

## **Examining the Effectiveness of Teacher Professional Development in an Authentic Learning Environment as Part of a Whole-School Initiative for School Improvement.**

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The paper examines first, how an action research activity, at the whole-school level, contributed to school improvement efforts over a three-year period. The paper also reports how one teacher involved in the action research activity used student feedback to guide improvements in her secondary classroom. Finally, the paper examines the use of student feedback reports as one form of data used to monitor the effectiveness of school-wide initiatives.

The findings indicate, firstly, that a whole-school approach to teacher professional development contributes to building a school culture that values continuous learning and which encourages teachers to trial strategies consistent with a whole-school focus on teaching and learning. Secondly, teacher action research using student feedback provides an authentic learning experience that gives teachers the opportunity to monitor, reflect and act to improve what they do in the classroom.

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### **ABSTRACT**

This paper reports a case study of one school which used teacher action research as part of a school-wide initiative to improve the classroom learning environment. At this school, a total of 35 senior secondary teachers were involved in the study over a three-year period. Each of these teachers selected one or two classes and used feedback data, gathered from their students, to make improvements to the classroom learning environment utilising an action research process. The study involved a mixed-methods approach that included questionnaire responses, document analysis and interviews. A total of 628 student responses from 55 classes were collected for analysis over the three years.

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### **OBJECTIVES**

The objectives of the study were to:

1. Investigate how one school used teacher action research as part of a whole-school initiative for teacher professional development and school improvement.
2. Explore the ways in which teachers used feedback from their students to guide improvements to the learning environment.
3. Examine the effectiveness of school initiatives in terms of changes in students' perceptions of the learning environment.

### **BACKGROUND**

A range of external and internal influences can be considered as key drivers behind the emphasis on school improvement and effectiveness. In Australia, an increased emphasis on student achievement has put the spotlight back on to school effectiveness and teacher quality. In terms of teacher quality, it is widely accepted that teachers need to be continuous or lifelong learners who see their own development as fundamental to effective teaching. Given the constraints of contemporary schooling, however, accessing meaningful professional development is often difficult. As a result, the use of action research has become increasingly popular for teacher professional development because it can occur over a period of time, within a school context and can be driven by the teacher themselves rather than delivered by an external organisation outside of class time.

This paper reports how one school used teacher action research as part of a whole-school strategy for school improvement. As participants in the research, teachers used student feedback as part of an action research process to help them to improve their senior secondary classroom learning environments. This section reviews literature pertinent to the research in terms of school improvement and teacher quality; teacher professional learning; action research and learning environments.

#### **School Improvement and teacher quality**

According to results reported in the *Victorian Quality Schools Project (VQSP)*, Rowe, Holmes-Smith & Hill (1993, p. 15) suggest that:

Good teachers make good schools, much more than the reverse... Their accumulated knowledge and skills form the principal asset in any school or education system...it is essentially through the quality of teaching that effective schools make a difference; in fact, on the basis of our findings to date, it could be argued that effective schools are only "effective" to the extent that they have "effective" teachers.

It is increasingly evident from past research that the impact of teachers on student learning is critical and any attempts for school improvement needs to focus on what happens in the classroom (Townsend, 2007). The focus on teacher quality and school improvement is a main aim for schools in Western Australia and this is made evident in the Plan for Public Schools (Department of Education WA, 2008) as well as the plans for individual government and non-government schools (AISWA, 2009). In an effort to revitalise and improve schools, as well as to link school improvement to student achievement, schools in Western Australia have introduced a number of school improvement programs including the Innovative Designs for Enhancing Achievements in Schools (IDEAS); Raising Achievement in Schools (RAISE) and Getting It Right (GIR) (Ingvarson, 2002; Wildy & Faulkner, 2008).

In a bid to improve teacher quality, an emphasis on shared leadership is becoming increasingly popular in schools (Crowther, Kaagan, Furguson & Hann, 2002). While Reeves (2008) acknowledges that this form of leadership is not a new concept, he proposes a new framework for leadership that promotes teacher action research as the new professional development. In his view, teacher research has a direct impact on student achievement, classroom practice and sustained professional development. In addition to engaging teachers directly in the analysis of data, forming essential questions about that data and collaborating to discover answers which are applicable in their classrooms and schools, action research also contributes to school effectiveness. Reeves (2008) asserts that teachers may not only influence student performance but also the performance of other teachers and school leaders. He reports that teachers were just as influenced by the professional practices and action research of their peers as the influences of students, family and personal experiences.

Although teachers are considered to be an essential lever of change in schools (because change is explicit in their classrooms and daily practices) effective school improvement requires sustained efforts by the school as an organisation (Reezigt & Creemers, 2005). The existence of a school culture, committed to continuous improvement, is essential for schools attempting to introduce interventions that will help them to become more effective. The culture of an 'improving school' according to Reezigt and Creemers (2005), includes a range of underlying factors such as a shared vision, history and sense of ownership of improvement, leadership, staff stability and willingness to become a learning organisation.

Reezigt and Creemers (2005), in presenting a comprehensive framework for effective school improvement, contend that effective improvement requires school-level processes that focus on student outcomes as the primary goal. Although teachers are considered to be important in school improvement, individual teacher initiatives are not sufficient unless the school, as an organisation, sustains the efforts. At the school-level, they describe three

concepts that can be considered to be key elements to an improving school - an improvement culture; improvement processes and improvement outcomes. All three concepts are interrelated and constantly influence each other; highlighting the cyclical nature of school improvement which has no real starting or endpoint. Within these concepts, the existence of an 'improvement culture' is strongly influenced by the school's willingness to become (or stay) a learning culture, Reezgit and Creemers (2005, p. 416) remark that 'schools that are not reflective are not likely to become improving'. For improvement to be successful, it is necessary to create an environment where teachers perceive themselves as learners and are willing to participate in training, development and collaboration with other teachers (Hargreaves, 1994; Timperley & Robinson, 1998). The research reported in this paper shows how the existence of an 'improvement culture', as described by Reezgit and Creemers (2005) can enable a school to demonstrate levels of continuous improvement over a period of time.

### **Teacher professional learning**

Past studies have documented the relationship between professional development, teacher learning and changes in classroom practice (Fullan, 1991; Hawley & Valli, 1999). In addition, a small number of studies suggest that there may also be a connection between teacher professional development and school improvement and, as a result, teacher development is increasingly being viewed as the key driver in educational change and improving student outcomes (Darling-Hammond, 1999, 2000; Hawley & Valli, 1999). More recently, the results from the Organisation for Economic Co-operation and Development (OECD) Teaching and Learning International Survey (TALIS) indicated that better and more targeted professional development is an important lever in teacher and school improvement (Organisation for Economic Co-operation and Development, 2009).

