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Paper

# **Examining Relationships between School-Level and Classroom-Level Environments in South Africa**

**Jill Aldridge**

This paper reports research into associations between the school-level and classroom-level environment in science classrooms in South Africa . An instrument, developed to assess students' perceptions of their classroom learning environment as a means of monitoring and guiding changes towards outcomes-based education, was administered to 2638 Grade 8 science students from 50 classes in 50 schools in the Limpopo Province. In addition, the teachers of each of the 50 classes responded to a questionnaire developed to assess factors in the school-level environment (such as the adequacy of resources, parental involvement and collegiality). The data collected using the two questionnaires were analysed to examine whether the environment created at the school level was linked to the likelihood of teachers successfully implementing outcomes-based education at the classroom level.

**Key Phrase:** Science Education; Outcomes-Based Education; School-Level Environment; Classroom-Level Environment; Learning Environment; South Africa

## **Relationships between the School-Level and Classroom-Level Environment in Schools in South Africa**

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### **ABSTRACT**

This paper reports research into associations between the school-level and classroom-level environment in science classrooms in South Africa. An instrument, developed to assess students' perceptions of their classroom learning environment as a means of monitoring and guiding changes towards outcomes-based education, was administered to 2638 Grade 8 science students from 50 classes in 50 schools in the Limpopo Province. In addition, the teachers of each of the 50 classes responded to a questionnaire developed to assess factors in the school-level environment (such as the adequacy of resources, parental involvement and collegiality). The data collected using the two questionnaires were analysed to examine whether the environment created at the school level was linked to the likelihood of teachers successfully implementing outcomes-based education at the classroom level.

**KEY WORDS:** Science Education; Outcomes-Based Education; School-Level Environment; Classroom-Level Environment; Learning Environment; South Africa

### **INTRODUCTION**

In countries around the world, there has been much attention given to the benefits and problems related to outcomes-based education. Although the media, politicians, educators and parents all seem to have opinions about outcomes-based education, unfortunately, very little of this is based on any evidence. The dearth of literature and research related to the implementation of outcomes-based education makes it difficult for various stakeholders to make informed decisions and to form opinions that go beyond anecdotal or subjective information.

The history of outcomes-based education and its adoption around the world was traced by Steiner-Khamsi (2006). She found that the overhaul of New Zealand's public sector, which ended in the State Sector Act of 1988 and the Public Finance Act of 1989, had important consequences for the education sector by emphasising outcomes-based accountability. At this time, as part of ongoing market-driven reforms, there was introduced in the UK a new national curriculum that embodied the language of "public accountability, effectiveness and market regulation" (Steiner-Khamsi, 2006, p. 688).

The outcomes-based reforms that took place in New Zealand (Bell, Jones & Carr, 1995) had much in common with curriculum reforms that took place in the United Kingdom (also known as competency-based education) (e.g. Faris, 1998), Australia (Aldridge, in press), Canada (Hopkins, 2002), South Africa (Botha, 2002) (Botha, 2002) and, for a brief period, the United States (also known as performance-based education) (e.g. Evans & King, 1994). Countries around the world have been adopting outcomes-based education as a model for reform in school and post-school education and training systems. The present study undertaken in South Africa's Limpopo Province examined the classroom-level and school-level environment developed as the education goals of outcomes-based education (OBE) specified in *Curriculum 2005* (C2005; Department of Education, 1996) were implemented.

## Previous Research on Learning Environments

Historically, schools have been viewed as organisations, operating similarly to other social groups in that they have their own goals, rules and regulations, roles, hierarchies of authority, forms of compliance, and communication patterns (Dorman, 1998; Dorman, Fraser, & McRobbie, 1997). These aspects constitute the school environment which has been linked to teacher self-efficacy, productivity and satisfaction in the workplace (Organisation for Economic Co-operation and Development, 2009). To date, however, little research has been carried out to help administrators and teachers to assess and improve the environments of their own schools. Studies by Brookover, Schweitser, Schneider, Beady, Flood, & Wisenbaker (1978) and Vyskocil and Goens (1979) have shown that the school-level environment could influence student cognitive outcomes, values, personal growth and satisfaction.

