricultural subjects remains relatively static (Thomas & Spencer, 1996).

Current Educational Directions

Education today continues to emphasise the importance of students developing generic “key” competencies, talents and capacities before leaving school. The “key” Competencies established from the Mayer Committee (1992) in the early 1990’s remain an educational focus. A copy of the “key” competencies is included as Appendix 1. The Competencies identify the importance of students developing skills in collecting, analysing and organising information, expressing ideas and information, planning and organizing activities, working with others in teams, using mathematical ideas and techniques, solving problems, and using technology (Australian Education Council and Ministers for Vocational Education and Training, 1992).

National Goals for Schooling. The Adelaide Declaration on National Goals for Schooling (cited in MCEETYA, 1999), describe the current national goals of school education, focus on developing the talents and capacities of students before leaving

school through the development of knowledge and skills, and an awareness of social justice issues. A copy of the National Goals of the Adelaide Declaration is included as Appendix 2.

The Adelaide Declaration (MCEETYA, 1999) emphasises the importance of developing skills in analysing, problem solving, communicating, planning and organizing (Goal statement 1.1), self-confidences, high self-esteem, development of potential life roles, including becoming community and workforce members (employment related skills) (Goal statement 1.2). Students should exhibit moral and personal responsibility (Goal statement 1.3), be informed citizens in relation to systems of government (Goal statement 1.4), have an understanding of career options, and exhibit a positive attitude towards vocational training and life-long learning (Goal statement 1.5). Students should also have knowledge and skills in new technologies (Goal statement 1.6), have concern for the stewardship of the natural environment (Goal statement 1.7), and the ability to develop healthy lives (Goal statement 1.8). The development of knowledge and skills refers to skills in the arts, English, health and physical education, languages other than English, mathematics, and science (Goal statement 2.1), as well as numeracy and literacy (Goal statement 2.2). Students should also participate in vocational learning with access to vocational education and training (VET) in senior school (Goal statement 2.3), and develop enterprise skills that will allow future adaptability and flexibility (Goal statement 2.4). The Adelaide Declaration is consistent with the outcomes of agricultural education where developing student's talents and capacities, knowledge and skill is important.

Quality teaching. The current direction of school education is designed to increase learning outcomes through quality teaching. The development of the quality teaching initiative builds on research reported by Newmann & Associates (1996) from

the University of Wisconsin-Madison. The Chicago Consortium, as it became known, highlighted the need for authentic learning, which produced results that would have meaning beyond the expectations of school. Newmann's intensive one-year study of 24 schools found that academic performance across all grade levels, in mathematics and social studies, increased when high authentic pedagogy was used. His conclusions were drawn from observing lessons, and collecting student work and comparing assessment methods and outcomes (Newmann & Associates, 1996).

Several Australian states, including New South Wales, Queensland and Tasmania have applied the authentic pedagogy research to develop new instructional designs. In New South Wales this approach is known as Quality Teaching in NSW Public Schools (Department of Education, 2003). The new pedagogies emphasise authentic, relevant learning experiences and the need for education to be directed toward the world beyond school, which is consistent with the aims of agricultural education.

Lifelong Learning. Australian education seeks to develop lifelong learning principles that assist every student in developing “knowledge, values, skills and understanding they will require throughout their lifetime and to apply them with confidence, creativity and enjoyment in all roles, circumstances, and environments” (Bryce, et al, 2000, p.5). The Agricultural Technology Syllabus produced by the Board of Studies NSW (2003) incorporates the goal of lifelong learning consistent with the Adelaide Declaration. Similarly, Queensland Studies Authority developed an Agricultural Education Syllabus and Guidelines document designed to “assist students to become lifelong learners” (Queensland Studies Authority, 2005, p.4). The Syllabus and guidelines characterise a lifelong learner as “a knowledgeable person with deep understanding, a complex thinker, an active investigator, a responsive creator, an

effective communicator, a participant in an interdependent world [and] a reflective and self-directed learner” (Queensland Studies Authority, 2005, p. 4). Therefore it is apparent that agricultural education is one approach to learning that incorporates the opportunity to develop skills attributed to lifelong learning.

Education for a sustainable future. Educating students on the importance of a sustainable future is also described among the goals of the Adelaide Declaration. The goal states that when students leave school they should “have an understanding of, and concern for, stewardship of the natural environment, and the knowledge and skills to contribute to ecological sustainable development” (MCEETYA, 1999). Although this is already an educational goal, the Australian Government Department of the Environment and Heritage in conjunction with the United Nations (UN), have dedicated a ‘Decade of Education on Sustainable Development (2005-2014)’. Sustainable development is defined as “using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased” (Department of the Environment and Heritage, 2005).

The framework for the ‘Decade of Education on Sustainable Development’ goes beyond the school curriculum to include collaboration with administration, grounds and canteen staff, and parents to achieve active involvement in sustainable projects. The decade will seek to introduce a variety of resource management projects such as wastewater, energy, transport usage, the purchasing of environmentally safe produce, and greater emphasis on recycling within schools. It will also encourage biodiversity, the reduction of general waste products, habitat creation, growing vegetable gardens, and mulching (Department of the Environment and Heritage, 2005).

Australia's future sustainability crisis is closely connected to Australia's agricultural industries and practices because of the amount of land in use for agricultural purposes. It is estimated that agriculture utilises 60% (769.2 million hectares) of available land and numerous natural resources. Agricultural industries currently use an estimated 70% of the total water supply, which is a significant issue since Australia's dry climate has never naturally suited many agricultural industries. Australia's soil is also not naturally fertile therefore the widespread use of large quantities of fertiliser is common, as well as the application of insecticides and pesticides for increased quality production. These products continue to work against Australia's future sustainability as they pollute waterways and damage soil structures. Land degradation is becoming increasingly prevalent due to the effects of erosion and salinity, which has a damaging impact on sustainability (ABS, 2003b; Roberts, 1995). Educating society, particularly the younger generations, about reducing the use of water and non-renewable resources as well as increasing alternative farming methods is essential for a sustainable future (Department of the Environment Sport and Territories, 1997). The Kondinin Group a not-for-profit organisation of farming and associated professionals, state that from a national school survey in 2001 "18 % of children believe that people living in cities don't need farmers, 46% of children in metropolitan areas consider farmers are important in daily lives compared to 62 % of kids in country areas" (Kondinin, 2001, p.1).

In response to the growing importance of teaching students about agriculture, a National Agricultural Scoping Network was established in 2004 to collectively promote agriculture within Australia education. The network incorporates agricultural professionals and associates from both private and public sectors within each State and Territory. A compilation of current agricultural programs and initiatives within

Australia have been identified. A copy of the programs is included as Appendices 3 (Brown, 2005, p. 94). The goals of the network are to arouse agricultural curiosity and promote agriculture in a variety of Key Learning Areas (Brown, 2005). These goals complement the developing strategy of the NFF entitled 'Campaign for Australian Agriculture' (Corish, 2005), which is focused on bridging the 'city-country divide'. Educating young people about agriculture and its associated processes is both relevant and required, and will assist in educating young people about a sustainable future.

Benefits of Agricultural Education

Research conducted in the United States identified significant educational benefits when students participated in hands-on agricultural education, regardless of their desired career choice (Dailey, Conroy & Shelley-Tolbert, 2001). Research conducted by Meichtry (1992, cited in Mabie & Baker, 1996, p.1) found that agricultural education:

leads to a better understanding of science concepts by providing students with meaningful, concrete experiences. Science processing skills such as observing, hypothesizing, measuring, collecting and analyzing data, and drawing conclusions... promotes problem-solving and critical-thinking skills.

Researchers Mabie and Baker (1996, p.3) identified student developments in science processing skills through two in-class agricultural projects. One hundred and forty-four grade five and six students, at two urban inner city schools, participated in one of two projects, or received no treatments. They included a "ten-week gardening project (56 students) [or a] ten-week series of three short in-class projects; bread making, chick-rearing, and seed germination (57 students)", the third group received no treatment (31 students) in order to draw comparisons. The participants completed a pre-test requiring the examination of popped and un-popped popcorn, and were asked to observe, relate, order, hypothesise, compare, communicate, infer and draw the logical steps of how to 'pop' popcorn. Results indicated "twenty-seven percent of the control

group, 48% of the garden group, and 53% of the short projects group showed improvements in their ability to compare the two items [popped and un-popped corn]" (Mabie & Baker 1996, p. 4). Further analysis of post treatment tests identified that "seventy-four percent of the control group, 64% of the gardening group, and 46% of the short projects group were able to draw a logical series of steps for making popcorn" (Mabie & Baker 1996, p. 5) before treatment. After treatment, students' science processing skills increased by twenty percent in the gardening group, nineteen percent in the short projects group, and declined by ten percent in the control (Mabie & Baker, 1996).

Although the following research was conducted in the 1980s, statements by researchers Berkey, Sutphum, and Flowers and Pepple, remain true today. Berkey & Sutphum (1984, cited in Dyer & Williams, 1997) researched the benefits of Supervised Agricultural Experience (SAE) (an agricultural program in the US) as reported by teachers in New York. Findings concluded that SAE helps to develop "favourable work attitudes, values and habits...enhancing classroom instruction, developing management skills, career preparation... building character... responsibility...development of record keeping skills" (p. 51). According to Flowers and Pepple (1987, cited in Dyer & Williams p. 51, 1997), students have a positive attitude towards SAE, which increases teacher morale due to participation.

Knobloch & Martin (2000), identified the perceived curriculum benefits of agricultural education as reported by six hundred and eight-nine elementary teachers, in seven counties in East Central Iowa. Findings concluded that, "generally, elementary teachers were favourable towards integrations of agriculture into the curriculum" (p.21). Ninety-seven percent of respondents agreed that agriculture enhanced the elementary curriculum, and eight-four percent agreed that agriculture could be integrated into any

subject matter (Knobloch & Martin, 2000, p. 21). Researchers Rudd and Hillison (1995, cited in Trexler & Hikawa, 2001) stated that although there are significant benefits in integrating agriculture into the curriculum, teacher's still face problems in doing so. However, research conducted by Wanaabe & Huntly (1998, cited in Trexler & Hikawa, 2001, p. 54), found that teachers with "positive attitudes towards integration" are able to overcome these challenges even if they lack agricultural knowledge.

Transferring knowledge into real life situations is complex task according to Choi & Hannafin (1997, cited in Dailey et al., 2001, p. 13), as the learner must have a good understanding of specific concepts. Agricultural Learning Experiences has been identified as a vehicle for teaching students knowledge that can be transferred to other applications, as "tasks reflect the contextual elements and reasoning complexity needed for addressing real-world problems". A stratified sample of individuals representing interests in agriculture such as high school students, and graduate students, were asked a series of open-ended questions in an (one-on-one) interview. The respondents were asked whether "agricultural education promotes the transferability of content and skills to further education, further careers, and life long learning?" (Dailey, et al., 2001, p.14). Collectively, the respondents stated that agricultural education helps to develop people who have good communication skills, cooperation, and understanding of the different facets of life, while developing social skills. These skills were identified as equipping students to be positive contributors to society. The majority of the respondents concluded that children, parents and educators are not aware of the valuable skills incorporated in an agricultural education program (Dailey, et al., 2001). In summary, the research cited above indicates that Agricultural Learning Experiences assist student in developing many essential life skills required within the workforce, as they interact with problems relating to real contexts.

Summary

Agricultural industries have been an integral part of Australia's history, economic development, population distribution, employment and education. Today agriculture continues to support the economy and employ thousands of people both directly and indirectly within agricultural industries.

Research identifies that agricultural education is recommended within Australian schools and is a suitable context for educating students through quality teaching methods such as authentic learning, while developing student's life long learning qualities and providing an avenue for teaching the importance of a sustainable future. The value of teaching agriculture using hands-on experiences extends beyond increasing students' knowledge to include assisting students in developing numerous life skills (e.g., problem solving, science processing skills and communication skills). The Adelaide Declaration (MCEETYA, 1999) emphasises the importance of students developing these talents and capacities before leaving school, therefore agricultural education fulfils many of the requirements and recommendations of a number of policymaking bodies. For this reason it would be beneficial to determine whether or not the advantages of Agricultural Learning Experiences, as identified by international researchers, are evident in the Australian context.

Chapter 3

Methodology

Introduction

The previous chapter described the value of agricultural industries to Australia's economy, employment opportunities, decentralisation of the population, and the role of agriculture throughout Australia's history. Agricultural education was identified as required with Australian schools, and could be used as a suitable context through which to achieve the broad goals for schooling as described in the Adelaide Declaration (MCEETYA, 1999). In addition, researchers described Agricultural Learning Experiences that indicate the utilization of generic "key" competencies which are able to be taught through instructional designs consistent with the elements of the quality teaching reforms (Department of Education, 2003). Furthermore, the international aim of achieving a sustainable future through educating today's students is also able to be achieved through Agricultural Learning Experiences.

This research seeks to identify possible benefits of Agricultural Learning Experiences, within an Australian context, at *Lindsay Rural School*.

Research conducted at *Lindsay Rural School* will be in the form of a case study, using both qualitative and quantitative research methods to provide data from a variety of sources. In order to reach a valid conclusion in regards the benefits of Agricultural Learning Experiences, consideration will be given to the perceptions of parents, students, teachers as well as data obtained through independent structured student observations.

Case Studies

Case studies provide a research methodology that focuses on a specific situation or circumstance and are conducted to identify possible relationships and outputs between individuals, groups, or for an entire organisation (Anderson, 1998; Bell, 1993). Through multiple perspectives of a situation in an organisation, the case study approach enables a more encompassing perspective to be obtained. The case study method avoids hypothesising in relation to predetermined outcomes. Instead it relies on the collection of data relevant to various facets of a situation, following which patterns and conclusions can be developed.

