PLAY IN EDUCATION DEVELOPMENT AND LEARNING

27th ICCP World Play Conference, Vilnius

Researching Play: Challenges & Opportunities

Play & Learning: Cause or Effect?

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Play: why do we do it?

Challenges and Opportunities

- The challenges of seriously researching play at the highest possible scientific level
- Why it is important that we meet these challenges:
  - If we want to influence policy for children and their education
  - If we want to help improve early childhood educational practice

Structure of the Talk

1. Play & Learning: the evidence
2. Methodological problems
3. What types of research do we need?
4. Possible mechanisms: motivation, language & self-regulation
5. Final thoughts

The importance of play in early development

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With Marisol Basilio, Martina Kuvalja and Mohini Verma

A report on the value of children's play with a series of policy recommendations

1. **Play & Learning: the evidence**

Considerable body of research providing circumstantial or correlational evidence, of a general relationship between children's play and aspects of their development

Includes work in:

- Evolutionary psychology
- Developmental psychology
- Anthropology
- Educational studies

Evolutionary psychology

Bruner (1972) Nature & Uses of Immaturity
- phylogenetic progression of play: physical (mammals) / object (primates) / symbolic (humans)
- proposed mechanisms: representational abilities, 'flexibility of thought'

Pellegrini (2009) play:
- allows focus on 'means' rather than 'ends'
- exploratory and iterative behaviour patterns

Anthropology

Peter Gray (2009 & 2012)
- children's unconstrained play in hunter-gatherer societies
- relationship between loss of play opportunities and increase in child psychopathology

Developmental psychology

Play associated with:

Tamis-LeMonda & Bornstein (1989): early cognitive ability

Bornstein (2006): emotional well-being

Christie & Roskos (2006): early language development

Educational studies

Play-based curricula associated with improved:

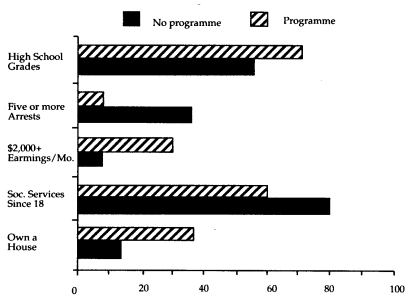
Diamond, Barnett, Thomas & Munro (2007): executive function

Marcon (2002): long-term academic, motivational and well-being outcomes by the end of primary school

Sylva, Melhuish, Sammons, Siraj-Blatchford & Taggart (2004): academic and social development

Darling-Hammond & Snyder (1992): reading , maths and social / emotional adjustment in school.

High Scope follow-up at 27 years



All findings are significant at p<.05 based on chi-square statistics.

From Schweinhart and Weikart (1993).

2. Methodological problems

Whitebread, D., et al. (2017). *The role of play in children's development: a review of the evidence*. PEDAL & the LEGO Foundation, DK.

- Many studies with small samples
- Mostly naturalistic rather than experimental
- Naturally occurring differences between play and non-play groups include factors other than play
- Relationships between play and learning correlational but not proven to be causal
- Short-term experimental studies possibly signal different expectations from children rather than supporting skills

Pretence

Lillard, Lerner, Hopkins, Dore, Smith & Palmquist (2013)

Reviewed 154 studies of pretend play's relations with children's learning and development

Concluded that pretend play:

- is one way of developing children's reasoning skills, but other ways are just as effective.
- may have a role in developing children's social skills and awareness of others' minds ('Theory of mind') but the evidence is mixed or unsatisfactory

Pretence

- could have a role in the development of language, narrative skills and emotion regulation, but the evidence is limited
- may help to develop children's creativity, intelligence, problem solving, self-regulation and executive functioning, but there is little or no evidence

Physical Play

4 systematic reviews in different aspects

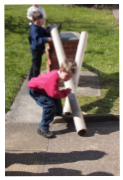
- *Bjorklund & Brown (1998)*: rough and tumble and physical activity play
- *Pellegrini & Smith (1998)*: physical activity play
- *Pellegrini & Bohn (2005)*: play during school recess
- *Brussoni et al (2015)*: 'risky outdoor play'.

Physical play

- Good evidence that physically active play provides children with exercise and the consequent health benefits
- Evidence associating physical play with developments in academic progress and social competence is inconclusive:
  - physical fitness itself has benefits for concentration, confidence etc
  - physical play often also involves social interaction of various kinds, playing with rules, pretence
  - taking a break from cognitive tasks, in itself, improves performance

Similar picture for

- Play with objects



Symbolic play

Games with rules

3. What type of research do we need?

- To establish that play causes development
- To establish causal mechanisms

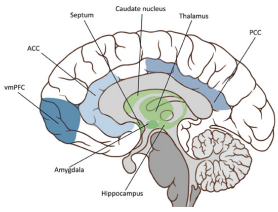
- Useful research methodologies
  - Neuroscience studies
  - Longitudinal studies
  - Observational studies

Neuroscience

Liu, C., et al. (2017). *Neuroscientific evidence on the connection between characteristics of playful experiences and learning*. The LEGO Foundation, DK.

