Transforming learning with Interactive Whiteboards: Towards A Developmental Framework

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This paper describes a developmental model that can be used to evaluate and guide teacher reflection and progress along a continuum in order to maximise the potential learning benefits afforded by interactive whiteboards. The model was developed using classroom observations and semi-structured interviews with eight teachers over a period of eighteen months in one South Australian primary school.

BIOGRAPHY

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INTRODUCTION

The use of interactive whiteboards in Australian schools is a relatively new phenomenon and consequently there has been little formal research into their use (Schuck & Kearney, 2007, p. 8). In South Australia, there have been no formal systemic initiatives that have supported the rapid implementation of interactive whiteboards (IWBs) in classrooms. However, many schools have funded the purchase of IWBs with support from the former Federal Government's Investing in Our Schools initiative between 2005-2007. The rapid installation of IWBs, combined with an understanding that the introduction of such technologies is insufficient to enhance learning, has motivated many school leaders and educators to seek support from academics and professional associations to help them achieve the potential benefits. Indeed, teachers are calling for developmental frameworks to develop their practice.

The purpose of this paper is to outline an interactive whiteboard developmental framework that can be used by teachers as a self-assessment tool to gauge their progress. The framework is based on research and particularly the work of Beauchamp (2004) combined with empirical evidence collected as part of an eighteen months project in one South Australian primary school. It is hoped that this framework will be valuable to school leaders, teachers and teacher-education students who are interested in the learning journey experienced by other interactive whiteboard users as a starting point for pedagogical reflection and analysis.

The Research Context and Method

The research project was undertaken in a primary school of approximately twenty-six (full-time equivalent) staff and 450 students situated in Adelaide, South Australia. Out of the eight teachers who participated in this project, half had just received an interactive whiteboard for the first time at the start of the project and the other half had been using their boards for twelve months. This study was designed in consultation with the eight participants and the Principal to investigate the impact of IWBs on teachers' pedagogy, assist teachers to reflect on their practice and consider strategies that might enhance and transform their pedagogical practice. One aim of the study was to identify a generic developmental framework that could guide teachers from within and beyond the school through a process of pedagogical transformation.

The initial data collection was undertaken with an individual interview in Term 3, 2006 and a fifty-minute video case study in Term 4 of the same year. This was followed-up with regular contact at least once each term over the next 12 months with two further individual interviews, two group interviews and a pair interview. A second video case study was conducted at the end of the eighteen-month period in December 2007. A single researcher, with the informed consent of management, the research participants, students and their parents, carried out the research at pre-determined times. All interviews were semi-structured, transcribed, verified by participants and coded using NVivo™ qualitative Software using a grounded theory approach (Strauss & Corbin, 1998). This methodology acknowledged participants as the critical agents in mediating the integration of the interactive whiteboard into their 'pedagogical subject knowledge' (Beauchamp, 2006) and using it to promote quality interactions and interactivity (Armstrong, Barnes, Sutherland, Curran, Mills & Thompson 2005, p. 457).

Throughout the data collection phase, close attention was given to conceptualising the shared experiences of participants' as they became more confident and skilled using the IWBs over the eighteen-month study period. The framework presented in this paper was refined throughout the study and shared with participants towards the conclusion of the project for their critical review, modification and validation. It was created using a process that used the research literature as a 'lens' for identifying the iterative elements for each stage of development as these emerged from the data. These elements were then organised into stages along a continuum.

The purpose of the developmental framework created in this project was two-fold. Firstly, to capture the common experiences of teachers so that the framework would be relevant as a general guide for other teachers in different contexts across all year levels and Learning Areas, regardless of the age and experience of teachers in Australian schools. Secondly, the framework could be used to track and describe participants' development with a view to identifying their different needs at each stage and the factors that support or constrain their development. The findings of participants' progress are not the focus of this paper. In order to be constructive, the framework needed to reflect the research literature about the change

process of teachers adopting new technological innovations and connect with teachers' lived experience to enable them to 'see themselves' (Ladwig & King, 2003, p. 25).

