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Beginning the day with the IWB in an early childhood classroom

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There is a substantial demand in New Zealand for professional learning opportunities to help early years' teachers to make use of ICT for teaching and learning (Harlow, Cowie and Jones, 2008), and where interactive whiteboards (IWBs) are increasingly being purchased by schools as instructional technologies. This paper reports on the findings of a researcher who was invited by a teacher in a small rural school in New Zealand to describe and understand the use of an IWB with young children aged five to six years. In this paper, the role of the IWB to enhance learning particularly in the use of language, symbols and texts is examined. The research involved collecting data from intensive classroom observation over a week using video and audio recordings as well as student and teacher interviews. Data were analysed using a framework developed by Kennewell and Beauchamp (2007), who identified how teachers used features of ICT/IWBs to enhance learning. The findings indicate that it was the way the teacher integrated the IWB into her pedagogy to improve the learning activities that made the IWB such an effective tool in this classroom.

Keywords: interactive whiteboard; language; pedagogy; early years' classroom.

INTRODUCTION

This article discusses the importance of *interactive whiteboards*, or IWBs, as a pedagogical tool that may be of considerable significance to early childhood teachers. It describes the IWB with particular reference to the experience of one classroom in which new strategies involving the implementation of an IWB were tested. The article is a contribution to a growing debate amongst practitioners about ways to best approach this technology.

The New Zealand Curriculum for English-medium teaching and learning in years 1–13 (Ministry of Education, 2007, p.12), identifies five key competencies: thinking; using language, symbols, and texts; managing self; relating to others; and participating and contributing and suggests that these competencies develop through children adopting and adapting practices that they see used and valued by those closest to them. Carr (2006) described how young children learn new skills by observing the teacher, imitating the behaviours, gaining a measure of self-control, and then adapting the new skill to use it in new ways to respond to new challenges.

It is possible for a the teacher to make use of ICT in modelling these behaviours and skills, indeed a growing literature has emerged concerning the ways that young children can benefit from ICT in the classroom. Research often points to the role of technologies in providing new and complementary opportunities for children to hone generic learning skills and to practice their social skills or competencies (Hillman and Moore, 2004; Lee and O'Rourke, 2006; O'Hara, 2008). Somekh (2007) discusses how the affordances[i] of ICT can be taken up and used pedagogically to transform children's learning, in particular the affordances of the interactive whiteboard (IWB). In 1991, Somekh and Davies suggested that technology was a 'part of a complex of interactions with learners, sometimes providing ideas, sometimes providing a resource for enquiry, and sometimes supporting creativity' (p.157). In a similar vein, Hennessy, Deaney, Ruthven, and Winterbottom

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(2007) reported that the IWB can be a dynamic and manipulative object of joint reference, which offers new forms of support for socially shared cognition, much better than a single computer, the IWB can support a group learning activity and provide excellent opportunities for communication and collaboration.

In 2007, Kennewell and Beauchamp examined how the features of a setting could provide potential for action and at the same time, constraints which may structure the students' actions. They identified those actions occurring in the classroom which were considered to influence learning, and classified these using a list of descriptive terms, relating each action to any features of ICT that afforded or constrained it. They were mindful that the teacher's role is to orchestrate the features of the setting, using their knowledge of students' characteristics, in order that the goal may be achieved with some cognitive effort but without excessive frustration.

The research described in this paper used the taxonomy of features developed by Kennewell and Beauchamp (2007) to show how a new entrant/early years' teacher used the IWB to offer support and extension to the language learning of the young children in her charge. The analysis of data, collected over the period of a week, via field notes, informal conversations with the children, video and audio recordings of lessons, and teacher interviews revealed that the IWB supported the teacher to provide an element of what she called 'awe and wonder' in the children's learning.

