

DEVELOPMENT AND VALIDATION OF A CLASSROOM ENVIRONMENT QUESTIONNAIRE FOR VOCATIONAL EDUCATION

by

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Paper for Presentation at the

Australian Association for Research in Education Conference,

Newcastle, November, 1994.

Abstract

This paper reports the development and validation of the Training Environment Questionnaire (TEQ) which can be used to assess psychosocial aspects of classroom environments in vocational education settings. Measurement of psychosocial aspects of classroom environments in Australian classrooms has been extensively undertaken by Fraser, who developed the Individualised Classroom Environment Questionnaire (ICEQ) for use in schools, and the College and University Classroom Environment Inventory (CUCEI) for use in higher education. These instruments are based on Moos' conceptualisation of environments in terms of three dimensions: interpersonal relationships, goal orientation or personal growth, and system maintenance and system change. Problems have been found in using Fraser's instruments in TAFE settings and the need to refine Fraser's instruments further in terms of Moos' original conceptualisation of environments has been established.

The TEQ is based on Moos' schema, but takes more account of adult learning principles. The pilot questionnaire has been administered in a wide range of training environments including the armed services, emergency services, the civil aviation industry, management training organisations, universities and TAFE colleges. The instrument has been revised and readministered and its face validity and internal factor structure established. It is envisaged that this new instrument will contribute to valid and reliable measurement of psycho-social aspects of vocational classroom environments. Such measurement is necessary for research which examines the inter-relationships between teaching and learning in these settings. An understanding of these relationships will enable modelling of vocational instruction and facilitate the improvement of instructional practices.

DEVELOPMENT AND VALIDATION OF A CLASSROOM ENVIRONMENT QUESTIONNAIRE FOR VOCATIONAL EDUCATION

INTRODUCTION

In this paper we report on research to develop and validate a questionnaire (The Training Environment Questionnaire) which can be used to assess psychosocial aspects of classroom environments in industry training and other vocational education settings. These aspects are: Independence, Instructor Support, Collaboration, Clarity and Innovation.

No instrument has yet been developed specifically to measure psychosocial aspects of TAFE or other vocational education settings. However, measurement of psychosocial aspects of classroom environments in Australian classrooms has been extensively undertaken by Fraser, who has developed the Individualised Classroom Environment Questionnaire (ICEQ) (Fraser & Rentoul, 1980; Fraser, 1980, 1990) for use in schools, and the College and University Classroom Environment Inventory (CUCEI) (Fraser & Treagust, 1986; Fraser, Treagust & Dennis, 1986) for use in higher education. Fraser's instruments are based on Moos' (Insel & Moos, 1974; Moos, 1974; Trickett & Moos, 1973, 1974) conceptualisation of environments in terms of three dimensions: interpersonal relationships, goal orientation or personal growth, and system maintenance and system change. The factors in Fraser's instruments have not been confirmed when used in TAFE settings, and the need to reconsider training environments in terms of Moos' original conceptualisation of environments has been established (McKavanagh & Stevenson, 1992). This may be because neither Fraser's ICEQ designed for use in schools, nor his CUCEI designed for use in colleges and universities, appears to place the emphasis on adult learning principles (e.g. Knowles, 1980; Candy, 1991; Zemke & Zemke, 1981; Brookfield, 1988), which would be expected in vocational education classrooms.

The aim of the present study is to develop a valid and reliable instrument for vocational education classroom environments which takes into account adult learning principles. In terms of Moos' schema, it is expected that the personal development dimension is as important in a vocational as in a school setting, because both settings stress personal growth and self-enhancement. However, in vocational education a greater emphasis on relationships (which are embodied in adult learning principles) is expected. This includes human relationships among learners and relationships between teacher and learner. In terms of system maintenance and control, less emphasis on classroom discipline and control and greater emphasis on orderliness and clear expectations is predicted in line with adult learning principles of learners actively shaping the environment. It is also envisaged that vocational education which is continuously undergoing change (e.g. in the current climate of national reform) innovation and responsiveness to change would be an important feature of the environment. These considerations require reconceptualisation of instrumentation to embrace adult learning principles and especially to:

- a. differentiate types of personal relationships, such as peer support from teacher-student support, to establish the source of personal support;
- b. accommodate shaping and clarifying the learning environment because of its importance to adults; and
- c. give emphasis to innovation because of its importance in adult and vocational education settings during processes of change.

