

Changing Learning Environments for Quality Tertiary Classes

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***Abstract:** The purpose of this study was to investigate students' and lecturers' actual and preferred perceptions of their classroom learning environments. The study involved the modification and validation a new form of the College and University Classroom Environment Inventory (CUCEI). This study is distinct in that it is the first study utilising the modified CUCEI at the tertiary level. The reliabilities of the scales of the modified CUCEI ranged from 0.73 to 0.94. Student perceptions indicated a preference for a more favorable learning environment in all seven areas measured by the CUCEI. Female and male students perceived their classroom environments similarly. However, mature students perceived their classroom more positively on two scales, Task Orientation and Equity. Generally, lecturers perceived their environment more favorably than their students. Lecturers who employed the normal mode of course delivery, that is lecturing, were generally perceived less favourably by their students. Lecturers could find this new version of the CUCEI to be a valuable source of information, particularly for comparisons between their own and their students' perceptions. Further, this study also provides university lecturers information on how they can create a quality-learning environment to enhance student learning and satisfaction.*

***Keywords:** Quality; classroom environments*

Introduction

Higher education has over the years recognized that it is a service industry and has to reevaluate the approach in the industry by placing greater emphasis on meeting the expectations and needs of customers, students (Cheng & Tam 1997; Elliot 2002). Studies have consistently confirmed a strong correlation between classroom environments, learning and satisfaction (Fraser, 1994, 1998; Fraser & Fisher, 1994; Griffiths, 2001; Suarez, Pias, Membiela, & Dapfa, 1998; Templeton & Jensen, 1993; Whiffen & Kalivada, 2001). Research over the last four decades has recognised that students' and teachers' perceptions are important parameters of the social and psychological aspects of the learning environments of school classrooms (Fraser, 1994, 1998; Getzels, & Thelen, 1960; Ramsden, 1991; Templeton & Jensen, 1993). Walberg's theory on educational productivity indicates that student ability, maturity, motivation, the quality of and quantity of instruction, the psychological environment at home, the classroom social group, the peer group outside the classroom and the time involved with the video/television media contribute to the variance in students' cognitive and affective outcomes (Walberg, 1981, 1984). The model was successfully tested as part of a national study showing that student achievement and attitudes were influenced jointly by these factors (Walberg, Fraser, & Welch, 1986). An interesting outcome from these studies

was the finding that classroom and school environments were important influences on student outcomes.

Studies in the classroom have also shown that girls and boys differ in their perceptions of their of classroom environment (e.g., Burkam, Lee, & Smerdon, 1997; Ferguson & Fraser, 1996; Henderson, Fisher, & Fraser, 1998; Suarez, Pias, Membiela, & Dupia, 1998). Lim (1995), in his study of secondary school students, found that male students perceived their classrooms as allowing greater opportunities for working at their own pace and time while female students viewed their classrooms as opportunities to participate and have control of their own learning. Research has also shown the boys prefer competitive and individualised learning, whereas, girls prefer learning which involves cooperative models and mutual assistance (Johnson & Johnson, 1991; Parker, Rennie, & Harding, 1995). Johnson and Johnson (1991), however, showed that as students progressed to higher grades both male and female students seemed to gain more interest in competitive learning.

Tertiary Classroom Environments

Studies with tertiary classroom environments are relatively few in comparison to studies carried out at the primary and secondary levels (Ramsden, 1991; Ramsden, Martin, & Bowden 1987; Ramsden, Patrick, & Martin, 1988; Richter, 1997). Basically, the students' approaches to learning were functionally related to the environment in which the students found themselves. This includes the classroom environment, the lecturer, the institutional environment, and the type of school from which the student came. The three perceptions of good teaching, freedom of learning, and workload were found to be most important in both the final year of secondary school and in tertiary studies. Booth (1997) supported the findings of Ramsden in his research on the experiences and expectations of students in transition to a history degree. He found that apart from good teaching, the students would fair better if there were clear and concise communications, higher student involvement, and university professors who had good inter-personal relationships with their students. Other problems that were reported by Booth (1997) included a lack of general concern for students by the university lecturers and students finding that the tertiary environment was much more task orientated leading to much heavier work loads. Similar findings were also reported by Ritcher (1997) in a study investigating student transition from secondary to tertiary education in Germany. Again, students perceived the classroom environment less favourably on moving to a higher level of study.