The week began with a child bringing a Monarch butterfly chrysalis into class for news. Another child commented that it was like a Cicada case, so the teacher retrieved the Cicada slide show that the children had made a couple of weeks previously and they looked to see if this was so. The teacher made use of the interest this stimulated to provide a week-long inquiry into the Monarch butterfly life-cycle, bringing in all curriculum areas, and all manner of resources and activities to support and broaden the experiences and understandings of her children. The week ended with a butterfly emerging and flying away from the nature table as the children packed up for the weekend. This paper details two learning examples from this week where the IWB was used. The analysis was based on ideas from Kennewell and Beauchamp's framework (2007) as can be seen in the tables for each learning example, and shows how the teacher was able to integrate the technology into her pedagogy to provide support for children's language learning and the development of one of the key competencies in particular—the use of language, symbols and texts.

Using the IWB as a shared space for language development

> 'Good morning class. Well, my Dad went to the dog trials and he got second and third. He got this stuff for being good with dogs and that. And Katrina who works at the pub sometimes, she was there too, and she won this vest, and a hat and a notebook. And Sheila, she got this little pink bag with tools and that in it. And that's all'. (Year 1 girl)

Data—The daily news focused on listening to the experiences that children chose to share with others and recording these on the IWB so that the accumulated experiences could be retrieved when appropriate for some further use.

Commentary—This first activity of the day was used to settle the young children, some of whom had already been in the classroom for three quarters of an hour by the time the bell to start the day had rung. Mostly during this time, the children were chatting to the teacher or to each other while being purposefully occupied with the many possibilities available to them, including the IWB and a bank of four classroom computers loaded with maths and language games. The Year 2 children could use the computers to search out information on the Internet, or write and print a sentence or two on the teacher's laptop. There were Lego building blocks, paper, crayons and scissors to use, and needless to say, during this particular week, observation of the constant changes and wonderment at the Monarch butterfly caterpillars on the nature table by the door to the classroom.

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Data—Once they had gathered on the mat in front of the IWB, and greeted the teacher and each other using Te Reo Maori, there was a new Maori word or perhaps a phrase to listen to for the first time, for example, one little girl had asked on day two of the observed lessons what the Maori word for *butterfly* was. So the word *pepepe* was pinned up on the Te Reo board at news time. Then when the teacher asked for news contributions, a child stood and greeted the class, who responded with, 'Good morning, Jimmy.' The use of speech marks was a current focus for Year 2 children and the use of capital letters and full stops was a focus for the Year 1 children, so as the child spoke to the class, the teacher wrote down what the child said in the form of reported speech: Jimmy said 'We went to the movies'. She would then ask a Year 1 child, 'What should go at the end of what somebody says?' If the child gave the correct answer, he would then come up and put the full stop at the end of the sentence.

Teacher: 'We need the little sign that tells us where to stop. Luke will you come and put the full stop where it has to go, Where is the last letter I wrote? Just a little round dot. Good, we'll all read it now'.
Class: 'Mandy said, my Dad went to the dog trials'.
Teacher: 'Good, can I ask you to do that again tomorrow? [Luke rubs out the dot and does it again] Good checking, Luke'.

Sometimes the teacher left out the speech marks and asked what was missing, whereby a Year 2 child might offer, 'Speech marks' and come up and put them in the correct place on the IWB. On the second day of observation, the three pieces of news had the word *look* in them, so when a Year 1 boy gave his news, at the end, he was asked to find the word *look* in the other two pieces of news and to write the word into his sentence in the gap the teacher had left.

Commentary—The data showed how the teacher was able to use the IWB to provide differentiation for her mixed year level class in a way that made the children feel that they had made a valuable contribution. All children were in the focal area when the IWB was used, so their participation was not limited to watching and listening, although there were two rules that governed who could actually present their news. These were that each day, a different reading group was asked to contribute, and within that group the first child could choose who would be the next presenter. The children benefitted from the opportunity to observe the teacher, listen actively, recognise different points of view, share ideas, and receive feedback. There would be questioning and discussion about each piece of news, but it was evident that a couple of the Year 1 children were very quiet during this time, so the teacher, who was a careful observer of each child, knew when to offer an opportunity or to ask that child a question to see if they could make a connection.