Data collected for case studies is usually conducted systematically through interviews and observational methods. However, data collection is not limited to these forms and can be obtained using either qualitative or quantitative research methods (Bell, 1993; Cohen, et al., 2000; Verma & Mallick, 1999). The case study method “strives for the same degree of reliability and validity as any good research” (Anderson, 1998, p.152), through the use of well developed data collection systems and accurate data analysis. Since a lot of data collection is specific to individuals and their relationships within the organisation, it is common practice to allocate fictitious names when reporting results (Cohen, et al., 2000). For this research, both the name of the school and the names of individuals who provided data have been changed to protect their anonymity. Case studies are usually written using everyday language for readability, to ensure the widest possible audience (Cohen, et al., 2000). They are however, difficult to verify or cross check as they usually report a unique context at a specific time. To avoid misleading and a distorted analysis and view of the situation, generalisations are limited (Bell, 1993), however, are often accepted “where other readers/researchers see their application” (Cohen, et al., 2000, p. 184). It is therefore

essential that the observer (usually a single observer) report only factual findings, and avoid personal bias in order to reduce speculation (Cohen, et al., 2000; Verma & Mallick, 1999).

A case study of *Lindsay Rural School* was the preferred methodology since this approach allowed the identification of the perceived benefits of Agricultural Learning Experiences, as articulated by parents, teachers and students. The use of multiple sources within the school organisation, gives the conclusions that are reached greater relevance, and limits personal bias and judgment.

Research Instruments

Four instruments were developed to assist the data collection process. These instruments comprised (a) a parent survey, (b) a student-writing task, (c) a teacher questionnaire, and (d) structured observations of students. The parent survey sought to gather a general perspective of Agricultural Learning Experiences and identify possible relationships between matters about which parents seem to hold significant. The student-writing task sought to identify students' perceptions through a data collection process that was open ended and at the level of students' cognitive development. The teacher questionnaire was developed to gain a perspective on the agriculture learning experiences from a professional viewpoint, and again the aim was to avoid leading teachers toward pre-determined or biased responses. The fourth data collection method involved structured observation where a limited number of student behavioural indicators were observed and recorded to determine the predominant behaviours among students and to keep the data collection process focused and manageable.

Following clearance by the appropriate institutional ethics committees, parents were asked to consent to the research. Parents at *Lindsay Rural School* were given

consent forms asking permission for their children to participate in the research, including the completion of the writing task and lesson observations.

Participants

The parent surveys were given to a total of 38 families, where parents were asked to complete one survey per child attending the school (52 students in total). Nineteen students participated in the writing task, consisting of four grade 4 students, five grade 5 students, nine grade 6 students and one grade 7 students. The same students were observed using a structured observation schedule. The three teachers at *Lindsay Rural School* participated through completing a questionnaire.

Instruments, Data Collection Method and Form of Analysis

Parent Survey

The objective of the survey was to identify parent's perceptions on the Agricultural Learning Experiences, and then identify the existence of possible relationships between perceived benefits. From this it was expected that any educational implications of parents' perspectives would be more easily identified (Anderson, 1998; Cohen, et al., 2000; Verma & Mallick, 1999).

The development of the parent survey instrument was conducted by collating the benefits of Agricultural Learning Experiences as stated within the international literature. The claimed educational benefits then formed the basis for each of the twenty-three survey items, which were then organised to allow responses using a Likert scale rating system. A copy of the final survey is included as Appendix 4.

Parents were given a three-week period to complete the twenty-three item survey and to answer the optional open-ended response. Collectively, parents' perceptions were important to the central research question of determining if

Agricultural Learning Experiences at *Lindsay Rural School* develop identifiable benefits.

A pilot study of the instrument was conducted which resulted in the inclusion of an 'unsure' column among the Likert scale options. It was believed that this would increase the accuracy and therefore the validity of the survey results, as some parents may not have known the answers to some of the questions and be unfamiliar with specific agricultural terminology. Minor terminology changes were also made.

The analysis of the data was conducted by firstly coding the Likert scale rating system, where *Strongly Agree* was represented by the number four, *Mostly Agree* was represented by the number three, *Mostly Disagree* was represented by number two, *Strongly Disagree* was represented by number one, and *Unsure* was represented by zero. The analysis of the data was conducted using the SPSS (version 11) statistical package and commenced with the calculation of Cronbach's Alpha test of instrument reliability. Further analysis of the data from parents' surveys included descriptive statistics (i.e., means and standard deviations) to determine whether parents across the school held similar views, correlations coefficients were calculated to determine whether any significant relationships were evident among parents' responses, and factor analysis was conducted to determine if the perceptions of parents loaded to form factors that indicated interconnection of any perceived benefits. The open-ended parents' responses were to be collated according to similar statements. Each participant was to be identified using the allocation of a codename. In the case of the parents they were allocated codenames of either 'P1', 'P2', 'P3' and so on, where the 'P' represented parent, in accordance with recommendations by Cohen, et al., (2000).

Student Writing Task

The *student writing task* was developed to identify specify benefits or disadvantages of learning through agricultural experiences as stated by students at *Lindsay Rural School*. The task required students to write a report, story, or recount of their personal agricultural experiences while at school, within three English lessons (students were encouraged to write openly and honestly). The students were giving a question framework to follow in order to keep the responses focused on agricultural learning tasks. The question framework consisted of asking about (a) their Agricultural Learning Experiences, (b) positive and negative memories, (c) things they have learnt that they may use in the future (if any), and (d) whether or not they would recommend an agricultural program for other schools. Under the guidance of the classroom teacher students with learning and writing difficulties were given the opportunity to write a storyboard to encourage concentration and fluency. These qualitative data was intended to provide another perspective of the Agricultural Learning Experiences within this case study.

Each of the students' were allocated a codename name for confidentiality reasons (Cohen, Manion & Morrison, 2000), which corresponded to the coded names used within the structured observation schedule. The written information was collated into related statements about learning content, learning experiences, the attitudes and values that students described, and whether or not they endorsed the program. Responses were categorised according to international claimed benefits of this learning approaches. The responses were categorised in accordance with the high inference variables on Appendix 6, which were used to assist in the analysis of the structured observations.

Teacher Questionnaire

The teacher questionnaire was developed to identify specific benefits or disadvantages of teaching through the use of Agricultural Learning Experiences. Ten questions were developed based on international research, which has identified particular benefits as outcomes of Agricultural Learning Experiences. The questions sought information regarding (a) the knowledge required to teach agriculture, (b) perceptions about students' motivation to learn through Agricultural Learning Experiences, (c) the integration of agriculture into other key learning areas, (d) the transferability of knowledge attained through agricultural experiences to other situations, (e) the development of life skills, (f) any negative aspects of the program, and (g) whether they would recommend a similar program to other schools. A copy of the questionnaire is provided in Appendix 5. The questions were designed to be easily understood (Cohen, Manion & Morrison, 2000). The questionnaire was made up of numerous open-ended questions which were designed to give teachers freedom to respond personally to each of the specific questions. The teachers were given three weeks to complete the questionnaire, and were allocated the codenames: 'T1', 'T2' or 'T3', where the 'T' represented teacher.

Structured Observations

The structured observational schedule was developed using statements from international literature which identified benefits of Agricultural Learning Experiences and a series of behaviors corresponding to the national educational goals of the Adelaide Declaration (1999) and educational "key" competencies (Australian Education Council and Ministers for Vocational Education and Training, 1992; Ministerial Council on Education, Employment, Training and Youth Affairs, 1999). Appendix 6 shows the statements used in observing students. A structured rating schedule was

devised to record the degree to which students completed each level of the behaviours listed in the observation schedule. This was intended to minimise bias and ambiguous definitions of student’s behaviours (Bell, 1993; Cohen, et al., 2000). Structured schedules are considered the most reliable form of observations due to consistent ratings from an observer (Anderson, 1998). The schedule was formatted using a vertical list of low-inference outcome indicators, and their associated high-inference life skill variables. The number of low-inference variables was kept to four or five indicators for successful observational manageability. The data was collected over a four week period where each student was generally observed on repeated occasions, selected at random, and observed through a variety of lessons both indoor and outdoor. Table 1 indicates the level of completions and the symbols used.

Table 1

Marking scheme for student exhibiting low inference variables.

<u>Key to levels of completion</u>	
Awareness	a
Understanding	u
Demonstration	d
Application	ap
Teacher directs	*

The descriptors indicating the level of completion for each behaviour, as listed in the observation schedule, were as follows;

- a. Awareness: student listens to the lesson instructions and appears attentive
- b. Understanding: the student comprehends the task instructions
- c. Demonstration: evidences indicate that the student is able to complete task.

- d. Application: The student exhibits fluency while completing the task, and appears to have the skills to complete tasks of a similar nature.
- e. Teacher Directs: The student requires teacher assistance throughout the completion of the task

The analysis of observation data was collated according to the frequency of observed, low-inference variables during both outdoor and indoor lessons, as shown in Table 1.

Chapter 4

Results

Introduction

The previous chapter summarised the research instruments, data collection method and data analysis procedures for this case study. The analysis of the (a) parent survey was conducted using the SPSS Statistical package (Version 11), and qualitative research methods, (b) teacher questionnaire was analysed using qualitative research methods, (c) student writing tasks were analysed using the high-inference variables framework from the structured observation schedule, and lastly, (d) independent observations were collated together according to the frequency of observed, low-inference variable, during both outdoor and indoor lessons. This chapter will describe the results for research questions one to four, as well as provide background information on *Lindsay Rural School*. Research questions five will be discussed in chapter 5.

Background Information

Lindsay Rural School (a pseudonym to provide anonymity) is a small private school offering Christian education on a nine hectare site located in rural Victoria. It is within commuting distance of Melbourne. The surrounding community is largely comprised of residential 'acreages'. *Lindsay Rural School* offers primary education in accordance with State curriculum requirements and in addition, it facilitates learning through an agricultural education program involving all students in both animal husbandry and horticultural activities. While *Lindsay Rural School* emphasises these agricultural components many of the essential Key Learning Areas (KLAs) are taught using conventional approaches unrelated to agriculture.

The animal husbandry and horticulture components engage the students in approximately one and a half hours of activities weekly, with an additional 10-15

minutes allocated per day for students to care for their animals, flowers and vegetable gardens. Animal husbandry activities revolve around the care of their eleven different varieties of chickens, including feeding and watering, as well as collecting, selling and incubating their eggs. The students are also taught how to care for the school's geese, ducks, rabbits, lizards, wallabies and three riding ponies which are available for riding lessons. The animal husbandry program at *Lindsay Rural School* requires the students to investigate the occasional death of animals, find missing animals, secure enclosures, monitor feeding programs, market and sell the eggs, and assist in rehabilitating injured or sick animals when required. The horticultural activities teach the students how to cultivate the soil for growing vegetables and flowers, care for seedlings, water, weed, pick, prune, fertilize, control pests, market and sell their produce.

Each school term the students have the opportunity to take part in managing the farm, where they are required to submit a written application for either a managerial or apprentice position. These positions include three managers; one each for the garden, farm and equestrian facilities, four wallaby managers, two maintenance teams, three rabbit and guinea pig managers and an apprentice for each management type. The managerial positions are usually selected from among students in the upper grades, who then mentor an apprentice from the lower grades. This job simulation is intended by the school to teach students to deal with conflict through effective communication and co-operation, to deal with problems immediately, and to develop skills in dealing with pressures associated with being a responsible leader.

Twice a year the school community participates in 'Green Thumbs Day' where they focus on improving the condition of the vegetable, flower and general garden landscape of the school. This is intended to build school-community spirit, and pride of ownership of the grounds and facilities. Students have the opportunity to participate as

members of an investment group once a year, where six or seven students from different grades work together to design and implement an agricultural investment of their choice. Each group is allocated a loan (currently \$100) for initial project costs with the goal of doubling their money. Students are expected to repay their loan at the end of each semester (parents agree to repay the school if losses occur). Parents become involved in their child's investment group, which the school promotes as part of the goal of building the community spirit.

Students' Perceptions of the Benefits of Agricultural Learning Experiences

The results described in this section relate to research question one which stated 'Can primary students identify specific benefits of learning through Agricultural Learning Experiences?' Nineteen students, consisting of four grade 4 students, five grade 5 students, and ten grade 6 students, participated in the writing task. The writing tasks required the students to recall (a) their Agricultural Learning Experiences, (b) positive and negative memories, (c) things they have learnt that they could use in the future and, (d) if they would recommend an agricultural program to other schools. These questions provided the students with a sequential structure to suited their developmental stage from which they could write about their perceptions. The analysis of written responses, as described in Chapter 3, was conducted to determine whether students reported benefits that matched the following criteria. The criteria had been directly taken from the six high inference variables developed for the structured observational schedule and corresponded to benefits described in the literature. The criteria were; problem solving, critical thinking, responsibility, communication, teamwork, and adaptability. Students' comments regarding memories and possible future use of agricultural knowledge were also analysed to identify patterns among

students' responses. To maintain participant' confidentiality, all references to individuals use pseudonyms.

Responses from the Writing Task

A sample of the students' writing task responses has been included as Appendix 7. Among the consistent responses to the writing task students at *Lindsay Rural School* identified the development of life skills in problem solving and teamwork as important. Tina (grade 6) stated: "*I've learnt about danger, safety, death and nature, team work and problems*".

Sam (grade 5) described both a problem solving process and teamwork as he described a reoccurring problem where native pigeons were continually becoming trapped in the geese enclosures, "*I've been feeding geese with Ben and Tony and we get birds from the geese pen*". Sam and three other geese monitors were later asked to complete an in-class problem solving report discussing ways to eliminate the problem of pigeons becoming trapped in the cage. The group was asked to define the problem, state what they had seen occurring, what they had done to minimize the problem, and what could be done to fix it. They had been given thirty minutes to complete the task. Sam wrote: "*the pigeons get through the bottom of the gate... what I think will fix it...connect wire to the gate, make the dirt level higher, give them a bigger space... what I have done... I have got the pigeons out by shacking [sic] the fence and blocking the geese and leaving the door open and they run out*". Each of the students in the group reported very similar ideas with small variations. Subsequently, the group actively participated in securing the enclosure.