Fraser, Treagust, Williamson, and Tobin, (1987) reported that despite the existence of strong traditional classroom environment research at the primary and secondary level, surprisingly little work had been done at the higher education levels because of the shortage of suitable instruments (Fraser, Treagust, & Dennis, 1986; Ramsden, 1991; Ramsden, Martin, & Bowden 1987; Ramsden, Patrick, & Martin, 1988; Richter, 1997). The *College and University Classroom Environment Inventory* (CUCEI) was developed in 1986 to fill this void (Fraser, Treagust, & Dennis, 1986). Recent studies now indicate that a personalised measurement, that is the student's personal perception in his or her role in the classroom, yields greater feedback from participants whereas the former approach makes the student provide perceptions of the class as a whole (Fraser, Fisher, & McRobbie, 1996).

Method

This study primarily focused on the investigation of students' and lecturers' perception of their classroom environment and the development and validation of a modified form of the CUCEI. Specifically, the objectives of this study were to

- develop and validate a personal form of the College & University Classroom Environment Inventory, (CUCEI);
- use this modified CUCEI to investigate how students tertiary levels perceive their classroom environments;
- investigate how lecturers at the tertiary level perceived their classroom environment;
- investigate if the students' gender influences their perceptions of their classrooms;
- investigate and examine the difference in student's actual and preferred perceptions according to age; and,
- investigate students' perceptions to their actual classroom environment when the mode of teaching is changed at the tertiary level.

Modified CUCEI

Student and lecturer perceptions of their classroom learning environment were measured using the seven scale, 49-item modified and personalised *College and University Classroom Environment Inventory* (CUCEI) (see Table 1). The modifications were such that the seven scale structure of the instrument was maintained with each scale having seven items.

Table 1. Descriptive Information for the Modified CUCEI

Scale Name	Description	Sample Items
Personalisation	Extent of opportunities for individual students to interact with the lecturer and on concern for students personal welfare	The instructor goes out of his her way to help me
Innovation	Extent to which the lecturer plans new unusual activities, teaching techniques and assignments.	The instructor often thinks of unusual activities
Student Cohesiveness	Extent to which students know, help and are friendly towards each other.	I make friends easily in this class
Task Orientation	Extent to which class activities are clear and well organised	Class assignments are clear and I know what I am doing
Individualisation	Extent to which students are allowed to make decisions and are treated differently according to ability, interests and rate of working	I am allowed to choose activities and how I will work
Cooperation	Extent to which students cooperate rather than compete with on another on learning tasks.	I work with other students in this class
Equity	Extent to which students are treated equally by the teacher	I have the same opportunity to answer questions as other students

The CUCEI in this study was modified in three ways. First, the actual and preferred versions of the questionnaire were personalised. Table 2 provides examples indicating how this was done.

Secondly, only five of the seven original scales were used and two new scales included; the Cooperation and Equity scales (Fraser, Fisher, & McRobbie, 1996). The Equity scale measured the extent to which students perceived they were treated equally by their instructors. In particular, this scale was included in order to allow investigations of students' perceptions of the environment with respect to gender for the reasons discussed earlier whereas, was included because the levels of cooperation seem to change as students proceed to higher levels of education (Midgley, Eccles and Feldlaufer, 1991). Finally, in keeping with recent developments in the design of learning environment questionnaires, the modified form of the instrument used in this study employed a five-point Likert response scale where each item is responded to with the alternatives of Almost Never, Seldom, Sometimes, Often and Almost Always instead of the four-point Likert response system utilised in the original CUCEI. The use of the five-point Likert scale was thought to give participants a greater choice in their responses. In addition, the five-point response is also considered to better represent the personalised nature of the questionnaire (Fraser, Fisher, & McRobbie, 1996).