Models of teacher professional development have undergone significant shifts since the 1930s, which were largely characterised by organised activities aimed at improving teacher knowledge or weakness (Clarke & Hollingsworth, 2002). More recently, the trend has been towards activities that promote teacher professional development as part of an active, life-long learning process (Clarke & Hollingsworth, 2002; Day, 1999; Fullan 1991; McKenzie & Turbill, 1999; Richardson, 1999). While Guskey's (1986) four step model of teacher change was criticised for its linear representation, it was significant in that it showed that teacher learning is most effective when linked to the classroom environment. Most researchers, however, have settled on the idea that the process of teacher change is non-sequential (Clarke & Hollingsworth, 2002; Day, 1999). Clarke and Hollingsworth's (2002) 'interconnected model of professional growth' highlights the complexity of professional development, allowing for multiple growth pathways between domains that are non-linear in structure. The model emphasises the importance of the environment in which the change is to occur; recognising that while some school contexts support teacher professional growth, others may not (Clarke & Hollingsworth, 2002).

In terms of the environment, a number of studies have sought to identify conditions that promote teacher learning in the workplace. According to Elmore (2000), the key to effective professional learning is to build a professional culture, characterised by collective responsibility for the practice of teaching and student learning. To strengthen this professional community, there needs to be increased teacher learning opportunities based on evidence from classroom practice and student progress. In other words, effective teacher learning is data driven. Furthermore, professional development needs to focus on student outcomes and be embedded in teacher practice, be school based and built into the day-to-day work of teaching (State of Victoria Department of Education and Training, 2005). The research reported on in this paper explores the effectiveness of teacher professional development which was implemented as part of a whole-school initiative for school improvement.

### **Action research**

Action research is a popular tool for professional development, particularly in educational settings (Grundy, 1995). It is described as a self-reflective form of inquiry undertaken by participants in social or educational situations to improve their practices or understanding of these practices (Carr & Kemmis, 1983; Kemmis & McTaggart, 1988). In terms of teacher professional development, Carr and Kemmis (1983) maintain that it is beneficial for teachers to conduct research about their classroom practices and teaching skills as part of an action research process.

The use of action research as a tool for professional development, allows teachers to take on the role of researcher, gathering relevant evidence to inform their practice as opposed to relying on advice from those who may not be as familiar or sensitive to the teaching and learning of their classrooms (Hubbard & Power, 2003). Past studies indicate that teachers who engage in action research have a higher sense of efficacy, and as a result, have an increased willingness to seek solutions to dynamic and ever changing classroom issues (Holly, Arhar & Kasten, 2005; Stringer, 1999). This paper explores briefly how action research implemented as part of a school-based professional development activity and based on student feedback data provided the teachers with opportunities to reflect and implement strategies for improvement.

### **Action Research, professional growth and school improvement**

The use of teacher action research has the power to transform professional development and led to significant change in the instructional practices of teachers (Richardson, 1990) and at the school level, carefully conducted action research has the potential to transform organisations into 'learning' communities (Calhoun, 2002; Joyce, Calhoun & Hopkins, 1999).

Reeves (2008) found that, when teachers are given the opportunity to engage in action research on a sustained basis and in a collaborative environment, three things occur: firstly, there is a direct and measurable impact on student achievement, behaviour and educational equity; secondly, teacher researchers affect the professional practices of their colleagues; and finally, effective professional practices are reinforced and repeated by both teacher researchers along with those teachers who are influenced by them. In the context of this study, action research provides teachers with the opportunity for professional growth in an authentic learning environment – the classroom. In addition, when implemented as part of a school initiative, it was anticipated that the action research process may contribute to whole school improvement in terms of improved learning environments and teacher quality (Reeves, 2008; Sagor, 2000).

A number of studies have shown how teachers successfully used feedback, based on students' perceptions, to improve the learning environment (Aldridge, Fraser & Sebela, 2004; Fraser & Fisher, 1986; Sinclair & Fraser, 2002; Thorpe, Burden & Fraser, 1994; Yarrow, Millwater & Fraser, 1997). More recently, student feedback based on the Technology-Rich Outcomes-focused Learning Environment Inventory (TROFLEI), described in the following section, was successfully used by teachers in a senior secondary setting to improve the learning environment of their students (Aldridge & Fraser, 2008). In this example, teachers utilised the action research process to help to guide their changes to the environment (Aldridge & Fraser, in press).

This paper describes firstly, the initiatives undertaken by one school whose priorities over the period of study included a focus on professional development, curriculum development and shared leadership. It then examines how one of the teachers used feedback data (evidence) gathered from her students as a tool for professional growth. Finally, it explores the nature and extent of change at the school-level evident in the student feedback data collected over the period of the study.

## **RESEARCH METHODS**

### **Sample**

The findings in this paper sit within a larger study that investigated the development and use

of a tool for teacher professional learning which can be used to gather feedback from students. Over a three-year period, the larger study involved 30 high schools in Western Australia. This paper reports the efforts of one of these schools, a senior college, that purposefully targeted professional development using teacher action research as part of a whole-school improvement initiative.

The senior college, located in a new, fast-growing northern suburb of Perth, Western Australia, opened in 2003 and, by 2009, had around 700 students. The school is characterised by flexible operating hours which offer students opportunities outside the classroom through placements at Universities, Technical and Further Education Centres (TAFE), community organisations or the workforce. The school has a focus on providing a safe environment that caters for the needs of senior secondary students and which promotes a young adult ethos. It features a mentor system designed to reinforce family values and to provide care, support and positive guidance to students on an individual basis.

The school formed the basis of a 'critical instance' case study as described by Anderson (1998) and involved the examination of 'a single instance of unique interest' within a much larger study. At this school, a total of 35 senior secondary (Grade 11 and 12) teachers were involved in the study over the three-year period. Each of these teachers selected one or two classes (comprised of approximately 20 to 25 students) and used data, gathered from their students, to make improvements to the classroom learning environment utilising an action research process (described below).

The teachers all had varying degrees of experience and were drawn across a range of learning areas including science, mathematics, the arts and English. In 2009, three of the teachers at the school volunteered to record what they did as part of their action research and be monitored by the researcher over that time.

A total of 628 student responses from 55 classes were collected for the school sample over the three year period. The samples involved in the analyses reported in this paper consisted of 153 students in 2007, 224 students in 2008 and 352 students in 2009.

It should be noted that there were limitations in terms of the sample. As the Principal was keen that all teachers were given the opportunity to be involved in the action research process, different teachers (with a range of experience) from each learning area were involved each year. During the course of the study, 10 out of the 35 teachers participated more than once. While, the involvement of teachers was voluntary and confidential, care was also taken to ensure that the selection of classes involved a range of school subjects and student ability levels across each learning area. The nature of the school as a senior college meant that there is a high turnover of students each year, and the students surveyed changed from year to year. Particular care was taken to ensure that the sample was representative of the school and involved a range of school subjects, student ability levels, teacher experience and learning areas.

### **Action research process**

To promote shared leadership and to provide professional learning opportunities, teachers at the school were encouraged to become involved in an action research activity that involved using feedback, based on students' responses to a learning environment questionnaire (described below), to guide decisions about how they might improve their teaching practices. This involved a five step procedure. (1) Teachers nominated one or two Grade 11 or 12 classes with which they wanted to work with to improve the learning environment. Students in each class were asked to respond to a questionnaire (designed to assess their perceptions of their learning environment). (2) Feedback based on students' responses to the survey was provided to the teachers in the form of a profile. (3) Teachers reflected on the data and identified aspects of the learning environment that they would like to change or improve during an intervention period. (4) Teachers then planned, implemented and monitored strategies aimed at improving the learning environment over a 6-week intervention period. (5) At the end of the intervention period, the same questionnaire was administered to the same group of students and feedback was provided to help the teachers to gauge the success of the strategies that they had implemented.

