Can enhancing the Technological, Pedagogical and Content Knowledge (TPACK) of early years teachers in the use of tablet technologies improve outcomes for young children?

by Jacqui Basquill

The aim of this research is to investigate whether the Technological, Pedagogical And Content Knowledge (TPACK) model (Koehler and Mishra, 2009) can be applied to develop teachers' use of technology in the classroom. It will examine how this can be applied to Early Years practice and if using this model can help Early Years teachers develop their practice to enable them to use technology in a stimulating enjoyable way to improve outcomes for young children, focusing on all forms of technology. The project will also investigate how improving teachers' understanding and thereby their provision of the resource to children will impact on children's learning in a variety of early years settings.

The use of technology throughout all educational settings is becoming increasingly more prevalent. My personal expertise focusses on the Early Years phase of education and I am interested in how technology, particularly the use of tablets either Android or Apple, is implemented in order to improve children's knowledge, skills and understanding. Early Years is defined as birth to five years of age (DfE, 2013), for the purpose of this study I will focus on practice with 3-5 year olds.

Experience in early years settings has shown that use of technology varies greatly and depends on the practitioners' confidence in its use. It may consist of a lone PC which sits in a corner and is rarely if ever used, to a wide range of programmable toys, interactive whiteboards, cameras, video and tablets all being planned for and used effectively to enhance children's learning (Plowman et al., 2010). This variation in provision and use has a great impact on both children's learning about IT and learning through IT. With such rich resources available and the potential for children to develop their independence and extend

their understanding in a wide variety of areas it is essential that teachers have a sound understanding of how to use them to their full potential.

Previous study has led to an interest in Koehler and Mishra's (2009) work on Technological, Pedagogical and Content Knowledge (TPACK). I am planning to investigate how the quality of the pedagogy behind the use of digital technologies, such as tablets, influences children's learning.

Whilst the use of technology has been gradually increasing in early years provision over the last thirty years, it has had erratic support by the practitioners and teachers involved. Siraj-Blatchford and Whitebread (2003: 18) explain that because of the active nature of early years pedagogy, many early years teachers believe that by using technology, children become 'passive recipients'. The House of Lords Select Committee report (2015) highlights the continuing lack of confident and competent educators with the skills to teach at a sufficiently high standard. These two issues have a significant impact on teaching of technology in the early years.

An issue with the use of technology in early years provision is the feeling that it is something to replace active learning experiences or an extra burden to pay for, plan for and spend precious time on. Siraj-Blatchford and Whitebread (2003: 93) explain that

> 'It would probably be a good idea if the educational technology was integrated into educational activities to the extent that it 'disappeared', so that it became unnoticed in just the same way as we no longer notice paper and pencil when it comes to writing. We simply take them for granted, and the new technology should probaby be the same.'

No matter what an individual's feelings or opinions about the use of digital technology is, or how they feel about its use in education, they cannot fail to see that it is part of modern day life and that it is being used by all age groups from young babies to very mature adults (Judge et al., 2010). Anggard (2013) comments on how technology gives children new

experiences and opportunities to play in a different way, whilst Craft (2012:174) highlights how children are more connected because of technology and that this is 'integrated with their lives'. McPake et al.(2007) found in their research that the vast majority of young children (97%) were growing up in a home that at least had a mobile phone. There is also the view however that technology has not delivered on its promises and children's outcomes have not improved because of it (Selwyn, 2013; Buckingham, 2007). For the purpose of this study the word 'outcomes' refers to the progress that children make through engaging in the activities. In early years practice it is routine to observe children regularly in order to assess their needs, understanding and interests in order to plan new activities which will extend their current level of knowledge, skills and understanding to the next stage (Lindon, 2012). Buckingham emphasises that computers have been in classrooms for three decades, and that learning has not changed. I would argue that while he may be accurate in the length of time schools have accessed computers, what he does not discuss is the change in quality of the technology available during that time as well as the training and confidence of teachers in order to use these facilities. It is clear that technology is here to stay and children are using a wide variety in their everyday lives (McKenny and Voogt, 2010). While many children have access to technology at home this varies greatly. This may be due to parental enthusiasm, beliefs, concerns (Lepičnik-Vodopivec and Samec, 2012) or due to financial circumstances (Judge et al., 2006; McKenny and Voogt, 2010) or it may be influenced by the child's own interests (McPake et al., 2013). An important feature of early years education is building on the child's existing knowledge and understanding (Fisher, 2013). Understanding these home experiences are important in designing appropriate learning experiences for the child in the classroom. Good communication with parents and carers are essential in developing a full picture of the child's strengths and interests and the

teacher's understanding of these will influence their planning to ensure the child is interested and engaged (Basquill et al, 2011).

