How experienced teachers learn in the information age

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In the world of the Information Age, digital natives (students) are being taught by digital immigrants (experienced teachers). These digital immigrants prefer to employ a number of abilities or multiple intelligences (Gardner 1983) to learn about software that can be beneficial to their students. As experienced teachers with limited ICT exposure, they are interested in: learning how to *p*ush buttons (P), thinking how to *a*pply software to their practice (A) and are willing to *c*hange their practice using ICT (C). This paper discusses a study of experienced teachers with limited ICT exposure and their preferred way of learning, as they PAC for the information age.

Keywords: experienced teachers, multiple intelligences, ICT exposure, digital immigrants and digital natives, PAC framework

Introduction

Howard Gardner (1999) writes that, in comparison in modern society, schools have remained relatively unchanged. Furthermore, he reflects that there is an array of ICT (Information and Communication Technologies) media which students can access and they learn in multiple ways (Gardner 2004). "Regrettably however, formal schooling often neglects these multiple ways of knowing" (Gardner 2000, p. 32), and education has inherently remained conservative, encouraging verbal and logical intelligences (Veenema and Gardner 1996). Additionally, Gardner points out that the ascendency of ICT within educational culture will shift traditional intelligences and permit individualised education with "active hands on learning" (Gardner 1999, p. 44)and "explicit step by step thinking" (Gardner 1999, p. 43) for students of the future, through logical, intrapersonal and kinesthetic intelligences. These students of the future are digital natives who speak the language of video games, computers and the Internet (Prensky 2001). Technology has enabled the native's life experience to become different from the life of digital immigrants who speak an outdated language (Prensky 2001) firmly anchored in a pre-digitized world (Prensky 2004) and their learning is still via traditional means (Prensky 2006). The traditional means of learning is lecturer-orientated, encouraging listening and logical step-by-step learning and regurgitation.

Using the above metaphor of digital immigrants for experienced teachers with limited ICT exposure and building on Gardner's work, as well as my previous papers presented at the Second International Conference on Multimedia and Information & Communication Technologies in Education (Senjov-Makohon 2003) in Spain, AARE conferences in Melbourne (Senjov-Makohon 2004) and Sydney (Senjov-Makohon 2005), this paper informs a study that observed the abilities of a group of Post Registration Primary School practising experienced teachers and how these experienced teachers as digital immigrants use certain abilities to learn for the information age.

Methodology

This research applied a participant observation qualitative methodology to observe experienced practising teachers' abilities in a mixed mode of learning in higher education. Mixed mode delivery entails two forms of interaction. In this case the lecturer met the participants face-to-face for a designated time during the academic year at University. The other component of the delivery occurred when the whole group transferred to online mediation: WebCT.

In this study, the researcher observed the participants in the university classroom, interviewed them at three points of the course – beginning, mid and final points and examined their written documentations. Finally, the lecturer verified the collected data in an interview.

Focus of study

The focus of this part of the study was on the abilities of sixteen teachers, who have general classroom teaching experience, but were relatively unfamiliar with ICT. Using the concepts and descriptions of Gardner's (1983) multiple intelligences framework as abilities, and criteria based on his concept of "learning about human abilities" (Gardner 2003, p. 4), the experienced teachers' learning was recorded over one academic year.

Findings

Gardner (1993) stipulates that while "there exists a multitude of intelligences" (p. xxiii) and all human beings possess the eight intelligences, certain intelligences are associated with school (verbal and logical), arts (kinesthetic, musical and spatial) and personal (intrapersonal and interpersonal) abilities. Not all abilities appear simultaneously, but they help in understanding how learners are most likely to learn.

In fact during the study, the participants predominantly valued the abilities and attributes shown in Table 1.

Table 1: Abilities and attributes valued by the teachers

Interpersonal	Kinesthetic	Intrapersonal
Bounce ideas off each other	Action, doing, physical activity	Individual reflection
Collective reflection	Participate	Pursue personal interest
Help others with their problems	Construct	Work at their own pace
Peer teaching	Demonstrate	Work alone
Brainstorm solutions	operate	Writing journals
Observe others	manipulate	Self direction
Ask questions and give feedback	create	
Collaboration	display ideas, concept and plans	
Anecdotal reporting		
Contribute to discussion		
Participate in group activities		
Cooperate with a partner		

These abilities were observed in three distinct ways of learning:

1 Learning how to "push buttons" (P)
2 Thinking through how to apply ICT to practice (A)
3 Changing practice using ICT (C)

and the following section describes the three ways of learning.