Many students at *Lindsay Rural School* described personal development in the form of learning to become more responsible as a result of their Agricultural Learning Experiences. Kim (grade 6) wrote: "*I have learnt how to look after animals and be*

responsible". Ben (grade 4) also recognised the need for responsibility in feeding animals: *"we take responsibility like feeding and other work."* Ally (grade 6) identified the responsibility in applying for a farm position, *"at our school they give us some responsibilities, we can apply for jobs like, horse monitor, barn monitor, maintenance"*. Simon (grade 6) discussed the importance of the farm managers as their *"job is to check to see if the chickens are in good health...and bury all the dead chickens"*. Jill (grade 6) reported her duties and experiences, *"we do lots of hands-on- animals things in class like, we hatch chickens (I got one and named him Charlie), clean pens and we have jobs like looking after a chicken pen with Black Orpingtons"*. Students at *Lindsay Rural School* clearly acknowledge that they are responsible for their animals. However, it was also evident that few references were made to their gardening responsibilities.

Students also articulated in their written responses that the Agricultural Learning Experiences provided them with the opportunity to develop skills in working together in teams. Tina (grade 6) stated: *"for the jobs I normally apply with friends when feeding and watering the chickens, we usually help each other"*. Sam (grade 5) referred to enjoying the teamwork on green thumbs day, *"green thumbs day, means we get to work in groups in the garden all day, it [is] fun and I like getting into groups...because you are with your friends"*. These statements clearly illustrated students' perceptions that the Agricultural Learning Experiences at *Lindsay Rural School* facilitated students' development within a team.

The criteria applied to the analysis of student writing task responses included the development of critical thinking, communication and adaptability. Students did not explicitly refer to these criteria which was not unexpected because this could require a level of maturity and meta-cognition that would exceed the developmental stage of the students in this research. Communication played a central role in achieving the

collaboration essential to teamwork and problem solving, both of which were articulated by students as benefits from Agricultural Learning Experiences. Both the individual and team agricultural activities required students to constantly learn about new things, requiring them to be adaptable and willing to try something new. From this it may be concluded that communication and adaptability were essential to successful teamwork and problem solving even though the explicit statements by students did not make mention of these skills. Independent observations of the students, which have been described later in the Results chapter, indicate the presence of, and level of development in these life skills.

Agricultural Memories

Students recalled many memorable Agricultural Learning Experiences in their writing tasks. Susan (grade 6) described: *“when arriving at the school for the first time, as I hoped (sic) out of the car I was so excited. I liked the animals so much and the fact I could look after them”*. This response indicated her desire to be responsible when looking after the animals, a quality which could be fostered in other areas of the school’s curriculum. Tina (grade 6) explained how exciting it is to be involved in growing plants in the garden and hatching chickens, *“I like it when my plants and gardens grow... I really liked it when we hatched chickens”*. Other memorable experiences reported by students included a sense enjoyment for being responsible in their favourite jobs, the day they won the State gardening competition, their enjoyment in developing an agricultural business, making a raft for the ducks on the dam, and being wheeled around in wheelbarrows while working in the garden. Students also reported upsetting and sad experiences, for instance when the chickens were killed by strangers, when students have fallen off the horses or being bitten by the rooster or geese, and some reported disliking weeding and working in the garden all day.

Discussion of the effects of memorable experiences as contributing factors in the development of positive school morale, understanding and appreciating real life, and positive development of character and resilience will be discussed in Chapter Five.

Future Use of Agricultural Knowledge

The students were encouraged to express how the skills and attitudes they have developed while participating in Agricultural Learning Experiences could be used later in life. Jemma (grade 6) stated: *“later on in life I will use my kindness on people like I give to animals”*. Mary (grade 4) wrote: *“I have learnt that every living creature and human shall be looked after”*. Steve (grade 6) said: *“I have learnt that the environment and animals are great and we shouldn't try to hurt them. Instead we should try and help them”*. Other responses included learning about the need to protect and look after animals, and to be patient when handling them.

Student Recommendations for School Agricultural Programs

The students were asked to write whether or not they would recommend an agricultural program to other schools. Simon (grade 6) stated: *“I don't recommend anyone the farming program because I would like us to be the only school to do the farming program”*. Kim (grade) made a similar statement: *“I do not recommend having a farm to any schools because I want our school to be one-of-a-kind. But I think that you should too! Because it makes you smarter”*. Students also clearly articulated their belief that they were privileged to have the agricultural program, Sam (grade 6) wrote: *“I recommend this to other schools because some schools aren't lucky like us”*. Steve (grade 6) believed that there were valuable lessons to be learnt, *“I would recommend other schools to start something like this (and) It is great to see other animals and environments everyday. It would be great to see another school starting something like*

this". It is clear from these statements that students highly valued the agricultural component of *Lindsay Rural School*.

Parents' Perceptions of the Benefits of Agricultural Learning Experiences

The results described in this section relate to research question two which stated: 'What are the perceptions of parents towards Agricultural Learning Experiences? Each family at *Lindsay Rural School* was asked to complete a 23 item survey for each child enrolled. A copy of the Parent Survey is included as Appendix 2. Parents were also given the option to answer an open-ended response on their perceptions of Agricultural Learning Experiences (ALE). Benefits reported by parents included educational and general wellbeing changes, and referred to the development of Christian principles. Analysis of survey responses involved (a) the determination of the reliability of the survey using Cronbach's alpha, (b) producing descriptive statistics to gain an overview of trends in parents' opinions, (c) correlation coefficients to determine if items on the Parent Survey were interrelated, (d) a factor analysis of items on the Parent Survey to determine whether parents' perceptions formed significant clusters, and (e) qualitative analysis of parents' written responses.

Reliability Analysis of Parent Survey

In order to determine the reliability of the parent survey, Cronbach's alpha was calculated from the items using the statistical package SPSS (version 11). An overall Cronbach's alpha value of .85 ($p < .05$) was obtained indicating that the survey could be reliably used for further analysis on parents' perceptions.

Descriptive Statistics

Parents returned a total of 39 surveys which represented a response rate of 73.6 percent, which was regarded as acceptable for the purposes of further analysis. The results showed that 46.5 percent of the students were male and 53.5 percent were

female, and 53.8 percent of students lived on residential blocks, where as 46.2 percent of students lived on a ‘property’. A total of 84.6 percent of students had access to domestic pets where as 12.8 percent had access to livestock while at home. Collectively, 65.8 percents of the students had regular access to gardening where as only 23.1 percent had access to growing fruit and vegetables.

Table 2 summaries the mean and standard deviation of responses for the parent survey.

Table: 2

Mean and Standard Deviation values for Parent Survey Items.

	Mean	Standard Deviation
Item 1	3.69	.468
Item 2	3.41	.595
Item 3	3.79	.413
Item 4	3.77	.706
Item 5	3.49	.756
Item 6	2.41	1.46
Item 7	2.49	1.45
Item 8	3.41	.549
Item 9	1.23	1.55
Item 10	1.95	1.72
Item 11	2.89	1.13
Item 12	2.03	1.60
Item 13	1.92	1.61
Item 14	2.89	1.27
Item 15	2.72	1.28
Item 16	1.82	1.62
Item 17	2.67	1.38
Item 18	1.28	1.59
Item 19	2.95	1.38
Item 20	2.18	1.32
Item 21	2.62	1.73
Item 22	2.21	1.72
Item 23	1.35	0.87

The rating system used to code parent responses ranged from zero (uncertain) through to four indicating ‘*Strong Agreement*’ with the survey item. Strong opinion, either in agreement or disagreement with a particular survey item was regarded as existing for statements distributed 1.0 standard deviation above or below the expected

mean of 2.5. Therefore strong opinions were deemed to exist where the mean value was equal to or above 3.5 or equal to or below 1.5. Item 23 was written as a negative statement and needs to be interpreted as representing a statement about which parents agree.

Results indicate that parents '*Mostly agree*' or '*Strongly agreed*' with items 1, 2, 3, 4, 5, and 8. On this bases, parents agree that their child (a) appears to be enjoying school (item 1), (b) frequently shares school experiences (item 2), (c) enjoys hands on experiences (item 3), (d) has respect for animals and living things (item 4), (e) enjoys learning though agricultural experiences (item 5), and (f) enjoys being independent (item 8). Parents disagreed with the statements contained in survey items 9 and 18. On this bases, parents '*mostly disagreed*' or '*strongly disagreed*' with that their child is more cooperative at home (item 9) and has a better understanding of mathematical concepts (item 18) as a result of Agricultural Learning Experiences.

Correlation Coefficients

Correlation coefficients were calculated using Pearson's r to investigate possible relationships between parents' responses on the survey. Correlation coefficients of 0.40 or above were included in reporting these results in order to focus on the more significant relationships between parents' responses. Table 3 shows the correlation coefficients for the Parent Survey.

Significant positive correlations were found between:

1. Item 1 (enjoys school), Item 2 (shares experiences), Item 14 (good life skills), Item 21 (prepared for the workforce), and Item 22 (higher education preparation).
2. Item 3 (enjoys hands-on experiences), Item 4 (respect for living things), and Item 5 (like learning through ALE).
3. Item 6 (good understanding of agricultural concepts), Item 11 (good problem solving skills), Item 12 (persistence, determination, patience), and Item 18 (understands mathematics).

4. Item 7 (more motivated), Item 10 (enhanced self-esteem), and Item 18 (understands mathematics).
5. Item 8 (enjoys independence), Item 10 (enhanced self-esteem), Item 11 (good problem solving skills), Item 17 (skills for future), and Item 18 (understands mathematics).
6. Item 10 (enhanced self-esteem), Item 12 (persistence, determination, patience), and Item 18 (understands mathematics).
7. Item 11 (good problem solving skills), Item 12 (persistence, determination, patience), Item 14 (good life skills), Item 15 (information processing skills), Item 17 (skills for future), Item 18 (understands mathematics), Item 19 (applied to other school subjects), Item 20 (subjects taught through ALE), and Item 21 (prepared for the workforce).
8. Item 12 (persistence, determination, patience), Item 16 (desire to work in farming), Item 18 (understands mathematics), and Item 20 (subjects taught through ALE).
9. Item 13 (appreciates farmers issues), Item 17 (skills for future), Item 19 (applied to other school subjects), and Item 20 (subjects taught through ALE).
10. Item 14 (good life skills), and Item 22 (higher education preparation).
12. Item 15 (information processing skills), and Item 18 (understands mathematics).
13. Item 17 (skills for future), and Item 19 (applied to other school subjects).
14. Item 18 (understands mathematics), and Item 19 (applied to other school subjects).
15. Item 19 (applied to other school subjects), Item 20 (subjects taught through ALE), and Item 21 (prepared for the workforce).
16. Item 20 (subjects taught through ALE), and Item 21 (prepared for the workforce).
17. Item 21 (prepared for the workforce), and Item 22 (higher education preparation).

Table 3
Correlation coefficients for the parents survey (note: * denotes $p < .05$; ** denotes $p < .01$).

ITEM1	ITEM2	ITEM3	ITEM4	ITEM5	ITEM6	ITEM7	ITEM8	ITEM9	ITEM10	ITEM11
ITEM1	1									
ITEM2	.466**	1								
ITEM3	.066	.347*	1							
ITEM4	.018	-.019	.494**	1						
ITEM5	-.086	.305	.515**	.364*	1					
ITEM6	.189	.164	.219	.349*	.290	1				
ITEM7	-.045	.067	.080	.300	.282	.300	1			
ITEM8	-.110	.035	-.075	.047	.195	.305	.382*	1		
ITEM9	-.227	-.048	.047	.195	.382*	.270	.242	.270	1	
ITEM10	.105	.081	.018	-.068	.324	.407	.500**	.270	.270	1
ITEM11	.271	.152	-.142	-.045	.433	.245	.348*	.241	.527**	.419**
ITEM12	.117	.321*	.041	.075	.400*	.276	.132	.165	.321	.530**
ITEM13	.220	.091	.180	.106	.368	.276	.023	.007	.277	.029
ITEM14	.485**	.128	.007	.031	.138	-.121	.263	.048	.329*	.450**
ITEM15	-.061	-.260	-.218	-.133	.233	-.166	.428**	-.037	.500**	.400*
ITEM16	.342*	.188	.180	.055	.187	.184	.437**	.230	.256	.440
ITEM17	.122	.331*	.106	-.027	.394*	.241	.238	-.069	.249	.542**
ITEM18	.084	.041	-.060	.107	.458**	.442**	.151	-.215	.274	.590**
ITEM19	.302	.123	.112	.313	.285	.145	.060	-.325*	.291	.223
ITEM20	.306	.038	.062	.046	.220	.132				
ITEM21	.567**	.183	-.089	-.032	.127	.035				
ITEM22	.572**	.070	.048	-.047	.091	.033				

Table 3
Correlation coefficients for the parents survey (note: * denotes $p > .05$; ** denotes $p > .01$).

