

## **Technology Integrated Pedagogical Documentation: Early Childhood Teachers' Beliefs and Practices Enhanced Through Technology Based Professional Learning and Support Project**

Gladys Milimu

Macquarie University, Australia

**Abstract:** Pedagogical documentation in early childhood development and education (ECDE) programs has been acknowledged to be important since it creates common working values among children, educators, administrators, parents and the significant others ((stakeholders) in ECDE. This paper is a report on the results of a case study involving eleven teachers in two early childhood development and education settings in Kenya. These female teachers participated in a professional learning and support project comprising of six workshops focusing on integration of technology in planning and pedagogical documentation. Findings indicate limitation in teachers' confidence, beliefs and practices in integration of technology in pedagogical documentation prior to participation in the project. The teachers' evaluation of the project through self-rating and group discussion demonstrated enhanced confidence, beliefs and practices in integration of technology in pedagogical documentation after participation in the professional learning and support project. The teachers also reported to have developed a positive attitude, motivation and interest in integration of technology in their everyday practices. Further, they developed a deeper understanding of ECDE technology beyond the narrow perspective of computers.

**Key words:** Technology, early childhood development and education, pedagogical documentation, beliefs, professional learning

### **Introduction**

Pedagogical documentation in early childhood development and education (ECDE) programs has been acknowledged to be important since it creates common working values among children, educators, administrators, parents and the significant others ((stakeholders) in ECDE. "We document in order to trace the process of learning and speculate on the outcomes for children. It also make visible ours and the children's thinking and to create an aide-de-memoir for children, educators and families of particular events and moments in the life lived in the early childhood setting" (Fleet, Honig, Robertson, Semann and Shepherd, 2011, p. 8). The Reggio Emilia early childhood education model (Wien, Guyevskey & Berdoussis, 2011) has been utilized by educators and researchers in early childhood development and education to understand the interwoven relationship between Reggio-inspired pedagogical documentation and the early years learning framework. The Reggio Emilia model is focused on documentation that "may be used as a tool for mediating the understandings of children in their own diverse social, cultural and historical contexts" (Dahlberg, 1995; Lenz Taguchi, 1997 in Alcock, 2000). Presently documentation of pedagogical practices in early childhood development and education is considered from a technological point of view. Varied digital resources are integrated in everyday practices in some early childhood settings and particularly in a few

developed nations. The technology integrated pedagogical documentation “assist the development of shared understandings of children within the social, historical and cultural contexts which influence the co-construction of learning, thinking and knowledge” (Alcock, 2000, p.6). This does not in any way mean that the traditional tools are not integrated in documentation of ECDE pedagogical practices. Prior to the movement of digital resources in ECDE, pedagogical documentation under the umbrella of Reggio Emilia was mainly centred on children’s art exhibitions displayed on walls and shelves.

The current use of technology in pedagogical documentation extends beyond the concept of art to include all ECDE curriculum areas (language, mathematics, science, music and physical activities). This ensures pedagogical documentation of children’s learning activities in all the ECDE curriculum areas. In addition to the use of walls and shelves, children’s work is displayed in photographs, on computers, videos and digital voice recorders. “Technological tools such as audio and video cameras and photographs visually and aurally document these creative and expressive processes providing a documentary archive about children’s thinking and learning” (Alcock, 2000 p.5). Successful integration of technology in pedagogical documentation in ECDE practices requires teachers with competence, adequate knowledge and skills on-the-state of the art. Recent research studies claim improvement in ECDE teachers’ technology related professional beliefs, skills and practices as a result of professional learning and support (Chen & Price, 2006; Chen & Chang, 2006; McCarney, 2004; Angeli, 2004).

### **Theoretical Framework**

This study drew upon cultural historical activity theory (CHAT) commonly referred to as activity theory (Ivic, 2000, Meyers, 2007; Engestrom, 2001; Roth & Lee, 2007) which link to sociocultural theories. CHAT proved to be the most viable frame for this study since it presented a mirror or lens of screening through the holistic and ecological perspective influencing the uptake of technology in Kenya’s ECDE system. The first phase of this research project involved design and implementation of a technology infused professional learning and support project as an intervention mechanism. As Somekh (2007) supports the need for a research study that is guided by CHAT in which prototype practices or models are set and investigated to see what happens.