Table 2. Examples of Changes in the Wording of Items in Personal Form of the CUCEI

Scale	Original CUCEI	Modified and personalised CUCEI
Task Orientation	Class assignments are clear so everyone knows what to do	Class assignments are clear and I know what to do
Personalisation	The lecturer goes out of his/her way to help students	The instructor goes out of his/her way to help me
Innovation	Students seem to do the same type of activities in every class	I seem to do the same type of activities in every class

Learning environment instruments are typically produced in two forms; *actual* and *preferred*, Table 3. The actual form asks students to describe their actual classroom learning environment whereas, in the preferred form students are asked to describe their preferred or ideal learning environment. Previous studies at the secondary and elementary school levels have found that there are often differences between students' perceptions of their preferred and actual learning environments. Differences have also been observed between students' and teachers' perceptions of the same learning environment (Fraser, 1994, 1998). The wealth of information obtained from elementary and secondary school studies suggests that it could be of value for tertiary educators to gain a fuller understanding of students' perceptions of their learning environments.

Table 3. Examples of Wording of Items in the Actual and Preferred Personal Form of the CUCEI

Scale	Actual	Preferred
Task Orientation	Class assignments are clear and I know what to do	Class assignments would be clear and I would know what to do.
Personalisation	The instructor goes out of his/her way to help me	The instructor would go out of his/her way to help me.
Innovation	I seem to do the same type of activities in every class	I would do the same type of activities in every class.

Data Source

A total of 504 first year university students and their 24 lecturers participated in the study which covered a variety of subjects; Chemistry, Physics, Biology, Computer Science, Mathematics and Geography. Two hundred and five participants were from Canadian institutions and 299 students were from Australian institutions. Both students and lecturers completed both forms of the instrument, the preferred and actual. The actual and preferred questionnaires were administered separately. The actual version was administered in week nine in the 15 week semester followed in week eleven by the preferred form.

Reliability and Validity of the Instrument

Table 4 reports two reliability and validity statistics for two versions of the CUCEI used with a sample size of 504 students and 24 lecturers. In line with previous research, statistics are reported for two units of analysis, namely, the student's score and the class mean score.

Internal Consistency

The Cronbach alpha reliability using two units of analysis for each of the seven scales in the CUCEI, for the actual and preferred versions are presented in Table 4. The Cronbach alpha reliability coefficients using the individual student as the unit of analysis ranged from 0.73 to 0.93 and 0.76 to 0.94 for the actual and preferred versions, respectively. With class means as the unit of analysis, all alpha reliability values were higher (see Table 4). Good alpha reliability figures was also apparent for lecturer versions, ranging from 0.64 to 0.90 for the actual version and from 0.72 to 0.93 for the preferred version. High alpha reliability figures were also apparent for the lecturer versions, ranging from 0.72 to 0.90 for the actual version and from 0.72 to 0.93 for the preferred version.

Table 4. Internal Consistency Reliability (Cronbach Alpha Coefficient), Discriminant Validity (Mean Correlation with Other Scales) and the Ability to Differentiate between Classrooms (ANOVA) for Two Units of Analysis