CONCEPTUALISATION OF THE INSTRUMENT

The importance of Moos' relationship dimension for adult learning is apparent in the principles of adult learning. Knowles (1970, 1975, 1980) differentiated pedagogy from andragogy by referring to pedagogy as a content model of learning and andragogy as a process model. It is his view that adults prefer more self-directedness in their learning and learn more efficiently through experimental techniques. Knowles himself recognised that andragogy and pedagogy were not child/adult dichotomies, but drew attention particularly to the prior knowledge and pro-active role of the adult learner and the need for learning

processes to facilitate this. Subsequent writers have also emphasised the importance of learning processes in adult learning settings. For example, Zemke and Zemke (1981) refer to the importance of protecting self-esteem when adults confront changing values and beliefs, inducing needs for structure and support. Like Candy (1987), Zemke and Zemke differentiate self-direction from the removal of supporting structure for adult learners. Brookfield (1988) also takes up the importance of relationships in adult learning processes. He refers to the need to nurture self-directedness and empowerment, fostering critical reflection, respect and collaboration.

In terms of Moos' dimensions, these concerns suggest substantial prominence of the relationships dimension (involving learning processes) in adult learning environments. According to Knowles (1980), adult learning environments are characterised by mutual trust and respect, acceptance of differences and sharing of responsibility among students and teacher. Therefore, we expect that both student-student and teacher-student collaboration are important relationships in such classroom environments. Billett (1994b) confirms the importance of such interaction within the cultures of practice of workplace learning.

It may also be that system maintenance for adult learners is concerned more with adequate structure and negotiated meaning (e.g. see Candy, 1987, 1991; Zemke & Zemke, 1981) than with discipline. In this case, it is envisaged that new items are necessary to measure these aspects of adult learning environments. As well, there is a need to capture the adult learning principles which advocate experimental learning in which learners try out new ideas and respond to change. In addition, in view of the claims being made about individualisation in such movements as Competency Based Training which is being introduced nationally into all vocational education, there is a need to capture and monitor these aspects of classroom environments.

From these considerations we have synthesised that important aspects of adult learning that environments would induce are: support, collaboration, structure, clarification and innovation. We have built these into a questionnaire, together with subscales important in both schools and adult and vocational settings (i.e. Fraser's independence and investigation) which align with Moos' personal development dimension. The theorised new subscales and their relationships to those of Moos' and Fraser et al's instruments are shown in Table 1.

Table 1: Relationship between Moos' dimensions* and the ICEQ, CUCEI and theorised and actual subscales of the questionnaire

Trickett & Moos (1973, 1974)	ICEQ (Fraser & Rentoul, 1980) (10 items per subscale)	CUCEI (Fraser, Treagust & Dennis, 1986) (7 items per subscale)	Theorised Subscales of Pilot Questionnaire	Actual Subscales of Common Items of Pilot and Revised Questionnaires
Personal development dimension	Independence	Task orientation	Independence	Independence
	Investigation		Investigation	
Relationship dimension	Personalisation	Personalisation	Support (Teacher-student)	Instructor Support
	Participation	Involvement		
		Student cohesiveness	Collaboration (Student-student)	Collaboration
System maintenance and change dimension		Satisfaction		
	Differentiation	Innovation	Structure	
		Individualisation	Clarification	Clarity
			Innovation	Innovation

*Moos descriptions from Fraser (1980), after Insel & Moos (1974) and Moos (1974).

DEVELOPMENT OF THE INSTRUMENT

A pilot Training Environment Questionnaire, consisting of 77 items was generated, based on the earlier work of Fraser and Moos and the reconceptualisation outlined above. Each item asked students to indicate their perceptions of the classroom environment on a five-point, Likert-type scale. The pilot instrument was administered to 711 trainees in a wide range of vocational training settings, including the armed services, emergency services, the civil aviation industry, management training organisations, universities and TAFE colleges. The instrument was factor analysed and revised and readministered to a another, similar sample of 761 students. The sample was chosen to represent a wide cross section of employment groups to provide a varied sample of vocational training environments. It was expected that there would be substantial variations in training environments across these classifications. These variations would exist in such areas as goals, syllabuses, teaching methods, work-study arrangements, kinds of courses taught and expectations of learners, and it was hypothesised that characteristics of learning environments would vary in accordance with these different characteristics.

