

Learnus®

MEDIATED WORKSHOP SERIES

Understanding Learning - is it all in the brain?

MEDIATED WORKSHOP REPORT:

The impact of touch-screens on early child development: is it really all bad news?

13 February 2016

18:00 to 20:00

Canterbury Christ Church
University UK

INTRODUCTION AND PURPOSE

This workshop forms part of the LEARNUS 2016 series of mediated workshops which aim to explore how our understanding of the brain might inform our understanding of teaching and learning. Within the context of the overall mission of LEARNUS, the purpose of this event was to bring together a range of stakeholders to share their expertise and understanding of learning with specific reference to research on the impact of touch-screens on early child development.

The opening presentation from Professor Annette Karmiloff-Smith was followed by round-table discussions and a plenary question and answer session. Prior to the workshop a paper¹ authored by Professor Karmiloff-Smith was sent out to participants in order to help familiarise them with some of the issues.

Sixty participants attended the workshop.

KEYNOTE PRESENTATION

Professor Karmiloff-Smith opened her presentation by reminding everyone that humans are born at an early stage in their development trajectory and that interaction with social and physical environment can have a significant impact on their neuro-cognitive development. Over time, as a function of responding to environmental stimuli (sound, vision, touch, smell), connections are made between cells in the brain. As the child gets older there is a dynamic process by which some of the connections are strengthened and others, the less used ones, are pruned. However, there are a range of factors that can interfere with brain development even before a child is born, e.g. the impact of a mother smoking and/or drinking alcohol during pregnancy, low SES etc. She then asked whether screen media also have a negative impact? In order to address this question Professor Karmiloff-Smith, focused on:

1. The role of sleep in infant development
2. The effects of TV/DVDs
3. The impact of touch-screen tablets.

1. THE ROLE OF SLEEP IN INFANT DEVELOPMENT

Sleep is now recognised as an important contributor to brain development especially in infants. Professor Karmiloff-Smith recalled how sleep was once considered to be a resting state during which there was very little brain activity. It is now recognised that this is far from the truth; sleep plays a crucial role in development even before birth and is a key part of the learning process. In their first two years infants on average spend more time asleep (around 10,000 hours) than awake (around

7,500). This is because at this stage they cannot 'switch off' from the endless stimulation to which they are subjected. During sleep, baby's ears and eyes are at rest, with lowered state of consciousness, enabling the brain to self-stimulate, concentrating on what's going on inside rather than outside. In fact some parts of the brain (e.g. midbrain and brain stem) are more active during sleep than when the child is awake. Sleep plays an important role in enabling the formation of connections which underpin physical and cognitive capabilities as young children develop. Sleep is also crucial for the consolidation of learning and for clearing neurotoxins from the brain.

2. THE EFFECTS OF TV and DVDS

The invention of new technologies has, throughout history, caused reactions from significant parts of the population. This was even true when the printing press was invented and people feared reading books would stop children playing. The introduction and use of electronic and digital technologies by young children have not escaped criticism and strong adverse reactions, many based on no scientific evidence at all. In 1999 guidelines from the American Association of Pediatrics recommended that children under two years old should not be exposed to any time in front of a screen (TV/computer/tablet). These have since been softened in the light of scientific evidence but further study is required. To illustrate this Professor Karmiloff-Smith outlined an investigation into the use of two 'learning' DVDs one described as based on a 'scientific' approach and another as 'aesthetically pleasing'. (NB. Some materials claim a scientific basis but the evidence is not always robust.) By monitoring infants' visual responses it was possible to demonstrate that appropriately designed materials, based on scientific studies of infant development, generated more visual attention, more sustained attention and more fixations on different screen locations in 6 to 12 month old infants.

3. THE IMPACT OF TOUCH-SCREEN TABLETS

TV and DVDs are largely passive experiences which may stimulate the visual/auditory systems, but not the fine motor system. Furthermore the child has no control. However, the introduction of touch-screen tablets is changing the sensory environment for everyone and young children in particular. For example, in 2011 approximately 7% of households had a tablet but by 2014 this had increased to 71%. Together with their availability tablets offer an intuitive interface which enables toddlers to gain intense contingent sensory stimulation and immediate feedback. Importantly research evidence is starting to indicate that if used appropriately, the use of touch-screens by infants can lead to positive effects for development. This provides the background for the TABLET (Toddlers attentional behaviours and learning with touch-screens) Project being run at Birkbeck College, University of London, in collaboration with Dr. Tim Smith, Dr. Rachel Bedford, and Ms Celeste Chung.