CUCEI Scales ANOVA	Unit of Analysis	Reliability				Mean Correlation with other scales				eta ²
		<u>Student</u>		<u>Lecturer</u>		<u>Student</u>		<u>Lecturer</u>		
		Actual	Preferred	Actual	Preferred	Actual	Preferred	Actual	Preferred	
Personalisation	Individual	0.87	0.84	0.79	0.72	0.34	0.45	0.30	0.44	0.23**
	Class	0.95	0.87			0.30	0.30			
Student Cohesiveness	Individual	0.82	0.83	0.77	0.75	0.20	0.47	0.28	0.28	0.28**
	Class	0.96	0.88			0.38	0.43			
Task Orientation	Individual	0.77	0.79	0.64	0.74	0.27	0.44	0.33	0.21	0.27**
	Class	0.92	0.92			0.33	0.44			
Cooperation	Individual	0.92	0.93	0.84	0.87	0.25	0.45	0.29	0.40	0.11*
	Class	0.96	0.94			0.29	0.38			
Individualisation	Individual	0.82	0.80	0.85	0.90	0.15	0.25	0.35	0.41	0.22**
	Class	0.93	0.94			0.34	0.35			
Equity	Individual	0.93	0.94	0.90	0.91	0.30	0.42	0.18	0.19	0.09*
	Class	0.97	0.98			0.38	0.45			
Innovation	Individual	0.73	0.76	0.72	0.93	0.22	0.43	0.18	0.42	0.13**
	Class	0.84	0.93			0.35	0.39			

** $p < 0.001$ * $p < 0.01$

The sample consisted of 504 students in 26 classes and 24 lecturers.

Discriminant Validity

The discriminant validity is described as the extent to which a scale measures an unique dimension not covered by the other scales in the instrument. Table 4 indicates that the mean correlations of the scales in the CUCEI ranged from 0.15 to 0.38 for the actual version and from 0.25 to 0.47 for the preferred form. From the values the CUCEI appears to measure distinct although somewhat overlapping aspects of classroom environment.

Capability of differentiating between classrooms

The characteristic of differentiating between perceptions in different classes was investigated for each scale using a one-way ANOVA with class membership as the main effect and using the individual as the unit of analysis. The eta² statistic in Table 4, representing the proportion of variance in scale scores accounted for by class membership, ranged from 0.09 to 0.28, indicating that each scale of the CUCEI is capable of differentiating significantly between classes ($p < 0.01$).

Factor Analysis

A principal components factor analysis, followed by varimax rotation, showed an instrument in which 44 of the 49 items had a factor loading greater than .30. The conventional cut-off value of .30 was chosen for the factor loadings (Stevens, 1992). This pattern was also found to be very similar for the preferred version. On completion of the factor analysis with the 49 item seven scale instrument 5 items which had a factor loading of less than .30 were deleted. The factor loading values of the remaining 44 items in the instrument confirm the seven factor structure of the CUCEI. For subsequent analysis the 5 unsatisfactory items were deleted.

Student Perceptions

All differences in this study were explored using a paired *t*-test analysis for each scale of the CUCEI, Table 5.

Table 5. Means and Standard Deviations for the Preferred and Actual Forms of the CUCEI for Students

Scales	Mean		Difference (P-A)	Standard Deviation	
	Actual (A)	Preferred (P)		Actual	Preferred
Personalisation	3.56	4.19	0.63**	0.78	0.59
Student Cohesiveness	3.36	3.82	0.46**	0.76	0.79
Task Orientation	3.94	4.28	0.34**	0.52	0.53
Cooperation	3.38	3.93	0.55**	0.95	0.89
Individualisation	2.10	4.23	2.13**	0.71	0.53
Equity	4.42	4.61	0.40**	0.64	0.58
Innovation	3.29	3.48	0.19**	0.69	0.71

** $p < 0.05$

n=504

Students were generally more in agreement to what was expected in their preferred classroom environment as the standard deviation in the preferred versions were generally lower. All seven scales showed statistically significant differences. This suggest at the tertiary level students perceived a greater degree of difference between their actual and preferred environments.

Students generally perceived the Individualisation scale as the least favourable. This suggests that students perceive that there is less choice at the higher level of studies.

Further, this unfavourable perception could be possibly due to students relying on their lecturers for what they should know before they move on to their next year of university work, and not wanting too much decision making authority at this level.