As part of step 3, all participants took part in a workshop that included a reflective practice activity, designed to assist teachers with the interpretation of their data and to provide an overview of the action research process. They were also given opportunities to discuss, brainstorm ideas and ask questions of the researcher and their colleagues. All participants also received paper based materials to help to guide them through the action research process identified in step 4.

**Instrument used to assess the Learning Environment**

Eight learning environment scales which originated from The Technology-Rich Outcomes-Focused Learning Environment Inventory (TROFLEI, Aldridge, Dorman & Fraser, 2004; Aldridge & Fraser, 2008) were used to collect quantitative data for use in the larger study. The initial version of the TROFLEI contained 80 items with eight items belonging to each of ten scales. The modified version of the TROFLEI used in this study, involved eight scales with eight items in each. These scales included: Student Cohesiveness, Teacher Support, Involvement, Task Orientation, Cooperation, Equity, Differentiation and Young Adult Ethos. Table 2 provides a description of each of the eight scales administered to students.

*Table 2: Descriptive information for each scale – the learning environment*

| <i>Scale</i>         | <i>Description</i>  |
|----------------------|---|
|                      | <i>The extent to which ...</i>  |
| Student Cohesiveness | ...students know, help and are supportive of one another.                                   |
| Teacher Support      | ...the teacher helps, befriends, trusts and is interested in the students.                  |
| Equity               | ...students are treated equitably by the teacher.   |
| Young Adult Ethos    | ... students are given responsibility for their learning and are treated like young adults. |
| Task Orientation     | ...it is important to complete planned activities and to stay on the subject matter.        |
| Differentiation      | ...teachers cater for students differently based on their capabilities and interests.       |
| Involvement          | ...students have attentive interest and participate in discussions in class.                |
| Cooperation          | ...students work cooperatively with other students on learning tasks.                       |

Items of the TROFLEI were responded to on a five-point scale with the alternatives of Almost Never, Seldom, Sometimes, Often and Almost Always. To provide an economical format, the TROFLEI pioneered the inclusion of two adjacent response scales on the one sheet (one to record what students perceived as actually happening in their class and the other to record what students would prefer to happen in their class) (Aldridge & Fraser, 2008). The layout of this format is shown below and a listing of the items contained in the questionnaire is provided in Table 3.

|   | ACTUAL                  |            |                       |           |                          | PREFERRED               |            |                       |           |                          |
|---|-------------------------|------------|-----------------------|-----------|--------------------------|-------------------------|------------|-----------------------|-----------|--------------------------|
|   | Alm<br>ost<br>Nev<br>er | Seld<br>om | So<br>me<br>time<br>s | Ofte<br>n | Alm<br>ost<br>Alw<br>ays | Alm<br>ost<br>Nev<br>er | Seld<br>om | So<br>me<br>time<br>s | Ofte<br>n | Alm<br>ost<br>Alw<br>ays |
| 49 . The teacher gives as much attention to my questions as to other students' questions. | 1                       | 2          | 3                     | 4         | 5                        | 1                       | 2          | 3                     | 4         | 5                        |

As part of the larger study, the reliability and validity of the TROFLEI (when used in schools in Western Australia) was examined using a sample of 2043 students in 147 classes in nine schools.

When the researcher's goal is to construct a multiscale questionnaire, factor analysis provides a means of determining whether items within the same scale are tapping into the same construct and whether each scale is assessing a distinct construct. Principal axis factor analysis with oblique rotation (selected because overlaps between the various dimensions of the learning environment can be assumed and, therefore, the different dimensions are not independent of each other) and Kaiser normalisation was used to extract a factor structure for the modified TROFLEI and to check it against the *a priori* 8-scale structure of the modified TROFLEI. Factor analysis supported the 8-scale structure of the TROFLEI. The percentage of variance varied from 2.27% to 27.70% for different scales, with the total variance accounted for being 56.28%. Table 3 reports the factor loadings for each item and percentage of variance for each scale in the modified TROFLEI.

Two further indices of scale reliability and validity reported in Table 3 were then generated for the TROFLEI. The Cronbach alpha reliability coefficient was used as an index of scale internal consistency and an analysis of variance (ANOVA) was used to check the ability of each scale in the modified TROFLEI to differentiate between the perceptions of students in different classrooms. The internal consistency of each TROFLEI scale (for the individual student as the unit of analysis), using Cronbach's alpha coefficient, and the ANOVA results are reported in Table 3. Scale reliability estimates with the individual as the unit of analysis ranged from 0.82 to 0.94. THE ANOVA, with class membership as the independent variable ( $N=147$ ), indicate that each scale differentiated significantly ( $p<0.001$ ) between classes. That is, students within the same class perceived the environment in a relatively similar manner, while the within-class mean perceptions of the students varied between classes. The proportion of variance accounted for by class membership was calculated using the  $\eta^2$  statistic (the ratio of 'between' to 'total' sums of squares). The  $\eta^2$  statistic (an estimate of the strength of association between class membership and the dependent variable) ranged from 0.19 to 0.46. Overall, results suggest that the questionnaire is valid and reliable when used in high school classes in Western Australia.

### **Data collection and analysis**

The study involved a mixed-method approach that drew on quantitative and qualitative research methods to add depth and breadth to the results (Creswell & Plano Clark, 2007). Quantitative data were generated using the learning environment questionnaire (described in the previous section) and was utilised at the classroom-level (as part of a whole-school improvement effort) and at the school-level (as a means of gauging the success of the school's improvement plan). Data was collected from students at the end of the teacher intervention period during each of three years of the study (2007–2009). Qualitative information was gathered from multiple sources including teacher case-studies, semi-structured interviews with teachers and members of the school's leadership team, teacher reports and reflective journals, discussions with teachers at a forum held at the end of each year along with informal discussions with a cross section of students (approximately 40) and teachers (approximately 15) at the school. The qualitative data collected provided rich descriptions and enabled a better understanding of the processes undertaken from the view of the participants and other members of the school community (Erickson, 1998; Gudmúndsdóttir, 2001; Patton, 2002). This section describes the methods of data collection and data analysis used to answer each objective.

#### **Objective 1**

To investigate how the school used teacher action research as part of a whole-school initiative, information was gathered from various sources including school documents and recorded interviews with school administrators. School documents included the annual reports for 2007, 2008 and 2009; school policies and yearly operational plans along with a



range of written documents related to initiatives implemented by the school over the period. Semi-structured interviews with members of the school's leadership team including the Curriculum Manager and the Principal were used to provide information about school-wide initiatives and to gain an understanding of how they envisaged teacher action research linked to the school's initiatives; and how it contributed to professional development and school improvement. In-depth interviews with each of the case study teachers and the Curriculum Manager at the school were used to examine their views of the merits of using teacher action research as part of a whole-school initiative for teacher professional development and curriculum improvement.

