

'Help, I'm feeling paralysis about ICT': changing beliefs and practice around computer integration in the early years

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Introduction

This conference paper reports findings of a classroom-based intervention to investigate effective strategies to integrate computers in to an early years classroom. The project aimed to develop approaches to teaching and learning where there was a strong belief in a child-centred pedagogy. The data focus on one practitioner's changing beliefs and practice around her use of computers with young children and the opportunities they provided for meaningful learning. It suggests teacher beliefs about the role of computers in child-centred pedagogy may have an impact on the way they are used as part of teaching and learning.

What research says about computers in the early years

There is still is ambivalence towards the presence of technology in early years settings (Flewitt, Messer, & Kucirkova, 2014). Early years practitioners have a strong pedagogy to support learning in other areas of the curriculum, but find this more challenging with computers (Plowman & McPake, 2013) and need help to reflect on how they could apply these skills and expertise to learning with ICT (Plowman, Stephen, & McPake, 2010). For many early years teachers, there is a dilemma between a constructivist, play-based approach to learning and using technology in the early years (Plowman & Stephen, 2008; Stephen, 2010). Their existing pedagogy does not see a role for computers and their pre-packaged games and activities with pre-set learning outcomes. Research has shown teacher beliefs also have a powerful impact on pedagogy and that teachers may be unwilling to use new tools unless they fit in with their existing beliefs (Ertmer, 1999). Intrinsic beliefs about ICT, rather than external barriers such as a lack of computer skills, technical support or time, may be the main barrier to the effective use of computers in the classroom (Ertmer, 2005). Teachers' beliefs can be more powerful in their decision to use technology than the technology itself (Miller and Olson, 1994). This suggests a need for approaches to professional development that address the mismatch between teacher beliefs about technology and their theories about teaching and learning. Professional development to date has tended to focus on what might be needed to overcome external barriers such as lack of skills and technical support rather than focusing on what might be needed to address teachers' fundamental beliefs and attitudes about pedagogy and the process of teaching and learning with computers (Beauchamp, Burden, & Abbinett, 2015). There is a lack of research that explores how teachers can support children's use of computers in early years classrooms in ways that are dependent on their pedagogical skill, rather than specific on-screen activities.

Theoretical approach

This research adopted a sociocultural approach to learning combined with activity theory to view learning as contingent on both the context in which learning takes place as well as the

cultural tools and signs that mediate children's learning. A sociocultural approach to teaching and learning recognises Vygotsky's (1978) view of development as a social process in which knowledge is constructed as the result of interaction with others and mediated through the use of tools and signs. Leontyev's (1977) formulation of activity theory extends Vygotsky's conceptualisation of individual learning as socially and culturally determined. In activity theory the focus is no longer on the individual but their chosen goal, and the relationship between mediators, society and individuals in achieving the outcome of mediated action. Activity theory helps to understand how and why participants act in different contexts and examines the interaction between the rules and division of labour that govern teaching and learning in the classroom community. It shows how history and power play in to, and shape, the activity children engage in by analysing the rules and division of labour that govern the way participants act in the process of teaching and learning. Rules relate to factors that constrain or encourage activity and can include practitioners' beliefs and the philosophy that underpins their teaching as well as what counts as valid knowledge. The division of labour describes how children and teachers act during different types of activities. Using activity theory allowed me to widen the analysis out beyond either teaching practice or technology-mediated learning and consider the sociocultural context for learning and the extent to which learning is affected by the classroom environment and the factors that create that environment.

Designing an intervention to introduce change

The study used educational design research (EDR) to collaboratively design, implement and develop a naturalistic, classroom-based intervention to develop teaching and learning strategies to integrate computers in to an early years classroom. EDR is concerned with a theoretical rationale for how and why an intervention works. It investigates the process of teaching and learning rather than its outcomes and relies on teacher development as part of its overall design. EDR allows the researcher to identify as far as possible which particular features of an intervention are more effective and why (Reeves, 2011) and necessitates close collaboration with practitioners. The iterative process of developing, testing and analysing an intervention that is a feature of EDR provides a 'testing ground' for theoretically informed ideas developed to address real problems faced by practitioners and so aims to narrow the gap between research and practice. The inclusion of the context for learning as part of the analysis in EDR also results in a greater understanding of how the context in which teaching and learning takes place may affect learning outcomes (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003; Reinking & Bradley, 2008).