Cohen, McCabe, Michelli & Pickeral (2009) used a range of research methods (including historical analysis, review of literature and a policy scan to examine the relationship between school climate and educational policy, school improvement practice and teacher education. In examining school climate with respect to school improvement guidelines, the research indicates that a range of fields (such as risk prevention and health promotion) have identified aspects of the school environment that promote school success for students (Anderson, Thomas, Moor & Kool, 2008; Cohen et al., 2009).

In two other studies, relationships between the school-level and classroom-level environment were investigated. Fraser and Rentoul (1982) used a sample of 34 teachers to obtain data on their perceptions three school environment dimensions (affiliation, professional interest, achievement orientation) and five dimensions of the classroom-level environment (personalisation, participation, independence, investigation, and differentiation). The study revealed relationships between the two environments. In contrast, a second study by Dorman, Fraser and McRobbie (1995), concluded that the school-level environment does not necessarily transmit to the classroom environment.

Motivated by these previous studies, we undertook a study of whether teachers' perceptions of the school-level environment influence the learning environments that they create in their classrooms.

Freiberg's (1999) book, *School Climate*, identified numerous instruments and a range of alternative measures that can be used to assess the school-level environment. One such instrument, the School-Level Environment Questionnaire (SLEQ, Fisher & Fraser, 1991a, 1991b) was designed to assess school teachers' perceptions of psychosocial dimensions of the environment of the school. Versions of the SLEQ have been used successfully in Nigeria (Idiris & Fraser, 1997), South Africa (Aldridge, Laugksch & Fraser, 2006a), Rwanda (Earnest & Treagust, 2001a, 2001b), the US (Johnson & Stevens, 2006; Johnson, Stevens, & Zvoch, 2007) and Taiwan (Huang & Fraser, 2008).

Past research on school-level environment has involved school improvement (Fisher et al., 1991a; Templeton & Jensen, 1993), patterns of transition during middle school (Chung, Elias, & Schneider, 1998), teachers' perceptions of their work environment (Fisher & Grady, 1998), teacher morale (Young, 1998), gender differences (Huang et al., 2008), effects on student outcomes (Anderson, Thomas, Moore, Kool, 2008; Johnson & Stevens, 2006) and evaluating school-based interventions (Fraser, Williamson, & Tobin, 1987; Wahyidi & Fisher, 2006). The SLEQ was selected as a

starting point for the development of a questionnaire, designed specifically for use in South Africa (Aldridge et al., 2006a). This questionnaire and its validity are described below.

### **Study of Learning Environments in Africa**

Literature reviews reveal that there has been very limited learning environment research conducted in South Africa. During the 1990s, research in South Africa commenced with the work of Adams (1996, 1997) on laboratory classroom learning environments. Since that time, there have been only a handful of studies related to the field of learning environments that have been conducted in South Africa (Aldridge, Fraser & Ntuli, 2009; Aldridge, Fraser, & Sebela, 2004; Marjoribanks & Mzobanzi, 2004),

Marjoribanks and Mzobanzi (2004) examined whether family background moderated relationships between learning environments, goal orientations and students' interest in music. The sample included 210 student from rural communities in the Eastern Cape and 415 students from metropolitan Cape Town. All were black students with a mean age of 17.7 years and whose main language was IsiXhosa. In this study, the authors proposed a model that provided a conceptual framework within which they examined the variables used in the study (parents' aspirations, students' interest in music and learning environment). The results indicated that students of parents with lower aspirations had significantly less interest in music than did students with high-aspiration parents. The results also found that the learning environment had significant associations with students' interest in music.

Aldridge Fraser and Sebela (2004) investigated how teachers could use feedback based on students' perceptions of the learning environment in conjunction with reflective journals to assist teachers to become reflective practitioners. A sample of 1864 learners in 43 classes was used in investigating whether the instruments involved in the study were valid and reliable. During a 12-week intervention phase, two teachers used the profiles (based on students' feedback data) to assist them to develop strategies aimed at improving the constructivist orientation of their classroom learning environments. It was found that teachers were able to use feedback from students to guide changes in their pedagogical practices. Also, reflective journals were found to be useful for teachers as they implemented strategies aimed at enhancing the learning environment.