Research shaping the design of the framework

Six frameworks based on research, influenced the development of the framework in this project. Together these provided a conceptual understanding of teachers' common concerns, characteristics and competencies as they progress through different stages of development using technology in general and specifically interactive whiteboards. In particular, these frameworks were used as a 'lens' to analyse the empirical data and classify different levels of sophistication related to the use of interactive whiteboards by the research participants. In this way, there was an attempt to align the stages of the framework created in this project with the existing research. The six frameworks influencing this project will now be briefly explained. The first three of these frameworks apply to the use of technology in general, the fourth framework is focused on effective pedagogy, and the last two are specific to the use of interactive whiteboards.

Firstly, the framework described by Hooper and Rieber (1995) describes the adoption of unspecified technology over five phases (familiarisation, utilisation, integration, reorientation, and evolution). A critical aspect of their work is to argue that the full potential of any educational technology can only be realised when teachers progress through all phases of development. Furthermore, there is a critical turning point at the third 'integration' stage when teachers decide whether or not to 'breakthrough' and make a commitment to move even further with integrating the technology, otherwise there is at risk of it being misused or discarded (Hooper & Rieber, 1995, pp. 157-158). Teachers' undergoing a mind shift from a behavioural to a cognitive view of learning supports this 'breakthrough'.

Two other influential frameworks are called the 'stages of concern' (Hall and Loucks, 1978) and the 'levels of use of an innovation' (Hall & Hord, 2006). These two frameworks complement each other to identify both the affective and behavioural dimensions of change. The 'stages of concern' framework describes the affective dimension of change as teachers engage with a new program or practice and move through seven 'stages' that are grouped into four categories (Awareness, Self, Task, and Impact). The 'stages' correlate with increasing sophisticated levels of use of an innovation and provide a helpful way to describe the different concerns experienced by teachers as they move along a continuum. The implication of this framework for this project is that in the early stages, teachers are focused on how to manage new skills and time demands using the interactive whiteboard. These are followed by the mid-stages where their concerns shift towards considering how to make the innovation work better for learners, and in the final stages, concerns about working with colleagues and seeking further challenges.

The 'levels of use of an innovation' framework by Hall & Hord (2006), describes the behavioural aspects of what teachers do with an innovation in their classrooms along a continuum of seven levels. The first three levels relate to teachers that are preparing to actually make use of a particular innovation. This is followed by early attempts where teachers are focused on the mechanical aspects that often involve using teacher-centred pedagogies and using the innovation to improve learning outcomes. The final levels describe how teachers begin to coordinate their efforts with colleagues to increase the impact of the innovation on learning and seek more effective uses of the innovation. In the context of this research project, indicators have been described along the continuum that reflect this increasing level of sophistication with some adjustments being made as the framework begins with actually using interactive whiteboards (not just considering their use).

The fourth framework to influence this study is the New South Wales model of pedagogy called the Quality Teaching Framework (State of NSW, 2006). This framework identifies eighteen elements of effective pedagogy divided into the three dimensions of 'Intellectual Quality', 'Quality Learning Environments' and 'Significance'. During this project, teachers participating in this study took part in a one-day professional learning day to learn how to apply this framework. During the study close attention was given to analyse how the elements of effective pedagogy were demonstrated or could be incorporated into the description of indicators to promote quality interactions using the interactive whiteboard. For example, the higher levels of the continuum include sustained interactions, higher-order thinking, strong connections between learning within and outside of the classroom, and meaningful connections between subject areas. It is important to point out that the QT Framework is generic to all year levels, subjects and contexts and does not refer to the use of interactive whiteboards. Recent research in the state of New South Wales suggests that interactive whiteboards "allowed many elements of the Quality Teaching Framework to be realised" (Schuck & Kearney, 2007, p. 25).