	ITEM12	ITEM13	ITEM14	ITEM15	ITEM16	ITEM17	ITEM18	ITEM19	ITEM20	ITEM21	ITEM22
ITEM1	.117	.220	.485**	-.061	.342*	.122	.084	.302	.306	.567**	.572**
ITEM2	.321*	.091	.128	-.260	.188	.331*	.041	.123	.038	.183	.070
ITEM3	.041	.180	.007	-.218	.180	.106	-.060	.112	.062	-.089	.048
ITEM4	.075	.106	.031	-.133	.055	-.027	.107	.313	.046	-.032	-.047
ITEM5	.294	.393*	-.199	-.017	.138	.361*	.080	.227	.254	-.034	-.160
ITEM6	.400*	.368*	.138	.233	.187	.394*	.458**	.285	.220	.127	.091
ITEM7	.245	.276	-.121	-.166	.184	.241	.442**	.145	.132	.035	.033
ITEM8	.348*	.132	.023	.282	.263	.428**	.437**	.238	.151	.060	-.175
ITEM9	.242	-.090	.165	.007	.048	-.037	.230	-.069	-.215	-.252	-.325*
ITEM10	.527**	.241	.250	.321	.277	.329*	.500**	.256	.249	.274	.291
ITEM11	.419**	.137	.410*	.530**	.029	.450**	.400*	.440**	.542**	.590**	.223
ITEM12	1	.312	.375*	.288	.409**	.230	.495**	.288	.449**	.280	.238
ITEM13	.312	1	.036	.226	.323	.443**	.204	.407*	.407*	.274	.135
ITEM14	.375*	.036	1	.327*	.134	.085	.255	.319	.187	.335*	.430**
ITEM15	.288	.226	.327*	1	.179	.363*	.404*	.321*	.250	.248	.135
ITEM16	.409**	.323	.134	.179	1	.243	.255	.220	.262	.229	.221
ITEM17	.230	.443**	.085	.363*	.243	1	.379*	.489**	.367*	.342*	.018
ITEM18	.495**	.204	.255	.404*	.255	.379*	1	.464**	.340*	.300	.161
ITEM19	.288	.407*	.319	.321*	.220	.489**	.464**	1	.689**	.501**	.238
ITEM20	.449**	.407*	.187	.250	.262	.367*	.340*	.689**	1	.576**	.367*
ITEM21	.280	.274	.335*	.248	.229	.342*	.300	.501**	.576**	1	.683**
ITEM22	.238	.135	.430**	.135	.221	.018	.161	.238	.367*	.683**	1

Factor Analysis on Survey Data

The factor analysis procedure was conducted using the parent survey data to identify any related groupings of parent responses. The decision to conduct a factor analysis was supported by the array of relationships identified through the correlation procedure. The factor analysis was conducted using Principal Component Analysis with varimax rotation, again using the SPSS Statistical package (version 11). The data confirmed nine factors which accounted 77.7% of the variance. A scree plot indicating eigenvalues greater than one is shown in Figure 1. The factor loadings for each item have been included as Appendix 8.

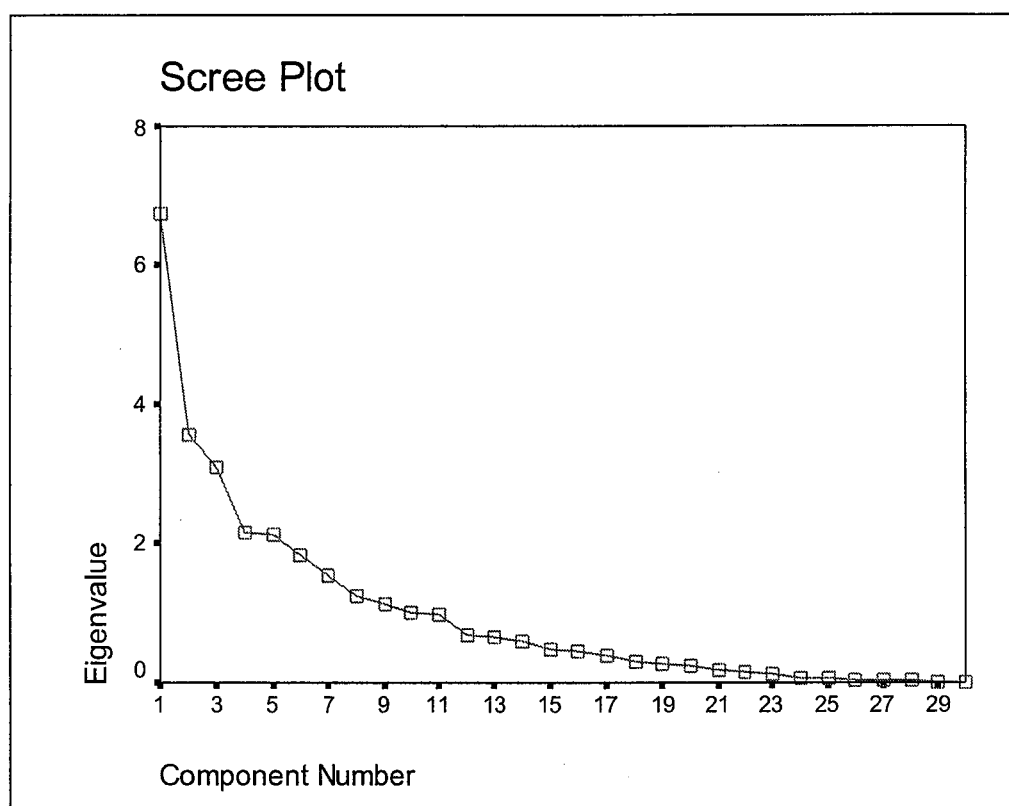


Figure 1: Scree plot of eigenvalues for the parent survey.

Table 4

Parent survey items loading for factor one: *Personal Development*.

Item No.	Description
Gender	
Item 7	As a result of agricultural experiences my child <i>is more motivated to learn</i> .
Item 8	As a result of agricultural experiences my child <i>enjoys being independent</i> .
Item 9	As a result of agricultural experiences my child <i>is more cooperative at home</i> .
Item 10	As a result of agricultural experiences my child <i>has enhanced self-esteem</i> .
Item 12	As a result of agricultural experiences my child <i>is developing persistence, determination and patients</i> .
Item 18	As a result of agricultural experiences my child <i>is understanding mathematical concepts</i> .

Factor One loaded for seven items as shown in Table 4. Due to the predominance of items describing qualities relating to personal development this factor was labelled '*Personal Development*'. Factor Two loaded for five items as shown in Table 5. Therefore Factor Two has been labelled *Transferable Skills* due to the items generally referring to abilities that students will apply in life beyond the classroom.

Table 5

Parent survey items loading for factor two: *Transferable Skills*.

Item No.	Description
Frutveg	My child has regular access to growing fruit and vegetables at home.
Item 19	Agricultural Learning Experiences <i>teach skills that can be applied to other subject areas</i> .
Item 20	Agricultural Learning Experiences <i>can assist in effectively teaching English and Human Society and Its Environment</i> .
Item 21	Agricultural Learning Experiences <i>help prepare my child for the work force</i> .
Item 22	Agricultural Learning Experiences <i>help prepare my child for higher education</i> .

Factor Three comprised four items as summarised in Table 6. Factor Three has been labelled *Information Processing and Problem Solving* to correspond with two of the items contributing to this factor. The loading of the item relating to a good understanding of agricultural concepts suggests that parents perceive a link between the

understanding of agriculture and problem-solving and information processing skills. It also suggests that parents perceive these links to be more evident in older students.

Table 6

Parent survey items loading for factor three: *Information Processing and Problem Solving*.

Item No.	Description
Age	
Item 6	As a result of agricultural experiences my child <i>has a good understanding of agricultural concepts</i>
Item 11	My child <i>has good problem solving skills</i>
Item 15	My child <i>has good information processing skills (measuring, collecting, analysing data and drawing conclusions)</i>

Factor Four identified relationships between items describing students as enjoying school (item 1), wanting to share their experiences (item 2), and learning skills that can be used later in life (item 17). Therefore Factor Four has been labelled *Social Skills*. Factor Five describes students as enjoying hands on experiences (item 3), having a respect for animals and living things (item 4), and enjoying learning through agricultural experiences (item 5). On the basis of these linked items Factor Five has been labeled *Authentic Learning*. Factor Six consisted of items relating type of residence, regular access to livestock and the perception that Agricultural Learning Experiences prepare students for higher education. Therefore Factor Six has been labeled *The Potential of a Rural Lifestyle*. Factor Seven loaded for two items which described Agricultural Learning Experiences as helping students to appreciate issues faced by farmers (item 13), and learning agricultural skills that can be used later in life (item 17). Therefore Factor Seven was labelled *General Appreciation of Agriculture*.

Factors Eight and Nine each loaded for single items which have not been described due to the limited benefit these factors make in understanding the perceptions held by parents in relation to Agricultural Learning Experiences.

Parents' Written Responses

Parents at *Lindsay Rural School* were asked to add any additional comments within an optional open-ended response. Within this section a parent reported: *"I believe that an agricultural based learning program gives a child the opportunity to learn to be responsible"* (P 3). Another response stated that children develop *"team work, hard work, persistence, patience and appreciation for food and animals"* (P 1) while being part of the agricultural program. Developments in self-esteem and motivation to learn were other key benefits identified by parents. For example: *"it provide life skills and most importantly the motivation to learn which flows through into other subjects and increases children's (my child's) self-esteem...which is so important for later teenage years in this society"* (P 6). Broad consensus was evident among parents that the development of life skills required for the work force is facilitated through Agricultural Learning Experiences. One parent concluded:

the life skills that are taught through this program are outstanding. The process of applying for work positions and taking responsibility should be in all schools. Having something to take care of eg - animals or plants assist children to move from egocentric concerns and aid in their understanding of caring for others and our environment. An agricultural program gives children something to take pride in thus the self-esteem benefits are enormous!! I chose the school for my children because of the agriculture- based learning program. I am an advocate for this style of learning. Outcomes; writing job applications, accounting, responsibility, strong work ethic, understanding to get a salary=commitment to a job, advertising, problem solving, broad knowledge base, confidence (P 7).

Agricultural Learning Experiences were described by one appreciative family as providing an environment that changed their child's schooling life.

Our child was frequently sick (weekly) and didn't want to go to school and didn't like learning. This school experience has totally changed our child and we are great advocates of the program. It has been greatly benefited our family" (P 4).

Similarly, another parent stated that:

my son had many problems before attending this wonderful school (hyperactivity, short attention span and emotional issues) but now doing so much great work in all subjects thanks to this wonderful school environment. We are so grateful to God that such a wonderful school exists (P 5).

Not all parents reported that their children expressed unreserved appreciation for the agricultural learning activities. As an example, one parent reported that her child did not always enjoy hands-on agricultural experiences:

our child is not the kind of person who likes getting his hands dirty! So voluntary contact with the animals and gardens is not high on his priority list. However, we know that the duties he carries out within the compulsory class activities are most definitely beneficial to him. We hope that later in life he will be able to recall and use the lessons and skills he has learnt at this school (P 2).

Christian Principles

Parents also made reference to the spiritual aspects of the school's program and stated that in addition to academic success, their children were effectively taught about God through agriculture, "*besides the obvious benefits to the academic perspective of children educations (maths, science, English, problem solving, agriculture, animal husbandry etc) these lucky children are able to learn about God's creation 'hands-on' and are able to appreciate God's grand plan from a young age*" (P 5).

Teachers' Perceptions of the Benefits of Agricultural Learning Experiences

The results described in this section relate to research question three which stated: 'What are the perceptions of teachers towards Agricultural Learning Experiences? The three teachers at *Lindsay Rural School* were asked to complete a survey in relation to: (a) how they perceived teaching the agricultural components, (b) whether Agricultural Learning Experiences improved students overall motivation to learn, (c) whether Agricultural Learning Experiences could be used to teach a variety of key learning areas, (d) how information processing skills could be enhanced, (e) how agricultural knowledge be transferred to other areas, (f) what essential life skills were

developed by students, (g) whether they perceived any negative aspects to an agricultural program, and (h) whether they would recommend that other schools develop an agricultural program.

The teachers' initial perceptions of the agricultural component of the curriculum were identified as being generally comfortable as they had some personal experience in agriculture. The teachers did however state that it is essential that the teacher has "*an enjoyment of gardens and a love for animals*" (T 2), and that teachers in such schools needed to be prepared to "*gain the necessary knowledge*" (T 1) and skills, and be prepared to "*take time and effort to research*" (T3) the agricultural topics. The teachers indicated a strong belief that their students were more motivated to learn as a result of Agricultural Learning Experiences, especially when caring for the chickens (after a while the students are motivated in the garden). When students:

have a reason to learn a skill; when they can see the necessity of acquiring knowledge in order to achieve a good result in a practical skill, they are definitely more motivated to learn". It was reported, "after these activities the children work well in their class work" and appear to be "more motivated to learn if they do not have to sit all day (T2).

The Agriculture Learning Experiences were also reported as being a valuable tool for effectively teaching subjects across the key learning areas and in developing an integrated curriculum, for example:

measuring to work out square metres of animal enclosures for ordering animal bedding, chance and data to work out the probability of getting a splash orpington (type of chicken) from two blue orpingtons, multiplication to work out how many bulbs we need to plant 10 rows with spacing of 5 cm etc. Science is continually involved. Written expression is involved in keeping diaries when incubating chickens or growing seeds, writing job applications etc. Students become confident in public speaking when they run farm tours etc. The list could go on and on (T2).

Teachers identified students' improvements in information processing competencies through their Agricultural Learning Experiences. Teacher 3 stated:

“students have a great opportunity to improve their skills to observe and hypothesise as they are provided with many ‘real life’ opportunities for problem solving e.g- which is the best pen to keep our new wallabies in - considering size, sunlight and shelter? Design an extension for it to include some area of natural habitat; or how can we stop the crows from stealing our chickens; or how can we stop the pigeons from becoming trapped in the poultry enclosures; or why do pigeons get trapped while the crows manage to get in through very small spaces and find their way back out again”. They constantly measure, collect and draw conclusions from the little production line: the mini farm...analysing why certain things happen and...become socially more adapt” (T3).

