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Science education in Early Childhood: a snapshot of Australian settings

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Background, Framework and Purpose

In Australia, reform is occurring in the area of early childhood. Previously, early childhood came under the management of the Australian Government social services departments and as such, the focus for Early Childhood settings was on providing high-quality, accessible and affordable care. Late in 2008, an “Early Years Learning Framework” draft document (2008) was proposed to provide “quality early childhood education in the year before formal schooling”. The document is a work in progress, which invites participation from Early Childhood Educators in “the critical conversations about how they think about, understand and practise the facilitation of young children’s learning in early childhood settings. It is in this time of reform, that a research project was instigated which studied the amount of science being undertaken in early childhood settings as well as how it was implemented.

Rationale

In the safe caring environment of an early childhood setting, children can interact with the natural world, ask questions, and discover for themselves. Play is the vehicle for learning and practising – particularly in science. The Early Childhood practitioner should recognise the importance of, and provide opportunities for, learning science through play. The researchers visited a number of early childhood settings and observed first hand the play experiences of the children. Through their ‘scientific’ lenses, they identified many science based contexts and observed how the teachers also interacted with the children in these circumstances.

Methods

We undertook a case study of four different Early Childhood settings, gathering data to describe the overall programs, the science experiences of the children, and to illuminate the various approach to science teaching and learning. The perspectives of EC practitioners were sought. Since this represented an interpretive study of a system that was ‘bounded’ in both time and space, we identified case study as the most appropriate methodology.

Data collection methods

In collecting data, we used a range of well-accepted methods. Initially, a survey was sent to 75 Early Childhood Centres and Kindergartens in Victoria inviting the staff to respond to the questions which related to the science practices within the centre. Staff members were invited: to participate in two interviews, for the centre to be observed and samples of programs or other public documents to be collected. Data was not collected from children or any aspect of children’s involvement recorded. Data is therefore from EC practitioners’ opinions and perceptions, researchers’ observations and documents.

Results

Case Study One
Setting: 4 year old group, small community kindergarten, government supported. Total number of student in the setting=25.
After observing the centre over a number of visits it was concluded that science was indeed present in just about everything delivered. In particular, it was clear that the teacher used a strategy of rich language and open questioning to focus children’s observations. The teacher was adept at using any play situation to ask expansive questions related to science knowledge and understanding. It was also clear from the reviews that the teacher’s own science knowledge was quite good. She used correct scientific language when speaking to the children. In further discussion, the teacher revealed that her interest in science had grown as she found that children were so naturally absorbed in all science things.

Case Study Two

Setting: Regional city privately sponsored Early Childhood Centre, attached to a large private Prep-12 school. 4 year old group. Approx 25 children.
Director: Experienced 25 years, Bachelor of Early Childhood Education.
Assistant: Diploma of Children’s Services
Teacher: Bachelor of Early Childhood Education.

Observation of the centre indicated that it was run in a similar way to other centres with static displays for children as well as interest centres with a particular focus. On one of the “science focus” observation days, children discussed animals, observable behaviour and animal families. The teacher asked children to group animals by visible characteristics such as presence of horns, number of legs, colour and other features which the children identified. While the teacher used the word ‘families’ in a scientific manner, it was clear that the children interpreted it in its ‘everyday’ sense (Fleer, Ridgeway & Gunstone, 2006). They identified two animals of similar breed, called them ‘mummy and daddy’ and continued to search for a smaller version to use as the ‘baby’. As the activity ensued, one of the children alerted the teacher that there were more animals in one line than another, because they were spread out. The teacher used the opportunity to work on the idea of ‘conservation of number’ as it had been raised by the child.

Case Study Three

Setting: 4 year old group, outer suburban community kindergarten with four members of staff, both assistants with no formal qualifications.
Director: BEd (Early Childhood), Diploma of Teaching (Early Childhood). Over twenty years of experience.
Teacher: Diploma of Teaching (Early Childhood)

Science is integrated into the whole program involving; questioning using stems such as who, what, how, when and why; the setting up of interest centres such as ice melting, seasonal tables and sensory troughs; discussions; experiments such as volcanoes, popcorn, nutrition, body awareness and anatomy. The teacher had built up an extensive resource of folders of materials as well as children’s books and teacher texts covering a wide range of science topics (including environmental, physical, biological and chemical sciences). These resources represent an on-going process and an examination of the folders revealed the focus on science language, particularly correct vocabulary.
Case Study Four
Setting: Suburban, Council run Long day care and kindergarten centre with fourteen staff two of whom are involved in the Kindergarten Room
Ass director: Bachelor of Education (Early Childhood)
Assistant: Diploma of Children’s Services

Observations made during visits to the centre showed the approach to be integrated, with an emphasis on modelling correct spoken language. An example of the use of children’s interests was their engagement in a Space theme instigated by a recent lunar eclipse. The children played in a rocket ship and drew pictures of their ideas about Space. Drama was included in the children’s explorations as they acted out their experiences of going to the moon, communicating their ideas about what they needed to do and what they were doing. Children were asked questions to stimulate thinking about some of the problems that would need to be solved, for example, because there is no air on the moon what do we need to do? Do we need to bring our own?

Conclusions and Implications
In reviewing the four case-studies, it was clear that there were some differences. In some instances there was a strong emphasis placed on the use of ‘correct’ language, a recognition of the Vygotskian background theories of the importance of language in determining meaning and understanding. That is, that conceptual thinking is not possible without verbal thinking (Nixon and Aldwinckle 2005). In others, this language emphasis was less important than the immediacy of the direction that children were taking the learning. When these directions included play it can be suggested that children’s cognitive development was further enhanced, as suggested by the work of Vygotsky when articulating his thoughts on the role of play (Dockett and Fleer 2002).

Where the teacher was confident in her own science understandings, the questioning was more relevant, more spontaneous and usually required deeper thinking on the part of the children. Science experiences evolved out of every outdoor activity – the learning environment was rich in science and associated language. Where the teacher relied more extensively on pre-planned science experiences, only those questions which had been pre-planned were asked and extension of the children’s understanding was limited or did not occur.

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Bibliography