Differences in Perception based on the Gender of Students

Both male and female students were generally in agreement about what their preferred classroom should be like, though the mean scores for the female students were very slightly higher than those of the male students in all scales except for Individualisation. Female students seemed to want less of a decision making role in the classroom. Cooperation on the other hand was as expected where female students wanted greater cooperation in class (Johnson & Johnson, 1991; Parker, Rennie & Harding, 1995). However, when the classroom environments were compared both males and females perceived their environment almost identically, (see Table 6). This similarity in perceptions replicates findings in other studies, that both male and female students perceptions moved closer together as they moved into higher level studies (Ferguson & Fraser, 1996; Johnson & Johnson, 1991). However, the findings here contrast against findings that show that there are statistically significant differences in perceptions of between male and female students (e.g., Burkam, Lee, & Smerdon, 1997; Ferguson & Fraser, 1996; Henderson, Fisher, & Fraser, 1998; Suarez, Pias, Membiela, & Dupia, 1998).

Table 6. Comparison of Means and Differences for the Preferred and Actual Forms of the CUCEI for Male and Female students

Scales	Actual		Difference (M-F)	Preferred		Difference (M-F)
	Male (M)	Female (F)		Male (M)	Female (F)	
Personalisation	3.43	3.64	0.21	4.10	4.26	0.16
Student Cohesiveness	3.33	3.38	0.05	3.90	3.78	- 0.12
Task Orientation	3.94	3.93	- 0.01	4.25	4.34	0.09
Cooperation	3.37	3.44	0.07	3.77	4.34	0.57**
Individualisation	2.14	2.04	- 0.10	3.10	2.94	0.08
Equity	4.45	4.34	- 0.11	4.59	4.67	0.08
Innovation	3.37	3.23	- 0.14	3.41	3.56	0.15

** $p < 0.05$

* $p < 0.1$

n = 99 females and 106 males

An interesting feature of the results depicted in Table 6 was that both male and female students were in agreement that there was hardly any difference in the way they were treated by their lecturers as measured by the Equity scale.

Mature Students

Mature students are defined in this study as students who have commenced their tertiary studies at the age of 19 or above. Studies have shown that older students perceive their classroom environment differently from younger students (Fraser, Treagust, Williamson, & Tobin, 1987). The results as presented in Table 7 show that older students in the classes of this study also preferred a more positive environment. Mature students also indicated that they were treated equally and that they did not perceive any difference in equity. The standard deviations also indicate that mature students were in general agreement in their perceptions of their actual classroom environment, and of their preferred classroom environment. When the

classroom environments of the mature students were compared with those that have come fresh from the senior secondary schools, two out of the four statistically significant scales were perceived more favourably by the mature students. Mature students perceived the scales of Task Orientation and Equity more favourably whereas those below 19 years of age perceived the scales of Personalisation and Individualisation more favourably. This comparison is limited because of the limited sample size, with only 45 mature students used in the paired *t*-test analysis.

Table 7. Comparison of Means and Differences between Mature and First Time Students at the Tertiary level for the Preferred and Actual Forms of the CUCEI

Scale	<u>Actual</u>			<u>Preferred</u>		
	Mature (M)	First Time (FT)	Difference (FT-M)	Mature (M)	First Time (FT)	Difference (FT-M)
Personalisation	3.78	4.00	0.22*	3.98	4.23	0.25*
Student Cohesiveness	3.40	3.30	-0.10	3.56	3.96	0.40*
Task Orientation	3.93	2.57	-1.36*	4.22	4.35	0.13
Cooperation	3.32	3.33	0.01	3.63	4.05	0.42*
Individualisation	2.15	3.43	1.28**	2.80	3.08	0.28
Equity	4.51	3.83	-0.68**	4.40	4.75	0.35*
Innovation	3.13	3.44	0.31	3.44	3.34	-0.10