In view of Vygotsky’s beliefs (Vygotsky, 1978, Angstrom, 2001 & Ivic, 2000) in the first generation of CHAT, the concept of human labor and tool use were regarded as ways through which man changes nature and transforms himself. In the current study, a professional learning and support project enriched with technological tools was aimed at enhancing the pedagogical beliefs and practices (transformation) of ECDE teachers for the purpose of integrating technology in pedagogical documentation appropriately. This would improve the learning experiences of young children who in the long term would use the skills and knowledge to improve or change nature.

The main tool systems in the professional learning project included laptops, digital cameras, printers, photocopiers, Microsoft word, Power point and Photo Story 3, internet and websites. It is also important to note that children’s voices were an important element of the tool

systems. All these tool systems were incorporated in the project based on participants' needs and views identified prior to design an implementation of the project. This took care of the aspects of culture and historicity as advocated by the CHAT theory (Vygotsky, 1978; Leont'ev, 2005). This correlates with Vygotsky idea on how internalization of culturally produced sign systems brought about behavioral transformation and bridged early and later forms of individual development (Vygotsky, 1978). Having achieved the main research aim of transforming teachers' behavior in regard to integrating technology in pedagogical documentation, the prototype model established may be utilized as a bridge when designing ECDE technological integrated policies, curriculum and training for all ECDE practitioners in Kenya.

### **The Study**

Integration of digital resources in teachers' pedagogical practices enhances their professionalism and quality of learning provided to children in early childhood development and education (ECDE) settings. There are emerging trends in technology integrated pedagogical practices that can be researched on by using case study methodology in the same manner as used in researching on pedagogical practices infused with locally available traditional materials. Eleven early childhood development and education female teachers participated in six technology enriched professional learning and support project through workshops. These workshops were organized at two ECDE settings in Nairobi, the capital city of Kenya during the third school term in 2011. The project aimed at enhancing teachers' beliefs and practices in technology integrated pedagogical documentation. The two case study settings were categorized as high and low technology case study centres. The high technology case study centre (HTCSC) had a laboratory with over thirty desk top computers whilst the low technology case study centre (LTCSC) had only one computer for administrative functions. The participants in this study included five ECDE teachers at the HTCSC and six ECDE teachers at the LTCSC. Seven of these participants were fully trained ECDE teachers and four were still undergoing training in ECDE.

During technology based professional learning, the participants were provided with six learning sessions in the six workshops. Each session had learning objectives, content, learning experiences for participants, duration for each learning session and digital resources. The digital resources comprised of fast working modern laptops, high speed internet connection modems, digital cameras, websites, Microsoft word, Power point and Photo Story 3 for windows, printers, scanners and photocopiers. Participants were also supported in opening their email accounts.