A study by Aldridge, Fraser and Ntuli (2009), involved the administration of a learning environment instrument to the primary school students ( $N=1077$ ) of 31 distance-education primary school teachers who used feedback about discrepancies between learners' actual and preferred learning environment to guide changes in their classroom practice. During a 12-week intervention phase, qualitative information was collected to provide indepth insights into and descriptions of three case-study teachers. The results of the study indicate that, to varying degrees, the teachers were successful in their attempts to improve the learning environment.

Three other such studies (summarised below) have been conducted in other parts of Africa, including two in Nigeria (Idiris & Fraser, 1997; Jegede, Agholor & Okebukola, 1995) and one in Rwanda (Earnest & Treagust, 2001a, 2001b). In Nigeria, Idiris and Fraser (1997) developed an instrument to investigate associations between the classroom environment and learner outcomes in agricultural classes. Agriculture, a compulsory subject for junior secondary school learners, is the main revenue source for the country. Administration of the questionnaire to 1175 learners in 50 classes from 20 schools revealed a low level of student centredness, negotiation and

differentiation. The study also indicated that Nigerian learners would prefer low levels of each of these scales in their learning environment (Idiris & Fraser, 1997).

In another study carried out in Nigeria, the Socio-Cultural Environment Scale (SCES) was used in investigating the perceptions of 328 distance-education learners (Jegede, Agholor & Okebukola, 1995) in terms of the socio-cultural climate of non-Western science classrooms. This study also included a sample from the Caribbean and Asia. The results revealed a significant difference between the perceived and the preferred classroom climate in each of the regions.

Earnest and Treagust's (2001a, 2001b) study of school-level environment in Rwanda involved assessment of four dimensions of school environment. A sample of 125 teachers perceived a limited amount of work pressure, a lack of resources, low affiliation between staff members, and a great deal of staff freedom.

### **DEVELOPMENT AND VALIDATION OF QUESTIONNAIRES**

In our study, we collected classroom-level environment data from 2638 Grade 8 science students from 50 classes in 50 schools in the Limpopo Province, South Africa. In addition, the 50 science teachers of each of these classes responded to a school-level environment questionnaire. Of the 50 schools, 37 were rural schools, nine were township schools and four were urban schools. These schools can be considered to be a representative sample of the range of schools located in this part of South Africa.

A major contribution of our study was the development and validation of two widely-applicable and distinctive questionnaires: one for assessing students' perceptions of their actual and preferred classroom learning environments in outcomes-based learning settings. The development and validation of the questionnaires involved a number of steps:

1. Examining the *Curriculum 2005* and national and international literature on outcomes-based education (OBE) to identify dimensions central to the educational philosophy of OBE.
2. Conducting interviews with science curriculum advisors and with Grade 8 science teachers to ensure that the scales were considered salient to the school context.
3. Selecting and developing scales that would cover the dimensions that are consistent with Moos' (1979) scheme for classifying the dimensions of any human environment: Relationship dimensions (which measure the degree of people's involvement in the environment and the assistance given to each other); Personal Development dimensions (which measure the kind and strength of the personal relationships in the environment); and System Maintenance and System Change dimensions (which measure the degree of orderliness, control and responsiveness to change in the environment).
4. Relevant dimensions and items for the actual form were adopted and adapted from widely-used general classroom environment questionnaires such as the What Is Happening In this Class? (WIHIC) questionnaire (Aldridge, Fraser & Huang, 1999), Constructivist Learning Environment Survey (Aldridge, Fraser, Taylor, Chen, 2000; Taylor, Fraser & Fisher, 1997) and Individualized Classroom Environment Questionnaire (Fraser, 1990).

5. For the student questionnaire, items and instructions were translated into Sepedi (or North Sotho), the local vernacular, and provided alongside the English version as English is the second language for the majority of students in the Limpopo Province.
6. Finally, both questionnaires were field-tested and subsamples of students and teachers were subsequently interviewed about the clarity and readability of the items.