*Objective 2*

To investigate and evaluate the processes used during teacher action research (Anderson, 1998), qualitative information was gathered from three case teachers who agreed to be monitored during the action research process. Multiple sources of information, including in-depth recorded, semi-structured interviews, written reports and reflective journals (Erickson, 1998; Gudmúndsdóttir, 2001; Patton, 2002) were used. At each stage of the action research process, each of the three case study teachers were given opportunities to discuss their approach and the types of strategies to be trialled with the researchers and other teachers. They were also asked to document their action research activities, using a reflective journal (Daniels, 2002) that could be used to record the strategies that they used and their feelings with respect to the problems and success associated with implementing the strategies. They were also requested to submit a report (a template for which was provided to each teacher) outlining what they did, the types of strategies implemented and the effect these strategies had on improving the learning environment. The case study of one of these teachers is reported in this paper.

*Objective 3*

A large scale quantitative overview was used to gauge the success of school initiatives for each year (Mark, Feller & Button, 1997). In addition, quantitative data was used to provide feedback to the teachers involved and the administration of a questionnaire to students before and after the intervention period. This data helped to examine the impact of the strategies used by individual teachers and to monitor any school-level change over the three-year period.

To evaluate the whole-school improvement initiative, in terms of changes over the three years (2007, 2008 and 2009), one-way MANOVAs were conducted separately with the set of learning environment scales as the dependent variables and the year as the independent variable. In each case, the multivariate test yielded statistically significant results ( $p < 0.01$ ) in terms of Wilks' lambda criterion, indicating that there were differences between years for the set of criterion variables as a whole. Therefore, the univariate ANOVA was interpreted for each individual environment and attitude scale. Then Tukey's HSD post hoc procedure was used to identify for which pairs of years the between-year difference on each scale was statistically significant. Also, effect sizes were calculated (as recommended by Thompson, 1998, 2001) to estimate the magnitude of the difference between each pairs of years.

*Table 3. Factor Analysis Results, Internal Consistency Reliability (Cronbach Alpha Coefficient), and Ability to Differentiate Between Classrooms (ANOVA Results) for the modified TROFLEI*

| Factor Loading<br>Item                          | SC   | TS | IN | TO | CO | EQ | DI | YAE |
|---|------|----|----|----|----|----|----|-----|
| <b>Student Cohesiveness (SC)</b>                |      |    |    |    |    |    |    |     |
| 1. I make friends among students in this class. | 0.73 |    |    |    |    |    |    |     |
| 2. I know other students in this class.         | 0.65 |    |    |    |    |    |    |     |
| 3. I am friendly to members of this class.      | 0.58 |    |    |    |    |    |    |     |

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|  |      |      |
|--|------|------|
| 4. Members of the class are my friends.  | 0.79 |      |
| 5. I work well with other class members.   | 0.63 |      |
| 6. I help other class members who are having trouble with their work.                    | 0.35 |      |
| 7. Students in this class like me.   | 0.75 |      |
| 8. In this class, I get help from other students.  | 0.38 | 0.34 |
| <b>Teacher Support (TS)</b>  |      |      |
| 9. The teacher takes a personal interest in me.  | 0.71 |      |
| 10. The teacher goes out of his/her way to help me.                                      | 0.75 |      |
| 11. The teacher considers my feelings.   | 0.71 |      |
| 12. The teacher helps me when I have trouble with the work.                              | 0.65 |      |
| 13. The teacher talks with me.   | 0.69 |      |
| 14. The teacher is interested in my problems.  | 0.73 |      |
| 15. The teacher moves about the class to talk with me.                                   | 0.69 |      |
| 16. The teacher's questions help me to understand.                                       | 0.64 |      |
| <b>Involvement (IN)</b>  |      |      |
| 17. I discuss ideas in class.  | 0.74 |      |
| 18. I give my opinions during class discussions.   | 0.78 |      |
| 19. The teacher asks me questions.   | 0.60 |      |
| 20. My ideas and suggestions are used during classroom discussions.                      | 0.72 |      |
| 21. I ask the teacher questions.   | 0.48 |      |
| 22. I explain my ideas to other students.  | 0.63 |      |
| 23. Students discuss with me how to go about solving problems.                           | 0.48 | 0.32 |
| 24. I am asked to explain how I solve problems.  | 0.61 |      |
| <b>Task Orientation (TO)</b>   |      |      |
| 25. Getting a certain amount of work done is important to me.                            |      | 0.68 |
| 26. I do as much as I set out to do.   |      | 0.59 |
| 27. I know the goals for this class.   |      | 0.54 |
| 28. I am ready to start this class on time.  |      | 0.64 |
| 29. I know what I am trying to accomplish in this class.                                 |      | 0.54 |
| 30. I pay attention during this class.   |      | 0.66 |
| 31. I try to understand the work in this class.  |      | 0.69 |
| 32. I know how much work I have to do.   |      | 0.62 |
| <b>Cooperation (CO)</b>  |      |      |
|  |      | 0.69 |
| 41. I cooperate with other students when doing assignment work.                          |      | 0.64 |
| 42. I share my books and resources with other students when doing assignments.           |      | 0.70 |
| 43. When I work in groups in this class, there is teamwork.                              |      | 0.66 |
| 44. I work with other students on projects in this class.                                |      | 0.78 |
| 45. I learn from other students in this class.   |      | 0.74 |
| 46. I work with other students in this class.  |      | 0.76 |
| 47. I cooperate with other students on class activities.                                 |      | 0.70 |
| 48. Students work with me to achieve class goals.  |      | 0.66 |
| <b>Equity (EQ)</b>   |      |      |
| 49. The teacher gives as much attention to my questions as to other students' questions. |      | 0.66 |
| 50. I get the same amount of help from the teacher as do other students.                 |      | 0.69 |
| 51. I have the same amount of say in this class as other students.                       |      | 0.74 |