The fifth framework to influence this study is by Miller et al (2004) who described a basic three-stage pattern of pedagogical development that teachers experience as they became more fluent with interactive whiteboard techniques and gain understanding of the nature of interactivity. The three stages are: Supported Didactic, Interactive, and Enhanced Interactive. The Supported Didactic stages characterises the early beginnings of teachers using the interactive whiteboard only as a visual support to lessons (not as an integral strategy for conceptual development). The Interactive stage characterises the use of the interactive whiteboard as a tool to challenge students to think by using a variety of verbal, visual and aesthetic stimuli. The third, Enhanced Interactive stage, is characterised by a change in thinking by the teacher who seeks to integrate concept and cognitive development in a way that exploits the interactive capacity of the technology. At this level: "Teachers show considerably enhanced understanding of the learning process, talk about the ways technology can support learning, and show ingenuity in developing materials to meet specific learning needs with much more evident differentiation of tasks" (Miller, Glover & Averis, 2004, pp. 6-7).

The final framework, specific to the use of interactive whiteboards that significantly influenced this study was the work of Beauchamp (2004) who identified a developmental framework of specific competencies that need to be addressed for effective use of the interactive whiteboard in classroom teaching. These competencies are classified into five stages using four variables (operating system use and file management; mechanical skills; program variables; and classroom management and pedagogy). The structure of the framework created in this research project is structured into five developmental stages similar to the work of Beauchamp (2004). Indeed, two of the five stage headings from Beauchamp's framework have been adopted. The other three headings were adopted from the work of Miller et al (2004) as it was felt that these focused attention on the key issue of pedagogical interactivity. The indicators described for each stage of the framework created in this project, were based on the competencies identified by Beauchamp (2004).

In summary, the framework created in this study is informed by previous research focused on effective pedagogy and the process of change related to technological innovation in general and specifically the use of interactive whiteboards. The framework has been designed to focused attention on the pedagogical transformation required by teachers and the challenges associated with moving past the third stage of development. In addition, it attempts to conceptualise the change required by teachers to work towards relinquishing control of learning to students. Furthermore, it attempts to reflect the changing concerns and behaviours of teachers as they move from concerns about themselves and the management of technology, towards a focus on working collaboratively with colleagues to address concerns about learners and outcomes. Finally, the framework describes indicators based on research about eighteen elements of effective pedagogy and the competencies that need to be addressed for effective use of the interactive whiteboard in classroom teaching. Together, these six frameworks provide a comprehensive 'lens' for identifying, describing and classifying the descriptive indicators that emerged from the empirical data over the eighteen-month research project.

The Framework

This section provides a general description of the overall continuum. Each stage is described using a generic approach in the anticipation that other teachers may use this framework. The detailed technical and pedagogical indicators for each stage are shown in Appendix 1. Due to the significant influence that the work of Beauchamp (2004) had on this project, the competencies that have been adopted from his work are identified in bold text in Appendix 1. In this way, it is easy to distinguish how the framework in this project extends the work of Beauchamp (2004).

Before describing the indicators for each stage, it is important to note that although the framework has been designed so that each stage builds on the skills from the previous level, there is no expectation that all teachers will demonstrate all indicators or demonstrate skills only within one stage at a time. Indeed, it is most likely that teachers will demonstrate indicators from at least two stages simultaneously. There is also no suggested time line to reach the transformation stage for all teachers but it is important to note that without a pedagogical transformation based on a shift in teachers' understandings about the need to increase learner autonomy, teachers are unlikely to move beyond stage 3. Furthermore, the longer teachers remain at levels one to three, the more entrenched the interactive whiteboard will become into their existing traditional practice.

Teachers' learning and practice is influenced by many factors and this framework forms only a small part in supporting teachers' to develop their practice. However, the framework encourages teachers to analyse the development of their technological and pedagogical skills that can provide fertile ground for reflection and professional dialogue linked to the wider school context and leadership. Although not yet tested with participants beyond this study, the framework in its current form could be used as a guide for teachers to evaluate which stage best describes their current practice. This can be achieved by marking the indicators for which there is evidence and using this as a basis to identify future individual learning goals and whole school professional development needs. An improvement on this approach may be for teachers to gather evidence through observation of each other's teaching in a supportive environment or for shared discussion in team meetings.