### **Classroom-Level Environment Questionnaire**

The classroom-level instrument, the Outcomes-Based Learning Environment Questionnaire (OBLEQ), has seven scales with eight items per scale. Included in the OBLEQ were scales (from existing instruments) considered to be of relevance to the philosophy of outcomes-based education, as well as a newly-developed scale, Responsibility for Own Learning. The seven scales of the OBLEQ are: Involvement (the extent to which students have attentive interest, participate in discussions, do additional work and enjoy the class); Investigation (the extent to which emphasis is placed on the skills and processes of inquiry and their use in problem solving and investigation); Cooperation (the extent to which students cooperate rather than compete with one another on learning tasks); Equity (the extent to which students are treated equally and fairly by the teacher); Differentiation (the extent to which teachers cater for students differently on the basis of abilities, rates of learning and interests); Personal Relevance (the extent to which teachers relate science to students' out-of-school experiences); and Responsibility for Own Learning (the extent to which students perceive themselves as being in charge of their learning process, motivated by constant feedback and affirmation). A listing of the items contained in the final version of the OBLEQ is provided in Table 1.

The relevance of each OBLEQ scale to outcomes-based education, according to Curriculum 2005 (Department of Education, 1997), can be found in Aldridge et al., (2006b). Using OBLEQ data collected from 2638 students in 50 classes, we conducted principal axis factoring followed by oblique (direct oblimin) rotation (selected because the factors in the set of learning environment scales are expected to be correlated, Coakes & Steede, 2000). At this stage, items were omitted and the two scales of Investigation and Involvement scales came together, suggesting that this sample of students regarded these two constructs in similar ways. For the remaining items, all items had a factor loading of at least 0.30 on their own scale, and no other scale, with the exception of Items 34 and 35 from (from the Differentiation scale) that did not have a loading of at least 0.30 on their own or any other scale. Table 1 reports the factor loadings for all items in the refined version of the OBLEQ. The percentage of variance varied from 3.13% to 13.66% for different scales, with the total variance accounted for being 35.70%.

The internal consistency reliability (Cronbach alpha coefficient) for the OBLEQ scales ranged from 0.62 to 0.79 with the individual as unit of analysis (see the bottom of Table 1). An analysis of variance (ANOVA), with class membership as the independent variable, was used to determine whether each OBLEQ scale was able to distinguish between the perceptions of students in different classes. The results reported at the bottom of Table 1 indicate that each OBLEQ scale differentiated significantly ( $p < 0.01$ ) between classes. The  $\eta^2$  statistic (a measure of the proportion of variance accounted for by class membership) for the OBLEQ ranged from 0.08 to 0.13 for different scales. Overall, results suggest that the Outcomes-Based Learning Environment Questionnaire (OBLEQ) is valid and reliable when used in high school science classes in South Africa.

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Table 1. Factor Analysis Results, Internal Consistency Reliability (Cronbach Alpha Coefficient), and Ability to Differentiate Between Classrooms (ANOVA Results) for the OBLEQ in South Africa

Factor Loading Item	Inv	Coop	Eq	Diff	PR	Resp
<b>Involvement/Investigation (INV)</b>						
2. I give my opinions during class discussions.	0.36					
4. My ideas and suggestions are used during classroom discussions.	0.39					
5. I ask the teacher questions.	0.35					
6. I explain my ideas to other students.	0.36					
7. Students discuss with me how to go about solving problems.	0.44					
8. I am asked to explain how I solve problems.	0.60					
9. I carry out investigations to test my ideas.	0.42					
10. I am asked to think about the supporting facts for statements.	0.54					
12. I explain the meaning of statements, diagrams and graphs.	0.45					
<b>Cooperation (COOP)</b>						
17. I cooperate with other students when doing assignment work.		0.51				
18. I share my books and resources with other students when doing assignments.		0.46				
19. When I work in groups in this class, there is teamwork.		0.33				
20. I work with other students on projects in this class.		0.47				
22. I work with other students in this class.		0.47				
23. I cooperate with other students on class activities.		0.45				
24. Students work with me to achieve class goals.		0.31				
<b>Equity (EQ)</b>						
25. The teacher gives as much attention to my questions as to other students' questions.			0.39			
26. I get the same amount of help from the teacher as do other students.			0.40			
27. I have the same amount of say in this class as other students.			0.41			
28. I am treated the same as other students in this class.			0.52			
29. I receive the same encouragement from the teacher as other students do.			0.54			