Learning how to push ICT buttons (P)

Interpersonal ability is the interaction between participants to collectively "bounce ideas off each other", ask questions and help each other to brainstorm and solve problems. For example, at the beginning of the course, Dorothy asks "where's the on button!" Although, these experienced teachers were unsure of their skills; they lacked confidence and were not fully comfortable with ICT, they observed, asked questions and reassured each other: …Doris "shows … and comments that her son told her that she can't break anything … so she should just try it!"

However at this stage of their learning, they predominantly valued interaction to collectively reflect, contribute to discussions and participate in group or pair work activities. Often Patrick, Pearl, Delia and Patricia were seen to:

> discuss their ideas…, show each other … and talk about the various buttons/icons … to find out what they could do…; Penelope and Danielle often joined the group to solve particular problems… Philomena and Peg worked together and were often joined by Con

who contributed and "participated in discussions, once he felt confident in his newly acquired knowledge".

Ashley and David asked questions and gave feedback on the different icons and their functions. Ashley reported about his experience, he reminded himself and finally concluded his students "were only preppies … they still had lots to learn!" David saw the interaction between the participants as remarkable:

> where we help each other out, because there is a positive learning environment; where we can share, rather than competing against each other, and not ignore someone, but ask each other 'how did you do that?' 'What do you do here?'

In the interaction, the participants also "did" and "thought" about solving problems. They would "try and work things out … to do things" and reflect collectively and individually on what they saw demonstrated by their colleagues and the lecturer. However, in this initial stage of learning, interaction was observed more than "doing" and "reflecting" on how to push ICT buttons.

Thinking through how to apply ICT to practice (A)

Again the three abilities appeared: kinesthetic interpersonal and intrapersonal. Nevertheless the sequence was different from the initial way of learning. Now, doing and thinking were emphasised, with an emphasis on how to apply ICT to practice. Change occurred as the participants became confident and comfortable with ICT. Firstly, the participants increased the "doing" and secondly, their collective and individual reflection about the software increased, where they began to think how to apply the new information into practical activities for their classrooms. They no longer exclusively asked about the buttons and their functions, but they collectively and individually reflected and thought how to apply the respective softwares into their workplaces. Regarding collective reflection, Boreham (2003) writes "collective professional knowledge" is networked and collected by different nodes that develop an awareness of the given activity.

In groups, pairs and individually, the participants became aware of the different nodes by "doing", thinking and explaining how the software "can make life easier for them". For example, Patricia explained about Microsoft Excel and how she organised the literacy program at her school and Phoebe explained how she developed eportfolios instead of the "big portfolios for grade ones". Con "talks about his learning – I need to do these things before I can teach the children; how to publish the school magazine, scanning, digital camera and web pages …"

As far as Patrick was concerned, "involve me and I will learn…", "by doing and surfing on the Internet … instead of using text", Patrick "discovered the Louvre site in Paris for his art class", which he "excitedly showed his university colleagues". He told the group, he now downloads the pictures … and there are so many more pictures to show the kids… you can do so much more …" The group became involved in discussing and brainstorming on how to incorporate his discovery into classroom activities.

At this stage of their learning, the participants were comfortable and confident to think on how to transfer and apply ICT into established practices.

Changing practice using ICT (C)

Generally, the participants valued the learning environment, especially the doing, interacting and sharing of ideas on how to change practice. Similar to the second way of learning; kinesthetic, interpersonal and intrapersonal were predominantly valued by the participants and as Dorothy stated this:

> [It] must be the way I learn: just going over it and over it and over it. …Just to have the confidence really, to have the confidence to try different things. Even some of the things that I haven't learned here, it's just doing things here, and talking to people about what they've done, trying things, which I'd never done before, I just would never go near... Yeah it has really been good, …; we've mucked things up and we don't do things the way they are meant to be, but we try them, we do them, and when you figure them out you sit there and do it ... It's just the doing …

However, not all participants interacted and made sense of ICT in a collective fashion in the university classroom. Phoebe preferred to individually work on her projects in the university classroom, where she "often created worksheets for her grade ones and experimented with Word". And yet outside the university classroom, she networked "with …her younger brother in law and nephew … who were so helpful". Phoebe further developed her skills, experimenting with digital portfolios and then demonstrated her new knowledge and skills to her school colleagues, sharing with them how PowerPoint could be utilized to compile digital portfolios. For her this was "a trial project" for her Grade Ones. However, when she finally acquired sufficient ICT knowledge and skills, and felt comfortable and confident, she did interact and demonstrate her new acquisition to her university colleagues. The exhibition of her new acquired knowledge took a long time and as far as Phoebe was concerned, her final success was in demonstrating and "presenting her work to the group – this has taken me a long time. I had a few problems, … to say the least". During her presentation to her university colleagues, she demonstrated, shared and explained her learning process and how her own students were able to now display "their work and photos in their individual digital portfolios" (in PowerPoint).

