Using the Interactive Whiteboard to teach literacy in primary schools: 
facilitating student-to-student whole-class dialogic interactions.

Abstract
Much of the research conducted on the use of the IWB in primary school classroom focuses on teacher-to-student interactions. This paper, drawing on a social theory of learning reports on a qualitative case study undertaken with two primary school classes in one school in New South Wales, Australia. Here the focus of the lessons was on literacy where students were learning to write reviews. The results of the study demonstrate that the use of the IWB can provide for learning in a whole class setting where interactions between students feature. Consequently, the teacher is able to take on a facilitator’s role.

Keywords: interactive whiteboard (IWB), primary education, dialogic interactions, whole-class teaching, ICT

Introduction
One of the important components of learning in schools is the interactions that occur. There has been recent research conducted where the importance of interactions in supporting effective is highlighted (Mortimer & Scott, 2003; Wells & Ball, 2008). The interactive whiteboard (IWB) connected to the computer is a powerful tool that can potentially support and enhance the interactions taking place in the classroom.
To date, there have been few articles focusing on the use of the IWB in primary schools using a case study approach to examine the interactions’ of participants focusing on student interactions. Much of the literature focuses on the interactions between teacher and student (BECTA, 2004; Bennett & Lockyer, 2008; Schuck & Kearney, 2007; Smith et al, 2004). The focus of this paper is to highlight ways in which the IWB can contribute towards whole-class interactions that are dialogic in nature where the focus is on student-student interactions.

The setting for the research is in a year three and four primary school classroom in Sydney, Australia where data were collected over three school terms. The focus of the learning occurring in the classroom revolved around literacy where students were learning to write a response. The research was exploratory in nature where the teachers in conjunction with the researcher wanted to try different approaches based on data analysis.

The initial research question in stage one was:

- How can the IWB support whole-class learning where literacy is the focus?

As data were collected and analysed the project moved into a second stage and the research questions were:

- In what ways can the use of the IWB facilitate student-to-student interactions?
- What role does the teacher take on where there are increased student-to-student interactions?
Background
The use of the IWB to support literacy in the classroom has been encouraged since the 90s. In London in the late 1990s the Department for Education and Skills released a National Literacy Strategy (NLS). One of the strategies involved the use of whole-class teaching. In the NLS Framework, whole-class teaching is described as “discursive, characterised by high quality oral work” and “interactive, encouraging, expecting and extending pupils’ contributions” (Department for Education and Employment [DfEE], 1998, p. 8) where dialogic forms of teaching and learning are encouraged. Dialogic interactions are ones where children’s own words, ideas, speculations and arguments which feature much more prominently compared to monologic interactions where typically the teacher controls much of the discussion (Alexander, 2005).

The use of the Interactive Whiteboard (IWB) was seen by the Department for Education and Skills as one way of facilitating such whole-class interactions where dialogic interactions would feature (Smith, Hardman and Higgins, 2006).

In focusing on the interactions of participants around the IWB researchers have identified a number of positive learning outcomes where the IWB is used to facilitate whole-class teaching. For example, a report published by the British Educational Communications and Technology Agency BECTA (2004) makes a number of claims in the ways that the IWB improves the nature of interactions. The authors state that the use of the IWB can “improve the quality of interactions and teacher assessment through the promotion of effective questioning” (p. 2) and that: “Pupils
talk for longer than otherwise in their responses and use an extended range of vocabulary in their explanations (p.2). Goodison (2002) found that the IWB allows knowledge to be shared publicly, allowing students to learn together.

Whilst there are some positive reports on the use of IWBs, many researchers have found that the whiteboard does little to change the interactions that occur in a whole-class setting. Schuck and Kearney (2007) for example, found that the IWBs did not change the type of questioning instigated by the teacher. The traditional Initiate–Response–Evaluate (IRE) style of teaching, which was identified by Mehan, (1979) predominated. Schuck and Kearney also found that “student questioning, either of the teacher or each other was seldom noted…” (p. 68). Likewise, Smith, Hardman, Wall and Mroz (2004) found that “traditional patterns of whole class teaching persist” (p.455). Here it was reported that there was little evidence of dialogic teaching taking place. This finding has been reported by numerous other researchers (eg, Higgins et al., 2005; Kennewell, Tanner, Jones, & Beauchamp, 2008). This body of research reflects the fact that technology-led initiatives in education have often not been accompanied by an “adequate understanding of what their take-up might imply for pedagogy” (Warwick & Kershner, 2008, p. 270).