30. I get the same opportunity to contribute to class discussions as other students.	0.4					
	8					
31. My work receives as much praise as other students' work.	0.4					
	3					
32. I get the same opportunity to answer questions as other students.	0.4					
	5					
<b>Differentiation (DIFF)</b>						
34. Students who work faster than me move on to the next topic.	0.6					
	4					
35. I am given a choice of topics.	–					
36. I am set tasks that are different from other students' tasks.	0.5					
	8					
38. I use different materials from those used by other students.	0.5					
	2					
39. I use different assessment methods from other students.	0.5					
	8					
40. I do work that is different from other students' work.	0.6					
	4					
<b>Personal Relevance (PR)</b>						
41. I learn about the world outside of school.	0.5					
	7					
42. My new learning starts with problems about the world outside of school.	0.4					
	0					
43. I learn how science can be part of my out-of-school life.	0.5					
	4					
44. I get better understanding of the world outside of school.	0.5					
	7					
45. I learn interesting things about the world outside of school.	0.5					
	6					
47. What I learn I can use in my out-of-school life.	0.4					
	1					
<b>Responsibility for Learning (RESP)</b>						
49. The teacher encourages me to plan what I'm going to learn.	0.3					
	6					
50. The teacher encourages me to decide how well I am learning.	0.4					
	5					
51. The teacher encourages me to decide which activities are best for me.	0.6					
	3					
52. The teacher encourages me to decide how much time I spend on learning activities.	0.5					
	3					
53. The teacher encourages me to decide which activities I do.	0.4					
	9					
54. The teacher encourages me to assess my learning.	0.4					
	2					
55. The teacher encourages me to decide the pace at which I learn best	0.4					
	9					
56. The teacher encourages me to think about areas in my learning that I need to improve	0.3					
	9					
% Variance	3.4	3.1	13.	6.6	4.7	3.4
	6	3	66	8	5	6
Alpha Reliability	0.7	0.6	0.7	0.6	0.6	0.7
	0	7	3	2	9	3
ANOVA (Eta <sup>2</sup> )	0.1	0.1	0.1	0.1	0.1	0.0
	2**	2**	3**	3**	0**	8**

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\*\*  $p < 0.01$

Factor loadings less than 0.30 have been omitted from the table.

The sample consisted of 2638 students in 50 classes in South Africa.

The  $\eta^2$  statistic (which is the ratio of 'between' to 'total' sums of squares) represents the proportion of variance explained by class membership.

### **School-Level Environment Questionnaire**

The School-Level Environment Questionnaire (SLEQ, Fisher & Fraser, 1990) was drawn on for our study in South Africa. In addition to scales from the SLEQ, two new scales were developed for use in South Africa (namely, Parental Involvement and Familiarity with OBE), as they were considered to be relevant to the successful implementation of OBE by school management teams and teachers. The final version includes seven scales, namely, Parental Involvement (the extent to which parents are involved in their children's education at both an individual and school level), Student Support (the extent to which there is a good rapport between teachers and students and students behave in a responsible and self-disciplined manner), Collegiality (the extent to which teachers can obtain assistance, advice and encouragement and are made to feel accepted by colleagues); Familiarity with OBE (the extent to which teachers have been trained to use teaching and assessment strategies associated with OBE), Innovation (the extent to which teachers discuss professional matters, show interest in their work and seek further professional development, Resource Adequacy (the extent to which the support personnel, facilities, finance, equipment and resources are suitable and adequate) and Work Pressure (the extent to which work pressure dominates the school environment). Teachers were requested to respond to items of the modified SLEQ on a five-point frequency scale with the alternatives of Almost Never, Seldom, Sometimes, Often and Almost Always.

Using data collected from a sample of 403 teachers from 54 schools in South Africa, validity statistics were calculated (Aldridge et al., 2006a). Table 2 provides each item's wording and factor loading and each scale's percentage of variance, Cronbach alpha coefficient and results of ANOVA for school membership differences (the ability of each scale to distinguish between the perceptions of teachers in different schools).

Principal components factor analysis resulted in the acceptance of a revised version of the modified SLEQ comprising 51 items in seven scales. Table 2 shows that, for all scales, the items loaded on their own scale and no other scale, except for Item 80 which had a loading of more than 0.30 with the OBE Familiarity scale as well as with its own scale (namely, Innovation). The percentage of variance varied from 4.5 to 13.6 for different scales, with the total variance accounted for being 45.8%.