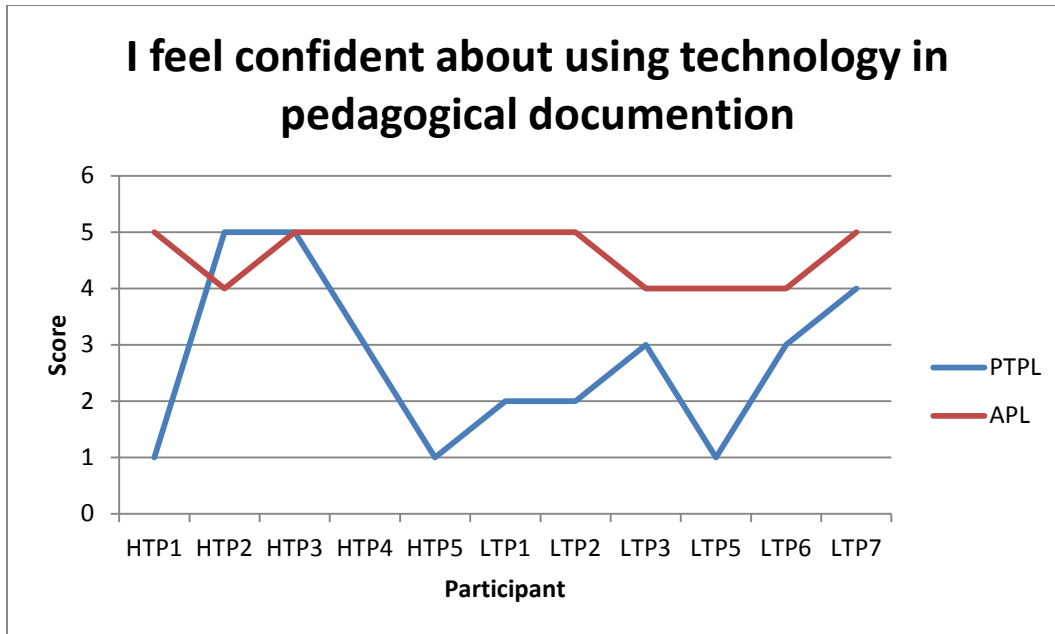
The learning activities included: facilitator's (researcher) demonstrations and discussions with participants; participants working on tasks; emailing to the facilitator, and/or printing the accomplished work. Qualitative analytic methods were used to identify major trends and emerging patterns within the research project as it progressed. The trends and patterns were pursued in detail within-case and cross-case analyses (Zainal, 2007). Participants' self-evaluation rating scales, observation and focus group discussion in one sitting with all the eleven participants were used to examine participants' views in regard to the impact of the

project on their beliefs and practices in technology integrated pedagogical practices. The focus group discussion was recorded by using a digital voice recorder and subjected to transcription process. Subsequently, thematic analysis and coding were employed to determine emerging trends that unfolded in professional data.

### **Findings**

Prior and after participation in professional learning and support project, the participating teachers (N=11) self-evaluated their confidence in regard to integration of digital resources in pedagogical documentation by using a five point Likert scale. Prior to participation in professional learning, two teachers in high technology case study centre (HTCSC) and one teacher in low technology case study centre (LTCSC) were confident about integrating technology in pedagogical documentation. There were eight participants (three teachers in HTCSC and five teachers in LTCSC) teachers feeling unconfident about integrating technology in pedagogical documentation prior to participation in professional learning. Teachers in HTCSC evaluated the statement on confidence by using a mixture of options ranging from strongly disagrees to strongly agree prior to participation in the professional learning and support project. Their counterparts in the LTCSC used a range of the same options except the option on “strongly agree”. This scenario is seen in Figure 1 in which the prior to professional learning (PTPL) line is moving in a zigzag manner depicting teachers’ mixture of evaluation responses to the statement provided on their confidence in regard to integration of technology in pedagogical documentation. There was minimal difference in confidence held between the two groups of teachers despite one group of teachers being in a high technology setting and the other group in a low technology setting. It needs to be noted that the high technology setting had a computer laboratory installed with over thirty desk top computers whilst the teachers in low technology setting had personal mobile telephones as the only digital resources accessed and used. There was only one computer in the LTCSC used for administrative purposes.

After participation in professional learning, all the eleven teachers’ self-evaluation rating scores indicated enhanced confidence in integration of technology in pedagogical documentation. Both groups of teachers in the two settings of study applied either agree or strongly agree in evaluation of their confidence in integration of technology in pedagogical documentation. The after professional learning (APL) line in Figure 1 shows teachers’ almost similar evaluation choices and scores after participation in professional learning project. These choices are evidential of teachers’ consensus on how they felt confident about using technology in pedagogical documentation after participation in professional learning and support project.



**Figure 1:** A Graph on teachers’ self-evaluation rating on their confidence in integration of technology in pedagogical documentation

Key:

PTPL = Prior to professional learning

APL = After professional learning

HTP = High technology participants

LTP = Low technology participants

Data on teachers’ contributions during focus group discussion indicates a change in their understanding of the term “digital technology” after participation in professional learning and support project. This was an important factor to be considered in the study since the teachers’ way of understanding this term reflected the types of technology integrated in pedagogical documentation. Some of the teachers’ group discussion views on these understandings are presented in these excerpts.