'The news time is an invaluable tool for getting to know my learners as individuals. I'm storing away a knowledge of their interests to be used for making connections, and engaging them in learning tasks'. (Teacher)

Data—Later in the day on two of the three days, the Year 1 children who had given their news were encouraged to return to the IWB to illustrate their news at the bottom of the board once the teacher had retrieved the news page, and read it again as a part of their 'reading' activities. On these days, in addition to the features of acquisition-data entry, eradication and display, already listed as used by the teacher, the children were able to make their own choice of colour.

'At times, past news files are brought back specifically because they lend themselves to a particular learning need (individual, group, or class) e.g. in shared writing with my learner writers who are drawing a story plan and constructing the text with me. Sometimes the response is 'I don't know what to draw...' we can refer back to news drawings'. (Teacher)

Commentary—Vygotsky (1987) argued that talk eventually serves not only to represent

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meanings and to interact with others about those meanings, but also to regulate drawing itself by helping the child to plan a particular drawing and to monitor her or his shaping of lines and curves. Vygotsky described drawing as a kind of graphic speech that paves the way for writing.

Data—The features of the IWB that were commonly used during news time included: library storage, acquisition/data entry, eradication, display, store and retrieve, and emphasis. Text recognition where the IWB recognises handwriting and converts it to text was not used, as the teacher felt that at this level it would take away from the child's ownership of the item when next viewing the news, perhaps later in the day. The pedagogical actions of the teacher, who sat to the side of the children and the IWB during a typical news time included: recording, changing, prompting, selecting, focusing, sharing, composing, summarising, responding, recapitulating difficult to hear contributions, instructing, modelling, scaffolding, providing feedback, providing links between contributions and classroom experiences, questioning, facilitating discussion and explaining. Table 1 shows how the features of the IWB were used to support the actions and interactions of the teacher and the children during news time through the week and the effect of these actions on the development of the key competency—use of language, symbols and texts.

TABLE 1
THE IWB—A SHARED INTERACTIONAL SPACE

Features of IWB (Kennewell and Beauchamp (2007)	Actions supported by use of IWB	Enhanced development of children's ability to use of language, symbols, and texts
Library Capacity Multimodality	**Retrieval and display:** Teacher showed slide show about Cicada unit	Authenticity of visual images (symbols) supported ownership by children of prior knowledge, a sense of belonging and the confidence to participate in a new context
	Comparing: The slide show motivated children to consider similarities and differences—Cicada/butterfly	Intellectual curiosity was stimulated by visual images – making comparisons
List Acquisition, Capacity Provisionality	**Focusing:** Teacher focused class on prior and new knowledge of punctuation and spelling	Making meaning of, and using the codes in which knowledge is expressed
	Composing: Teacher wrote up a sentence in reported speech as child told his news **Modelling:** Teacher showed where to start the letter (used a red dot)	Making oral contributions and viewing their ideas displayed for others to see gives value to those ideas
	Differentiating: Teacher matched tasks to level of ability	Year 1 child was encouraged to spell 'said' through imaging
	Prompting: Teacher asked children to recall days of week, then selected a Year 1 child to find the card with the day and stick on to wall **Composing:** Teacher wrote date on IWB	Locating a word in the classroom environment prompted a Year 1 child to see himself as a capable learner
	Annotating: Child added full stops, speech marks, or complete words depending on level of ability **Undoing:** Child *undid* when incorrect symbol or letter used	Children were supported to listen actively and share ideas
Emphasis Capacity Provisionality	**Retrieval:** Revisiting the news for Year 1 children (reading group) to draw pictures under their *news of the day* **Drawing:** Children chose colours and illustrated their sentences	Adding visual images (symbols) to illustrate and make text easier to recall for beginning readers/writers Children reflecting on use of symbols and *undoing* parts to improve their drawing
	Focusing: Use of *drum roll* sound effect as news item was ready to read **Reading:** Children read news items with teacher	Taking turns to read own news item