Stage 1 –Whiteboard Replacement

This stage is characterised by teachers continuing to function in a familiar teaching style. Teachers at this level share concerns about using the technology in front of the class and their desire for time to practice their skills in private or at least only in front of their class of students where they have established a supportive working relationship. Consequently, teachers at this level are likely to adopt a 'business as usual' approach to classroom management by tightly controlling how the interactive whiteboard is used. The tasks assigned to the board by teachers are frequently those that replace the functions of static whiteboards or those easily achieved with a computer linked to a data projector. Thus, teachers at this level primarily use the interactive whiteboard to do 'old things in new ways' (Prensky, 2005) such as write up class agendas on a blank pages using native interactive whiteboard software (without saving) and use the projector to display weekly spelling lists typed legibly using a Word processing program.

The main affordances of the technology perceived by teachers at this level are predominantly technical in nature related to time saved writing and erasing work from one lesson to another, and improved presentations using colour and text recognition. Depending on the positioning of the board, better display facilities for whole class viewing may also be identified but this benefit may not be articulated until later stages when problems associated with room lighting and projector quality are addressed. It is important to note that the challenge for teachers at this level is to become familiar with the use of the pen, finding and selecting appropriate tools, and

managing text recognition (that often automatically replaces words inaccurately either due to teachers' lack of familiarity using the pen or due to the limited dictionary of terms).

Stage 2 – Supported Didactic

This stage is characterised by teachers planning learning based on the native software that is provided with the interactive whiteboard. This software is used as a visual support and organisational tool but not as an integral strategy for supporting students' conceptual development. At this level, teachers are primarily concerned about how to use the technology and how to manage the time demands of preparation. They are also interested in exploring the affordances of being able to connect to the Internet and view information together as a whole class. At this stage, there is a tendency for teachers to take a 'one-size-fits-all approach to whole class teaching where all students are expected to learn at the same pace controlled by the teacher. This 'traditional' role makes teachers a central feature of the classroom. However, teachers at this stage begin to change this role by initiating and planning opportunities for students to interact with the board and practice their skills.

Stage 3 - Interactive

This stage is characterised by teachers feeling comfortable with the routine use of the interactive whiteboard and they will often comment that they rely on it and 'can't live without it'. Consequently, teachers can feel anxious and irritated when the technology is unreliable and they frequently need to invoke a 'back-up' plan. This mid-stage of development is critical and will determine if teachers make a commitment to progress towards a 'pedagogical metamorphosis' or stall in their development by continuing to assimilate the interactive whiteboard into their practice without further pedagogical changes. That is, they decide whether they will continue to do 'old things in new ways' or aim to do 'new things in new ways' (Prensky, 2005). This decision is not straightforward or necessarily a conscious one. Teachers enter this stage feeling that they need to progress their use of the interactive whiteboard by creating more engaging and interactive learning activities that appeal to students. Ways to achieve this include incorporating more advanced technical techniques using the board and creating a wider range of opportunities for students to interact with it. This includes incorporating hyperlinks in the native interactive whiteboard software to interactive websites and having students manipulate Learning Objects and use mathematics tools (that are part of the native interactive whiteboard software). At this stage, teachers often begin to plan learning activities as 4-part lessons (Starter, introduction, development and plenary) and consider how the interactive whiteboard could best be used to support the achievement of intended learning outcomes. Advancement through this stage is made easier if teachers are confident computer users and if they have full-time daily access to an interactive whiteboard and a laptop with the native software they are able to take home.

Stage 4 – Enhanced Interactive

This stage is characterised by teachers with a high level of technical expertise who use the interactive whiteboard in responsive ways to improve teaching and learning through interactivity. Teachers at this level are skilled in the use of a wide range of software programs beyond native interactive whiteboard software and frequently access high-quality digital resources online. Teachers use these tools to sustain interactivity through effective questioning, provide a wider range of differentiated student-centred activities, and maximise student participation through small group work. High-quality digital resources include multimodal texts, real time data, information from multiple perspectives and a range of software applications and peripheral hardware devices (such as wireless slate or data loggers). These resources are used to:

- make learning more interesting, authentic and relevant to students
- allow more time for thinking, observation, discussion and analysis
- increase opportunities for communication and collaboration
- support exploration and experimentation by providing immediate visual feedback
- support multiple forms of conceptual representation

At this stage, lesson planning involves meaningful sequences of lessons with specific intended learning outcomes and differentiated tasks to meet the needs of all students. These lessons emphasise interactivity and collaboration between students and the teacher, as well as between students.