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|  |      |      |      |      |      |      |      |      |      |
|--|------|------|------|------|------|------|------|------|------|
| 52. I am treated the same as other students in this class.                           |      |      |      |      |      |      |      |      | 0.72 |
| 53. I receive the same encouragement from the teacher as other students do.          |      |      |      |      |      |      |      |      | 0.75 |
| 54. I get the same opportunity to contribute to class discussions as other students. |      |      |      |      |      |      |      |      | 0.77 |
| 55. My work receives as much praise as other students' work.                         |      |      |      |      |      |      |      |      | 0.64 |
| 56. I get the same opportunity to answer questions as other students.                |      |      |      |      |      |      |      |      | 0.73 |
| <b>Differentiation (DI)</b>  |      |      |      |      |      |      |      |      |      |
| 57. I work at my own speed.  |      |      |      |      |      |      |      |      | –    |
| 58. Students who work faster than me move on to the next topic.                      |      |      |      |      |      |      |      |      | 0.41 |
| 59. I am given a choice of topics.   |      |      |      |      |      |      |      |      | 0.68 |
| 60. I am set tasks that are different from other students' tasks.                    |      |      |      |      |      |      |      |      | 0.58 |
| 61. I am given work that suits my ability.   |      |      |      |      |      |      |      |      | 0.43 |
| 62. I use different materials from those used by other students                      |      |      |      |      |      |      |      |      | 0.79 |
| 63. I use different assessment methods from other students.                          |      |      |      |      |      |      |      |      | 0.76 |
| 64. I do work that is different from other students' work.                           |      |      |      |      |      |      |      |      | 0.70 |
| <b>Young Adult Ethos (YAE)</b>   |      |      |      |      |      |      |      |      |      |
| 65. I am treated like a young adult.   |      |      |      |      |      |      |      |      | 0.72 |
| 66. I am given responsibility.   |      |      |      |      |      |      |      |      | 0.77 |
| 67. I am expected to think for myself.   |      |      |      |      |      |      |      |      | 0.71 |
| 68. I am dealt with as a grown up.   |      |      |      |      |      |      |      |      | 0.81 |
| 69. I am regarded as reliable.   |      |      |      |      |      |      |      |      | 0.77 |
| 70. I am considered mature.  |      |      |      |      |      |      |      |      | 0.78 |
| 71. I am given the opportunity to be independent.                                    |      |      |      |      |      |      |      |      | 0.75 |
| 72. I am encouraged to take control of my own learning.                              |      |      |      |      |      |      |      |      | 0.71 |
| % Variance   | 2.27 | 2.59 | 3.74 | 4.51 | 7.95 | 27.7 | 4.63 | 2.91 | 0    |
| Alpha Reliability  | 0.86 | 0.93 | 0.89 | 0.87 | 0.90 | 0.94 | 0.82 | 0.93 |      |
| ANOVA (Eta <sup>2</sup> )  | 0.19 | 0.46 | 0.21 | 0.19 | 0.24 | 0.29 | 0.27 | 0.25 |      |
|  | **   | **   | **   | **   | **   | **   | **   | **   | **   |

\*\*  $p < 0.01$  • Factor loadings less than 0.30 have been omitted from the table. • The sample consisted of 2043 students in 147 classes.

• The eta<sup>2</sup> statistic (which is the ratio of 'between' to 'total' sums of squares) represents the proportion of variance explained by class membership.

## FINDINGS AND RESULTS

### The role of teacher action research in a learning organisation

The school's involvement in the study over the three years was one component of a multi-faceted school improvement program in which a culture of improvement was developed and nurtured. The school recognised that professional development, using teacher action research in an authentic learning environment (their classrooms), both encourages and provides teachers with opportunities to trial strategies consistent with a whole-school approach to teaching and learning.

Leadership within the school was considered by the Principal to be a shared process and was a key priority outlined in their school report for both 2008 and 2009. The school's plan over this period aimed to address three priorities: to promote shared leadership within the school; support professional learning opportunities for teachers; and to implement a whole-school approach to curriculum development. By the start of 2009, all eleven members of the school's leadership team had completed an 'Instructional Leadership' professional learning program through their local district education office and four aspirant leaders had

completed the same course by the end of that year. In addition to this, four staff members had also achieved accreditation to deliver the program to other school leaders and aspirants. According to the school's Curriculum Manager:

I think that what we offer here at the school would satisfy both teacher professional development and professional learning. We show them what constitutes good practice and we try to develop them as a teacher, we model strategies and then we support them back in the classroom.

During the action research process, the first author held informal and formal conversations with teaching staff, the school's leadership team and students. The teachers whom were interviewed all reported a strong sense of 'community', with most of them regarding the school as a 'learning organisation' where learning is accepted as being the core business for both teachers and students. The teachers who were interviewed were keen to be involved in the action research and felt that it would give them an opportunity to focus their teaching and learning strategies to address a particular issue that they had identified and to use data from the posttest to see if they had made a difference to their students' perceptions.

Discussions with students during the administration of the questionnaire indicated that many of them felt that their teacher's involvement in the action research made them feel that the teacher valued their opinions. Students indicated a general willingness to participate in the surveys and to give feedback which they knew would be used by the teacher as a means for reflection and improvement. Two of the teachers explained to their students how involvement in the study helped them to personally reflect and to improve their practices. These two teachers felt that their involvement in the action research helped to reinforce to their students the importance of continuous learning.

The school's involvement in this study was seen to fulfil a number of aims of the school. Firstly, it gave teachers an opportunity to access professional development, as part of an action research process, within their immediate school context with a focus on a particular class group. Secondly, it linked well other school initiatives related to curriculum development. In 2006 and 2007, a small number of teachers had been encouraged to pilot the use of 'cooperative learning' strategies with their senior school students. Cooperative learning relates to an instructional strategy that involves having students work in small groups or teams to help one another to learn academic material (Slavin, 1991). Based on the success of this activity, the school decided to train one to two teachers from each learning area whose role in the school would be to support teachers' trialling cooperative learning strategies and encourage others to consider the benefits that these strategies could have on teaching and learning in their classrooms. By the end of 2009, there were four teachers who had accessed specific training in the area of cooperative learning and instructional intelligence through the local district education office and were able to deliver the accredited program to other teachers. The Curriculum Manager indicated that both the school's leadership team and members of the Curriculum Development Committee hold the view that the competencies linked to this cooperative learning training increased the number of strategies and tactics to a teacher's repertoire that could be 'called upon in a classroom situation when required to facilitate students learning on a given task'.

In 2008, the school embarked on a five-phase school-based implementation strategy known as the IDEAS process (Crowther, 1999). A part of this process involved the administration of a survey to examine the school culture and teaching practices. The IDEAS process focuses on the action of teachers in the classrooms rather than change in organisational structures and is underpinned by the concepts of professional community and shared leadership (Crowther, Hann, McMaster & Ferguson, 2000; Marks & Louis, 1999). The data gathered from this survey indicated that a strong culture of learning existed among the teachers at the school. By the end of 2009, the school had successfully established its school-wide pedagogical principles and vision with the prospect that these teaching and learning principles would be embedded across the school in all curricula and would inform

the types of instructional practices carried out by teachers by 2010. Aside from teacher involvement in action research, teachers also accessed other professional learning opportunities both within the school and through external providers which included IDEAS workshops, training in cooperative learning strategies and conferences specific to individual learning areas. In addition, it allowed teachers to put into practice those cooperative learning strategies that they had been exposed to as part of a whole-school focus on curriculum development.

With respect to the teachers' involvement in the action research process using student feedback, one member of the leadership team remarked:

In terms of the action research activity, it helps us to focus teachers. When teachers get their data and they select an area for improvement, we send them information as to some of the things they could trial... At the end of the day, it is up to the teacher whether or not they want to use some of these strategies or trial their own.

The action research also provided teachers with opportunities to share and participate in collegial discussions which were focused on what they do in the classroom and ways to improve their teaching practices. The Curriculum Manager noted that:

Because of all of this cohesiveness [in terms of staff interactions], the support that we have and networks we have established at the college, teachers feel that they are not pressured into doing something but the support is there if they want to trial it.