* $p < 0.05$ ** $p < 0.0001$

n =45 pairs

Mode of teaching

One objective of this study was to evaluate the classroom perceptions to gauge if the style (mode) of teaching at the tertiary level has any bearing on the classroom environment (Biology, Physics/Mathematics and Computer Studies). In comparing the actual classroom

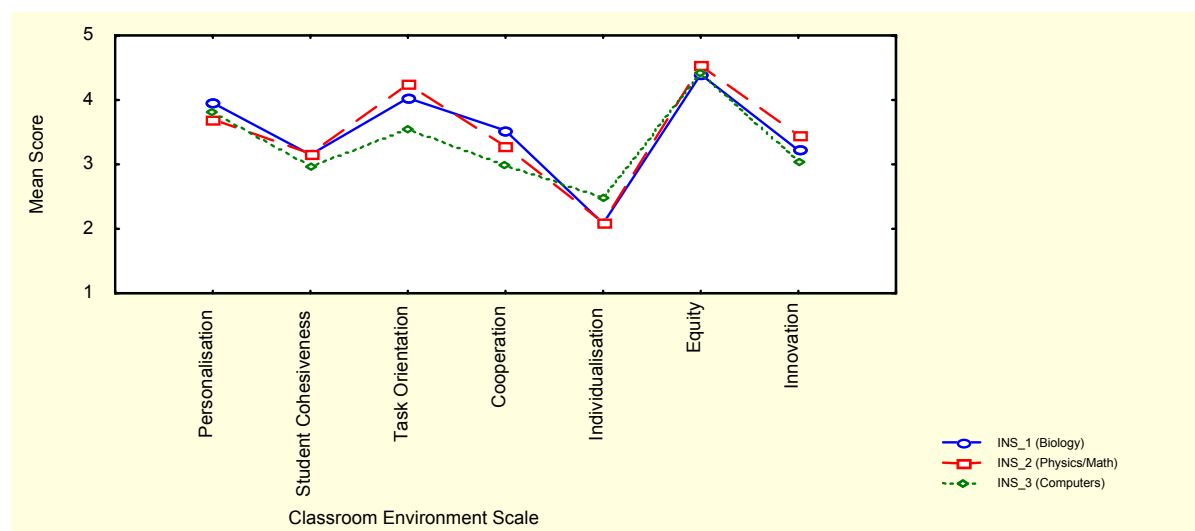


Figure 1. Comparison of students' Actual perceptions of the classroom environments in the three classes.

environments of these three lecturers, (see Figure 1) students' perceptions seem to be very dependent on their lecturer's style of teaching.

Of the three lecturers picked in this study, two followed the ‘guided’ form of instruction, (Lecturer one and Lecturer two), and the other the normal lecture mode of instruction, (Lecturer three). ‘Guided’ form of instruction is defined in this study as a teaching style that is a combination of that used in high school and that used in university. This transition phase, which covers semester one of the academic year and runs for 15 weeks, is used to develop the skills and needs of the students to cope with university studies. During this time, some lecturers pursue this combined teaching style to allow students time to adapt to the changes that they are expected to make at university level courses. Lecturer one lectured in Biology, Lecturer two in Physics and Mathematics and Lecturer three in Computer Studies. The largest standard deviation was observed consistently in the Cooperation scale for all three lecturers. This suggests students were not in close agreement about this aspect of the classroom environment in the classes of all three lecturers. With the exception of the Personalisation and Individualisation scales, lecturer three had generally a lower mean score than the other two lecturer. It appears from the data seen in Figure 1, that students favour the ‘guided’ approach to teaching employed by the Biology and Physics/Mathematics lecturers. The low score in the Individualisation scales in all classes could suggest that all students see the classes as being non flexible in terms of their ability to be involved in the decisions made regarding their classes as well, the inflexibility of the tertiary lecturers to take into account varying student abilities and interests.