Stage 5 – Synergistic User

This final stage is characterised by a significant shift in teachers' pedagogical understandings and skills. At this level, both teachers and students are technically fluent in the use of the interactive whiteboard as a tool for learning and the device is used seamlessly as an almost 'invisible' part of all activities to facilitate a high level of classroom interaction. In particular, students' learning is the central focus of the classroom supported by the interactive whiteboard and peripheral devices as a means to an end. In addition, there is a significant change in the role of the teacher from being the central focus of the classroom, to being a facilitator to guide students towards the successful achievement of intended learning outcomes.

At this level, teachers value working collaboratively together to plan complex units of inquiry over extended periods. These units are underpinned by contemporary learning theories and approaches e.g. constructivist learning theory and the 'Backwards-by-design' (Wiggins & McTighe, 2005) and 'inquiry learning' approaches (Murdoch, 1998). The units are carefully planned but sufficiently flexible to be meaningful and responsive to students' interests and individual learning needs. They are designed to achieve intended learning outcomes, focus on investigating essential questions related to specific content areas, build on students' prior knowledge and skills, and gather evidence of learning throughout the unit i.e. assessment 'as' 'for' and 'of' learning (Earl, 2003). Where relevant, the units make connections and seek perspectives beyond the school and view students as producers as well as consumers of information that are in a position to 'take action' and make a difference in the community. Teachers at this stage are discerning about which technical and pedagogical practices are most effective and willingly support colleagues to develop their skills as part of a community of practice. They are also interested in advancing how IWBs and other technologies can be used do 'new things' in new, creative and innovative ways' (Prensky, 2005) to improve students' learning.

CONCLUSION

This paper described a generic developmental framework for the use of IWBs that can be used by teachers. It provides both a descriptive overview of each stage of development as well as specific common indicators of what this stage of development looks like in practice. This developmental framework was created by bringing together findings from existing research and evidence from a longitudinal empirical study over eighteen months in one South Australian primary school. In particular, the framework was developed in consultation with research participants to assist them to 'see themselves' and conceptualise a path to becoming an effective interactive whiteboard user. As a result of this project, it is now easier for classroom teachers to self reflect and analyse their practice using IWBs and identify their professional development needs. This is important because teachers are critical agents in mediating the integration of interactive whiteboards into their practice and using these devices to promote quality interactions and interactivity - the keys to learning and sustained student interest (Higgins, Beauchamp & Miller, 2004). This developmental framework builds on the work of Beauchamp (2004) by providing a comprehensive description of the technical and pedagogical indicators that are characteristic of advanced interactive whiteboard use in Australian schools. Feedback from the research participants in this project was positive. For example, one participant commented:

> The framework is great. It is clear enough to see where one sits and confronting enough in a positive way to seek direction for forward movement. On a whole school basis, it gives a great understanding for the direction of professional training and support needed for staff. It can allow individuals and staff to set targets as to where they want to be.

Further research is required using this developmental framework as a tool to analyse the empirical research findings to identify the factors that supported or constrained teachers' development along this continuum. The framework may also require further explanation for use with teachers beyond the project school.

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APPENDIX 1 - Interactive Whiteboard Developmental Framework