The teachers believed that the skills learnt in the Agricultural Learning

Experiences are transferable to other applications, as the students have learnt *“to solve real life problems”* (T2). The experiences teach students about death and have helped develop *“creative thinkers...that are more practical and efficient”* (T2). Teachers report that the investment groups facilitate student’s development in life skills such as *“team work, initiative and determination”* (T3) and *“life skills in problem solving and critical thinking”* (T2). The students also learn the importance of caring for *“creature[s] or plant[s] or they will die- so they learn to be responsible”* (T3). The skills they have learnt in growing their own food is *“making them resilient...as they have learnt that they can survive if they work”* (T3).

Effective communication skills are developed in the students, as they interact with others *“they are quickly taught some vital skills when caring for animals”* (T3). Students learn that a *“gentle approach with animals will produce confidence and so it is with real life relationships”* (T 3). In addition, teachers stated that students in this schooling environment were *“more pre-occupied with day-to-day responsibilities on the farm rather than entertainment/music/games that other students occupy their lunchtime with”* (T3).

When asked to describe any negative aspects of the agricultural program, one teacher responded saying that the *“biggest problem for me as a teacher is preparation*

time. E.g. purchasing seeds and organising gardening tools” (T1). It can also be difficult managing the farm as “*in a small school there are less people to rely on and so the small group must do the planning, growing following through, fixing*” (T3). It was also explained that the time used for the Agricultural Learning Experiences did not currently allow time for the students to learn another language, as recommended by the State curriculum. However, “*the benefits of animal husbandry and horticulture outweigh that of LOTE*” (i.e., Languages Other Than English) (T2).

When asked if they would recommend an agricultural program to other schools the immediate answer was “yes” as “*children learn about real life situations...it brings out the best in children’s characters, responsibility, perseverance and good work ethics*” (T1). Another teacher stated that, “*after seeing so many of our students blossom through our agricultural programs, I can’t really imagine education without it. Most of our students have a confidence that will stand them in good stead through their lives*” (T2). The students also “*show a lot of initiative in other areas...are quite confident to have a go at other things*” (T1), which is beneficial for all students. The students who were “*not highly academic in the traditional areas of literacy and numeracy have an opportunity to shine in a more practical area. It gives students an understanding that intelligence is not confined to the students who are good at the ‘text book’, therefore it is very beneficial*” (T2).

Teachers also reported the benefit to the school community as “*students take ownership of the place and they try to beautify it and keep it clean and neat. Parents take ownership of the school and put in a lot of their time*” (T3).

The teachers at *Lindsay Rural School* understand that not all schools have appropriate land space and facilities, however they maintain the belief that all schools can be “*involved in a big way, others in just small activities. Students must know where*

our foods come from and how much toil it takes to put food on the table. It's a must" (T3).

Christian Perspective

From a Christian perspective teachers concluded that Agricultural Learning Experiences help *"develop a love and respect of creation and the creator,"* [and allows] *students to learn about God through nature...getting a glimpse of what an awesome designer He is"* (T2). Teachers *"believe that God did not design us to learn everything in sterile, fairly unchanged environments, enclosed by four walls"* (T3) however they did not negate the value of the classroom for learning.

Observations of Students at Lindsay Rural School

The results described in this section relate to research question four which stated 'Do independent observations confirm claimed advantages of Agricultural Learning Experiences? Nineteen students participated in the writing task consisting of four grade 4 students, five grade 5 students, nine grade 6 students and one grade 7 student. The structured observation schedule was used to determine the degree to which students completed tasks relating to the benefits of ALE including (a) problem solving tasks, (b) designing informative posters on the Olympics, (c) horse riding lessons and instructional care, (d) creative writing tasks, (e) daily care of their animals, vegetable and flower gardens, (f) visual arts activities involving drawing scenes around the school, (f) horticulture-planting seeds and animal husbandry-checking the age of the chooks, (g) Bible based activities relating to books of the Bible, (h) mathematics involving two dimensional and three dimensional shapes, and (i) comprehension tasks. Students who exhibited the low inference variables were regarded as being engaged in the development of the high inference variables. On the basis of the observed level of skill implementation students were allocated a level of completion for each low

inference variable. Table 1 summarises the marking scheme used to record the level of completion of specific skills as shown on page 31, this table has been reiterated for the analysis of Table 7 and 8.

Table 1

Marking scheme for student exhibiting low inference variables.

Key to levels of completion	
Awareness	a
Understanding	u
Demonstration	d
Application	ap
Teacher directs	*

The frequency of implementation of low-inference variables were entered onto a structured observation schedule as shown for Table 7 and 8 respectively. The first table (i.e., Table 8) identifies observational data from outdoors lessons and the second table (i.e., Table 9) is the collective result of observations from indoor activities.

High Inference Variable	OUTDOOR 1													
	Student Codenames													
	Low Inference Variable (Outcome indicator)													
	Mary 4	Ben 4	Anne 4	Bret 4	Tim 5	Ally 6	Jemma 6	Bob 5	Alice 6	Steve 6				
1. Problem Solving	1.1 Task definition	ap	d	d	u	ap	ap	ap	ap	ap				ap
	1.2 Makes accurate observations	ap *	ap *	d	ap	ap	ap		ap	ap				ap
	1.3 Develop alternative strategies		ap		ap									
	1.4 Select most suitable strategy	ap *	ap *	*	ap	d	ap	ap	ap	d				d
	1.5 Applies most suitable solution			*	ap	d	ap	ap	ap	ap				ap
2. Critical Thinking	2.1 Sort, evaluates & interprets information			ap	*		ap							
	2.2 Formulate hypotheses	u	u			ap			ap	ap				ap
	2.3 Comprehend & extract significant evidence		ap	ap *	ap	ap	ap	*	ap	ap				ap
	2.4 Recognizes & evaluates evidence	ap *	ap *			ap			ap	ap				ap
	2.5 Reasons deductively	ap *	ap *	u	d	ap	ap	d	ap	ap				ap
3. Responsibility	3.1 Shows awareness that they are accountable for their actions	*	ap	ap *	u	u *	ap	d *		ap				ap
	3.2 Plans & manages time (meets deadlines)	a	d *	a *	*	a *	ap	ap *						ap
	3.3 Shows accountability when in a group													
	3.4 Sets realistic goals													
4. Communicate	4.1 Listens to task instructions	u *	d *	u	d	ap *	ap	*	ap	ap				ap
	4.2 Asks questions to clarify directions		u	d	ap *	d *								
	4.3 Reads & understands information in a variety of forms													
	4.4 Assists others in understanding						ap		ap	ap				
5. Teamwork	5.1 Is an active participant in groups	ap			d		ap							
	5.2 Respects the opinions of others	d												
	5.3 Offers their perspective, ideas			d										
	5.4 Plans & makes decisions with others & supports outcomes of those decisions		d			ap	ap							
	5.5 Negotiates & resolves conflicts positively & promptly		ap											
6. Adaptability	5.6 Motivates the group to complete tasks													
	6.1 Willing to try something new	ap	ap	ap		ap	ap	ap	ap	ap				ap
	6.2 Able to accommodate changes in activity													
	6.3 Learns from mistakes & feedback	ap	ap				ap							ap

Table 8
Student observation records for indoor lessons

High Inference Variable	INDOOR 1	Student Codenames									
		Mary 4	Ben 4	Anne 4	Bret 4	Tim 5	Ally 6	Jemma 6	Bob 5	Alice 6	Steve 6
1. Problem Solving	1.1 Task definition	ap	u	ap	*	d *	ap	ap	d	ap *	ap
	1.2 Makes accurate observations	ap	ap	ap	d	d	ap	ap	ap	ap	ap
	1.3 Develop alternative strategies	ap	ap	a		ap		ap	ap		d
	1.4 Select most suitable strategy		a			a					
	1.5 Applies most suitable solution										
2. Critical Thinking	2.1 Sort, evaluates & interprets information	u *	ap	ap *	d *	u *	ap	ap		ap	ap
	2.2 Formulate hypotheses										
	2.3 Comprehend & extract significant evidence	u	ap	d		5	ap	ap		ap	ap
	2.4 Recognizes & evaluates evidence										
	2.5 Reasons deductively										
3. Responsibility	3.1 Shows awareness that they are accountable for their actions	d	*	u *	d *	d *	ap	ap	d	ap	d
	3.2 Plans & manages time (meets deadlines)	u *	u			u *	ap	ap	ap	ap	d
	3.3 Shows accountability when in a group		u			u *					
	3.4 Sets realistic goals										
4. Communicate	4.1 Listens to task instructions	d	*	d *	d	ap *	ap	ap	d	ap *	ap
	4.2 Asks questions to clarify directions	d	d	u	d	d *	ap	ap	d	ap	ap
	4.3 Reads & understands information in a variety of forms	u		ap	u	u	ap	ap			u
	4.4 Assists others in understanding				d						
5. Teamwork	5.1 Is an active participant in groups		*			d			d		
	5.2 Respects the opinions of others		d			ap			d		
	5.3 Offers their perspective, ideas										
	5.4 Plans & makes decisions with others & supports outcomes of those decisions		d			u *			d		
	5.5 Negotiates & resolves conflicts positively & promptly										
6. Adaptability	5.6 Motivates the group to complete tasks										
	6.1 Willing to try something new										
	6.2 Able to accommodate changes in activity	d	d	ap *	ap	ap *	ap	ap	ap	ap	ap
	6.3 Learns from mistakes & feedback			*		*					

Chapter 5

Discussion on Findings

Introduction

The results from the previous chapter summarised many specific benefits of Agricultural Learning Experiences, as perceived by parents, teachers, students and researcher observations. The results from each source will be discussed according to their corresponding research question, while question five will discuss the combined perspective from all research data in relation to the national goals of education.

Students' Perceptions

Research question one was intended to establish whether or not students reported benefits of learning through Agricultural Learning Experiences (ALE). Analysis of the student writing tasks identified personal development in problem solving, teamwork, responsibility and future use of agricultural knowledge. These personal developments directly correspond to the goals described in the Adelaide Declaration (MCEETYA, 1999), and the generic “key” competencies, regarded as essential to the workplace (Australian Education Council and Ministers for Vocational Education & Training, 1992).

The development, by students, of these specific life skills appears to be directly related to their enjoyment of Agricultural Learning Experiences, as stated by numerous students. Recalling gardening experiences was generally stated considerably less than experiences relating to animals. This may reflect student’s periodical interactions with growing flower or vegetables, and continuous interactions with the animals.

Theoretically this outcome can be explained by a number of theories of motivation that describe the importance of student interest in an activity in order to motivate effort. The Expectancy x Value theory predicts that student effort is related to

the degree to which students believe they will succeed at a task and the value they will give to the task. Value increases when students are more interested. From a theoretical point of view the reasons for enjoying ALE seem to be easily accounted for (McInerney & McInerney, 2002; Sternberg & Williams, 2002).

Statements by students identified that many of the believed they were privileged through having access to ALE, *“I want our school to be one of a kind. But I think that you should too! Because it makes you smarter”* (Kim). This student portraits a belief that the agricultural program at *Lindsay Rural School* is unique and that it has increased her academic performance.

Developing knowledge that can be transferred to other situations was also identified by students. Statements such as: *“I will use my kindness on people like I give to animals”* (Jemma) show an example of this. Similarly, another student stated that they have learnt the importance of caring for the animals and the environment, which they can use later in life. Learning through real life contexts at *Lindsay Rural School* has provided the students with an environment that facilitates the development of knowledge that can be transferred to other situations.

Parents’ Perceptions

Research question two was intended to establish the perceptions of parents towards Agricultural Learning Experiences. The reliability analysis of the parent survey confirmed the suitability of this instrument as a means of identifying parents’ perceptions. Trends in significant mean values indicated that parents agreed with the following survey items 1, 2, 3, 4, 8 and 23. They state that children; enjoy school, frequently share school experiences, enjoy hands-on experiences, have respect for animals and living things, enjoy learning through agricultural experiences, enjoy being independent, and perceive agriculture as relevant regardless of students’ future career

choice. These results clearly identify that parents believe their children enjoy learning through Agricultural Learning Experiences, and perceive it to be a relevant form of education.

Trends in significant mean values indicated that parents disagreed with survey items 9 and 18, which stated that ALE assists their children in being cooperative at home and their understanding of mathematical concepts.

The correlation coefficients for the survey identified numerous relationships between items, interestingly there were no significant negative correlations when all items were coded. In light of the large number of correlations, only correlations that incorporate four or more items will be discussed. Correlations between items 1, 2, 14, 21, and 22 identifies that parents perceive their child's enjoyment of school and desire to share their experiences, is connected to the development of good life skills, preparation for the workforce and higher education. Parents therefore perceived that their children are being prepared for life beyond school.

Significant positive correlations were found between items 8, 10, 11, 17 and 18, where parents identified their children as enjoying independence, and as a result of ALE have enhanced self-esteem, problem solving skills, skills required for the future, and understanding in mathematics. This correlation states that parents perceive ALE as assisting their child's personal development and essential skills. The development of mathematical understanding in conjunction with the other items is an interesting and less expected correlation. This correlation supports the importance of mathematics in terms of curriculum goals as required by the Adelaide Declaration (e.g., Goal Statement 2.3, MCEETYA, 1999).

The analysis of the Parent Survey also identified significant positive correlations between items 12, 16, 18 and 20 which stated that parents perceive ALE as assisting

their children in developing persistence, determination, patience, the desire to work in farming, developing mathematical understanding, and can be used to teach other subjects. From this it can be concluded that parents perceive ALE as assisting their children in developing specific personal qualities and educational understanding, while enhancing the curriculum and stimulating interest in agricultural careers.

Correlations between items 13, 17, 19 and 20 identified that parents perceive ALE as developing their child's understanding of issues facing farmers, developing skills that can be used after leaving school, and teaching skills that can be applied to other subject areas. This indicates that parents perceived that essential skill are learnt through ALE, which can be applied to other school subjects, while developing an appreciation of issues facing farmers.