As argued by Hall and Higgins (2005), the IWB is designed to allow teachers to teach from the front of the classroom, but this has the effect of maintaining the traditional role of the teacher which maintains the status quo, which has been noted by other researchers (Hedburg, 2006;
Mercer, 2007). It has been clearly shown that if the use of ICT such as the IWB is to be educationally successful, then changes need to be made to pedagogical practices (Kennewell, 2006; OECD, 2001). Through using ICT such as the IWB, the teacher can take on the role of a facilitator (European Commission, 2003; Kozma 2003).

Theoretical Framework
The theoretical framework that informs the analysis of the data is guided by the belief that learning is a social process and draws on the work of both Vygotsky and Bakhtin.

Proponents of sociocultural theory argue that learning is primarily a social process mediated through interactions using tools (Vygotsky 1978; Wertsch 1999). The types of tools that Vygotsky refers to fall into two categories, these include physical tools (such as pens), and semiotic tools (such as language). Humans do not directly act on the physical world, but rather use tools as a way of indirectly mediating actions in the world.

Interactions are socially reciprocal actions involving two or more people (Wang, 2004). They are complex social phenomena which are composed of verbal and non-verbal characteristics which can be described as “…tools in action shaped by participants' culturally based definitions of the situation” (Kumpulainen and Mutanen, 2000, p. 149). Interactions are "…a necessary and fundamental mechanism for knowledge acquisition for the development of both cognitive and physical skills” (Barker, 1994, p.1).
The nature of participants’ interactions mediated by the use of the IWB is focused on in this paper. The IWB is a tool that is not independent of the participants in the classroom. Its use is shaped through the social interactions of the teacher and students which in turn shapes the nature of the interactions. This is a reciprocal process.

The term dialogic discourse draws from the notion of learning as a dialogue which Bakhtin (1981) distinguished from monologic discourse, where for much of the time, the teacher is in control of the interactions that take place in the classroom. “According to dialogism we produce and organise social reality by talking and writing” (Lyle 2008, p. 225).

In focusing on interactions, features of dialogic interactions are drawn upon where learning is Collective: teachers and children address learning tasks together, whether as a group or a class, rather than in isolation;

• Reciprocal: teachers and children listen to each other, share ideas and consider alternative viewpoints;

• Supportive: children articulate their ideas freely, without fear of embarrassment over ‘wrong’ answers, and they help each other to reach common understandings;

• Cumulative: teachers and children build on their own and each others’ ideas and chain them into coherent lines of thinking and enquiry.

(Alexander, 2006).
In creating a classroom environment where dialogic interactions are encouraged a different learning space is created to that of a more teacher-centred classroom. This learning space referred to here has been elaborated by Wegerif (2007). This space is not a physical space, but rather a collaborative space where “learner and teacher engage with each other and, in a sense, learn to see the task through each other’s eyes” (p.3).

Many of the discussion on dialogic interactions in the literature focuses on the interactions between students and teachers (eg, Mercer, Dawes, & Staarman Kleine, 2009; Smith, Hardman, Wall, & Mroz, M. 2004); indeed, the very fact that it is commonly called dialogic teaching suggests that only interactions between students and teachers are considered to contribute towards the learning experience. Very little discussion is on the place of dialogic interactions between students which are as important as teacher-student interactions. As suggested by Fisher (2007) “learning conversations that stimulate thinking can be described as ‘dialogic’”(p. 617). The term ‘dialogic interactions’ is used in this article, which reflects more accurately the social nature of learning.

**Research Design**
For the study qualitative methodology (Erickson, 1986; Lincoln & Guba, 1985) was used drawing on aspects of case study methods. A number of different data were gathered throughout the study.
The study was conducted over three school terms with a year three class students and their teacher and a year four class and their teacher in a suburban primary school in Sydney, New South Wales (NSW), Australia. The school is in a medium to high socio-economic area and there is a strong emphasis on the use of information and communication technologies (ICT) in the classrooms. There were 30 students in the year three class with 28 students giving consent to be involved in the project. There were 29 students in the year four class with 26 students consenting to be involved in the study. The age range of the students was between eight to 11 years old. The classes were selected for the study as the school had IWBs in every classroom and the teachers were interested in exploring new pedagogical approaches with their use.