TECHNICAL INDICATORS

Stage 1 Whiteboard Replacement	Stage 2 Supported Didactic	Stage 3 Interactive	Stage 4 Enhanced Interactive	Stage 5 Synergistic User
1.1 Predominant use of the interactive whiteboard for text and drawing **or as a projection device.**	2.1 Predominant use of stored, original teacher created sequences of pages using native iwb software incorporating basic features (e.g. 'drag and drop' of words).	3.1 Use of a wider range of **tools** and interactive whiteboard effects **(e.g. random name generator, hide & reveal, timer, magnifier, and mathematics tools).**	**4.1 Teachers are able to use a wide range of open-ended and subject specific software programs (beyond native iwb software) and online tools (e.g. to create concept maps, music, artwork, digital stories, audio files, blogs, personal portfolios and collect, manipulate and analyse data).**	5.1 Teachers demonstrate a high level of skill and an intuitive interaction **using a range of open-ended and/or subject specific applications and online resources and tools (e.g. graphing software to demonstrate manipulation of scale and use of wikis, podcasting and blogs).**
1.2 Limited use of stored files (e.g. for Word files for spelling lists or grammar exercises).	2.2 Files are often prepared prior to lessons. 'Save as' is used after lessons so that work can be retrieved.	3.2 Growing use of external **interactive** resources **(e.g. hyperlinked websites in native iwb software for quick access or use of files created by others).**	**4.2 Laptops are used to complement activities with the interactive whiteboard and there is experimentation with the use of** other input devices **controlled by students (e.g. wireless keyboard, slate, digital microscopes and data loggers).**	**5.2 Seamless incorporation of external input devices and software applications to enable synchronous sharing of students' work direct from laptops etc. onto the IWB.**
1.3 Changes made to files and annotations rarely saved.	2.3 Limited use of external resources (e.g. Internet or school intranet).	3.3 The ability to **use tab browsing** and minimise or maximise windows to switch between applications (e.g. native iwb software and browser).	**4.3 Use of advanced features of native iwb software (e.g. text techniques using multiple layers, animated objects, Flash action buttons).**	**5.3 Use of synchronous and asynchronous communication tools (e.g. video conferencing, instant messaging, audio comments, desktop sharing software and web based communication applications).**
1.4 Teacher learning to use the pen to navigate files in place of mouse and use text recognition.	2.4 Use of existing graphics (i.e. clip art) in the native iwb software standard library to 'decorate' work.	**3.4 Native iwb software files are shared with others via Internet and/ or Intranet.**	**4.4 Teachers use online social networking software tools (e.g. del. icio.us) to manage and locate relevant websites.**	**5.4 Storage and retrieval of lesson artifacts created by students from a network or online storage site with student and parent access from home (e.g. class blogs, wiki, SlideShare).**
1.5 Predominant use of native interactive whiteboard software and perhaps one additional word processing program.	**2.5 Incorporation of scanned images of textbook pages and worksheets.**	3.5 Use of a wider range of graphics (including those from the Internet, **digital camera and scanner**) specifically chosen for purpose not just 'decoration'.		**5.5 Use of 'record' to capture actions and dialogue using the interactive whiteboard to enable students to review work independently.**

All of the competencies adopted from Beauchamp (2004) are written in plain text whilst the new indicators are shown in bold text.This layout makes it easy to see how the project has extended the work of Beauchamp (2004) across the five stages.