There is also the question of how the teacher views the use of technology (Swaminathan and Wright, 2003). It is no longer necessary to question whether technology is important in children's learning (Gialamas and Nikolpoulou, 2010), but the teachers confidence and understanding of the technologies is of paramount importance (Maddox and Cummings, 2004; Judge et al., 2006). Serriere (2010) highlights the need for teachers to build on the children's own experiences in order to create meaningful learning because children have a wide range of technological experiences from a very early age. Sime and Priestley (2005: 131) discuss how policy makers recognise the importance of this at the highest level to meet the needs of a 'digital generation' of learners. The Early Years Foundation Stage Framework requires children to understand the variety of technologies used and select appropriate resources for a specific reason (DfE,2013).

This use of technology in schools began with the introduction of simple computers, programmable toys, audio video equipment which focussed on the children engaging with these to more sophisticated technologies such as interactive whiteboards, pupil response handsets and now smartphone and tablet technologies (Maddux and Cummings, 2004). These can be used at a simple level for young children to engage with and at a more complex level for teachers to design, create and demonstrate innovative learning opportunities (Ifenthaler and Schweinbenz, 2013).

Falloon (2013) discusses the propensity for education professionals to grasp any new fads or ideas and implement them without adequate research. However there are always teachers with enthusiasm and technological skills who will lead practice. Judge et al.(2010) discusses how this can contribute to the discrepancies in children's' technological experiences in

school. Hedman and Gimpel (2010) investigated the hype surrounding technologies in schools and their findings supported the hypothesis that rather than the actual potential of the technology it was adopted because of the hype, popularity and prestige it was afforded. While good marketing may be a key reason for the uptake in schools the attraction of immediate responses, ease of access to resources that would require much greater skills and understanding without the technology means that there is the potential for children to support, consolidate and extend their learning either with or without the teacher's support. Couse and Chen (2010) found that young children preferred using tablets for art work as colours did not smudge and mix, and the process was easier. It is important to question if this is a good reason for using the tablets? Is the process not more important than the final product? However, there are many young children who will not engage in any process that involves getting their hands dirty, using tablets may be a way to enable them to learn skills that they may otherwise avoid.

There are difficulties integrating new technologies into the classroom, firstly the learners' attitudes towards it as a contributory factor to its success or failure, secondly and possibly more importantly, the teachers' attitudes and experience with it (Ifenthaler and Schweinbenz, 2013). Ifenthaler and Schweinbenz's research emphasises the effect teachers' expectations have on the success of the devices those with fewer expectations delivering poorer experiences for the children. They also discuss that even those with high expectations cannot provide improved experiences for the children unless they have a deep understanding of the technology and its potential. A final issue raised in their research was the significance of '… a smoothly running infrastructure as a pre requisite for TPC [Tablet-Personal Computer] use' (Ifenthaler and Schweinbenz, 2013:533). This has implications for the quality and accessibility of training in this area.

The discussion so far demonstrates the importance of teacher knowledge and understanding as the major element to making the use of tablet technologies in the classroom a successful venture or not. Koehler and Mishra (2009) discuss the challenges of teaching with technology. They highlight how traditional pedagogical technologies have a ‘specific' use such as using a pen to write with, they are ‘stable' little about them changes over time and they have ‘transparency of function' in that they do what they were designed for. In contrast modern electronic technologies are less well defined, they are ‘protean' they can be used in many different ways, ‘unstable' they are constantly changing, quickly out of date and ‘opaque' few understand their internal workings (Koehler and Mishra, 2009:61). The use of technology is often imposed on teachers (Mumtaz, 2000) and frequently there is a lack of training opportunities to enable them to embrace the full potential of the technology they are required to use.

Koehler and Mishra investigated these issues further and designed a theoretical framework to address the issue. They built on the work of Schulman (1986) who had considered three essential domains for teaching successfully: pedagogy, content and knowledge. Schulman claimed that these cannot be considered separately but are all interlinked.

