Child's play or a child's crucial work? The importance of play in learning science

Dr Sue Dale Tunnicliffe
Reader in Science Education
UCL Institute of Education

Abstract

Is playing a waste of time? Or is it an essential apprenticeship in developing scientific literacy? Children are often observed during play, which is divisible into experimental investigative play when they explore phenomena and narratives, when they are working through a past experience imaginatively or interpreting a story they have heard.

Children are spontaneous investigators, curiosity innate. They explore using themselves hence hands on activities are the feature of children's play and such are essential in the learning of science in the early years. They observe, learn what actions produce what effect or what action or object or organisms they have observed does what, the essence of science. The science explanation is not needed in this key initial learning phase where they observe, question, design n an investigation, observe what happens and note the outcome These experiential leaners do not need an explanation, they need to add the experience to their learning repertoire, to be retrieved at a later date. Such practical experience of the phenomenon is essential to further learning. At this age the foundations for observational and planning skills are laid as well as the process skills of manipulating items, collecting and evaluating such. Later in a child's formal science education such fundamental experiences provide them with an experiential foundation on which to construct the curriculum science required for examinations.

Introduction

"Science, during early childhood, Is more than play? It is serious business. If we fail our children and students in science, the reasons may include lack of appropriate experiences during early childhood"

Wolff-Michael Roth, Maria Ines Mafra Goulart, Katerina Plakitsi (2013).

Piaget suggested that children are naturally curious and learn from exploring their own environment (Robins, 2012). Children play. In terms of science learning is playing a waste of time? Should adults noticing play intervene when the child's solution to a problem is, on the experience of the adult, not going to 'work', opt produce the accepted science observations and outcome? If the child's idea (Hypothesis) is not going to produce the desired outcome? Should the adult point this out or let then child discover that the action he has initiated fails to solve a problem is unlikely to do so? Whilst it is sometimes frustrating to watch such happen, it is imperative to building the child's experience (or science repertoire) to let the event proceed.

> *Daniel when three years old sat on a swing in the children's play are in the par., He thought it would then start swinging and could not understand why it did not do so. He squirmed around ion the seat and then notice that there was a little movement of the swing, slightly forwards and then back. Eventually he worked out by trail and error, and possibly remembering seeing others on swings, he had to input the energy to get the swing to move, and that putting his kegs and tors forwards gave results! Which he did to his great pleasure and satisfaction?*
> *His adult could easily have just told him what to do or just pushed him!*

Moreover, children are creative thinkers. Recent research (Robson 2014) has developed an approach which she refers to as the ACCT framework, (Analysing Children's Creative Thinking) to identify and also analyse this in young children. It is pertinent to our theme

Partnerships

A child's early learning experiences in science are so important in developing their scientific persona. And such are either solitary or in a partnership. Sometime it is a vicarious or in partnership in the sense that the child notices, observes, another doing something like working up the motion of swing, and copies them, as visitors often do in museums, copying or modeling actions of others (Koran et al. 1989) as for example there was an element of this 'copying' in Daniel's realising how to move the swing. for example Most often a partnership activity between adult and an early learner, but with a difference. The objective is to use a particular approach advocated of posing a challenge via a cue question to the child. Thus and is not only to provide a stimulus for them to explore a own designed science experience but scaffold the thinking of a participating child through further questions and often with the outcome in the initial question. Such as, "Is the moon always visible at night?", whereby the child has to plan a strategy to answer the question. Children have to learn certain skills first of all and then hone them with practice and learn where t it is appropriate to h apply these skills, thought sand actions, to a new situation. The partner can assist them in this learning with the appropriate cue as they master the skill to work out their thought. This is difficult to do but try.

Bear in mind the words of the Russian psychologist Vygotsky, "What a child can do with assistance today she will be able to do by herself tomorrow"(1987, p.87)

Spontaneous Inquiry

The partner adult often needs to set up the items to show the starting point and the end point when they want to create a learning opportunity. The one item, could be labeled magnet and the child be told it were a magnet. In the case of some studies, e.g. on weather, photographs of and end point might be used, or of a starting point to stimulate Looking- Talking- Thinking and Doing. Thus the learners are encouraged to work out how they can use the starting point and reach the given outcome. In order to conduct this partnership activity, which is not a full structured because you are encouraging their thinking with asking cue questions as appropriate and introducing appropriate cue questions, which do not tell them what to do. The relevant vocabulary is provided, as well as the skills and experiences they need before they can tackle the given activity.

Obervations- actions in play

Learning science begins with babies looking around, gradually acquiring manipulative skills they can use for a definite action and then play. Learning is gradual and begins with intuitive ideas but is consolidated by noticing a phenomenon, talking about it, and thinking about them again and investigating where appropriate and sharing with someone else. Learning does not occur in a linear manner but in a constructive, sometimes referred to as a spiral curriculum context, being developed increasingly in more depth (Bruner, 1977). The starting point for science is observation, (Sylva et al. 1980).We strive as educators to encourage young children and their associated adults, parents, relatives other carers and teachers, to share the observations and talk about such and increase their own self-esteem and literacy. Moreover, children are intuitive scientists (Gopnik, 2009).