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Adding to the list of words we know

'Ooh, is that our caterpillar? There's a great, big fat one! He's still wriggling!' (Year 1 child)

Data—Swan plants covered with caterpillars had been arranged on the nature table and on the second day, one of the caterpillars had spun itself into a chrysalis much to the delight of the children who gathered around to watch. The teacher listened to all the words used by the children at this time and used the situation to talk about the word *chrysalis,* and then showed the class a YouTube movie of the complete lifecycle of a Monarch butterfly. This showed the caterpillars eating their egg cases once they had emerged, which sparked a role play session with all the children crawling around the floor pretending to eat their *egg cases*. The teacher decided to use the IWB later in the day to capture all the words and extend their thinking about the caterpillars in a flipchart that the children could use later to help them to write stories in their own *Butterfly Books*. In the afternoon, she called the children up to the IWB to put on their *red hats* (de Bono, 1985) and think of words and feelings about the Monarch butterflies and caterpillars. The older children wrote up whole words like *beautiful*, others wrote parts of words, and the teacher wrote up words suggested by the children through prompting. Four of the older children spelt out the word *caterpillar*—each one giving a part of the word, then all four spelling the entire word. The word *chrysalis* was looked for in the library books that the children had found during a short visit to the school library just beforehand. When they had found the word, one child spelt it out for the teacher to write on the IWB. The following sequence shows what happened when the children who were at different literacy levels began to think about words to do with the topic.

Teacher: 'Now we'll start a new flipchart with words to do with our Monarch butterfly. So if I say, 'Our caterpillar's over there.' What's the first word that comes to mind?'
Class: 'Caterpillar'.
Teacher: 'Charmaine, I'd like you to give the pen to Hayley, and Hayley would you write the word 'cat' please. Look at that beautiful C starting at the top, the A starting at the top did you see that Max? Looks like an X, how can you fix it up? OK, and closer to the 'A' please. Thank you, now would you pass it to Julie, because I want her to spell 'er.' What two letters make 'er' in the end of moth-er, fath-er, sist-er what spells er?'
Class: 'Broth-er'.
Teacher: 'OK, now would you pass it to Emelia. Emelia, do you know the two letters that make 'er', that go on the end of Mother? [Emelia writes up 'or'] That says 'or' but you want 'er'.
Class: 'e-r'.
Teacher: 'Yes, Mary checked her letter, look…come across to me, a line across to me and now go up like a 'C'. OK that's a stick, can you rub it out again? Now concentrate Julia, put your pencil back. OK, now do a little line over to me as if you were starting a 7, across like this, now do a C round you go, there we go, now an 'r' from its top, closer, closer to the 'e', huddle right up to the 'e', good girl, back up the same track with a nice hook'.

Commentary—Although the children had a limited vocabulary on 'butterflies' as the Monarch butterfly unit had just begun, although it followed on from a unit on the Cicada and its life cycle, so there was a limited knowledge of the concept of 'life cycles'. They did, however, have what the teacher called 'awe and wonder' words to do with butterflies and these were the words that she was hoping to be able to record in this session. During this activity the children were encouraged and supported by the teacher and by each other to recall their personal and their collective knowledge of the topic, as well as words that described how they felt, to broaden their vocabulary,

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and to make sense of what had happened in the classroom that day.

Data—The IWB features that provided the structure for this activity were the flipchart, eradication, display, the object-moving facility, and the store-and-retrieve facility. The flipchart was not over-prepared as it was going to be used to develop the understanding of butterflies rather than as a presentation. At the end of the unit, it was transferred to the wall display and used by parents, when they visited after school, as a discussion starter with their children. The teacher continued to refer to the chart during literacy hour for reading, rhyming, word building and questioning.