A discussion was conducted with the two teachers at the beginning of the study which allowed for both the teachers and the researcher to collaborate and negotiate the educational focus of the lessons and the direction the research might take. Given that the research was exploratory in nature the direction was decided through on-going discussions with the teachers and researcher throughout the study. The discussions allowed for pedagogical changes to be implemented based on some initial analysis of the data, which related to the types of interactions occurring in the classroom whilst using the IWB to support the learning taking place. Both the teachers and researcher were positioned as co-teachers (although the teachers took on most of the teaching) and co–researchers, (although the researcher took on most of that role).

The discussion also provided information on the teacher’s experience in using IWBs. The year three teacher stated she was reasonably confident in using the IWB. The year four teacher who
was not long out of university stated her understanding of the capabilities of the IWB was not as solid as she might like.

Questionnaires were provided to students at the beginning and end of the study. The beginning questionnaire elicited information on students’ prior educational experience with using the IWBs. All the students surveyed had learnt with the IWBs the year before and enjoyed learning with them. The questionnaire provided at the end of the study asked students about their experiences in using the IWB to construct a class response. Given space limitations of this paper, the data reported on later draws on the video recorded sessions in the classrooms with some questionnaire responses by the students.

Classroom interactions involving both whole class and group work were captured using a video recorder. Video data allowed for whole class interactions to be captured and analysed. It was important that these students were able to participate equally in the class activities whilst ensuring ethical guidelines were followed. The majority of students had permission to be involved in the project. The students who did not have permission were seated with a group who were not recorded whilst the students worked in groups. During whole-class discussions the camera was turned off when the two students without permission interacted with the teacher.

Data collection and analysis
Data were collected over three school terms. In total, 12 lessons were observed, six for each class. The lessons lasted from between 40 minutes to one hour. The first two lessons for each
class were observed in term two, the second set of two lessons were observed in term three and
the final set of two lessons were observed in term four. In all three sets of lessons the format was
the same; for the first lesson the students discussed their text and the structure of a response and
then in groups generated ideas. In the second lesson the students bought their ideas together and
constructed a written class response.

During the first two lessons the teachers did not use the IWB, instead relying only on resources
which included pen, paper and a traditional whiteboard. During the second two lessons the
teacher used the IWB for both lessons and the students used pen and paper to record their ideas.
For the last two lessons the students generated their ideas using a computer and teacher used the
IWB. The reason for these differences across the three lessons was to provide for comparison in
using the different resources. Below is a table outlining the lesson sequence including the
activities and resources used:

**Table 1: Overview of lesson activities and resources used**

<table>
<thead>
<tr>
<th>Lesson number</th>
<th>Lesson set</th>
<th>Lesson activities and resource used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Class read text, generate ideas in groups. No IWB used</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Class constructs text drawing on group ideas. No IWB used.</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>Class read text, generate ideas in groups. IWB used for input. Pen and paper used for generating group ideas.</td>
</tr>
</tbody>
</table>
As indicated earlier, a dialogic framework was used to analyse the data. To begin, all the data were transcribed so that it was in a written format. In coding the data the four features of dialogic interactions were used (Collective, Reciprocal, Supportive, Cumulative) and a record was kept of the number of times particular students interacted, how long they interacted for, who they interacted with and what they interacted about. In addition to this, the types of literacy resources they employed were also recorded.

## Constructing the texts

Two episodes are focused on in this section. The first episode was chosen as it illustrates two important factors; a teacher-centred delivery and an example of how the IWB is being used without the electronic texts generated by the groups being used to generate the class text. The second episode illustrates how the IWB is being used to support student-centred dialogic interactions and how the board can facilitate the sharing of group texts and the construction of the class text. This second episode, as discussed later in the paper, illustrates changes made to the lesson as a result of the analysis of lessons one to four.
During episode one (lesson four) the class is constructing the text after they have worked together in groups using pen and paper to record their ideas. The teacher is at the front of the class. During episode two (lesson six) the class is constructing the text after they have worked together in groups using Word to record their ideas. Students are taking it in turns to come out to the front of the class.