In terms of the school's third priority, to employ a range of cooperative learning strategies across the school by the end of 2009, all teachers in the school had been trained in the use of instructional intelligence, selecting strategies that maximise learning opportunities. In addition, 95% of these teachers had gone on to achieve a Level 1 Cooperative Learning certificate. To maintain the school-wide commitment to effective teaching and learning practices, each learning area has one mentor whose role is to support beginning and new teachers to the school.

Interviews with teachers indicated that the level of support provided by the school and the number of teachers who openly talk about what they do in the classroom, affect those around them, with one teacher remarking that 'Teachers don't feel like they have to do it but because they see other teachers doing it they feel like, "Well, I don't want to miss the boat", so they try a few things too'. This notion of action research affecting the professional practices of other teachers reflects the findings asserted by Reeves (2008). A recent survey of students undertaken by the school reported that a range of cooperative learning strategies were being used by teachers, including mind/concept maps, think pair share, place mats and that students were both aware of the strategies and their purpose in terms of facilitating their learning.

According to the Principal and Curriculum Manager, the data collected using the learning environment questionnaire for each year and over the three years of involvement allowed administrative staff to reflect upon whole school priorities, particularly those of shared leadership and pedagogy. It provided a good basis for discussion regarding the schools performance in these areas and direction in terms of future planning.

The extent to which this school was able to demonstrate levels of continuous improvement over the three-year period may be seen, in part, as a result of the school's organisational culture. A number of factors that Reezigt and Creemers (2005) describe as an 'improvement culture' were clearly evident at this school. The school has high staff retention rate; an highly motivated and committed work force who have a clear understanding of the school's direction and vision and, as a whole-school community, actively work towards the achievement of this vision. In addition, the school is committed to teacher professional development, their involvement in this study and other initiatives, all of which demonstrate a willingness to become a 'learning organisation' (Reezigt & Creemers, 2005) and support their teachers in becoming reflective practitioners as part of their school improvement efforts.

### **One teacher's story**

This section describes the activities and processes undertaken by one of three case study teachers who were monitored during their action research. Maggie is a mathematics teacher who has been teaching for four years, three of which has involved teaching students at the senior secondary level. Maggie participated in the study in 2008 and 2009 and used her involvement as a means of gauging her performance and to help her to improve her teaching practice. This section reports how Maggie used her data during 2009.

Maggie decided to focus her improvement strategies on a Grade 12 senior mathematics class comprised of 15 students, a majority of whom were boys aspiring to university entrance in the field of science and mathematics. After the class was surveyed, Maggie examined her data and considered some of the challenges and issues that she had with the class. She identified two areas for focus, Equity and Involvement.

The Equity scale assesses the extent to which students perceive that they are being treated in a way that is fair. A positive learning environment is one in which students have the opportunity to engage fully with the concepts, ideas, knowledge and processes which they are to learn regardless of their gender, culture, social class, ability, family circumstance or individual differences. With this in mind, this scale requires students to consider the way in which they are treated and whether or not the level of teacher support, encouragement and learning opportunities is the same for everyone in their class (Rennie, 2004, 2005).

The Involvement scale examines the extent to which students feel that they have opportunities to participate in discussions and have attentive interest in what is happening in the classroom. Research has established that, if students are actively involved in learning activities, then it is likely that learning will be more meaningful to students. According to the Curriculum Council (1998, p. 34), "Students should be encouraged to think of learning as an active process on their part, involving a conscious intention to make sense of new ideas or experiences and improve their own knowledge and capabilities, rather than simply to reproduce or remember." The Involvement scale assumes that language plays an important role in helping students to understand what they are learning (Taylor & Campbell-Williams, 1993) and that giving students the opportunity to participate in classroom discussions and to negotiate ideas and understandings with peers, rather than listening passively, are important aspects of the learning process. Maggie considered her data and discussed the results with students in her class. After further discussion with a colleague in her learning area, Maggie felt that many of the issues related to Equity and Involvement were similar and decided to use a range of strategies to increase student involvement (as a whole) in class activities.

In terms of Equity, I thought carefully about what was happening in the classroom and realised that there were a number of students who sat at the rear of the class who were very quiet and a number of students who sat at the front of the room who were very enthusiastic. I also realised that I often engaged with the students at the front as they were more likely to ask questions of me. While I assumed that the students at the back were doing okay, I really did not know if they were paying attention or understood the work.

With respect to Involvement, I decided to employ a number of strategies that were related to Instructional Intelligence and Cooperative Learning that I had become aware of through the professional learning activities offered through my school.

During the six-week intervention period, Maggie trialled a number of strategies designed to increase student involvement, including, mind maps, ghost walks and place mat activities, (all of which Maggie had become aware of during Cooperative Learning workshops held at the school). These activities were designed to create a safe environment in which quieter students would be more willing to take risks with their learning. Maggie hoped that the use of small groups would help build learning partnerships between students and facilitate their understanding of important concepts and ideas. To promote further inclusivity, when

addressing the whole class, Maggie focused on improving her questioning techniques by structuring and framing her questions in a way that targeted specific students to keep them on task and to check their understanding. To this end she commented:

In addition to improving my questioning techniques to check for understanding, I started to move around the classroom instead of standing at the front of the room. As I moved around the room, I would address students individually and direct my questions so that all students, including those I considered to be quiet, were involved in the lesson.

During the intervention period, Maggie accessed the support person in her learning area for advice on suitable Cooperative Learning strategies to address the issues that she had identified and formed a partnership with a more experienced teacher of mathematics to share ideas and discuss her results.

At the end of the intervention period, the learning environment questionnaire was readministered to her Year 12 class. Figure 1 provides a feedback profile that shows the result for her pretest data and her posttest data. The profile indicates a pre-post improvement for both the Equity and Involvement scales, areas that Maggie had specifically targeted. Aside from the data presented to her, Maggie felt that there was a noticeable improvement in the classroom learning environment which was supported by a number of informal discussions that she had held with her students. Maggie felt that the class was a more active, cohesive group and this was supported by her data which also showed shifts in the areas of Student Cohesiveness and Teacher Support. Maggie commented:

In terms of my teaching practice, I have been able to put into practice a number of strategies that I have picked up from professional learning activities undertaken through the school, conversations with colleagues and what I already knew. In particular, I have increased the type and effectiveness of teaching and learning strategies that I use in the classroom. I feel that my questioning techniques are now more effective and as a result of my efforts with this class, I know how to check for understanding and know how to implement a range of strategies to get students more actively involved in their learning which I hope means that their understanding of the work has also improved.

Maggie's story is an example of how one teacher at the school used teacher action research to put into practice a range of strategies that were consistent with a whole school approach to teaching and learning. Maggie felt that the school offered a dynamic and non-threatening environment which supported the needs of teachers by providing access to a range of professional development activities which focused on their core business of teaching.