The internal consistency (Cronbach alpha reliability coefficient) for each scale of the SLEQ ranged from 0.69 to 0.92 with the individual as the unit of analysis. To ascertain whether the each SLEQ scale was able to differentiate between the perceptions of teachers in different schools, an analysis of variance (ANOVA) was calculated for each scale. The ANOVA results indicated that, with the exception of Innovation, each scale was able to differentiate significantly ( $p < 0.01$ ) between the perceptions of teachers in different South African high schools. Overall, the results of the analysis suggest satisfactory reliability and validity for this version of the SLEQ when used with science teachers in South Africa.

Table 2. Factor Analysis Results, Internal Consistency Reliability (Cronbach Alpha Coefficient) and Ability to Differentiate Between Schools (ANOVA Results) for a Modified Version of SLEQ

Item	Factor Loading						
	PI	SS	Coll	E	Inn	RA	WP
<b>Parental Involvement (PI)</b>							
33. Parents show interest in what is happening.	0.7						
	1						
34. Parents get involved in school activities.	0.7						
	6						
35. There is communication between parents and teachers.	0.6						
	0						
36. Parents attend school meetings when invited.	0.6						
	4						
37. Parents help learners in doing assignments and projects.	0.6						
	2						
38. Parents make valuable contributions to the running of the school.	0.7						
	2						
<b>Student Support (SS)</b>							
25. There are disruptive and difficult students.		0.6					
		0					
26. Students are helpful and co-operative to teachers.		0.6					
		5					
27. Students are pleasant and friendly to teachers.		0.6					
		7					
28. There are noisy, badly behaved students.		0.5					
		2					
29. Students get along well with teachers.		0.6					
		8					
32. The rate of absenteeism is low.		0.3					
		7					
<b>Collegiality (COLL)</b>							
41. I receive encouragement from colleagues.			0.7				
			1				
42. I feel accepted by other teachers.			0.6				
			7				
43. I feel that I can rely on my colleagues for assistance if I need it.			0.6				
			5				
44. My colleagues take notice of my professional views.			0.7				
			4				
45. I feel that I have friends among my colleagues.			0.7				
			3				
46. I feel that there is good communication between staff members.			0.6				
			9				
47. I receive support from my colleagues.			0.8				
			4				
48. I discuss teaching methods with other teachers.			0.7				
			1				
49. Teachers discuss teaching methods and strategies with each other.			0.6				
			6				
50. Teachers avoid talking with each other about teaching and learning.			0.3				
			1				

51. Professional matters are discussed during staff meetings.	0.5 1
53. Teachers show interest in what is happening in other schools	0.5 8
54. Teachers are keen to learn from their colleagues	0.7 0
55. Teachers show interest in the professional activities of their colleagues.	0.7 4
<b>Familiarity with OBE (OBE)</b>	
1. I have sufficient knowledge about OBE to deal with OBE-related issues in my teaching.	0.6 5
3. I feel confident about facilitating learning in an OBE class.	0.7 9
4. I feel confident about developing OBE learning activities.	0.8 4
5. I feel confident about developing OBE assessment tasks.	0.7 3
7. I am able to interpret OBE learning materials used.	0.6 3
8. I feel confident in recording and reporting learner performance.	0.5 4
<b>Innovation (INN)</b>	
74. Teachers are encouraged to be innovative.	0.5 1
76. Teachers like the idea of change.	0.3 8
77. New curriculum materials are implemented.	0.6 8
78. There is experimentation with different teaching approaches.	0.6 3
79. New and different ideas are being tried.	0.5 6
80. Teachers are excited about using the new OBE approach.	0.4 5 0.3 5
<b>Resource Adequacy (RA)</b>	
11. Facilities are adequate for a variety of classroom activities.	0.4 6
12. There is sufficient space for learners to engage in group activities in the classrooms.	0.6 5
13. There are enough classrooms for all learners.	0.7 3
14. Classrooms have sufficient seating or desks.	0.7 4
15. Learners have access to a laboratory.	0.4 5
16. The supply of learner support material is sufficient.	0.5 3
<b>Work Pressure (WP)</b>	

17. I am under pressure.							0.67
18. I have to work long hours to complete my work.							0.70
19. I have to work very hard.							0.59
20. I have no time to relax.							0.50
22. We are understaffed.							0.36
23. It is hard for me to keep up with my workload.							0.52
24. I have to work at home to get all of my work done.							0.56
% Variance	4.8	4.9	4.7	13.0	4.5	7.0	6.3
Alpha Reliability	0.86	0.75	0.92	0.77	0.77	0.77	0.69
ANOVA (Eta <sup>2</sup> )	0.36**	0.34**	0.25**	0.30**	0.18**	0.47**	0.21**

\*\*  $p < 0.01$

The sample consisted of 403 teachers in 54 secondary schools in South Africa.