> 'For my Year two children, our learning intention at the moment is 'putting in interest words'—adjectives. Our Monarch wall display—full of child-generated adjectives. A bit over the top but they had got the idea and were flying with it!! We use these words when we go back to previous news, which we love to read over as it is, and purposefully put in adjectives. Children have ownership and voice in the resources!' (Teacher)

Commentary—Part of the teacher's pedagogical action plan was to make use of de Bono's Thinking Hats (de Bono, 1985).

> 'de Bono's thinking hats really work for me with children who are learning to organise their thinking. We come to a topic knowing that there are different ways to approach it, different things to internalise, different ways of getting their thoughts around it once they have, and then different ways of getting their minds around expressing what they have learnt. Now the IWB – I can use the thinking hats with the IWB so that they can be creative, they can search for facts, they can express emotions about what they see. You can easily set up something that would encourage that type of thinking'. (Teacher)

Scaffolding is providing assistance for some aspects of the learning activity so that students can focus on other aspects (Cunningham and Billingsley, 2006). By calling up four Year 2 children to spell the word *caterpillar* in chunks, the teacher scaffolded the learning. She understood that one child alone would not yet be able to spell the whole word, so to introduce the Year 1 children to the concept of *syllables* and remind the Year 2 children of this, the four children shared the pen to write up their part of the word.

> 'One of my pedagogies that is relevant to this is that I scaffold everything for them as far as word charts, number charts, and I say over and over and over again, 'Where would you find that information here in the room?' We do something called a wall walk, every now and again when we come in, in the morning as we line up and make our way in we walk around the walls. In a month's time I'll find the word 'shed', or 'skin' or 'caterpillar'. Where would you find it? This gives them ownership of the classroom if nothing else'. (Teacher)

Data—The teacher then continued to allow those who felt confident to write up words or parts of words, and to guide some of them to think about where to start the word and how to move the pen in the right direction as they formed the letters. The teacher also recorded some of the children's words herself, prompted the children to think creatively, and to think more broadly about colours, body parts, food eaten, etc., and modelled how to group words according to themes.

The resulting word chart would be retrieved, added to and referred to throughout the week as needed. At the end, two children attempted to report their own achievement by spelling the word 'caterpillar' after the teacher offered an incentive to any who could spell the word the following morning. Table 2 shows how the features of the IWB were used to support the actions of the

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teacher and the children during literacy hour and the effect of these actions on the development of the key competency—use of language, symbols and texts.

TABLE 2
A FLIPCHART OF NEW WORDS ABOUT BUTTERFLIES

Features of IWB: (Kennewell and Beauchamp (2007)	Actions supported by use of IWB:	Enhanced development of children's ability to use of language, symbols, and texts
Acquisition Provisionality Capacity	**Prompting:** Teacher prompted children **Scribing:** Teacher wrote up words suggested by children	Children offering ideas about words and reflecting on own learning, drawing on personal knowledge, asking questions. Children thinking creatively—broadening their vocabulary.
	Modelling: Teacher modelled letter formation **Scaffolding:** Teacher explained a strategy—broke words up into 'chunks' **Differentiating:** Children at different levels wrote up whole words, parts of words	Setting personal learning goals to learn spelling of a new word. Working effectively together to spell a word.
	Organising: Children suggested word groupings—teacher moved words	Developing an understanding of letter formation, word parts, and word groupings.
	Selecting: Children wrote about the caterpillar in their Butterfly Book choosing words from the flipchart of *butterfly* words (individual activity)	Selecting words from flipchart to produce meaningful text.
	Clearing space: Teacher dragged toolbox out of way to make room for display **Saving:** Teacher stored flipchart for later use	Learning to use the features of the IWB to provide information.
Range Dynamism	**Comparing:** Class watched YouTube movie of Monarch butterfly life cycle to compare chrysalis with one in the movie	Children reflecting on own learning, drew on personal knowledge, asked questions.

DISCUSSION

A better understanding of the combinations of IWB features that worked together to support activities and that led to meaningful learning was gained through the analysis of the teaching and learning during the week. The two examples highlight the way the IWB was a tool that the teacher could draw upon to orchestrate the learning (Kennewell and Beauchamp, 2007). But it also had distinctive features that made a specific contribution to the classroom environment. This had a lot to do with the ways in which the teacher worked, which reflected her deeper ideas about learning.