Skills acquisition

Before some investigation can really be carried out there are certain skills that a learner needs, such as being able to pick up items, pour water, and such foundation experiences are given so you can ensure that the learner has such skills. In a planned learning situation it is useful to have things to use in investigations available so a list of possibly useful items is included. However, through their own play and vacillated opportunities young children can explore various skills such as water pouring, measuring which provide skills and processes needed in more complex play and since investigations

The starting point for noticing the learning of science

The key to starting science is for the adults to observe the child and provide suitable cues for them to develop their ideas and questions. It is essential to understand their use of words, as their meaning may not be the same as that of their adult. As children acquire early language they begin to label phenomena. This naming is an inherent human need (Bruner, Goodnow and Austin, 1956; Markman, 1989). Additionally, young children ask questions incessantly when given an opportunity. However, young children ask questions incessantly when given an opportunity (Tough, 1977), a behaviour, which often disappears in the formal education environment where class or pre school adult/child verbal interaction is foremost, triadic dialogue takes over. The child no linger initiates the verbal sequence, but is the middle speaker (in the three parts) participant responding to the question.

The activities of early years are a starting point but also often a finishing outcome. Thus athe child has to work out how out to proceed from the start to the outcome. Talking to the learner as s/he progresses in planning and performing the actions to meet the challenge can reveal much about the previous knowledge and experience of the learner and their ability to verbalise their thoughts and skill at problem solving. Using open questions and 'push back' questions (Chin, 2008) as such can prompt the child further in developing their thinking and reasoning.

Talking, listening and dialogue

We don't tell them or show them, many of use do find this difficult. We try and suggest, through dialogue, further action.

> *Children, we now know, need to talk, and to experience a rich diet of spoken language in order to think and learn. Reading, writing and number may be acknowledged as curriculum 'basics' but talk is the true foundation for teaching*." (Alexander, page 9).

It is important not to tell the children what to do but scaffold the activity with appropriate questions and actions. Such recognition of the different types of questions that may be used is invaluable and recognizing the very basic idea that the learner is exploring and the further scientific knowledge and understanding such investigation can lead to, but not tell the child. Children's attitudes towards science are extremely important as these can influence their early attainment in the subject and their outlook in adulthood to scientific issues, young earners in the early years of schooling young children are particularly enthusiastic, and enjoy practical experiments and independent investigation but this enthusiasm diminishes (Pell & Jarvis, 2010).

However, when engrossed in activity children do not necessarily talk. Very young children who play do not talk, but they do play and investigate. When being involved in imaginative activities, such as telling the story out loud of what, for instance, their Lego figures or toy cars or dolls are doing and provide an oral narrative. On other occasions when they are involved in observations and investigations they often do not talk, (Tizard, and Hughes, 1984); sometime they make an out an loud statement which is really a hidden question. Furthermore, it is now accepted that there is an intimate link between language and thought and thus the cognitive development of a child is affected to a considerable extent by the nature, context and forms of language, which s/he hears and uses (Halliday, 1993). Unless instructing in some action that could be dangerous, specific instructions to achieve an plan for an investigation and outcome are not given, rather the emergent scientist will need to think and do the investigation as they see fit, with some adult led cue questions, provided during activities if deemed appropriate.

Play is crucial stage in learning science

We now recognise that play is crucial to the development of a child (Moyles, 1989) and that society should promote awareness of and work to change the attitudes towards play (Whitbread at al., 2012) who point out that play is the work of children and essential for intellectual achievement and emotional wellbeing. Learning through experience is developed in both spontaneous and directed play and introducing inquiry based science fits well into extended play activities progressing to challenges to solve. Play after all is often very much problem solving (Moyle's, 1989). 'Just playing', is a phrase has been used in a derogatory sense by educators, and some parents and other adults, unfamiliar with early years learners. Parents whoa recollect education and assume this is how it should be manifest for all as their lawn usually secondary stage experience file to understand the essential and critical value inks a child's learning of play.

Children's understanding- children's science

It is important for adults to find out children's real ideas about the topic. The emergence of inquiry science from a child's earliest years and stresses the importance of observing the play of early years children. Observing early years children at play provides insight into their basic early science learning. The stages of inquiry science develop from being directed through guided science to open or authentic science with the learner determining the plan, the action and the interpretation of outcomes, is discussed together with exemplars from observed real situations, suggestions for recording and assessment. I stress the partnership between adults, parents, carers or teachers, and child in the learning process.

It is useful for us to bear in mind and that for the child their ideas are the conceptions those of formal science education 'misconceptions, hence gather idea of a child and their personal interpretation should be regarded as alternative conceptions to the accepted wisdom. However, as educators we are required to assist the learner in their journey to the established science.

Conclusion

The starting point for the learning of science and engineering, at this early age, is play. In such activities theses early learners are making observations, asking questions and problem solving, asking questions, albeit to themselves, devising their own strategies for eliciting an answer. Such working out by the child are them using 'hidden questions' to themselves even though in the earliest of years, thoughts are not verbalized. Thus, the only evidence, we, as , observers, have is we can see the actions of children which are thus an expressed model of their science playa/investigation. Moreover, such learning occurs in the immediate environment of the child, in its community, with the people with whom s/he spends their time and begins long before any formal educational interaction. Starting children on their path in learning science as in other subjects is a community endeavour. These places of potential learning are where they live and the immediate environment outside. In these locations children witness everyday activities such as cooking, cleaning, washing, various activities with materials such as textiles, wood, clay, as well as identifying and being involved with basic life processes such as moving, breathing, eating, excreting and the human activities associated with the life processes and beyond.

Children are immersed in their environment, to include natural structures, built, human construct such as their village or adjacent areas, which all contain various amounts of technology, maths and science. Thus can range from a simple cooking vessel being used on an open fire to mobile phones; from natural vegetation to a manicured garden and the everyday non-built areas. Moreover, the natural environment is comprised from physical, geological and biological matter and features of this, such as rocks, plants and watercourses may be observed. Additionally, the culture and particular uses of science and technology by the community with whom the children live are evident and noticed, pointed out by members of the community, buildings, transport, water sources for instance. If children can not play can they develop as scientifically literate beings, problem solvers, communicators?

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