Koehler and Mishra (2006) introduced technology into this interplay and explain how content, pedagogy and technology are connected, they consider each element separately as an essential part of the learning and teaching process. They then consider them in pairs discussing how they interlink and finally the three elements together as Technological, Pedagogical Content Knowledge (TPCK).

The three areas, content, pedagogy, and technology, overlap to lead to four more kinds of interrelated knowledge. (Koehler and Mishra, 2006:1025)

> TPCK is the basis of good teaching with technology and requires an understanding of the representation of concepts using technologies; pedagogical techniques that use

> technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students' prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge and to develop new epistemologies or strengthen old ones. (Koehler and Mishra, 2006: 1029)

If this framework is to be used as the basis of the research, clearly there is a need to develop definitions to ensure that teaching components are clear for each domain. This project will look to examine the elements of TPACK and create clear characteristics for each and then through the use of a Blog the participants will be able to share practice and support each other with ideas and solutions. Discussions regarding planning and assessment will be encouraged to ensure participants are able to add depth of understanding regarding the pedagogy underpinning their use of technology to enhance the content of the learning opportunities for the children.

This will lead to developing planning activities which will involve the Characteristics of Effective Learning (DfE, 2013), approaches that are essential in early years education to ensure exciting constructive activities which will support the children's learning. This links to the actual content of learning and clear emphasis will be placed on learning about technology and learning through technology.

The outcomes will be measured qualitatively, examining the quality of teacher/ child engagement prior to the training and following it, examining the quality of their experiences before and after, analysing the experience through their perceptions and through impartial observations, comparing the two.

It is clear that as technology becomes more accessible, through the use of touch screens for instance, the more attractive they become to young children giving them control and engagement with activities they would not be able to have without.

This piece of research will investigate a potentially very flexible and accessible piece of technology. The knowledge skills and understanding of teachers will be assessed and the impact this has on the use of technology and the outcomes for children. As more and more settings invest in these new technologies this research will support managers and staff and ultimately the children in realising the importance of the technological, pedagogical and content knowledge required. It will use them as a versatile tool to encourage engagement, support, consolidate and extend their learning and improve their outcomes. Whilst there is a large amount of research investigating the use of technology in education the vast majority examines tools and techniques and how they can be used. A growing amount of research explores the pedagogy behind the use of technology, often in a much focussed way, looking at particular hardware or software. This leads me to question the reason why tablets have been adopted in many educational settings for all age ranges. For the purpose of this research I will focus my questions on Early Years settings.

The Main Question: Can enhancing the Technological, Pedagogical and Content Knowledge (TPACK) of early years teachers in the use of tablet technologies improve outcomes for young children?

Underpinning this question are a variety of others whose answers will inform the conclusion. These questions have been formed as a result of information found in the literature review.

1. Does the range of experience and understanding of the use of tablet technology held by early years practitioners affect the provision for children in the setting?
2. How can the use of technology enhance the children's learning experience?

3. How can developing the understanding of available technologies, the need for sound underpinning pedagogy and appropriate content support learning opportunities for young children to enable them to move confidently to the next steps in their learning?

Whilst the marketing skills employed by large companies such as Apple and Samsung make tablet technology very appealing and while they are currently very popular-the actual benefits of using them are not well researched (Falloon, 2013). Some educational settings are getting caught up in the hype in order to improve children's motivation and become more marketable without considering the practical implications (Cummings and Maddox, 2004). This project will examine the reality of current practice in early years settings and establish what is quality, where there are discrepancies between planning and practice and how technological, pedagogical and content knowledge can be brought together to improve practice thereby improving outcomes for young children. It will do this through careful scrutiny of current practice and learning and supporting teachers to work as a community through the use of the Blog which will enable participants to discuss their practice, share resources and discuss underpinning pedagogy with the aim of supporting practitioners to understand the importance of developing their pedagogical approach to using technology. Once this project is complete, the intention is to engage a broad spectrum of practitioners to develop technology enhanced learning in the EYFS. By collating a baseline of the process and developing actions from that, implementing the action and evaluating the outcomes, practice will be improved. This process will be repeated to ensure that the potential of tablet technologies to improve outcomes for children is identified, the knowledge skills and understanding required by teachers to achieve this is clear and to highlight to teachers in all age ranges, the need to have a sound understanding of the technology being used, the

pedagogy behind using it and the content being taught in order to enable children to achieve better outcomes and make recommendations to early years teachers to support them in enhancing their practice in this area.