Roth's study (1995) on the role of chalkboards in classroom science talk showed that teachers

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need to allow children to participate and also to be in direct control of representational technologies. This was beginning in this classroom of Year 1 and 2 children as they started the day at the IWB. Children's experiences were related, and although scribed by the teacher on the whole, several of the older children took responsibility for adding words and punctuation to the sentences. The very young children were scaffolded to add the full stop or to add a letter. The news of the day was used regularly in the classroom to create printed booklets, for reflection, as an instructional resource, for example, learning nouns/adjectives, verbs/adverbs, combining sentences, and rereading for fact and inference.

> 'A child may use a previous news item to begin a story during writing time either in book or on the computer and expanding on it. Taking it to a complete composition. I've found that the ownership of these entries is very motivating'. (Teacher)

On day two of the observations, the Year 1 children who had given their news illustrated their sentences on the IWB with drawings and then read their news to the teacher, pointing out the features of the sentence on prompting. In this way the IWB became a shared interactional space, of more value than a blackboard or a whiteboard, as records could be saved and retrieved, and better than a paper flipchart as accidental happenings could be erased and rewritten or redrawn.

Although there were several ideas in these learning sessions that were planned and anticipated relating in particular to the Living World strand of the science curriculum (Ministry of Education, 2007), other activities were pursued in direct response to the emergent goals and understandings of the students. These activities sometimes clarified an individual student's personal perception of a particular idea and then became a part of the shared learning experience through discussion with others at a shared time on the mat, for example Charmaine bringing in a book with a life cycle diagram, the sentence she wrote on the laptop about butterflies, and Alan's website that he found on the Internet. Sometimes it was the representation of something shown to the class that they could not have seen happening on the nature table that caused them to take up the idea in role-play so as to understand it better, as in the caterpillars eating their egg cases.

The role of the teacher

It is evident from the examples that this classroom had the characteristics of a supportive learning environment (Leinhardt and Steele, 2005), with all students having the opportunity to have their voice heard, student questions being viewed as an opportunity for reasoned discussion, equality and respect, and a sense of fun in the learning, with the teacher guiding the children's investigations and dialogue towards the objectives she had set down for the unit.

The role of the teacher is by necessity manoeuvred towards that of information gatherer and curriculum maker in the pre-teaching phases of teaching. When first making use of the IWB in the classroom, the teacher is by default a novice alongside her pupils, a state that evolves through repeated use and via professional learning opportunities towards facilitator and guide during the teaching phases (Wallace, 2004). This teacher found that during the pre-active phases of teaching, finding and selecting IWB materials was a significant challenge. But the affordances for her of using the IWB were worth the effort she needed to make. In particular, looking at the news of the day and the flipchart of words, the features of capacity for storage, the library and the range of resources available for her to choose from, made her preparation more efficient and the resulting resource reusable. During reading times, small groups of children illustrated their news or added another word to the flipchart, while the teacher concentrated on providing support to other groups of children.

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The role of the IWB

Kennewell (2006) in his synthesis of UK research into the IWB phenomenon suggested that it was the way that the IWB could assume a variety of roles in the classroom of an effective teacher - that of consultant, organiser, facilitator and as a repository, that made the IWB an effective tool for communal learning. The research did not convince Kennewell that this would be the effect in the classroom of an untrained teacher, with group and individual learning, or in all classroom settings.

Analysis of the two examples detailed in this paper suggests several affordances of the IWB that are of particular significance for the work of the teacher in the junior classroom—helping children to engage in the concept, get the main idea, and want to learn more.

The IWB provided the structure for children to engage in the concept

The IWB facilitated the development of insight by allowing the children to make sense of a concept in a different way, for example, by watching a dynamic movie of a butterfly emerging from a chrysalis and then watch their own butterfly emerge.