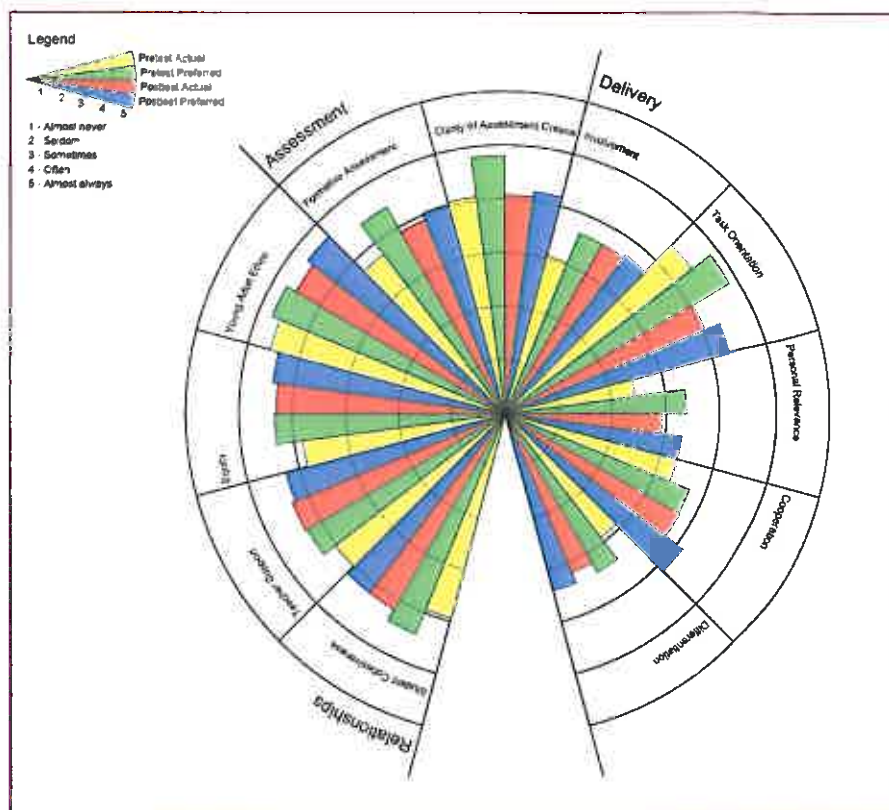


Figure 1. Maggie's final profile showing the actual and preferred student responses (pretest and posttest) to the learning environment survey.

### MONITORING THE SUCCESS OF SCHOOL INITIATIVES

The school's involvement in teacher action research, using student feedback data, was one component of a multi-facet approach designed to improve teaching and learning practices in the school. It was also a data collection tool and was used to assess and monitor the level of school improvement according to achievement targets linked to the priorities of shared leadership, teacher professional development and curriculum development in the school's plan.

Based on the students' responses to the learning environment questionnaire, profiles of the average item mean for each scale for each of the three years were generated. At the administrative level, these profiles provided a simple overview of the school's progress, of students' perceptions of the learning environment. Such profiles were found to be highly useful for generating discussions amongst teachers and administrative staff, as well as for assisting with decisions about the professional development needs of teachers. In addition, the profiles were used to provide information that could be used as part of the school's end-of-year reporting and accountability.

Table 4 provides the average item mean and average item standard deviation for each of the eight learning environment scales for each of the three years (2007–2009). Although it was heartening for teachers and administrative staff to know that there was a general increase in scores for each scale over the four years, the data does not indicate whether or not the between-year changes were statistically significant. To do this, MANOVA was conducted and its results are shown in the last column of Table 4. This table suggests that there were statistically significant differences in students' perceptions of classroom environment ( $p < 0.01$ ) over the years from 2007 to 2009 for five of the eight learning environment scales, namely, Student Cohesiveness, Teacher Support, Equity, Differentiation and Involvement.



To interpret the statistically significant between-year difference in learning environment scale scores identified through the ANOVAs reported in Table 4, Tukey's HSD multiple comparison procedure was carried out to ascertain the statistical significance of differences between two pairs of years (i.e. 2007 and 2008, 2008 and 2009), as well as the overall difference for the three-year period from 2007 to 2009, for each scale. The asterisks in Table 4 indicate which scales pairwise comparisons of years were statistically significant using Tukey's HSD procedure.

*Table 4: Average Item Mean, Average Item Standard Deviation (SD) and MANOVA Results for Differences between 2007, 2008 and 2009 in Classroom Environment Using the Individual Student as the Unit of Analysis*

| <i>Learning Environment Scale</i> | <i>Average Item Mean (SD)</i> |                |                | <i>Difference between Years F</i> |
|-----------------------------------|-------------------------------|----------------|----------------|-----------------------------------|
|                                   | <i>2007</i>                   | <i>2008</i>    | <i>2009</i>    |                                   |
| Student Cohesiveness              | 3.91<br>(0.66)                | 4.10<br>(0.64) | 4.04<br>(0.67) | 4.42*                             |
| Teacher Support                   | 3.48<br>(0.86)                | 3.78<br>(0.97) | 3.99<br>(0.83) | 20.81**                           |
| Equity                            | 3.94<br>(0.95)                | 4.04<br>(0.91) | 4.16<br>(0.78) | 4.08*                             |
| Young Adult Ethos                 | 4.15<br>(0.81)                | 4.22<br>(0.89) | 4.27<br>(0.75) | 1.70                              |
| Task Orientation                  | 3.94<br>(0.76)                | 4.06<br>(0.59) | 4.06<br>(0.66) | 2.04                              |
| Differentiation                   | 2.95<br>(0.79)                | 3.33<br>(0.88) | 3.44<br>(0.85) | 21.93**                           |
| Involvement                       | 3.13<br>(0.81)                | 3.39<br>(0.85) | 3.47<br>(0.87) | 10.16**                           |
| Cooperation                       | 3.75<br>(0.86)                | 3.87<br>(0.76) | 3.81<br>(0.78) | 1.13                              |

\* $p < 0.05$ , \*\* $p < 0.01$

$N = 194$  students in 2007, 224 students in 2008, 352 students in 2009.

Additionally, the magnitude of the difference between each pair of years is also shown in Table 5 for each learning environment scale. These differences between years in Table 5 are reported as effect sizes (calculated by dividing the difference in average item means for a pair of years on a learning environment scale by the pooled standard deviation for that scale for those years). Effect sizes provide a measure of the magnitude, or educational importance, of differences in scale scores between years (Thompson, 2001).

An overall interpretation of differences in students' perceptions from 2007 to 2009 can be made by examining the average item means in Table 4, the effect sizes in Table 5, and the results of the statistical tests involving Tukey's multiple comparison procedure in Table 5. Pairwise post hoc comparisons in Table 4 revealed the statistically significant changes ( $p < 0.05$ ) between pairs of years, together with the effect sizes associated with those significant changes, as discussed below.