The TABLET project is addressing the question, "*What is the influence of touch-screen use on toddler cognitive development?*". Using a range of methods, evidence indicates that the use of tablets increases from approximately 50% of infants between 6-11months to 90% of toddlers at age 28-36 months. The time also increases from an average of just under 7 minutes per day to 40 minutes respectively for these groups. Although the project is ongoing the preliminary findings to date indicate:

- the use of tablets with young children in the UK is similar to that of 6-36 month old children in other nations;
- there is no evidence of developmental delay in users versus non-users and that negative relationships only appear with passive users;
- that earlier active touch-screen use ('scrolling') predicts earlier fine motor milestones ('stacking').

The project will build on these initial findings using longitudinal data to investigate further the mechanisms of cognitive development and the effect of active and passive tablet use on this.

Professor Karmiloff-Smith concluded her presentation by briefly considering some points of good practice in the use of tablets. She emphasised the need to use them interactively as a complement to other materials, books, toys and everyday experiences.

ROUND TABLE DISCUSSIONS AND PLENARY

The groups at each table were invited to reflect on the points made during the keynote presentation and in the light of that to consider one or more of the following questions:

- To what extent do current practices in teaching and learning of young children reflect understandings gained from educational neuroscience?
- What evidence do we have that particular strategies work?
- In what ways do you consider the use of technology in general and touch-screens in particular, can enhance the learning of young children? What evidence do you have to support your view and what might educational neuroscience contribute?
- In the light of the presentation in what ways might you review your current practices as a teacher/practitioner/researcher? What questions does the presentation raise for you?

The very lively and rich discussions that ensued inevitably raised many more questions than answers with issues ranging from matters relating specifically to brain structure and activity (*‘What is actually going on inside the brain?’*) to the possible impact on the way in which children interact with others (*‘Does use of tablets encourage children to be anti-social?’*). Despite the variety of points raised, it is possible to identify 4 themes running through the round table discussions and the questions that were raised with Professor Karmiloff-Smith during the Q&A plenary.

1. **IMPACT ON CHILDREN’S DEVELOPMENT MILESTONES.** Several discussions raised issues related to the potential impact (both positive and negative) the use of touch screens might have on developmental milestones. Questions raised included: Which milestones are affected? Is the sequence of the milestones changed? Is it possible that in future the milestones that are assessed will need to be modified?
2. **THE TYPE OF INTERACTION WITH THE DEVICE.** The potential for active interaction with the device was noted alongside the value of enabling infants to take some control over their experience. However, there was debate around how ‘active’ engagement is defined. A physical reaction (touching, pinching etc.) to what children see on the screen or hear in response to their action seems obvious but are there more subtle ways in which they might be engaging actively with the material. Is it possible to demonstrate mental activity related to the stimuli of a touch-screen? If so, is this the same as or different from say, a child looking at a book? Does the level and quality of interaction change if the touch-screen is used by two or more children working together?
3. **PARENTAL RELATIONSHIPS.** The role of parents is highly influential in all aspects of an infant’s experiences; the use of touch-screens is no exception. There was general agreement that parents using the tablets effectively with their children, sharing the experience and providing stimulation can significantly improve the impact. However, as with the effective use of books and toys, to what extent can the role of the parent be restrictive rather than enabling? It was felt that in contrast to the use of books many parents may feel more inhibited when using touch-screens due to their own (lack of) confidence in using such technologies. Indeed concern was expressed that some parents may feel intimidated because they ‘know less’ than the toddler using the device. Bearing in mind that younger parents are more likely to be comfortable with using touch-screens, is there an argument for looking at how parents engage with their children in

using tablets and the effects of this on the child. Are some parents over-controlling? Do children / parents need some guidelines within which they can work?

4. MEDIUM TO LONG TERM EFFECTS. Although it was acknowledged that it was too early to have any substantial evidence, several groups raised issues around the potential medium to long term effects. The discussions focussed on both the social effects and the mental health of the children. To some degree both these areas arose from similar questions around the extent to which the use of touch-screens could lead to children becoming isolated – engaging mainly with the device rather than with other children and adults. Other more specific issues that arose during these discussions included potential physical effects resulting from behaviours such as over use of immature limbs (e.g. wrists) in holding devices for long periods of time.

IN SUMMARY

The underlying argument put forward by Professor Karmiloff-Smith, i.e. that there are benefits from using touch-screens, was widely welcomed. The need for more reliable and robust scientific evidence was also acknowledged. Inevitably there are many caveats, notably that there are still many unanswered questions and, importantly that the findings should not be taken in isolation of other evidence – especially when the research findings are applied to practices.

THANKS

LEARNUS wishes to thank Professor Annette Karmiloff-Smith for her thought provoking presentation and responses to the questions and to all the workshop participants for their willingness to share their ideas, experience and expertise. Thanks also go to everyone who helped to make this workshop possible, especially Dr Nicola Abbott and Dr Amanda Carr and Canterbury Christ Church University for all their support.