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

### ASSOCIATIONS BETWEEN THE SCHOOL-LEVEL AND CLASSROOM-LEVEL ENVIRONMENT

To investigate associations between the environment created at the school level and environment created by teachers at the classroom level, simple correlation and multiple regressions were used. To assess the school-level environment, as perceived by the teachers, the SLEQ-SA was used to assess the seven scales of Familiarity with OBE, Resource Adequacy, Work Pressure, Student Support, Parental Involvement, Collegiality and Innovation. To assess the classroom-level environment, as perceived by the students, the OBLEQ was used to assess the six scales of Involvement/Investigation, Cooperation, Equity, Differentiation, Personal Relevance and Responsibility for Learning. The sample involved 50 science teachers in 50 schools who responded to the SLEQ-SA. For each teacher, the students in one of his or her science classes completed the OBLEQ. The school mean was used as the unit of analysis for the student data to enable matched pairs of student and teacher data to be used.

Table 3 shows that only three of the 42 simple correlations between the six classroom environment scales and seven school environment scales were statistically significant ( $p < 0.05$ ). Collegiality was negatively and significantly correlated with the classroom environment scale of Differentiation and Innovation was positively and significantly related with the classroom environment scales of Involvement/Investigation and Cooperation. Table 3 also shows that four of the six multiple correlations were statistically significant for the analysis involving students' perceptions of the classroom environment, these being for Cooperation, Equity, Differentiation and Responsibility for Learning.

The standardised regression coefficients were used to identify which of the individual school environment scales were significant independent predictors of a classroom

environment dimension; Collegiality (with Cooperation and Differentiation) and Innovation (with Involvement/Investigation, Cooperation, Equity, Differentiation and Responsibility for Learning). All statistically significant correlations were positive with the exception of Collegiality with Differentiation. The results suggest that schools in which teachers were encouraged to be more innovative also had classroom environments that emphasised involvement/ investigation, cooperation, equity, differentiation, and responsibility for learning. Schools in which teachers were more collegial had classroom environments that emphasised cooperation, equity, and responsibility for learning. It was interesting to note, however, that schools in which there was increased collegiality, there was less classroom differentiation.

**Table 3. Simple Correlation and Multiple Regression Analyses for Associations Between Seven School-Level Environment Scales (as Perceived by the Teacher) and Six Dimensions of the Learning Environment (as Perceived by the Students)**

Scale	Involvement/ Investigation		Cooperation		Equity		Differentiation		Personal Relevance		Responsibility for Learning	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Familiarity with OBE	-0.11	0.11	-0.06	-0.02	0.07	0.06	-0.13	-0.18	0.06	0.02	-0.13	0.12
Resource adequacy	0.04	0.01	0.12	0.21	-0.03	0.08	0.06	-0.05	0.01	-0.03	0.02	0.14
Work pressure	-0.28	0.12	-0.08	0.07	-0.15	-0.06	0.06	0.09	0.12	0.01	-0.19	-0.06
Student support	-0.14	-0.18	0.21	-0.07	0.08	-0.32	-0.14	0.39	0.33	0.13	0.10	-0.09
Parental Involvement	-0.26	0.02	0.07	0.12	0.05	0.23	-0.20	-0.24	0.30	0.30	-0.01	0.03
Collegiality	-0.16	0.22	0.15	0.66*	0.27	0.81**	-0.49**	-0.84**	0.18	0.15	0.21	0.67**
Innovation	0.40*	0.51*	0.36*	0.82**	0.24	0.79**	0.10	0.51*	0.06	0.33	0.22	0.55*
<i>p</i> Multiple Correlation ( <i>R</i> )	0.46		0.64*		0.63*		0.62*		0.42		0.53**	

\*0.05 \*\**p*<0.01

*N*= 50 science teachers for school environment and 50 student class means for classroom environment



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