*Table 5: Effect Size and Tukey's HSD Multiple Comparison for Statistical Significance of Difference Between each Pair of Years for Learning Environment and Attitude Scales*

| Scale                | Effect Size & Tukey HSD |           |           |
|----------------------|-------------------------|-----------|-----------|
|                      | 2007-2008               | 2008-2009 | 2007-2009 |
| Student Cohesiveness | 0.14**                  | 0.05      | 0.10      |
| Teacher Support      | 0.16**                  | 0.12*     | 0.29**    |
| Equity               | 0.06                    | 0.06      | 0.13*     |
| Young Adult Ethos    | 0.04                    | 0.03      | 0.08      |
| Task Orientation     | 0.09                    | 0.00      | 0.08      |
| Differentiation      | 0.22**                  | 0.06      | 0.29**    |
| Involvement          | 0.15**                  | 0.05      | 0.20**    |
| Cooperation          | 0.07                    | 0.04      | 0.04      |

\* $p < 0.05$ , \*\* $p < 0.01$

$N = 194$  students in 2007, 224 students in 2008, 352 students in 2009.

Effect size was calculated using formula of  $d = M_1 - M_2 / \sqrt{[(\sigma_1^2 + \sigma_2^2) / 2]}$ ,  
 $r_{yx} = d / \sqrt{d^2 + 4}$

#### *Changes between 2007 and 2008*

Between 2007 and 2008, there was a statistically significant improvement in scores for the four learning environment scales of Student Cohesiveness, Teacher Support, Differentiation and Involvement. For the statistically significant changes, effect sizes ranged from 0.14 to 0.22 standard deviation; these effect sizes would be 'small' according to Cohen's (1992) criteria.

#### *Changes between 2008 and 2009*

Between 2008 and 2009, the only learning environment dimension that changed statistically significantly was Teacher Support. The effect size was 0.12 standard deviations (which is 'small' according to Cohen's criteria).

#### *Overall changes between 2007 and 2009*

Over the three years of the study to 2007 and 2009, there was an improvement in students' perceptions of four of the eight learning environment dimensions: Teacher Support with an effect size of 0.29; Equity with an effect size of 0.13; Differentiation with an effect size of 0.29; and Involvement with an effect size of 0.20. According to Cohen (1992), these effect sizes (with the exception of Equity) indicate 'moderate' changes between 2007 and 2009 and these four dimensions.

The results indicate that there was a moderate change (Cohen, 1992) over the three-year period for three of the eight scales, these being; Teacher Support, Differentiation and Involvement. The school identified these three scales as being important indicators of classroom improvement in relation to curriculum development initiatives being implemented at the school during that period. These three scales and their improvement over the three years are discussed in relation to the school's priorities and related activities below.

The improvements in students' perceptions of Teacher Support over the three-year period supported the school's notion that teachers were putting in place a range of strategies that supported student learning. The Teacher Support scale assesses the extent to which the teacher befriends, helps, trusts and is interested in students. The teacher's relationship with his or her students is a pivotal aspect of any learning environment, which can lead the student to love or hate a subject, and to be inspired or turned away from learning. The supportiveness of a teacher helps to give students the courage and confidence needed to tackle new problems, take risks in their learning, and to complete challenging tasks. If students consider a teacher to be approachable and interested in them, then they are more likely to seek the teacher's help if there is a problem with their work. The teacher's

relationship with his or her students, in many ways, is integral to a student's success and to creating a cooperative learning environment (Hijzen, Boekaerts & Vedder, 2007). During interviews, the three case study teachers identified the Teacher Support scale being important to them and their efforts when planning their modifications to the learning environment. One of these teacher's remarked that it was foremost in their mind to "create a safe environment, where students are willing to take risks in their learning and become more independent" and "I used a range of cooperative learning strategies, like 'think, pair, share' and 'placemat' to allow students to gain confidence and become more active participants in the classroom".

The school looked at improvements in the Differentiation scale as a result of school-level professional learning for teachers which encouraged teachers to employ their 'instructional intelligence' to select the most appropriate teaching and learning strategies (including cooperative learning activities) to maximise learning opportunities and student understanding of a particular concept or idea. The Differentiation scale assesses the extent to which students perceive that teachers cater for students differently based on students' capabilities and interests. Classroom environments are generally composed of groups and individual students who differ considerably in their ability, rates of learning and interests (Griffin & Smith 1997; Spady, 1993). By devising and implementing a range of learning, teaching and assessment strategies which cater for this diversity, teachers may provide both individuals and groups of students with opportunities to learn and achieve.

Likewise the school considered improvements to the Involvement scale (discussed earlier) as further evidence of efforts to get teachers to consider the way they operate in the classroom through school-level professional development activities that encouraged teachers to utilise cooperative learning strategies and consider their classroom delivery as being integral to student learning. One of the case study teachers indicated that their participation in school-level activities related to instructional intelligence and cooperative learning has "...made me a lot more aware of what I want to try and do in the classroom" and "During the intervention period, I began framing and directing my questions more carefully in the classroom and used 'wait time' in a more conscious fashion".

The information provided to the administrative staff at the end of the year proved useful in terms of furnishing feedback regarding the efforts of the teachers and providing information that could be used to identify future professional development needs.

## **IMPLICATIONS**

There are a number of implications arising from this critical instance case study. The results of the study suggest that, to ensure that school improvement initiatives are effective, there are benefits to creating what Reezgit and Creemers (2005) describe, a 'learning organisation' at the school level. The school that formed the basis of this case study involved a shared vision and commitment to continuous learning, which are two important elements which exist in an 'improving school' with an 'improvement culture' (Reezgit and Creemers, 2005). As such, it would appear that the ability of this school to consistently demonstrate improvement is largely the result of the school's organisation culture and processes which actively support its teachers to become reflective practitioners (Reezgit & Creemers, 2005).

In this instance, the results imply that it is worthwhile for schools to consider the use of teacher action research to help to establish notions of 'shared leadership' as suggested by Reeves (2008). In this way, rather than a top-down approach, school improvement involves teachers taking note of students' views of the learning environment created in their classes, examining the problem, challenge or issues that become evident. This approach was described by Reeves as being the 'recognition' step in his seven step process (Reeves, 2008) and it would appear that this was an important factor in encouraging teachers to improve the quality of their teaching.

The results implied that, when implemented as part of a school initiative, teacher action research, using student feedback, is an effective vehicle with which teachers can improve their classroom learning environments. For individual teachers, this case study indicates that teacher action research, based on student feedback, provided opportunities for them to

access professional development in an authentic learning environment, their classrooms. By engaging in action research, teachers are not only encouraged to become reflective practitioners but they are able to use student feedback in a meaningful and constructive way that can enhance their teaching practice and lead to improvements in the learning environment.

The results suggest that, when schools consider using teacher action research as a tool for teacher professional development, it is likely to be more effective when used as part of a whole-school initiative for school improvement. In this way, teachers involved in the action research process are able to draw on assistance from colleagues, leaders in the school and other resources provided by the school. In this respect, the results suggests that a whole-school approach to teacher professional development may contribute to building and maintaining a school culture that values continuous learning and which encourages teachers to put into practice teaching and learning strategies consistent with the school's vision.

Finally, the results imply that student feedback, based on a learning environment questionnaire may provide useful data with which the school can gauge the success of their school improvement efforts as outlined in their school plan and assist in their planning for future school improvement. The ability of this school to consistently demonstrate levels of improvement over the period of study suggests that it would be useful to further investigate the contextual and school factors to better understand the processes and elements which may contribute to effective school improvement.

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