*I have also learnt that there are many digital tools to be used in ECDE and not just computers alone. I attend workshops and sometimes facilitators request for our email addresses and I provide none because I have always thought the process of acquiring an email address was complex. I am happy the training has enabled me to learn how to use an email address [LTP3]*

*The technology training is an eye opener for us to use computers and other ICT tools like cameras in our professional practice [HTP1]*

*According to me the training was good because I now know the importance of technology and the kind of tools to be used and not just computer alone [LTP6]*

*I am quite impressed with technology training that we have just finished. At least I now know that ICT in ECDE is not just a matter of computers alone. There are other digital resources like cameras; internet and Microsoft programs that make technology for ECDE [LTP2]*

There appeared to be a consensus on the teachers' understandings in connection to digital technology relevant in ECDE in both case study centres. The four teachers admitted to have changed their conceptualization of ECDE technology after participation in professional learning and support project. They now viewed technology as a range of digital resources and not just "computers". According to the four teachers, the digital resources relevant for professional practice in ECDE included email, computers, cameras, and internet and Microsoft programs.

Earlier on before participation in professional learning, data was collected on teachers' views in regard to their understanding of the term digital technology. These views demonstrated mixed definitions as far as teachers' understandings of the term were concerned. Some of the teachers' responses in both settings exhibited their understandings of the term digital technology in relation to the functional process of a computer; digital technology as computers; digital technology as tools beyond computers and digital technology as data or information in digital tools. These definitions demonstrated teachers' varied understandings on what digital technology was all about. According to the stated definitions, some teachers understood the term from a narrow perspective of computers while a few others understood digital technology as a range of digital tools in addition to the computers.

Apart from enhanced understandings on the concept of digital technology, the professional learning project impacted on teachers' skills and knowledge in integration of technology in pedagogical documentation. The following excerpts are teachers' evaluation comments during focus group discussion held after technology infused professional learning.

*The training was good because it has made me know how to operate some ICT equipment including the computer, digital camera and the internet. I am glad that the training we have had in technology has provided us with skills and knowledge on how to operate computers and I am now sure of helping children while in the computer lab [HTP5]*

*For me I can say at least I am now somewhere in the world of technology. Since I became an ECDE teacher I have been preparing my schemes of work, lessons plans and children's assessment records by using pens and exercise books. The technology training has provided me with skills and knowledge on how to prepare these documents by using ICT tools and especially the Microsoft word and digital camera [LTP1]*

*The technology based learning has provided me with knowledge and skills on how to use different digital tools in my ECDE profession. I have a diploma in ICT and very*

*many packages and this training has made me realize that the diploma ICT courses are not applicable in ECDE. One needs to be trained on how to integrate ICT tools in ECDE and that is something that very many managers have not known. I hope the management in our school will now allow us to handle our ECDE children in the computer lab so that we make use of the skills and knowledge we acquired from the technology training we have just completed [HTP2]*

*The training has also made me know how to open and send email messages and use camera and Microsoft word to plan for my ECDE activities. I have started using internet in cyber cafes to browse for information on ECDE. I am also able to send and receive messages through emails on my own [LTP5]*

*It is true as my co-teacher said; we did some practice on what we learnt in the training. We used a digital camera to take photographs of our children as they worked on an activity involving sand. We also trained them how to take photos by themselves and discuss what they saw in their own photos. They felt happy and did not want us to end the activity. We have a plan of building photo albums on children's learning activities in all curriculum areas so that our fellow teachers, children, visitors and parents coming to our class are able to see what children learn through photo albums [LTP2]*

These responses illustrate the impact of technology enriched professional learning and support project on teachers' skills and knowledge. Not only was the impact evidenced in participants' basic operational skills and knowledge but also in integration of technology in pedagogical documentation. The responses demonstrate teachers' acquisition of skills and knowledge for operation of varied digital tools, including laptops and the internet. They also communicated through internet, sourced for ECDE information on websites, used digital tools to plan for ECDE activities and integrated in pedagogical documentation. One of the teachers [LTP2] categorically explained how she and her co-teacher involved children in documentation of a learning activity that involved the use of digital tools. This example shows the two teachers' deeper understanding of pedagogical documentation as a process that requires children's (as stakeholders) active participation as advocated by the Reggio Emilia ECDE model.