Phoebe, during her three interviews, in her journal and during the observations, was definite that learning for NCPB (Non Computer Practising Background) teachers in the ICT milieu is:

> By doing … by doing, definitely. Because, I know, we've had a professional development session here [at her school]; it was on computers. I sat there and a lot of it just went right over the top of my head, I didn't get any of it – because I wasn't sitting in front of the computer and doing.

Similarly Delia who exhibited a high level of manipulating and creating activities in PowerPoint, bought her own digital camera and experimented with it. She took pictures to download "them into My Pictures and things where [she] wouldn't have dreamed of doing anything like that before. [She] learned how to use the scanner... [She also used] PowerPoint for scanning and the digital camera for her Multicultural Week Displays". She commented that her practice had changed since she had began the course, however within the year the practice was limited to transposing text based activities into a digital format.

Discussion

The evidence in this study indicates experienced teachers prefer three ways of learning as they PAC technology into their lives. They value three dominant abilities, but the order of the three abilities initially is different from the other two ways of learning (Table 2)

Table 2: Dominant abilities valued by the teachers

Push buttons (P)	Apply software (A)	Change practice (C)
Interpersonal	Kinesthetic	Kinesthetic
Kinesthetic	Interpersonal	Interpersonal
Intrapersonal	Intrapersonal	Intrapersonal

Firstly, they valued interaction, secondly and finally, they preferred to actively "do". They valued collective and individual reflection about ICT activities and knowledge that were transferable into established practices. Although they transferred activities from text base to e-base, they did not construct activities incorporating hypertexting nor did they operate the software similar to digital native's 'twitch-switch' way. Nevertheless, learning according to the participants "is so different from their ..." previous university learning environment. In this environment, they were active participators rather than passive recipients of knowledge where logical and verbal abilities "are particularly important in the kinds of schools that we have today — ones that feature listening to lectures, reading, writing and calculating…"(Gardner 2004, p 31).

Gardner (1999) stresses this point but further points out that students of the future also value certain abilities that are different from traditional school learning. As digital natives, they value kinesthetic, intrapersonal and logical abilities. Digital natives in an ICT environment prefer logical step by step thinking (Gardner 1999) to solve problems that they encountered in real life (Gardner, 1983; Silver et al., 2000), in processes not different from traditional learning. However, in the ICT environment both the digital natives and immigrants (Prensky 2001) value kinesthetic and intrapersonal abilities, albeit in different ways and forms. And within the similar preferred abilities certain attributes are valued more by one group than the other. Regardless of the two similar abilities, there are difference preferences between the two groups. What further distinguishes the two groups is that digital immigrants value interpersonal ability to learn in the information age. Therefore, although both groups value similar abilities, they also value different abilities and prefer to learn differently.

Summary

In summary, this research adds to Gardner's work, especially his recommendation for students of the future, to be permitted to have their education individualised and personalised by taking into account kinesthetic, logical and intrapersonal intelligences (Gardner 1999). However, he has been silent on experienced teachers' learning as digital immigrants. Consequently this study adds to the knowledge base of teacher professional learning. Experienced teachers as digital immigrants "learn best by doing" and they prefer to interact and reflect on their actions.

Conclusion

The research reported here is part of a wider study and these findings are limited to Gardner's theory of multiple intelligences as abilities to solve ICT problems, create products or services of value in a given cultural practice (Gardner 1983).

Digital Immigrants often question the real value and are afraid of new technologies (Prensky 2006). On the other hand, once they learn how to push buttons (P), they are prepared to collectively and individually reflect on how to apply the software (A) albeit "simply to deliver the old lessons in a more convenient and efficient format" (Gardner 1999, p. 43). They are prepared to change their practice (C). They are prepared to PAC technology into their lives, consult and share their experiences within their community of practitioners (Brookfield 1995), network and students.

This research opens new ways of thinking about experienced teachers' professional learning as digital immigrants. Professional learning occurs in practice through collective and individual interaction, leading to participants becoming responsible for their own active participation and simultaneously introducing new techniques into their established practice. They no longer are receivers of information; but they value "doing …, interacting …, exchanging knowledge and skills on how to do it" (ICT).

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