While the factor analysis of the survey identified nine components, the last two components only loaded for a single item. For this reason only the first seven components will be described. A complete description of which items loaded for these components has been provided in Chapter 4. The factor analysis confirms that parents hold distinct and positive views of the knowledge, skills and values being developed by their children. These skills equip the students with values of rural life styles, appreciation, social skills, transferable skills, information processing and problem solving skills. For fluent readability, the factors have been labelled (a) Personal Development, (b) Transferable Skills, (c) Information Processing and Problem Solving, (d) Social Skills, (e) Authentic Learning, (f) The Potential of a Rural Lifestyle and, (g) General Appreciation of Agriculture.

These loadings are closely aligned with the national goals of education, while developing students' appreciation for agricultural industries. The results identify a relationship between the factor labelled personal development, and female students at

Lindsay Rural School. Similarly, the factor labelled transferable skills is associated with students having access to growing fruit and vegetables at home. The factor labelled information processing and problem solving, is associated with student's ages, where parents of older students perceive developments in this areas to be more evident. The majority of the older students have attended *Lindsay Rural School* from the beginning of their schooling experience. Therefore, parents of female students, older students, or students who have access to growing fruit and vegetables at home are more likely to have positive perceptions of the benefits of ALE.

The parents' written responses collectively identify that their children have developed responsibility, "*team work, hard work, persistence, patience and appreciation for food and animals*" (P1), motivation, self-esteem, understanding of God and creation, and a developing work ethic. It was also identified, by at least one parent, that their child with "*hyperactivity, short attention span and emotional issues*" (P5) was significantly benefited by ALE. Parents did however identify that not all children enjoy getting dirty. Despite this they still recognise the benefits attained by their children. The additional written responses summarised benefits of specific developments of children, indicating educational growth and significant positive impacts for a variety of student needs.

Teachers' Perceptions

Research question three was intended to establish the perceptions of teachers towards Agricultural Learning Experiences. The analysis of the open-ended questionnaire identified that the teachers at *Lindsay Rural School* agreed with research identifying the benefits of ALE from a teaching perspective, as they facilitate student's developments in life skills (Berkey & Sutphum, 1984; Choi & Hannafin, 1997; Mabie & Baker 1996). Teachers concluded that their students have developed "*team work,*

initiative and determination” (T3), motivation, information processing, problem solving and critical thinking through real life situations, responsibility, communication, Christian concepts and confidence through ALE. Teachers recognised that students work well in the classroom after ALE.

Agricultural Learning Experiences were also stated as an effective teaching and learning avenue for students that are not academically inclined. Enhancing the school community spirit and the curriculum through real life problem solving was a significant statement identified within the analysis of the questionnaire. International research confirms teachers’ perceptions that agriculture enhances the curriculum and can be integrated throughout many Key Learning Areas (Knobloch & Martin, 2000). Regardless of the extra time required in researching and preparing the ALEs, the teachers at *Lindsay Rural School* recommended other schools establish an agricultural program, and could not imagine teaching without it as the benefits are far reaching.

Independent Observations

Research question four was intended to establish whether independent observations confirmed claimed advantages of Agricultural Learning Experiences. Observations of students at *Lindsay Rural School* sought to identify the level of completion of activities associated with the following high inference variables: problem solving, critical thinking, responsibility, communication, teamwork and adaptability. Students were allocated a level of task completion of ‘awareness’, ‘understanding’, ‘demonstration’, ‘application’ or ‘teacher directs’ as stated in Chapter 3. For example observations of Ally, Jemma, Alice and Steve consistently identify that they are working mainly within the ‘application’ level, regardless of whether activities are indoor or outdoor. Findings identify that students such as Mary, Ben, Anne and Brett, are constantly requiring ‘teacher direction’, regardless of whether the activities are

indoor or outdoor related. This appears to reflect the grade that they are currently completing (grade 4) and have therefore not been exposed to the ALE for as long as the majority of grade six students. Observational results of students such as Tim and Tony indicate inconsistencies in their level of completion of activities, especially when comparing outdoor and indoor results. It should be noted that these students were also observed to have difficulty concentrating and exhibited far greater enthusiasm for learning when lessons were conducted outside the classroom. Observations of these students outside the classroom showed that they required less teacher assistance. Students' level of completion of teamwork identified by the low inference variables was not significantly evident in comparison to the remaining five high inference variables.

Educational Benefits

Research question five was intended to establish whether the claimed benefits of Agricultural Learning Experiences contributed to student's development of the national education goals. The Adelaide Declaration (MCEETYA, 1999), and generic "key" competencies regarded as essential to the workplace (Australian Education Council and Ministers for Vocational Education & Training, 1992) and the value of Sustainable Education (Australian Government Department of Environment & Heritage, 2005) will be discussed in association with the results of perceived benefits of ALE at *Lindsay Rural School*.

The Adelaide Declaration (MCEETYA, 1999) emphasises the importance of developing skills in analysing, problem solving, communicating, planning and organising (Goal statement 1.1). Students specifically identify the development of problem solving skills, where teachers state numerous tasks require their students to problem solve, communicate, plan and organise. Parents' perceptions identify the

development of information processing and problem solving skills within factor three, consistent with written statements.

Education goals state the importance of students developing self-confidence, high self-esteem, development of potential life roles including becoming effective community and workforce members (Goal statement 1.2). Parents' written perceptions of the benefit of ALE identify the development of their child's self-confidence, high self-esteem, and skills required for the future within the workforce. The analysis of the Parent Survey identifying distinct factors confirms parents' written perceptions. Teachers also recognised the value of Agricultural Learning Experiences in supporting students' development of confidence and the life skills required for the workforce.

Developing talents and capacities in exhibiting moral and personal responsibility (Goal statement 1.3) is identified by each of the four participant groups. The development of students' understanding of career options and exhibiting a positive attitude towards vocational training and life-long learning is an important goal (Goal statement 1.5). Both parents and teachers identify the development of life skills that attribute to the development of life-long learning, however not explicitly mentioned.

The concern for stewardship of the natural environment (Goal Statement 1.7) is an educational goal that was specifically identified by students only.

The development of knowledge and skills within the Key Learning Areas is a focus of *Lindsay Rural School*, where Agricultural Learning Experiences are often integrated into the different subject areas in order to enhance the authenticity of learning.

Lastly the goals of the Adelaide Declaration state that students should develop enterprise skills that will allow future adaptability and flexibility (Goal statement 2.4). Observations of students identified that the majority of students were willing to try

something new which may attribute to future willingness and flexibility. The numerous skills and attitudes developed with Agricultural Learning Experiences could therefore be expected to have a positive effect on the students within all facets of their future.

In addition to these education goals, the “key” competencies identify the importance of students developing skills in working within teams (Australian Education Council and Ministers for Vocational Education and Training, 1992). The development of abilities to work effectively in teams was identified by the students’ and teachers’, and through observations, however this did not occur extensively.

Reference to the value of Sustainable Education (Australian Government Department of Environment & Heritage, 2005) has not been specifically identified by the participants, however it must be noted that practices associated with sustainability were evident.

The wide variety of perceptions describing benefits that contribute directly to nationally established goals of education confirms the value of Agricultural Learning Experiences at *Lindsay Rural School*.

Chapter 6

Conclusion

The previous chapter discussed the results of Agricultural Learning Experiences according to the perceptions of parents, teachers, students and independent observation. This chapter will establish conclusions regarding the benefits of Agricultural Learning Experiences, as well as the limitations of this research. Following this, recommendations for further research within Agricultural Learning Experiences will be suggested.

Identified Benefits

This case study was designed to identify the existence of educational benefits of ALE at *Lindsay Rural School*. The use of both qualitative and quantitative data collection techniques offered a range of perspectives while at the same time allowing the identification of specific benefits. The results clearly show that ALE contributes to students' personal development and academic performance. Parents, teachers and students consistently reported that attending *Lindsay Rural School* has developed students' skills in problem solving, responsibility and teamwork which are important goals stated by the Adelaide Declaration (Goal Statement 1.1 and 1.3). Numerous other benefits were also identified by the participants which are also important to national education goals. The educational benefits form a broad picture of the development of students' ability to self-regulate, which is defined by Zimmerman (2002) as the ability to select processes that can then be adapted to suit specific tasks. Students' development of life skills and lifelong learning has assisted their growth toward the achievement of self-regulation.

The Agricultural Learning Experiences at *Lindsay Rural School* provides a learning context that is highly authentic, enjoyable, and stimulating, and which develops

positive relationships between teachers and students. In other research (e.g., Department of Education, Training and Youth Affairs (DETYA), 2001) these qualities have been identified as having the potential to reduce ‘at risk’ behaviour among young people. The DETYA (2001) report defined ‘at risk’ behaviours as being a significant cause of difficulties in transitions from schooling to adult life, causing students to leave school earlier. The agricultural program at *Lindsay Rural School* therefore could be predicted to minimise the possibility of their students being “at risk”.

Limitations

Although the case study of *Lindsay Rural School* does not allow for extensive educational generalisations, it provides an example of an institution that uses an agricultural program to develop skills and knowledge in both personal and academic areas. This agricultural program can, however, be used as a framework for establishing programs within other schools.

Requirements of the Agricultural Learning Experiences approach

The Agricultural Learning Experiences at *Lindsay Rural School* are developed and facilitated through the commitment of the teachers, as they see the enormous value of the program as an educational tool. The involvement of the parents is also essential as many assist in ensuring that general maintenance and duties of the mini farm are completed. The support from parents throughout the agricultural program contributes to the positive school-community spirit.

Recommendations

Recommendations for further research include the study of personal and academic achievements by students within a small rural school not offering Agricultural Learning Experiences. This could be compared to the learning outcomes of a

demographically similar school which provides agricultural learning experience, such as *Lindsay Rural School*.

Researching the personal and academic benefits of students having access to small animals such as domestic pets and portable vegetable and flower growing boxes would be worthwhile. This could identify whether a structured agricultural program could be offered in an urban school setting in the situation where space is a significant limitation.

As the majority of the population resides within the six major cities, it would be interesting to identify whether students participating in Agricultural Learning Experiences within these regions elect a career in agriculture as a result of their participation during the compulsory schooling years. This would identify whether exposure to agriculture within city regions encourages these students to elect careers within the industry.

Throughout the decade of education on a sustainable future (2005-2014) (Australian Government Department of the Environment and Heritage, 2005), the establishment of pilot agricultural programs within a number of institutions and regions would be beneficial in identifying whether an agricultural program is a suitable context for teaching students the importance of a sustainable future. The results from the pilot studies could then be used to recommend other avenues for developing students' personal and academic understanding of a sustainable future.

The value of Agricultural Learning Experiences, as identified by multiple sources in the case study of *Lindsay Rural School*, have enormous personal and academic benefits for students. Agricultural Learning Experiences clearly offer an educational approach that encourages students' enjoyment of learning and the development of essential life skills, which are identified by national education goals as

talents, capacities and generic “key” competencies. Although agricultural programs require a great deal of organisation, time and effort, the development of an agricultural program is to be highly recommended.

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Appendices

Appendix 1

“Key” Competencies- Established from the Mayer Committee

Key Competencies

Collecting, analysing and organising information

The capacity to locate information, sift and sort information in order to select what is required and to present it in a useful way, and evaluate both the information itself and the sources and methods used to collect it.

Communicating ideas and information

The capacity to communicate effectively with others using the range of spoken, written, graphic and other non-verbal means of expression.

Planning and organising activities

The capacity to plan and organise one's own work activities, including making good use of time and resources, sorting out priorities and monitoring one's own performance.

Working with others and in teams

The capacity to interact effectively with other people both on a one-to-one basis and in groups, including understanding and responding to the needs of a client and working effectively as a member of a team to achieve a shared goal.

Using mathematical ideas and techniques

The capacity to use mathematical ideas, such as number and space, and techniques such as estimation and approximation, for practical purposes.

Solving problems

The capacity to apply problem solving strategies in purposeful ways both in situations where the problem and the solution are clearly evident and in situations requiring creative thinking and a creative approach to achieve an outcome.

Using technology

The capacity to apply technology, combining the physical and sensory skills needed to operate equipment with the understanding of scientific and technological principles needed to explore and adapt systems.

Appendix 2

The National Goals of the Adelaide Declaration (1999)

National Goals of the Adelaide Declaration (1999)

1. Schooling should develop fully the talents and capacities of all students. In particular, when students leave schools they should:

- 1.1 have the capacity for, and skills in, analysis and problem solving and the ability to communicate ideas and information, to plan and organise activities and to collaborate with others
- 1.2 have qualities of self-confidence, optimism, high self-esteem, and a commitment to personal excellence as a basis for their potential life roles as family, community and workforce members
- 1.3 have the capacity to exercise judgement and responsibility in matters of morality, ethics and social justice, and the capacity to make sense of their world, to think about how things got to be the way they are, to make rational and informed decisions about their own lives and to accept responsibility for their own actions
- 1.4 be active and informed citizens with an understanding and appreciation of Australia's system of government and civic life
- 1.5 have employment related skills and an understanding of the work environment, career options and pathways as a foundation for, and positive attitudes towards, vocational education and training, further education, employment and life-long learning
- 1.6 be confident, creative and productive users of new technologies, particularly information and communication technologies, and understand the impact of those technologies on society
- 1.7 have an understanding of, and concern for, stewardship of the natural environment, and the knowledge and skills to contribute to ecologically sustainable development
- 1.8 have the knowledge, skills and attitudes necessary to establish and maintain a healthy lifestyle, and for the creative and satisfying use of leisure time.

2. In terms of curriculum, students should have:

2.1 attained high standards of knowledge, skills and understanding through a comprehensive and balanced curriculum in the compulsory years of schooling encompassing the agreed eight key learning areas:

- the arts;
- English;
- health and physical education;
- languages other than English;
- mathematics;
- science;

- studies of society and environment;
- technology;

and the interrelationships between them

2.2 attained the skills of numeracy and English literacy; such that, every student should be numerate, able to read, write, spell and communicate at an appropriate level

2.3 participated in programs of vocational learning during the compulsory years and have had access to vocational education and training programs as part of their senior secondary studies

2.4 participated in programs and activities which foster and develop enterprise skills, including those skills which will allow them maximum flexibility and adaptability in the future.