**Episode one**

The students have revised their paper and pen ideas they constructed in groups the previous lesson using paper and are now sitting on the floor in front of the IWB. The teacher is discussing the content of the class text:

**Teacher:**  Paragraph one and paragraph two generally would they be fact or opinion based? Remember we talked about this last time? Fact or opinion based. What do you think Liz?

**Jinah:**  Fact.

**Teacher:**  Okay. Do we agree?

**Students:**  [all together] Yeah.

**Teacher:**  Paragraph one and two generally fact based. Okay. Then we come to paragraph three. Michelle?

**Cath:**  It’s got their opinion.

**Teacher:**  Okay. So have we got a recommendation yet?
Cath: No.

Teacher: *Are they recommending anyone to read the story just yet?*

Gary: No.

Teacher: No. Okay. *So paragraph three, the job of paragraph three is for the reviewer, which is you, to actually provide a more personal opinion of the story. Okay. Where the wild things are is a magical story with fantastic pictures that make the story come alive. It’s funny, scary and a little bit sad. It makes you imagine your own wild things. So that’s when you have your opportunity to put your own opinion in, whether it’s for or against, okay. Doesn’t have to be a good recommendation or an opinion that shows that you liked it. It could also be that you didn’t like it. Okay. But that’s where your opportunity is, to provide the person reading the review with your opinion, and then what’s the purpose of the last paragraph? There wouldn’t be the reviewer that didn’t do this. Larry?*

Larry: *recommendation.*

Comment

Whilst there were some dialogic interactions taking place during lesson four in both classes, the majority of the interactions were typical of the extract above. It can be seen that the teacher is asking mainly closed Initiation-Response-Feedback questions that require typically only a one word response from the students. Drawing on Mortimer and Scott’s (2003) terms, the interactions were more authoritative than dialogic. There was limited space for students to develop and shape the conversation that was taking place due to the teacher’s role.
Also of significance is the amount of talking that the teacher is doing compared to the students. As seen in the last extract of the teacher, she is taking up much of the spoken space leaving limited opportunities for students to engage with her or other students’ ideas. For much of the episode, the teachers occupied most of the talking space as typified in this example.

As a consequence, there were few reciprocal interactions occurring where the participants were sharing ideas and considering viewpoints. There were also limited opportunities for cumulative interactions where the participants were able to build upon each other’s ideas. The types of interactions that were occurring were mostly the teacher checking for student understanding and then moving on the next point. This meant that there was limited in-depth discussion on concepts and so quantity of ideas was more important than quality.

As can also be seen in the extract above, there were no interactions occurring between the students. In analysing the data it was found that this pattern of interactions was consistent across both classes. All the discussions were being mediated by the teacher. Where students did respond to ideas of other students their responses were always directed at the teacher who then commented on the response.

In examining the educational interactions around the use of the IWB it was seen to promote a more traditional type of teacher-centred learning rather than allow for more dialogic interactions to take place. Rather than transform a teacher’s pedagogy as suggested by Armstrong et al.
(2005) the IWB reinforced a teacher-centred classroom which has been found in other classrooms (Kennewell, 2004; Knight, Pennant, & Piggott, 2004).

With this lack of dialogic interactions in mind, lessons five and six were planned collaboratively with the teachers and the researcher with a focus on changing pedagogical practice where students would be given more control in interacting with each other and the teacher would take on the role of facilitator. The initial suggestion of encouraging students to interact directly with each other was raised by the researcher. Through discussion with the teachers and researcher the decision to place students at the front and get other students to discuss ideas whilst the teacher would provide a more facilitative role was reached.

**Episode two**

Here in lesson six the class is again sitting around the IWB as in episode one. On this occasion one student is out the front of the class with a wireless keyboard sitting next to the IWB. The teacher is further away and is part of the audience and also has a wireless keyboard. All of the group texts that have been created in the previous lesson are open in tabs at the bottom of the screen for easy access. A document for the class text has been created and is also open.

In order to facilitate a more dialogic process and put students in control of both writing the response and interacting verbally with each other, one student from each group comes out to the front of the class and it is this person to whom students direct their questions rather than the
teacher. The teacher is taking on the role as mediator between the computer, the software, and the pupils’ learning experience (Virtual Learning, 2003).