Bibliography

Änggård, E., 2013. Digital Cameras: Agents In Research With Children. Children's Geographies, , Pp. 1-13.

Basquill,J., Beattie,L., Ryan, J. (2011) The EYPS Handbook. London: Pearson.

Buckingham, D. (2007). Beyond Technology: Children's Learning In The Age Of Digital Culture. Malden, Ma: Polity.

Couse, L. J. & Chen, D. W. (2010). A tablet computer for young children? Exploring its viability for early childhood education. Journal of Research on Technology in Education, 43(1), 75-98.

Craft, A., 2012. Childhood In A Digital Age: Creative Challenges For Educational Futures. London Review Of Education, 10(2), Pp. 173-190.

Department for Education (2013) Statutory Framework for the Early Years Foundation Stage. Runcorn: Department for Education.

Falloon, G., 2013. Young Students Using Ipads: App Design And Content Influences On Their Learning Pathways. Computers & Education, 68(0), Pp. 505-521.

Gialamas, V. And Nikolopoulou, K., 2010. In-Service And Pre-Service Early Childhood Teachers' Views And Intentions About Ict Use In Early Childhood Settings: A Comparative Study. Computers & Education, 55(1), Pp. 333-341.

Hedman, J. And Gimpel, G., 2010. The Adoption Of Hyped Technologies: A Qualitative Study. Information Technology And Management, 11(4), Pp. 161-175.

House of Lords Select Committee, 2015. Childcare Bill[HL] Government Amendments. http://www.publications.parliament.uk/pa/ld201516/ldselect/lddelreg/37/37.pdf [Accessed 20/10/15].

Ifenthaler, D. And Schweinbenz, V., 2013. The Acceptance Of Tablet-Pcs In Classroom Instruction: The Teachers' Perspectives. Computers In Human Behavior, 29(3), Pp. 525-534.

Judge, S., Puckett, K. And Bell, S.M., 2006. Closing The Digital Divide: Update From The Early Childhood Longitudinal Tudy. The Journal Of Educational Research, 100(1), Pp. 52-60.

Koehler, M. J., & Mishra, P. (2009). What Is Technological Pedagogical Content Knowledge? Contemporary Issues In Technology And Teacher Education, 9(1), 60-70.

Lepičnik-Vodopivec, J. And Samec, P. (2012) Advantages And Disadvantages Of Information-Communication Technology Usage For Four-Year-Old Children, And The Concequences Of Its Usage For The Childrens' Development. International Journal Of Humanities And Social Science Vol. 2 No. 3; February 2012.

McPake, J., Stephen, C., Plowman, L. (2007). Entering E-Society: Full Research Report. ESRC End of Award Report, RES-341-25-0034. Swindon: ESRC.

McPake, J., Plowman L. & Stephen C. (2013) Preschool children creating and communicating with digital technologies at home. British Journal of Educational Technology 44 (3) 421-431.

Maddux, C. D., & Cummings, R. (2004). Fad, Fashion And The Weak Role Of Theory And Research In Information Technology In Education. Journal Of Technology And Teacher Education, 12(4), 511-533.

Mumtaz, S., 2000. Factors Affecting Teachers' Use Of Information And Communications Technology: A Review Of The Literature. Journal Of Information Technology For Teacher Education, 9(3), Pp. 319-342.

Plowman, L. Stephen C., McPake, J. (2010). Supporting young children's learning with technology at home and in preschool. Research Papers in Education 25 (1) 93-113.

Selwyn, N., (2013) Distrusting Educational Technology: The Questions We Should Be Asking, But Are Not : Critical Questions for Changing Times. Routledge.

Serriere, S.C., 2010. Carpet-Time Democracy: Digital Photography And Social Consciousness In The Early Childhood Classroom. The Social Studies, 101(2), Pp. 60-68.

Sime, D. And Priestley, M., 2005. Student Teachers' First Reflections On Information And Communications Technology And Classroom Learning: Implications For Initial Teacher Education. Journal Of Computer Assisted Learning, 21(2), Pp. 130-142.

Siraj-Blatchford, J. & Whitebread, D. (2003) Supporting Information and Communications Technology in the Early Years, Buckingham: Open University Press.

Swaminathan, S. And Wright, J., 2003. Educational Technology In The Early And Primary Years. Major Trends And Issues In Early Childhood Education: Challenges, Controversies And Insights, Pp. 136-149.