The industries from which the sample was drawn are shown in Table 2. To ensure further that the questionnaire could be validated across a variety of settings the sample was also drawn from a wide range of training providers, as shown in Table 3. The trainees were being trained on-the-job or in conventional classrooms and specially equipped workshops, and were training in order to gain employment or promotion or to complete formal qualifications in the form of certificates, associate diplomas, diplomas and degrees as shown in Table 4.

Table 2: Student and Class Numbers by Employment Group for the Sample

Employment Group	Pilot Questionnaire		Revised Questionnaire		Total Sample	
	Classes	Subjects	Classes	Subjects	Classes	Students
Armed Services	4	100	6	247	10	347
Personal Services	11	194	4	57	15	251
Hospitality & Travel	7	166	5	76	12	242
Commerce & Industry	24	213	7	155	31	368
Public & Community Services	4	38	12	226	16	264
Total	50	711	34	761	84	1,472

Table 3: Student and Class Numbers by Type of Training Provider for the Sample

Training Provider	Pilot Questionnaire		Revised Questionnaire		Total Sample	
	Classes	Students	Classes	Students	Classes	Students
Direct Federal Funding	6	123	9	231	15	354
Private Provider	17	225	5	110	22	335
TAFE College	24	339	13	254	37	593
University	3	24	7	166	10	190
Total	50	711	34	761	84	1,472

Table 4: Student and Class Numbers in the Sample by Type of Qualification Sought

Qualification Sought	Pilot Questionnaire		Revised Questionnaire		Total Sample	
	Classes	Students	Classes	Students	Classes	Students
Non trade further education	23	234	12	169	35	403
Trade Certificate or Equivalent	12	176	7	192	19	368
Associate Diploma	13	282	8	234	21	516
Degree or Graduate Diploma	2	19	7	166	9	185
Total	50	711	34	761	84	1,472

DATA ANALYSIS

Three sets of data analyses were undertaken: factor analyses of the factor structure; reliability estimates of the subscales; and discrimination of subscales across subgroups. All statistical analyses were performed using SAS (SAS Institute, 1989).

Factor analyses were performed on the pilot and revised questionnaire data to establish the underlying structure of the instrument. The Factor procedure was used with squared multiple correlations of each variable with all other variables as the prior communality estimates with Varimax and Harris-Kaiser rotations. An item was included in a subscale if its initial factor loading was greater than 0.3 and the item did not load more highly on any other factor. After analysis of data from the pilot questionnaire, 16 items were deleted and 17 new items added. The analysis was repeated after the administration of the revised questionnaire. Only five reliable factors emerged from these analyses and these appeared to be the same five factors regardless of whether the data were drawn from the pilot or the revised sample and regardless of whether orthogonal or oblique rotations were utilised. None of the items discarded from the pilot questionnaire and none of the new items added to the revised questionnaire contributed significantly to these five stable subscales. Since the two samples were also comparable, all data for the 46 common items across both versions of the questionnaire were combined and analysed, yielding the same factor structure. The combined data were used in all subsequent analyses.

Once a stable factor structure emerged, the reliabilities of the corresponding subscales were examined and the subscales refined. Cronbach's alpha statistic was used as an indicator of the contribution of each item to the overall reliability of each subscale. An item was deleted from a subscale if its removal substantially increased alpha, or if the item correlated poorly with the subscale as a whole, or if the item had low face validity.

To provide further validation of the questionnaire, a multivariate analysis of variance (MANOVA), using the general linear model (GLM) procedure, was performed on the entire sample for each classification variable of employment group, training provider and qualification sought with the five questionnaire subscales as dependent variables. This procedure provided an overall test of significance as well as tests on each of the subscales and estimates of the contribution of each subscale.

RESULTS

Results are presented in two parts: the factor structure and reliability estimates of the subscales; and the discrimination of subscales across classification variables.