Five characteristics of play (Hirsh-Pasek et al.,2015)

- Joy
- Meaningful
- Active Engagement
- Iterative
- Socially interactive



Neuroscience related to the five characteristics

Joy	Meaningful	Active Engagement	Iterative	Socially Interactive
* Emotions are integral to neural networks responsible for learning * Joy is associated with increased dopamine levels in the brain's reward system linked to enhanced memory, attention, mental shifting, creativity, and motivation	* Making connections between familiar and unfamiliar stimuli guides the brain in making effortful learning easier * Meaningful experiences introduce novel stimuli linking to existing mental frameworks; processing these stimuli recruits networks in the brain associated with analogical thinking, memory, transfer, metacognition, creating insight, motivation and reward	* Active and engaged involvement increases brain activation related to agency, decision making, and flow * Active engagement enhances memory encoding and retrieval processes that support learning * Full engagement in an activity allows the brain to exercise networks responsible for executive control skills, such as pushing out distractions, that benefit short term and lifelong learning	* Perseverance associated with iterative thinking is linked to reward and memory networks that underpin learning * With practice, iteration increasingly engages networks related to taking alternative perspectives, flexible thinking, and creativity	* Positive caregiver-child interactions help build the neural foundations for developing healthy social emotional regulation and protecting from learning barriers, such as stress * Early social interaction promotes plasticity in the brain to help cope with challenges later in life * Social interaction activates brain networks related to detecting the mental states of others, which can be critical for teaching and learning interactions
These five characteristics involve neural processes that can prepare the brain for future learning.				

Neuroscience of play in simple mammals
(Pellis & Pellis, 2009)

- extensive research, spanning over 30 years, of play in simple mammals, mainly mice and rats
- this consists of physical 'rough and tumble' and play with objects.
- evidence of impact on brain development in specific areas of the pre-frontal cortex
- poor levels of social competence in animals deprived of these play opportunities.

Longitudinal studies

A few indicative studies:

- *Barker et el. (2014)*: the amount of less-structured time in 6-7 year old children's daily lives, including free play alone and with others, social outings, sightseeing and visiting museums & zoos, predicted their cognitive self-regulation.
- *Hughes et al (2015)*: the strongest predictor of 'school readiness', language and cognitive development among children at the point of starting school, was an item completed by their teachers indicating that the child 'talks about fun activities at home'
- *Wolfgang, Stannard & Jones (2010)*: quality of LEGO play at 3 and 4 years old predicted mathematical achievement in high school

Observational studies

Pellegrini's (1992) advice that 'observers might attend more closely to what children actually say and do during object play'

- *DeLoache, Sugarman & Brown (1982)*: observational study of children's stacking cups play between 18 & 42 months; revealed increasingly sophisticated error correction strategies
- *Cook, Goodman & Schulz (2011)*: recent observational study showing that within exploratory play, pre-schoolers spontaneously select actions that provide them with more information
- *Whitebread et al (2007)*: large observational study of 3-5 year olds spontaneous play activities in pre-school, identifying a wide range of self-regulatory skills being employed

4. Possible mechanisms: motivation, language & self-regulation

Istomina (1975)

Alochka A. (five years. two months) was busily engaged in preparing lunch, and several times reminded the experimenter that she needed salt.

When it was her turn to go to the store, she asked, with a busy expression on her face:

"Z. M., what should I buy? Salt?"

The experimenter explained to her that this was not all and named four more items that were needed. Alochka listened attentively, nodding her head. She took the basket, the permission slip and money and went off, but soon came back.

"Z. M., I have to buy salt, milk, and what else ?" she asked. "I forgot"

The experimenter repeated the items. This time Alochka repeated each word after the experimenter in a whisper and, after saying confidently, "Now I know what I had forgotten," went off.

In the store, she went up to the manager and, with a serious expression, correctly named four items, with slight pauses between each.

"There is something else, but I forgot" she said

Meta-communication in pretence

(Whitebread & O'Sullivan, 2012)

C8: I'm the farmer

A2: And am I the farmer's wife so?

C8: You're the farmer's wife and I'm the farmer as well as the Dad, you're the farmers' wife. You have to put the bales of hay in the trailer there (*pointing to his tractor constructed from wooden blocks and the*

chairs which are signifying the bales of hay)

A2: No! I don't want to get dirty!

C8: No you won't! The bales are clean; we need to lift them on the tractor

A2: Can I just not make the tea?

C8: Ya, you can make the tea and when you're ready then. . . then, come over

A2: Ok, I'll make the tea and then I'll come over!

5. Final thoughts

- Latest technology in neuroscience now permits us to monitor brain activity in young children while they are playing; EEG and NIRS
- In PEDAL, we are in the process of establishing a birth cohort longitudinal study of play
- Modern video technology and video analysis software allows for detailed analysis of behaviour, links between speech and action etc
- We are now beginning to understand how play influences development, and ways in which it can be a

CAUSE and an EFFECT!

Thank you for listening!

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More information about the research centre can be found at:

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