To begin, a student (Jenny) from one of the groups volunteers and came out to the front. The group text that had been created is displayed on the IWB and part of it reads:

*Each month every student who reads Countdown will get a different copy. Countdown magazines are a great opportunity for students to read interesting stories and have a variety fun activities.*

The students were encouraged by the teacher to consider how they might refine the text.

**Brian:** *I think we should write how there are different levels of the magazine, how it goes from countdown and up to orbit*

**Jenny:** *I think that would go better in the last paragraph*

Another student suggested

**Beckky:** *Maybe instead of saying a variety of activities you could write what the activities are*
Jenny: What sorts of activities should I add?

Bekky: What about the crossword? I really like doing that.

The student amended the text:

Each month every student who reads Countdown will get a different copy. Countdown magazines are a great opportunity for students to read interesting stories and a variety fun activities like the cross word.

Teacher: Are there were any other activities you might like to add?

Jim: What about the brain tease? That is good fun.

Danah: Can we add the comics as well?

Jenny: What would you like me to write?

Danah: What about the comics that continue each week?

Jenny: OK.

Jenny amended the text throughout the dialogue so that the final opening paragraph read as follows:
Each month every student who reads Countdown will get a different copy. Countdown magazines are a great opportunity for students to read interesting stories and a variety fun activities like the cross word, the brain teaser, and the comics that continue each week.

At this point another student came out from another group and that group’s text was brought up on the IWB for discussion. The class discussion went on this way until all the groups had presented their texts and added them to the class text. At that point there was general discussion about how to amend and edit the final text.

Editing the text

Once the students had written a draft of the text they set about editing it to ensure that it was correct and reflected what they wanted the text to contain. The extract below is taken from the year four class who were very animated in editing the text. It is at a point where a student is typing the heading for the text

**Written:** Review

**Student A:** is that how you spell review?

**Student B:** no

**Students:** i before e.

**Student C, D and E:** right click on the mouse.
Students: now press enter.

The conversation continued this way while students suggested improvements that could be made. The student were talking with each other, making suggestions and building on each others ideas and then when a consensus was reached the student with the keyboard would make the change. It continued this way until the class was happy with the end result.

One of the questions students were asked via the questionnaire at the end of the study was: Did you find talking directly with other students about your ideas in the final lesson helped? The majority of the students responded with a yes answer. One of the answers by a student was: yes it did because I understood the answers more.

There were five students out of the two classes who stated no and the reason they gave was because of the noise level.

In other question, students were asked: In the final lesson, did the IWB help you write the review? All of the students except one responded with yes. One of the students’ elaborations was: because we got so see each other’s work and discuss it together. The student who wrote no did not like having to wait to write.

Comment

It is difficult to capture in a linear fashion the conversation that the students had in editing the text. There were many ideas suggested by the students and the majority of the students were
engaged in the discussion. The ideas were sometimes randomly called out and other students would pick up on a thread and then a common consensus would be finally reached. The student at the front was taking directions from the class members and typing in the change as it was suggested and ratified by the students.

In comparing the interactions between episode one and episode two there are a number of differences in the interactions that took place. Firstly, the students are engaging with each other directly instead of the teacher mediating their ideas. As a result of the students engaging with each other it can be seen that instead of the students making statements in response to the teacher’s questions, they are asking each other more open ended questions.

In the final example, the students are questioning each other about the correct spelling of a word. One of the students provides a rule on spelling to remind the student how to spell the word. They then go on to support the student in how to correctly use the keyboard in order to make the required change. In doing so they were engaging in reciprocal interactions, where they are sharing ideas amongst each other. These types of comments and suggestions were not seen in episode one where the teacher rarely made these type s of errors. In having the students out the front, there was a greater sense of support for the learning amongst other students as co-learners that was absent in episode one.

One of the clear differences in the interactions between episode one and episode two was the amount of talking of the students. In episode one there was limited discussion by students with
one word comments. In episode two students are doing most of the talking and their interactions are beyond a one word answer. It is important to note that whilst the students’ responses were not in the order of whole paragraphs, they were longer. It was clear in observing the students that they were not used to this type of discussion and they often looked to the teacher for direction. The teacher would encourage them to discuss their ideas directly with each other. With more experience, the students might become proficient in interacting with each other and the quantity and quality of their interactions would improve.