3. Schooling should be socially just, so that:

3.1 students' outcomes from schooling are free from the effects of negative forms of discrimination based on sex, language, culture and ethnicity, religion or disability; and of differences arising from students' socio-economic background or geographic location

3.2 the learning outcomes of educationally disadvantaged students improve and, over time, match those of other students

3.3 Aboriginal and Torres Strait Islander students have equitable access to, and opportunities in, schooling so that their learning outcomes improve and, over time, match those of other students

3.4 all students understand and acknowledge the value of Aboriginal and Torres Strait Islander cultures to Australian society and possess the knowledge, skills and understanding to contribute to and benefit from, reconciliation between Indigenous and non-Indigenous Australians

3.5 all students understand and acknowledge the value of cultural and linguistic diversity, and possess the knowledge, skills and understanding to contribute to, and benefit from, such diversity in the Australian community and internationally

3.6 all students have access to the high quality education necessary to enable the completion of school education to Year 12 or its vocational equivalent and that provides clear and recognised pathways to employment and further education and training.

Appendix 3

Agricultural Education in each State and Territory in Australia

Major Ag Industries GVP	Meat & Livestock	Cotton	Dairy	Grains	Horticulture	Sugar	Wine	Wool	Eggs	Other (Food industry, Fisheries and aquaculture, Pigs, Goats, Tobacco, Apiculture, Horses, Farm forestry)
\$39 billion	\$3.6 billion	\$1.2 billion	\$2.8 billion	\$5 billion	\$6.5 billion	\$1.4 billion	\$2.4 billion	\$3.5 billion	\$330 million	
See Abirado Sharnbrook www.abirado.com.au	Meat and Livestock Australia www.mla.com.au	Cotton Australia www.cottonaustralia.com.au	Dairy Australia www.dairyaustralia.com.au	Grain Research and Development Corporation www.grdc.com.au	Horticulture Australia Limited www.horticulture.com.au	Sugar Industry www.sugar.org.au	Wine Australia Wine Industry National Education and Training Council winesb.com.au	Australian Wool Innovation Trust www.wool.com.au Australian Wool Education Trust www.aewt.com.au	Australian Egg Corporation www.aec.org	e.g. Australian Pork Limited www.apl.com.au
Agricultural Education focus	NSW	Victoria	Queensland	South Australia	Tasmania	Western Australia	Northern Territory	ACT	National	
Arousing curiosity about Agriculture in young children	Farm Arm Miling Barn - Sydney Easter Show plus 200 School Visits per year. Contact: Jane Southwell Royal Sydney Easter Show Education Program 20,000 students Contact: Jacqueline McCarthy Farm visits, Dairy Australia Contact: Janet Wolfmeister	Jamison's run Mobile Farm Royal Melbourne Show Contact: David & Marie Jamison Place-based 'edu-jainment' Golden Cow Tongala Collingwood Children's Farm	Food and Fibre Trail Royal Queensland Show Contact: Jane Southwell Rural Discovery Day OFF & The AgAware Group Contact: Rhonda Scoullar Bumyard Babine (Informal links to above)	Agaware Department of Primary Industry and Fisheries (DPiF) and The AgAware Group Contact: Rhonda Scoullar	Farm arm Miling Barn 2005 Royal Adelaide Show Contact: Jane Southwell Ag Learning Centre (Ag students and Teachers)	Kondinin Woolboot Series Kondinin - Taking Agriculture the Classroom Week 2004	Kondinin Woolboot Series Kondinin - Taking Agriculture the Classroom Week 2004	NFF Campaign for Australian Agriculture Contact: Mairi Barton, NFF	Kondinin Taking Agriculture the Classroom' Week	
Promoting Agriculture through Science, Mathematics and Technology	Landlearn eg Drought Maths Contact: Ann Fagan	Landlearn eg Drought Maths Contact: Ann Fagan	Agaware Department of Primary Industry and Fisheries (DPiF) and The AgAware Group Contact: Rhonda Scoullar	Australian Centre for Plant Functional Genomics Education Program' Get into Genes! Plant biotechnology workshops for students in Years 9-10 and Years 11-12. Contact: Belinda Barr	Skilling the Grange Coast Contact: Dr David Russell	Growing Knowledge Food, Fibre and Farming in Western Australia Contact: Katrina Bonser Kondinin	Grow to Learn Department of Primary Industry, Fisheries & Mines Contact: Alison Jacks	CSIRO Education Contact: Liz Yundien Department of Primary Industry, Fisheries & Mines Contact: Alison Jacks	Sheep CRC Schools Education Resource Development	
Promoting Agriculture through Studies of Society and Environment	Royal Sydney Easter Show Education Program Contact: Jacqueline McCarthy	Victorian Landcare Centre, Crewick SOSE curriculum focus now on 'sustainable farming' Warrambien Landcare Education Centre & Demonstration Farm Rokeby Landlearn Collaborative work with environment education sector to promote a balanced approach to the conservation/production perspective. Urban Rural Links Program	Agaware DPiF/The AgAware Group Contact: Rhonda Scoullar	Landcare Education (Good models not currently funded) Contact: Rob Wallace			Grow to Learn Department of Primary Industry, Fisheries & Mines Contact: Alison Jacks		Sheep CRC Schools Education Resource Development	
Promoting Agriculture through Agricultural and Horticultural Studies	NSW Association of Agricultural Teachers Cambodas Rural Technology HS Garry Tong Bankstown Grammar Hulsine Ag HS James Ruse Ag HS Yanco Ag HS	Vic Assoc'n of Agriculture and Horticulture Educators Elizabeth Murdoch College - Langwarrin Ballarat Grammar School Avila College - Mt Waverley Antonio Park PS Micham Burnsview NW PS	Qld Agricultural Teachers' Assoc'n Dakabin SHS Perry Grove SHS Hendra SC Southport SHS Linden Masters Luchindale Area School Kym Grant, Principal Nurioolpa HS St Marks, Port Pirie Faith Lutheran School, Tanunda	ATSA (Ag teachers Assoc) Unbrae Agricultural HS Dean Cresswell Cleve Area School Linden Masters Luchindale Area School Kym Grant, Principal Nurioolpa HS St Marks, Port Pirie Faith Lutheran School, Tanunda	Tasmanian Association of Agricultural Educators Bridgewater High School Contact: Jackie Brown Sheffield District School Contact: Alistair Primrose	Ag Educators Assoc'n WA Growing Knowledge Department of Agriculture WA Contact: Katrina Bonser Kondinin Landscare Farm School (also has Professional Development Program for Teachers).	Tammin Alcoa Landcare Education Centre Growing Knowledge Department of Agriculture WA Contact: Katrina Bonser Kondinin	National Association of Agricultural Educators Contact: Andrew Crosby	Sheep CRC Schools Education Resource Development	
Promoting Agriculture through Careers Education	Rural Skills Australia Alia Wilson Garry Tong VET in Schools School-based Apprenticeships TOCAL Agricultural College Murrumbidge College of Agriculture	Landlearn Contact: Ann Fagan Rural Skills Australia Rosa Cattle VET in Schools School-based Apprenticeships Primary Skills Victoria Land & Food Resources (Uni Melb) Dookie & Longerenong Colleges	Agaware DPiF/The AgAware Group Contact: Rhonda Scoullar Rural Skills Australia Beth Russell VET in Schools School-based Apprenticeships Ferry Grove SHS (TAFE accredited VET Course)	Rural Skills Australia Wool Industry Induction Program VET in Schools School-based Apprenticeships Contact: Jane Bartlett	DPiF and Rural Skills Australia Wool Industry Induction Program Cropping a Career Contact: Lesley Richardson VET in Schools School-based Apprenticeships	Curderdin Agricultural College Curtin University's Muresk Institute of Agriculture VET in Schools School-based Apprenticeships	VET in Schools School-based Apprenticeships	VET in Schools School-based Apprenticeships		
Promoting Agriculture through Health and Physical education	Royal Sydney Easter Show Education Program Jacqueline McCarthy	Landlearn Contact: Ann Fagan Livestock Industries (Pork & Dairy) Education Programs (LIEP) Health & PE Curriculum about to be launched based on findings of Animal Welfare Centre research.	Agaware DPiF/The AgAware Group Contact: Rhonda Scoullar Active-Ago Queensland Health Teacher and student resources for Years 1-7. Queensland Association of School Teachers	Agaware DPiF/The AgAware Group Contact: Rhonda Scoullar	Growing Knowledge Department of Agriculture WA Contact: Katrina Bonser	Grow to Learn Department of Primary Industry, Fisheries & Mines Contact: Alison Jacks	Dairy Australia Just a Little Bit Practical Nutrition Educational Resource produced by Dairy Australia available at www.justalittlebit.com.au Young Gourmet Gastronomy Challenge			

Appendix 4
Parent Survey

Parent Perceptions of Agricultural Learning Experiences (Horticulture & Animal Husbandry)

This survey is strictly confidential; please do not write your name on the sheet.

Age Gender Length of time at this school (eg. 2 years)

Please tick the correct response

1. Do you live on a:

(i) property ☐ OR (ii) residential block ☐

2. Does your child have regular access or contact with the following at home?

(i) domestic pets e.g dog, cat, bird ☐ (ii) agricultural livestock ☐
(iii) gardening ☐ (iv) growing vegetables/fruits ☐

PLEASE INDICATE WITH A ✓ WHICH RESPONSE BEST DESCRIBES YOUR FEELINGS TOWARDS YOUR CHILDS EXPERIENCES IN AGRICULTURE.

Strongly Mostly Mostly Strongly
Agree Agree Disagree Disagree Unsure

1. My child appears to be enjoying school					
2. My child frequently wants to share what he/she has experienced at school					
3. My child enjoys learning through hands-on experiences					
4. My child has respect for animals and living things					
5. My child likes learning through agricultural experiences					
6. My child has a good understanding of agricultural concepts					
7. My child is more motivated to learn as a result of agricultural experiences					
8. My child enjoys being independent					
9. My child is more cooperative at home due to his/her agricultural experiences at school					
10. My child's experience in agriculture has enhanced his/her self-esteem					
11. My child has good problem solving skills					
12. My child's experiences in agriculture has helped he/she to develop persistence, determination and patience					
13. My child's experiences in agriculture has helped he/she learn to appreciate issues faced by farmers					
14. My child has good life skills (that is: communication, conflict resolution, has a positive attitudes and a desire to do the best they can)					
15. My child has good information processing skills (that is: measuring, collecting, analysing data and drawing conclusions)					
16. My child has a desire to work in industries associated with farming (e.g. gardening, growing foods, animal husbandry etc)					
17. My child's experiences in agriculture have taught skills that he/she will be able to use when he/she leaves school					
18. Agricultural learning experiences have helped my child understand mathematical concepts					
19. Agricultural learning experiences teaches skills that can be applied to other school subjects					
20. Subjects like 'English' and 'Human Society and its Environment' can be taught well through agricultural learning experiences					
21. The agricultural experiences offered at this school will help prepare my child for the work force					
22. The agricultural experiences offered at this school will help prepare my child for higher education (that is: university etc)					
23. Agricultural learning experiences at primary level is only relevant if a child wants to pursue a career in an agriculture-related area					

Parent Perceptions of Agricultural Learning Experiences
(Horticulture & Animal Husbandry)

This survey is strictly confidential; please do not write your name on the sheet.

Please add any further comments or opinions about the value or lack of value of the agricultural components of the education provided at this school.

Appendix 5
Teacher Questionnaire

Agricultural Learning Experiences- Questionnaire for teachers

Background information

How many years have you been teaching (full time/part time)?

How many years have you been teaching at this school?

Were you initially worried about teaching the agricultural components of the school curriculum?

Please explain why or why not in the space provided

Is there any particular qualities or background knowledge that a teacher must have in order to competently teach horticulture and animal husbandry classes? Can you teach it without prior knowledge and skills?

Please explain why or why not in the space provided

Agricultural Learning Experiences- Questionnaire for teachers

Please answer the following questions from what you have learnt and experienced while working in this schooling environment.

1. Do you think that agricultural learning experiences can help improvement students' overall motivation to learn?

Please explain why or why not in the space provided

2. Do you think that agricultural learning experiences can be effectively used to teach subjects across all key learning areas, e.g. mathematics, English, science, HSIE, Creative arts.

Please explain why or why not in the space provided

Agricultural Learning Experiences- Questionnaire for teachers

3. Do you think that agricultural learning experiences can improve students' skill and process competencies, especially abilities to observe, hypothesis, measure, collect, analyse data, draw conclusions,

Please explain why or why not in the space provided

4. Do you think that agricultural learning experiences can teach skills that can be easily transferred to other applications? Possibly real life applications?

Please explain why or why not in the space provided

Agricultural Learning Experiences- Questionnaire for teachers

5. Do you think that agricultural learning experiences helps develop student's life skills in areas such as problem-solving, critical thinking, developing effective communication skills, responsibility and adaptability?

Please explain why or why not in the space provided

6. Are there any down sides to being involved in agricultural learning experiences? If yes, do the benefits out weigh these down sides?

Please explain why or why not in the space provided

Agricultural Learning Experiences- Questionnaire for teachers

7. Would you recommend other schools begin an agricultural program? Why or why not?

8. Please make any further comments about the benefits of agricultural learning experience that you have witnessed due to teaching in this schooling environment.