Lecturer Perceptions

As shown in Figure 2, the preferred scores were generally higher than the actual scores with the exception of the Task Orientation scale. This suggests that lecturers would prefer less structured classes and a higher level of task orientation in their actual classroom could be the

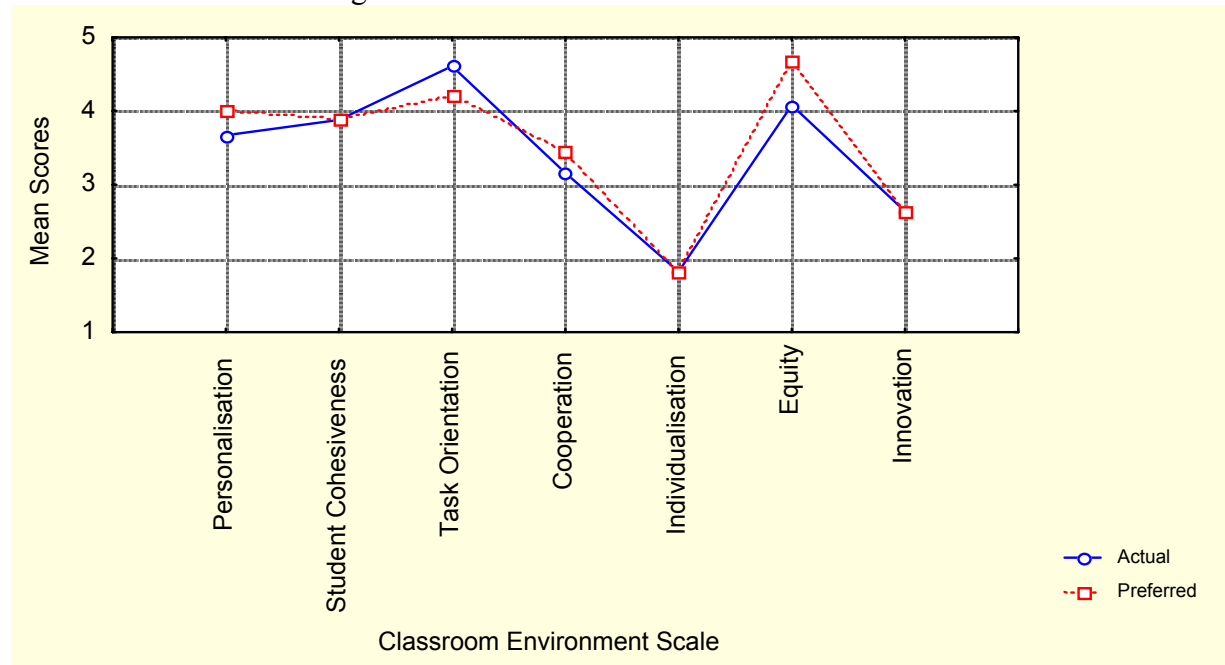


Figure 2. Scale mean profile for lecturers in the Actual and Preferred Forms of the CUCIEL. result of most lecturers employing innovative teaching approaches which is not usual for tertiary classrooms. Figure 2 also indicates that three other scales had statistically significant differences in the mean values. These scales are the Personalisation, Cooperation and Equity. The standard deviation figures also reveal that lecturers were in closer agreement about their

actual classroom environment but had somewhat differing perceptions of what their preferred classroom should be like.

Conclusions

This study is distinct in that it is the first study utilising the modified CUCEI at the tertiary level. This study also confirms the reliability and validity of the modified and personalised form of the CUCEI. Lecturers could find the modified and personalised CUCEI to be a valuable source of information, particularly for comparisons between their own and their students' perceptions. Clearly this study shows that students both mature and younger would prefer a more positive learning environment than what they currently perceive to be present. The study demonstrates that lecturers could gain an insight into the perceptions and possibly use the feedback they get to aid teaching and learning in their classrooms. Both male and female students perceived their classroom environment similarly at the tertiary level. Students also perceived their classroom environments more favourably when their lecturers deviated from the traditional method of teaching (lecturing) at the tertiary level.

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