In the students working with each other around the IWB there were a number of different learning experiences occurring. One was on the content of the lesson, which was the response. Secondly there was learning occurring around correct English language. Thirdly, there was a focus on technical skills associated with the use of the ICT tools.

**Discussion**
The extracts above illustrate the way the IWB was able to support dialogic interactions taking place between the students with the teacher mediating the process. The learning was very clearly collective where the responsibility and decisions were shared rather than the teacher making the decisions. The verbal discussions between the students (with some input from the teacher) were cumulative. This was particularly evident in the editing section of the group writing task where the students built on their ideas.
There was evidence of the students and teachers interactions being reciprocal. The students were asking open ended questions of each other were asked to develop or explain their ideas, which has been found in other lessons where the IWB is used (Higgins et al. 2005). There was consideration amongst students about what would work best. If one student felt an idea did not work there was discussion amongst students and a consensus was reached. On some occasions when two students has differing suggestions this consensus was reached by students voting by putting up their hands for the best approach.

Allowing students to interact directly with each other meant that the student at the front was required to have far greater responsibility for the discussion. Not only did that student have to ensure that a range of students were selected and allowed input, but their response needed to be one that would allow the entire class to move forward with their co-construction of the text. Here it was found that the IWB was used to encourage an interactive environment “wherein pupils actively participate in the social (re)construction of knowledge …” (Higgins et al. 2005). These types of interactions are very different from the IRE interactions where the teacher dominates whole class discussions (Mroz, Smith & Hardman, 2000).

In creating a student-to-student learning environment in which the IWB featured there was a different type of learning space created from that of a traditional teacher-centred classroom. Having the students take on the role of the teacher certainly allowed them to appreciate the role of the teacher. Similarly, placing the teachers away from the front of the board provided a different perspective for them.
Of significance is that the use of the IWB allowed students to easily see and manipulate each group’s ideas which has been found by other authors, for example Mercer, Warwick, Kershner and Kleine Staarman, (2010). Having the texts from the previous week available for the whole class to view and comment on allowed for greater dialogic interactions to take place. This was in comparison to the paper and pen method where there was no public access to group ideas as was evident in lessons two and four.

The feedback of the students via the questionnaire revealed that using the board facilitated the opportunity for discussion between them. Putting the group texts up on the screen allowed them to easily refer to the ideas they has generated in the groups and to use the cut-and-paste function of Word to easily transpose the sections they chose into the class text. The editing features of Word allowed them to easily change and edit their ideas, which whilst possible using other media, could not have been done as easily as it was in using Word.

The sharing of ideas was one of the main themes to run through student questionnaire responses. The ability for the IWB to mediate non-verbal dialogue (text) supported the verbal sharing and discussion of ideas. This finding has been found in other studies (e.g., Mercer, Hennessy, & Warwick, 2010).

As stated by several students, there was the frustration at having to wait for a turn to talk. Whilst the back seat role that the teacher took meant that more students were able to talk there was still
the issue that approximately 30 students shared the one discussion space. The limited discussion space will always be a point of management in any class where there are 30 participants.

**The facilitating role of the teacher**

Throughout the discussion in lesson six the students were in charge of writing the text and of the interactions that were taking place which according to Mortimer and Scott (2003) is “central to the meaning making process and thus central to learning” (p.3). The teacher (who had the other wireless keyboard) used that to bring up the different texts and so she took on the role of facilitator. The decision which text the teacher would bring up was based on the student who came out the front and so the teacher was supporting the learning process rather than directing it.

Having two keyboards allowed the teacher to move away from the front of the IWB and thus change the social dynamics of the classroom. Whilst a major benefit of the IWB is that it creates a scenario where the teacher is at the front of the class (BECTA, 2003), here the benefit was on removing the teacher from the front of the class and replacing her with students.

The use of the IWB coupled with the use of the keyboard also made it easier “for the teacher to move back and forth through the current and previous lesson’ work, re-visiting relevant ideas as and when required (as noted by Smith *et al.*, 2005)” (Mercer, 2007, p. 21). Having all the previous and current texts clearly accessible allowed for continuity between lessons. “Such
shared representation of content on the IWB potentially may be used to encourage more ‘interactive’ and ‘non-authoritative’ dialogue…” (Mercer, 2007).