The participants in this study were a nursery class of twenty-four 3-4 year olds, the class teacher and two early years educators (EYEs). The nursery was part of a two-form entry mixed community primary school in inner London. The setting was a large, well-resourced, open plan classroom with an outdoor space to which children had free access between the two whole class teaching sessions at the beginning and end of each morning. The children had free access to the classroom desktop computer and interactive whiteboard. Data collected included video recordings of children and staff in the nursery, ongoing audio-recorded reflective discussions with the practitioner, discussions with children, interviews with the EYEs and analysis of weekly planning sheets. Data collected before the intervention provided a detailed understanding of the classroom context into which the intervention had to fit and the 'problem' to be addressed. This suggested the need for an intervention that would:

- encourage practitioners to interact with children during children-led computer play

- include computers as part of planned adult-led activities
- allow practitioners time and space to reflect on their developing use of computers

The intervention was implemented in three cycles over the course of one academic year and developed in close collaboration with the practitioner and as the result of ongoing analysis and reflection on what worked and why.

The research followed BERA ethical guidelines and was mindful of the particular issues presented by research into young children's lives particularly when video data is collected. Consent was gained from parents, teaching staff and children and all participants were informed they had the right to withdraw anything they said at any stage and that their names would be anonymised. Previous experience of conducting research with young children showed me that children's consent is a fluid process; they will often give and withdraw their consent on a daily, and even hourly, basis and that they are usually competent and confident enough to do this (Vidal-Hall, 2013). Consent was, therefore, never assumed, but always renegotiated before the start of each session.

Mismatch between pedagogy and computers

Mary recognized her attitude to the presence of computers in the classroom was a 'reactionary' one and she described computers as 'something that sucked the life force'. She had a strongly held belief that children's computer use was 'passive and solitary'. Mary believed there was little meaningful interaction between children playing at the computer and that computers offered little space for their creativity. Mary did not believe children were engaged in any valuable learning experiences when sat in front of a computer screen using programmes with pre-determined outcomes that provided few opportunities for children to develop their own input and create something new rather than following the instruction provided by screen activities. One of the main constraints to Mary using computers alongside children was her belief that the computer needed a direct teaching approach from practitioners in order to give children the technical skills they needed to navigate programmes and use the mouse and pen tool on the interactive whiteboard. On one occasion Mary described showing a child how to use a computer mouse and said "It leaves a bad taste in my mouth when I have to sit and show them how to use the mouse and click and drag." This kind of more direct and structured teaching approach was not a strong feature of Mary's practice but one that she believed was warranted by the need to teach children mouse control. Mary found it hard to find a rationale for time spent with children using the computer and there was little meaningful interaction between Mary and the children around the computers. Face-to-face interactions with children at the computer were directed towards logging on, showing them how to load and make a game work, how to use the mouse or interactive whiteboard pen tool or solving technical problems. Having done this, Mary would then leave the children to use the computer on their own rather than exploring a game or activity game alongside them and seeing this interaction as an opportunity to extend learning based on the children's interests and choices.

Mary's view of computers was a direct challenge to her strong child centred pedagogy which was underpinned by the belief that

we have to offer children a set of experiences and see what they do with those experience and see how we can extend them.

Mary believed children's participation in free flow, child-initiated play provided the best opportunity for children's learning and that her role was to provide a stimulating learning environment in which children could explore their developing interests. This was supported by adult interventions in child-initiated play to extend their emerging knowledge, understanding and skills. Although there were planned adult-led whole class and small group teaching sessions, it was Mary's belief in child-initiated play that guided her practice most strongly. This was demonstrated during visits to the classroom when I recorded several occasions on which Mary abandoned the planned whole class teaching sessions because children were deeply engaged in child-initiated activities. The following comment suggests Mary viewed this as a more valuable and meaningful way of learning than adult-led teaching sessions.

I do think there needs to be a balance. However, I cannot get away from the fact that when I see children really engaged and learning through play the quality of what they're learning is far better than anything they get in a more structured imposed situation.

This view of learning was not compatible with Mary's description of children's computer use as passive and solitary and the fact that teaching mouse skills required a direct approach to teaching that was not a strong feature of Mary's practice. These beliefs were the main drivers behind the ways computers were used by adults and children together.

As part of her commitment to developing computer use in the classroom Mary introduced a new website which allowed children to choose from more than 50 activities rather than the few games they had been able to use previously. Mary also began to actively observe and reflect on child-initiated computer play and saw the impact children's engagement with computers and the social interaction and learning that this prompted. She described being

quite blown away by the level of social interaction that was happening and all the skills that were coming out of that.... And that is was very much child led, child initiated. So that was a big eye-opener for me.