The professional learning and support project had an impact on two teachers' professional beliefs. Both teachers felt the learning had changed their professional beliefs in regard to integration of technology in their ECDE practices. The following excerpts are responses by these teachers on their enhanced beliefs.

*I personally I can say the learning has changed my attitude towards the use of ICT in ECDE [LTP3]*

*Learning about ECDE technology has now changed my attitude towards the use of technology in ECDE. When the schools open, I will be accompanying my nursery children to the computer lab and even assist them where I can [HTP1]*

In addition to acquisition of skills, knowledge and enhanced professional beliefs towards integration of technology in pedagogical documentation, some teachers reported to have developed confidence, motivation and interest due to technology training as captured in the following group contributions.

*When people talk about what they do on computers; I keep quiet and look out of place. I am glad that the training has given me the confidence to also contribute in a discussion about ICT. I do not have a computer but once in a while, I will be going to the cyber café to use the internet to search for ECDE information and read my emails; send email messages to my relatives, friends and colleagues [LTP1]*

*I think I now have the confidence to work with digital tools in my ECDE work provided I have time and I am given support by the management [LTP7]*

*Based on the knowledge and skills I have received from the technology based training, I now have the confidence to discuss with the computer teacher what ECDE children should learn in technology and how best to teach them so that they don't just play games alone on computers [HTP3]*

*I have not gotten time for practice but I strongly believe that I know what to do as far as technology in ECDE is concerned. Before the training, I used to think that it was difficult to use ICT in ECDE and even wondered why some ECDE centres had computers. The ICT training has made me realize that managing ICT in ECDE is not difficult provided you have the ICT tools [LTP6]*

*The learning I have gotten from the ICT training has motivated me and I am going to find a way of practicing what I learnt so that I don't forget. With the knowledge and skills I have acquired from this training, I am thinking of enrolling in an ICT college to sit for examinations in Microsoft Word and Power Point so that I get certificates [HTP3]*

*I personally I have now developed lots of interest in integration of technology in ECDE, something I never thought of until I attended this course. It is my hope that when we open the school we will do some practice [LTP3]*

Due to participation in technology based professional learning, LTP1 is confident about contributing to discussions on ICT, searching for ECDE information and utilizing technology in communication. The LTP7 believes she now has the confidence to integrate digital tools in ECDE. However, she is of the opinion that possession of confidence is not adequate and suggests the need for time combined with support from the management for successful integration of digital tools in her profession. This teacher's views are almost similar to those of LTP6 strongly believing that she knows what to do with ECDE technology provided she has access to the ICT tools. In HTCSC, HTP3 felt the confidence she acquired was crucial in monitoring the developmentally appropriate technology in early childhood (DATEC) and specifically in her setting of practice. Additionally, she is motivated to the point of wanting to improve further her technology skills and knowledge in future.



### Discussion and Conclusions

Early childhood teachers' beliefs and practices were explored through an intervention project to inform understanding about the type of professional learning required in transformative technology integrated pedagogical documentation. Underpinning the type of professional learning were the relevant digital resources accessed and used by case study teachers during professional learning. Teachers' experiences during professional learning suggest a relationship between access to relevant digital resources and enhanced beliefs and practices in technology integrated pedagogical documentation. However, teachers' experiences in integration of technology in pedagogical documentation were limited by lack of basic knowledge and skills in technology and especially operation of the laptops. Their understanding of the term pedagogical documentation was also limited and this was a challenge in their efforts of integrating digital resources in the same.

Early childhood teachers' professional beliefs and practices in integration of technology in pedagogical documentation were enhanced as a result of participating in technology based professional learning and support project. The teachers' evaluation of the project also indicated enhanced skills, knowledge and confidence in use and integration of varied digital resources in pedagogical documentation. The teachers also reported to have developed a positive attitude, motivation and interest in integration of technology in their everyday practices. Further, they developed a deeper understanding of ECDE technology beyond the narrow perspective of computers.

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