The teacher also had the important role of managing the interactions that occurred. As is any classroom there are the quiet students who rarely offer suggestions voluntarily and students who are articulate and enjoy sharing their ideas. The teachers in both classrooms did manage lesson six so that many students had opportunities to interactive and contribute.

In the episode two extract the teacher asks the students a question which both teachers did. Here, as reported, the questions were mostly to seek clarification and usually a yes or no answer was required. In the second episode the teacher also asked questions as indicated in the extract. The purpose of the question and the response required by the students were different to that of episode one. In episode two in asking the students a question, the purpose of the teacher was to get them to consider the response they had provided and ultimately, if there was a more appropriate way of constructing the text. This did not always require a response from the students and helped to focus them so that they were able to collectively reflect on the topic as suggested by Tanner and Jones (2007).

**Pedagogical implications**

As suggested by Smith, Hardman and Higgins (2006), simply introducing new technologies like the IWB by itself “will not bring about fundamental change in the traditional patterns of whole
class teaching” (p. 455). What needs to take place is for teachers to consider what type of pedagogical practices best support the learning and what resources are available. The idea of orchestration, a notion discussed by Beauchamp and Kennewell (2010) in relation to the use of the IWB for teaching is important here. The notion of orchestration draws on the writing of Luckin (2008) who describes an ecology of resources as ‘a set of inter-related resource elements, including people and objects, the interactions between which provide a particular context’ (p. 451). Here the teacher can orchestrate the learning experience by utilising the available resources as well as taking into account the best possible pedagogical practices.

In the final lesson viewed, allowing students to interact directly with each other was not a new pedagogical act: many teachers have used this approach before. What was new in this situation was using the IWB where group texts were made available to all participants to create a whole class text, along with the student-to-student focused discussion. Here the orchestration of the resources used along with the positioning of participants produced an educationally successful lesson with regards to diabolic interactions occurring between students.

In summary, the interactions in the episode two are further along the dialogic continuum than in episode one. The interactions in both episodes were collective. The interactions in episode two were reciprocal where the students suggested to each other aspects to be included in the written response. As indicated, the students questioned each other as a way of considering alternative ideas rather than responding to the teacher as seen in episode one. The interactions were more supportive in episode two as the students were in dialogue with each other and were able to reach
a common understanding as to the final wording of the text. With the students questioning each other and using the IWB to see each group’s ideas as well as cut and paste them to develop a final text, they were able to sustain cumulative interactions. The teacher questioned the students as a way to support them in building their ideas. The student’s interactions with each other were longer than in episode one which supported the cumulative aspects of the interactions.

Conclusions

The results of the study indicate that the IWB can facilitate student-centred whole-class interactions that are dialogic in nature. This was evidenced in two ways. First, providing students with the ability to both construct electronic texts in groups and then cut and paste these to produce a final class negotiated text facilitated the opportunity for dialogic interactions to take place. The teacher was able to take on the role of facilitator by making suggestions to the students and asking open ended questions and through using the keyboard to textually support the students’ writing.

Secondly, by changing pedagogical practices to allow students to interact verbally with each other around the IWB, rather than via the teacher as is common in many classrooms, students were able to collaborate and critically explore their ideas in an in-depth way. The students were required to take far more responsibility for the discussions taking place and needed to ensure that they could provide feedback to other students which could then be used to produce the final text. In moving to a students-to-student environment with the IWB it was found that more students
interacted and that the length of their interactions tended to be longer and be more open ended than in earlier teacher-led lessons.

The IWB is a powerful tool that can be used in a myriad of different ways. In the case where students’ textual work constructed in groups is being used to develop a final text, the IWB can contribute towards this process whereby by verbal and written modes contribute towards the outcome along with a pedagogical approach that encourages greater dialogic interactions between students in a whole-class setting with the teacher taking on a facilitative role.

It is important in both professional development and teacher training programs that teachers are able to understand that there are different types of learning approaches such as teacher-centred and student-centred learning and how the IWB can contribute to these types of learning environments. By critically reflecting on teaching practices, it may be possible for teachers to fully appreciate how the use of the IWB can be used to support a learning environment that encourages dialogic interactions between and with their students.

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