Appendix 6
Structured Observational Schedule

High Inference Variable	Low Inference Variable (Outcome indicator)	Student Codenames							
1. Problem Solving	1.1 Task definition								
	1.2 Makes accurate observations								
	1.3 Develop alternative strategies								
	1.4 Select most suitable strategy								
	1.5 Applies most suitable solution								
2. Critical Thinking	2.1 Sort, evaluates & interprets information								
	2.2 Formulate hypotheses								
	2.3 Comprehend & extract significant evidence								
	2.4 Recognizes & evaluates evidence								
	2.5 Reasons deductively								
3. Responsibility	3.1 Shows awareness that they are accountable for their actions								
	3.2 Plans & manages time (meets deadlines)								
	3.3 Shows accountability when in a group								
	3.4 Sets realistic goals								
4. Communicate	4.1 Listens to task instructions								
	4.2 Asks questions to clarify directions								
	4.3 Reads & understands information in a variety of forms								
	4.4 Assists others in understanding								
5. Teamwork	5.1 Is an active participant in groups								
	5.2 Respects the opinions of others								
	5.3 Offers their perspective, ideas								
	5.4 Plans & makes decisions with others & supports outcomes of those decisions								
	5.5 Negotiates & resolves conflicts positively & promptly								
6. Adaptability	5.6 Motivates the group to complete tasks								
	6.1 Willing to try something new								
	6.2 Able to accommodate changes in activity								
	6.3 Learns from mistakes & feedback								

Appendix 7
Samples of students' writing tasks

04
I love my school. The horses are my favourite thing. I also love the animals. The chickens, geese, lizards, Rabbits, and we are going to get pet wallabies. We have different pens that we have to feed. I feed the Silver eyed Wyandottes bantams.

We have fun jobs we can do. Horse monitors, barn monitors, farm monitors, Sports monitors, garden monitors and maintenance monitors.

I have been a barn monitor and a horse monitor. I enjoyed being a horse monitor better because I was around the horses. I do not have any jobs at the moment.

My five most favourite experiences are; When I fell off a horse, When Jen and I came to school in the holidays and rode the horses, watching Elise break her leg, When I got chosen to be school captain, Bobby died of worms. (he was a horse)

I do not recommend having a farm to any schools because I want our school to be one-of-a-kind. But I think that you should too! because it makes you smarter.

I rate the animals at the school

1 2 3 4 5 6 7 8 9

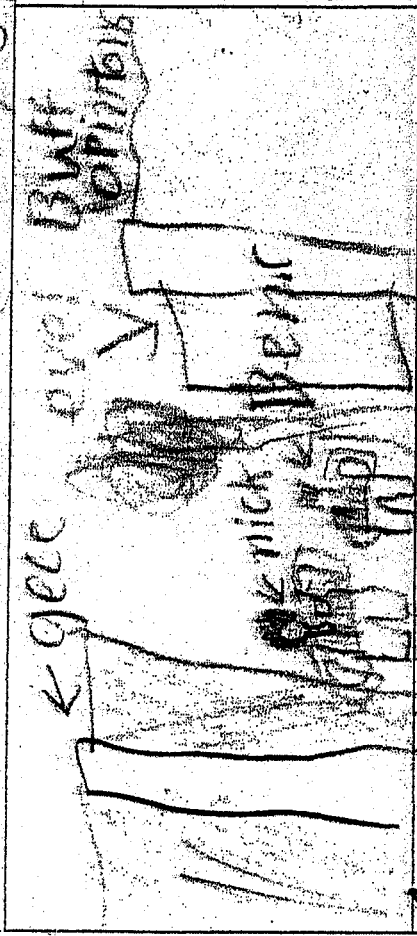


Why I rate them 10 because I love animals. Especially horses.

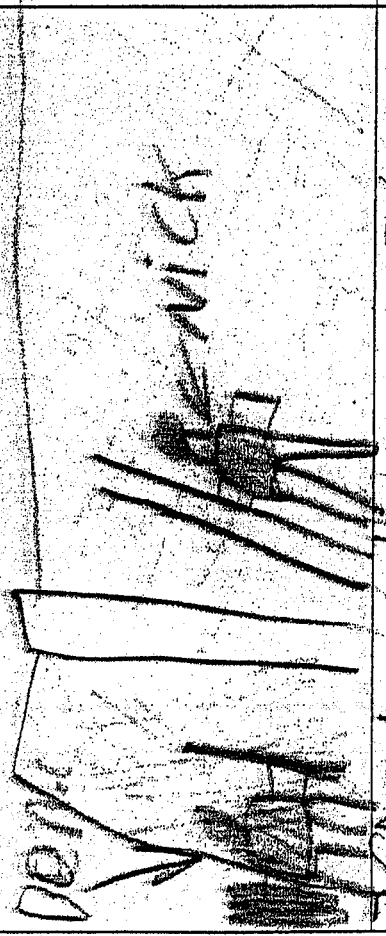
I have learnt how to look after animals and
to be responsible.

THE
N
O





How Mærtin
 stupid are
 The gecc.
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 comber/corner

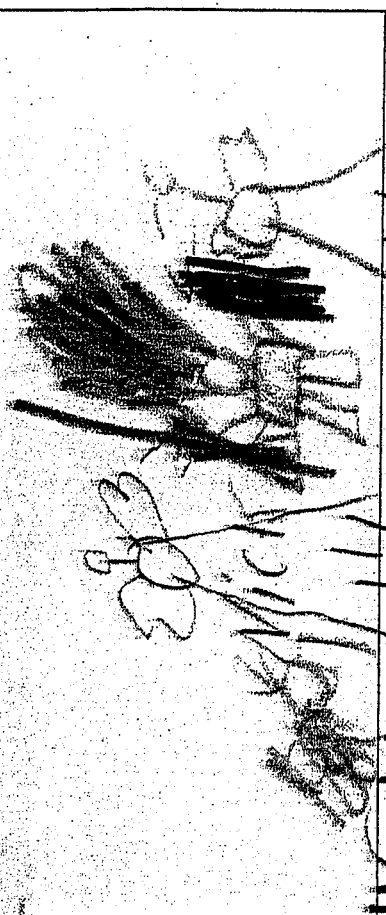


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 go to the side to.

2000/10/10

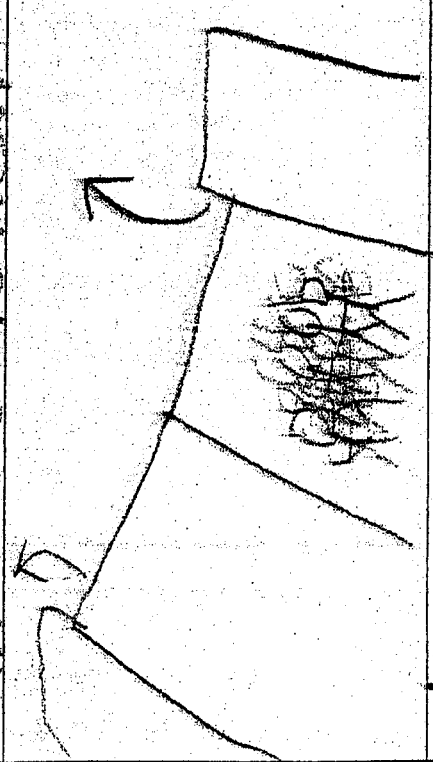


No, I have
 bout we fite
 The gecc, yer!!!

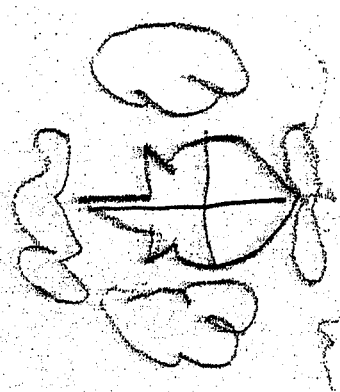


Station are all
 you'll no want
 un-continue miss
 lo This is a drug

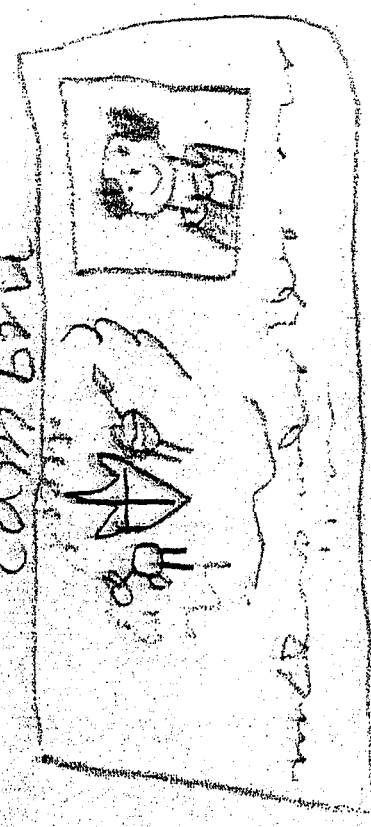
WSS!!! Stop
Dragging me. I
am awake!!!



The holl scoole
van.



6/24/11 VAM!!
Othrist By the
Federal Government
can be



8 Facts
Do not attack the
Americans. Don't listen
to them. Don't do
anything.

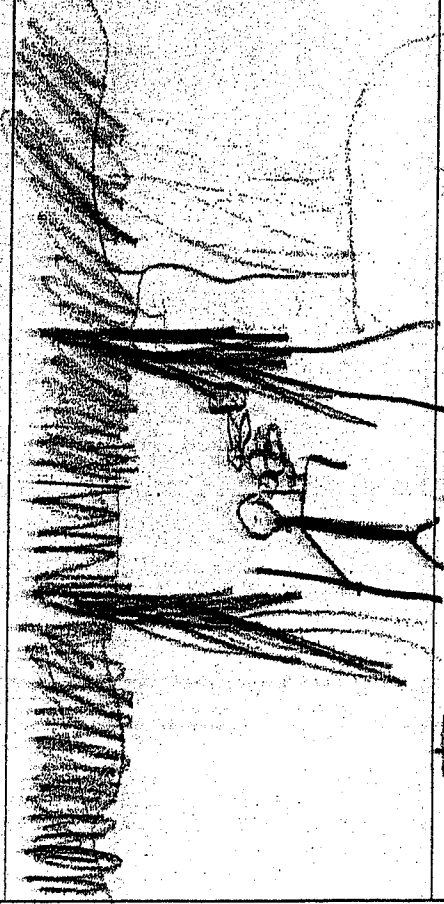
consequences



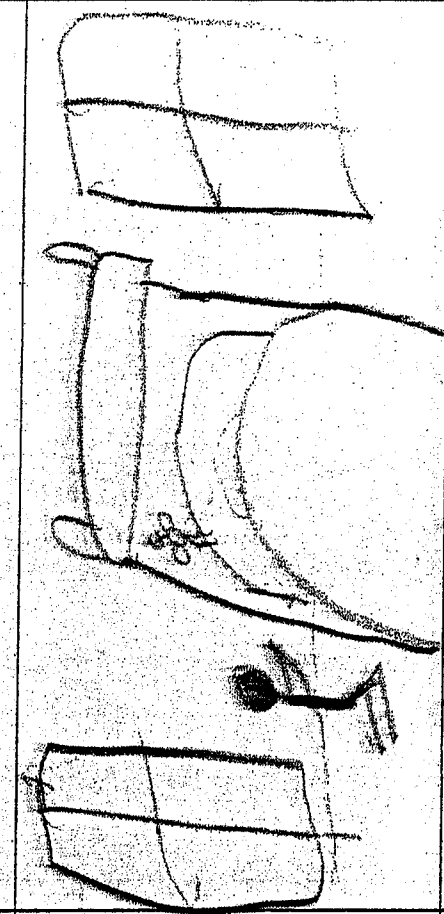
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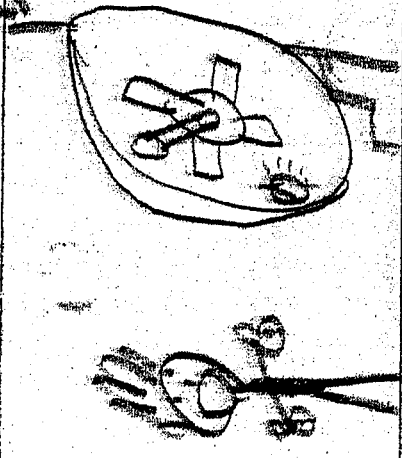


To
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 Feding anu works

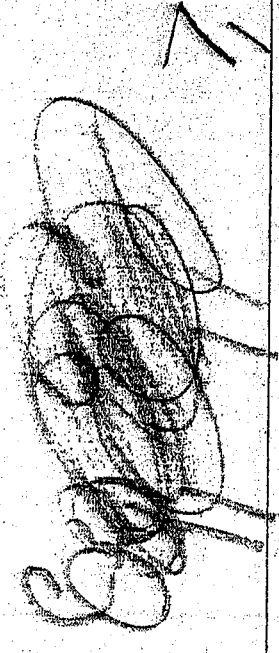


Pray for
 4 them

Best thing



The animals
are grate
to talk
yearning.



Another thing
the soft

would you recover



while you
madly
music
party

animals to
stupid
stupid

NO

Appendix 8

Factor loadings for each item of the Parent Survey

Factor Loading for Parent Survey

Survey Item	Factors								
	F1	F2	F3	F4	F5	F6	F7	F8	F9
Age			.715						
Gender	.631								
Time									
ResType						.872			
Dompets									
Livestock						.771			
Garden									
Fruitveg		.704							
Item 1				.623					
Item 2				.831					
Item 3					.787				
Item 4					.822				
Item 5					.525				
Item 6			.505						
Item 7	.537							.511	
Item 8	.654								
Item 9	.600								
Item 10	.690								
Item 11			.507						
Item 12	.814								
Item 13							.681		
Item 14									
Item 15			.659						
Item 16								.782	
Item 17				.481			.471		
Item 18	.675								
Item 19		.670							
Item 20		.885							
Item 21		.707							
Item 22		.551				.547			