Children collaborated and co-operated in groups using the games and apps they chose and loaded on to the screen and were active in constructing new understanding, skills and knowledge. Children were leading their own learning when they shared the skills and knowledge they brought from using computers at home and developed new skills as they problem solved how to play a range of different games. The active, social nature of their computer play was something Mary commented on and valued.

Such a lot of it is social, way more than a child sitting down and drawing a picture on their own. Way more interactive and that's been an eye-opener for me... I see it as a very active thing rather than passive. I see their engagement with it as active rather than passive.

Computers provided valuable opportunities for children's learning beyond the pre-determined outcomes of the games they chose. This new belief gave Mary a reason support children's computer use and extend their learning through her interventions in child-initiated computer play. Her focus shifted to one in which she followed children's choices and interests and began to see computers as an opportunity to develop the skills and knowledge she saw happening around the classroom computers. The specific games and

programs children used and physical mouse skills were no longer the main factor in determining the value of children's learning. It was the fact children used the computers in groups, and the collaborative knowledge development that computer games fostered that Mary came to see as meaningful learning. Crucially, these new beliefs gave her a role to play in supporting and extending children's computer mediated learning and Mary began to explore ways to use the computer as part of her practice and develop strategies to integrate the computer into teaching and learning. The big change was that Mary realised 'having the whiteboard on is not enough. I need to be there too'. There was a vital role for her to play by recognising and taking advantage of valuable opportunities for adult involvement in child-initiated computer play. The result was that

I'm far more likely to sit with it and to extend through it.....I try and make sure now that the time they have on it has some quality potential outcomes through it.

As Mary spent more time with children using the computer she was able to see and take advantage of teaching moments to extend learning through her strategic interventions in child-led play. She understood that 'by moving in I could really extend what was happening and it was differentiated by virtue of these children leading and then I could extend'. The children's interests and choices became the starting point for Mary's interventions based on a new belief that 'my intervention is really, really important'.

Changing contexts for computer activity

These comments highlight how far Mary's beliefs and practice around computers had changed. The ways in which she used computers during free flow play alongside children was guided by the children and their interests and choices and the valuable learning opportunities that this created. Her computer practice was no longer led by learning outcomes related to skills development. New beliefs meant computers were no longer incompatible with Mary's strong early years pedagogy and she began to develop new ways to integrate them in to her practice. These new practices changed the context in which computer mediated activity took place and constructed new rules and divisions of labour around their use. Pre intervention the context for computer use was controlled by Mary and her beliefs about what constituted valuable learning with computers. This guided the direct approach to teaching Mary adopted when she taught children how to use a mouse or navigate programmes. The rules that governed adult interventions in child-initiated computer play related to EYFS curriculum outcomes and successful participation in reception class computer lessons in the ICT suite. These rules determined the division of labour between children and practitioners and the nature of their interactions. Power lay with Mary and the knowledge she possessed, and the relationship between children and practitioners was unequal. Computer activities were led by practitioners and guided by their beliefs about computers rather than beliefs about a child-initiated learning and child-centred pedagogy.

Following the intervention, a new context for computer mediated learning was constructed around the way children used the computers and Mary's response to their developing interests and choices. Children using the computer in the classroom in social groups gained an identity of themselves as communicators in a digital context and constructed new skills and knowledge about computers. Mary's interventions supported and extended this and enabled new rules and divisions of labour that governed the way computers mediated learning and the outcomes of that learning. New rules for computer activity more closely resembled those that governed approaches to teaching and learning in other child-initiated

activities. Practitioner interventions in child-initiated computer play followed children's interests and choices, rather than being guided by pre-determined outcomes. Mary's new beliefs about the value of using computers during free flow play changed the rules around how she behaved at the computer and the ways in which learning took place during computer-mediated adult-child interactions. This enabled a redistribution of the division of labour that governed the way Mary and the children acted and the extent to which the outcomes of computer mediated activity were led by children and the ways they used computers in school rather than

Implications for practice

In this research the integration of computers in to teaching and learning was led by new beliefs about children's learning with computers and new approaches to using them during child-initiated play. This suggests teachers need to reflect on their beliefs and their impact of those beliefs on the way the children use ICT and the learning that takes place. Practitioners need to ask how much choice am I giving children and how do my own beliefs define those choices and the learning that emerges as a result of those choices. Am I missing an opportunity to use computers to connect activities with meaningful learning and support children's developing interests, skills and knowledge? Computers are not going to go away and they are now ubiquitous in the lives of young children outside school. We need to find ways to embrace their presence in EY settings and the first step towards this may be to address our own beliefs about pedagogy and technology.

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