Retrieving their own resources, for example, the Cicada slide show, from the IWB library helped the children to link new learning to their previous experiences. The IWB resources provided potential for learning by encouraging effective dialogue to introduce and build new concepts, then the opportunity for children to revisit and reflect on new learning.

Children enjoyed going up to the IWB to add or annotate data, the teacher discussing options and guiding the new children in their contributions, knowing that their work would be saved and used in other ways on other occasions as the IWB acted as a repository. They felt safe doing this in front of their peers as a respectful culture had been encouraged in the classroom, and if they made a mistake they could easily undo and change what they had added.

The IWB supported the children to grasp the main idea

The main idea of the unit of work on the Monarch butterfly was to have the children inquire into an aspect of the living world that was relevant to their experience. They were to observe, describe, identify, group and share in order to develop an idea about the Monarch butterfly. The size of the screen and the space allowed two children to work together on the IWB, which supported their social problem solving abilities. Features of the IWB that provided support for their actions in the lessons included multimodality, dynamism, emphasis, acquisition and the range of resources that the teacher had available to support children as they gathered and processed the information, and then linked the new knowledge to their prior experiences.

The IWB motivated the children to want to learn more

There was plenty of evidence that children were going about learning more about butterflies in their own time as a result of the stimulation they had received during class activities during the unit of work with the IWB. Before school several children used computers to search for information on the Internet, to write a sentence about butterflies on the IWB, or publish some writing on the computer and printer. During breaks some took 'nets' into the playground to catch Cabbage White butterflies, some stayed indoors to keep watch on the caterpillars in the terrarium, and show them to visitors from other classes in the school. After school, children were finding out more at home—going onto the Internet, learning to spell the words learnt during class, or motivating caregivers to find out more about Monarch butterflies. Parents appeared every day with excited tales of their children's unset homework.

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CONCLUSION

This research study discovered a teacher who was clearly delighted with the ways her 5 and 6-year-old children reacted to her enthusiastic but *beginner* use of the IWB. The teacher had some years of teaching experience, although she had only had an IWB in her room for a year. She felt that it was the way the children could interact with the IWB that supported them in their learning.

> 'The interactive features have been the most useful IWB features—the children being able to engage with objects, to be challenged in their thinking as they make choices, and call on prior knowledge to achieve the little challenges presented on the board. The simple moving about that the IWB demands'. (Teacher)

However, it became evident that it was the ease with which this teacher integrated the IWB into her pedagogy that really made the IWB such an effective tool in improving the learning activities in this classroom. The examples given in this paper show how the IWB was used to provide support for language development and differentiation in learning activities, and to enhance the development of the children's key competency in the use of language, symbols and texts.

As for the possibility of using the analysis to make a definitive statement about the influence of the IWB on children's learning, this of course is not possible, for as can be seen from the description of the lessons there was not one thing, or person, or tool in the classroom that any one instance of learning could be attributed to. What can be suggested however, is that the types of learning that were witnessed in the classroom were the sorts of thing that might be desired in a junior classroom and that were consistent with the notion that children were learning important ideas about language, symbols and texts, and were developing this key competency in preparation for future learning.

It is hoped that the research reported here might be the start of future research into the impact of ICT/IWB use that provides feedback to teachers to inform and encourage more radical pedagogical change. This research was able to detail a process of coming-to-know (learning) in the area of one of the key competencies, which is perhaps rather fraught with difficulty compared with looking at some sort of assessable subject, however, at a very young age, it is the development of these generic and life skills on which future learning can be based which is of prime importance. Implications for further research include looking at the use of the IWB across curriculum areas and across the key competency framework.

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NOTE

[i] The concept of affordance was developed by Wersch (1998), who defined affordances as the properties of a system that are perceived by the user as allowing the performance of certain actions that in turn encourage specific types of behaviour. ICT/IWB affordances are the elements of ICT/IWB that facilitate enhanced learning opportunities independent of content or preferred teaching styles.

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