**Play: the beginning of a Science, Technology, Maths and Engineering Learning Journey**

Intoduction given in . *Winning African Children Early for Science*- a Symposium for NARST-CADASE-February, 2022[. [**https://youtu.be/C9vJpvLMLto**](about:blank)

By

Dr Sue Dale Tunnicliffe

Chair Commonwealth Association for Science Technology and Maths Educators, Reader in Science Education at UCL IOE, UK. S.tunnicliffe@ucl.ac.uk

*Play is STEM in Action.*

Play is instinctive in a number of young mammals including humans . P lay is the most important stage in a Child’s learning journey . Piaget recognised this through observing his own children. It is becoming increasingly recognised that play is a very important part of a child’ experience and learning in early formal school

However, children start playing intuitively from the time of birth and the earliest years of their free choice investigations are vital in their learning and experiencing STEM science technology maths and engineering ideas in action .

Early play reported is particularly about physics and engineering ideas. Biology and ErEarth Sciences, physical geography experiences are not as apparent as in the play with toys and objects.

*Characteristics of Play*

In the first years children play solo, by themselves. When they become verbal and about 3 years they may start playing side by side and then collaboratively, exchanging ideas and cooperating.

I recognised STEM -E, STEM experiences for these very first years of encountering STEM in action in the everyday world where it is very apparent but rarely recognised. Indeed biological experiences and those of the environment are also part of these experiences in everyday.

*Recognition of importance of experiences initiated by child and adults role*

In all the work I have done with parents and communities I find they think these subjects have to be formal and in school. They do not realise that what the children experience in these first encounters lay vital foundations for later learning . As children become verbal they can start interacting with adults with verbal discourse.

It is vital that the adults working with children don't give them instructions unless of course it is a dangerous situation ,

Watching and observing a child at play helps adults understand the child. Listen to the children. Observe what they're doing and ask them a scaffolding question like “what else could you do? “Why did you do that?” “What do you think might happen if you did so and so?”

Once a child enters formal school they're very likely to be instructed wherever they are in the world and this innate investigative ability which is key in STEM is lost

*Play is progressive and in stages*

if you observe children playing you see them going through the stages of science inquiry which is summarised in the Play Cycle, It begins with their interest being caught by something.

Moreover, experts are beginning to realise and announce that playing and finding out for themselves with what they choose to play with is developing not only STEM experiences and understanding but the 21st century soft skills which people need to be able to apply what they know to critically think to problem solve to communicate all things which children are instinctively doing from their earliest years

We mustn't forget that ONE SIZE OF PLAY DOESN'T FIT ALL , It is progressive with age and experience as well as interest and skill. Its form varies in children of the same age and of different places but actions are similar. Children choose with what to interact.

Such choice of engagement applies to everyday things in their lives as well as toys , which, remember are designed and made by adults for children . They are not designed and made for children and they frequently do not use those items in the way that the adults intended.

Play of an individual progresses with their developmental age and with their experiences as they develop skills and understanding. The STEM Play cycle sequence has been used to document this progress and stages in a play episode.

*Children choose with what to play in Free choice*

One of the important, yet under recognised aspects of play, is what the children choose to play with. Why will they for example, see something and ignore it and yet they will notice something else and start investigating it.



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Whilst there are lists of identified different categories of play. Hughes (1996) made such a list. Very rarely do you ever see in all the books about early childhood any reference to the science let alone engineering Encourage parents carers communities to talk with children as they carry out everyday tasks including using technology. Encourage reference to early numeracy and spatial recognition, position, shapes.

*Recognise STEM actions in Everyday Life*

Point out to the early learning child the STEM with which the adult is involved in for example their daily routine. For example in cooking, the change in uncooked rice to cooked, this is not reversible for instance, dropping an item which does not come back up. How many plates needed for a meal? What shape are the plates?

*Pioneering African work in Play and Culture*

Pioneering work that is being conducted in this African research group is vitally important in increasing our understanding of play but also the role that culture plays

In play actions and with what children play.

We cannot assume that research done in one country, say the United States Australia or the United Kingdom, can just be applied to play in another country.

*Difficulties for Adults in recognising the fundamental basic actions in STEM play*

I would add that adults especially scientists and engineers and those involved in teaching find it incredibly difficult to forget the therapy they know and what they have to teach older children, such as the chemistry of photosynthesis, Newton's second law , in fact all the theory they've learned and to be able to recognise the very basic actions that children are choosing to do as they investigate in their play . We need to be able to recognise that they are using the very beginnings of the theoretical understanding . It is these basic first actions a which we use everyday and we need to show the children and it takes some skill and perseverance for adults used to telling children science facts to recognise the children’s’ investigations and findings out. Many teachers and parents don't like doing this, often say they don’t know the maths or science, or remember their school lessons but can not simply to the basic principles like a push or a pull for using a force, and say that to the child. They find it very difficult but it is vital to recognise the children's ideas and experiences and their understandings which form the basis of their STEM learning journey, alongside the traditional observations made by early childhood practioners.

Sue Dale Tunnicliffe

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