PEDAGOGICAL INDICATORS

Stage 1 Whiteboard Replacement	Stage 2 Supported Didactic	Stage 3 Interactive	Stage 4 Enhanced Interactive	Stage 5 Synergistic User
1.1 The teacher designs lessons that do not rely on the interactive whiteboard and uses it occasionally.	2.1 The teacher structures student tactile interactivity with the board. **Emphasis is on using the technical features to demonstrate understanding and maximum student participation** (e.g. 'drag' content on the board as part of cloze procedure, **or sequencing activities**).	3.1 Teacher initiated and planned opportunities for students to select tools, and interact with the board to **apply and analyse conceptual knowledge (e.g. Students manipulate Learning Objects and mathematics tools, and play games).**	**4.1 Use of multiple forms of representation to support substantive communication, demonstrate difficult to teach key concepts, and processes in motion (e.g. analyse live online data and incorporate animation, video, 3-D modeling, simulation or dynamic data software and virtual worlds).**	**5.1 Students determine many significant aspects of lessons either independent of, or dependent on, teacher approval** (e.g. the direction, momentum and scale of the next step in the lesson).
1.2 Only the teacher uses the interactive whiteboard.	**2.2 Native iwb software 'pages' are sequential and designed as templates or 'digital worksheets' where the whole class works on the same learning activity at the pace set by the teacher.**	**3.2 Use of the interactive whiteboard to connect knowledge across Learning Areas, and connect students' prior knowledge to the unknown.**	**4.2 Use of a range of applications (beyond native iwb software) to construct and apply conceptual understandings with students in meaningful ways using higher order thinking skills (e.g. create and analyse online survey data using SurveyMonkey™ and create authentic texts such as event posters and electronic year books).**	**5.2 The interactive whiteboard is an integral part of spontaneous, non-linear, fluid learning activities that support intended learning outcomes.**
1.3 Teacher presentation dominates over questioning.	2.3 Used most commonly for teaching English and Mathematics.	**3.3 Frequent and confidant use of the Internet to access interactive websites, locate information spontaneously when needed and to develop students' information and critical literacy skills.**	**4.3 Students frequently and confidently use the interactive whiteboard as part of lessons stimulating sustained dialogue between students and the teacher and between students.**	**5.3 The available technology is deliberately used to support Assessment for, as, and of learning (e.g. the teacher incorporates voting quizzes to assess progress and design a range of intellectually challenging assessment tasks to cater for individual needs).**
1.4 More eye contact with class.	2.4 Use of ICT 'vocabulary' by teacher and students when using the interactive whiteboard.	**3.4 Retrieval of saved native iwb software files by teacher to review and continue previous learning.**	**4.4 Input devices are in the hands of students to demonstrate their understandings.**	**5.4 Teachers are able to articulate and apply their comprehensive knowledge of contemporary learning theories, strategies, various curriculum and planning frameworks and skills to provide an inclusive and differentiated curriculum for students. (e.g. projects based on an Inquiry approach or 'Backwards by Design' model involving essential questions, authentic tasks and assessment, collaborative problem solving, higher order thinking and Multiple Intelligences).**

PEDAGOGICAL INDICATORS

Stage 1 Whiteboard Replacement	Stage 2 Supported Didactic	Stage 3 Interactive	Stage 4 Enhanced Interactive	Stage 5 Synergistic User
1.5 Quicker pace to lessons.	2.5 Teacher questioning follows the pattern of Initiate-Response – Feedback.	3.5 Teachers consciously plan and rely on the use the interactive whiteboard to support specific learning outcomes and deep conceptual knowledge that can be easily achieved with it (e.g. using shared images, accessing online resources and manipulating geometry tools).	4.5 There are opportunities for students to demonstrate their inquiry based learning skills to an authentic audience using the interactive whiteboard (e.g. students present their personal digital projects to peers or assist the teacher to co-construct learning resources).	5.5 Teachers work collaboratively to plan, reuse and refine high quality comprehensive units of work. These units link a range of high quality resources, activities and assessment tasks to stimulate and support learning using the interactive whiteboard over extended periods. Emphasis is on the use of the interactive whiteboard to do new things in new, creative and innovative ways.
	2.6 The interactive whiteboard is primarily used to provide visual support for text-based teacher-directed instruction to the whole class.	3.6 Teachers experiment with how to integrate the interactive whiteboard into relevant sections of planned lessons involving a blend of whole class and small group work (e.g. plan 4-part lessons comprising: Starter, Introduction, Development, and Plenary).	4.6 The interactive whiteboard is used to edit and annotate students' 'work in progress' in a supportive environment, generating sustained dialogue and feedback on learning (includes scanned book work and digital files).	5.6 Use of synchronous and asynchronous communication tools to connect with other students or external experts globally on collaborative projects or to seek information and compare multiple perspectives.
	2.7 The interactive whiteboard is used as a behavioural reward for students who complete their 'other' work and engage with class activities.	3.7 Increased pace of lessons to maintain student engagement using the interactive whiteboard as an organizational tool (e.g. use of hyperlinked resources, timer and moderate student tactile interactivity with the board).	4.7 Use of native iwb software to provide differentiated learning activities to cater for all students' needs.	5.7 Spontaneous use of the board to accumulate evidence of learning (e.g. use of the 'camera' or 'record' tools to capture learning moments as they occur for use in the plenary session).
	2.8 Files are retrieved to review and extend previous learning.	3.8 Increased use of native iwb software files created by others. Some of these are modified to suit specific learning contexts.	4.8 Teachers collaborate in formal and self-organising ways to share resources and support each other to develop their technical skills, and pedagogical ideas for shared integrated units of work and lessons.	