Factor structure and reliability of subscales

In an earlier study of vocational education classrooms, McKavanagh and Stevenson (1992) found difficulties in using Fraser et al's Individualised Classroom Environment Questionnaire (ICEQ) (Rentoul & Fraser, 1979; Fraser, 1980, 1990) designed for use in schools, or those of the College and University Classroom Environment Inventory (CUCEI) (Fraser, Treagust, & Dennis, 1986) designed for use in higher education. The Training Environment Questionnaire is designed to measure psychosocial aspects of vocational classroom environments where it was expected that there would be a greater emphasis on adult learning principles. It was expected that Moos' dimensions of personal development, relationships and system maintenance and change would underlie this new instrument.

Compared with Fraser's ICEQ, it was also expected that, for the Training Environment Questionnaire:

- the personal development dimension would retain its importance in vocational settings, because of the emphasis on individual growth and self-responsibility for adult learning;
- that relationships would also be important, because these embody adult learning principles related to collaboration and support; and
- that there would be a difference in emphasis in the system maintenance and change dimension. This dimension was expected to down-play classroom control and discipline and emphasise aspects of independence, such as structure and clarity, as well as innovation in response to change.

The results of the factor analysis are given in Table 5. Discussion of the results follows the table.

Table 5: Final Harris-Kaiser Rotated Factor Loadings for 1396 subjects on 5 subscales over 46 items

	#	Fac4	Fac2	Fac1	Fac3	Fac5	Wording of Item
I N D E P E N D E N C E	36	63*	-6	-13	7	-26	I find the best way to learn myself.
	20	63*	2	3	7	5	I decide how I will learn.
	76	57*	0	6	-1	2	I organise what to learn for myself.
	25	56*	-3	-14	-6	-15	I learn on my own.
	04	50*	4	3	1	-1	I learn at my own pace.
	23	47*	4	3	-12	21	I decide where I will learn.
	33	45*	-6	7	0	-8	I work on projects using whatever resources I find.
	69	41*	6	6	-7	25	I choose what to learn.
	17	37*	0	-2	10	1	I know when to use the library or workshop.
	70	32*	23	9	-3	24	I am free to learn what I want to know.
22	30*	8	16	-6	15	We work on problems whenever we like.	

Table Continued on Next Page

Table 5 (con't): Final Harris-Kaiser Rotated Factor Loadings for 1396 subjects on 5 subscales over 46 items

	#	Fac4	Fac2	Fac1	Fac3	Fac5	Wording of Item
I N S T R U C T O R S U P P O R T	65	3	87*	-13	-9	1	The instruction is well organised.
	57	0	78*	-9	-5	3	Topics are well planned.
	75	1	74*	-2	-10	7	The use of time is well organised.
	73	4	69*	1	-4	7	The instructor addresses the interests of the group.
	62	1	65*	3	7	-3	The instructor supports my learning.
	71	-3	63*	-9	1	-13	We learn from the instructor.
	30	-5	56*	-7	10	0	The instructor helps me whenever I need it.
	66	0	54*	-4	-5	-21	There is a set order to the learning tasks.
	51	1	54*	1	7	-6	The instructor ensures resources are available.
	12	-7	48*	15	6	-1	The instructor helps me understand why I am learning.
	15	-12	47*	20	-2	6	The instructor helps me see how to learn.
	28	-12	46*	14	-1	-7	The instructor helps me work out what to learn.
63	13	39*	5	28	-3	I understand why this learning is important.	
C O L L A B O R A T I O N	61	-1	-11	75*	-4	-3	Others in the group help me understand what to learn.
	53	-7	-8	73*	-5	1	Others in the group help me understand why I am learning.
	45	-2	-1	65*	-1	-2	Others in the group help me learn.
	60	14	-10	61*	4	-3	In this group we help each other with resources.
	34	-2	9	49*	5	7	We help each other use time better.
	56	2	27	42*	5	-6	We tackle problems.
35	-5	20	41*	4	3	We engage in a variety of learning activities.	
C L A R I T Y	42	5	-14	0	76*	-2	I am confused about how to learn.
	31	2	-6	-5	66*	-5	I am confused about what resources I should be using.
	27	0	-3	-4	64*	2	I am confused about what to do.
	41	-5	5	3	60*	3	I feel isolated in what I learn.
	72	-6	5	1	56*	6	I feel isolated when I learn.
	21	1	14	-1	48*	5	I am confused about why this learning is important.
	11	-2	11	1	29*	6	No one helps me see why I am learning.

Table Continued on Next Page

Table 5 (con't): Final Harris-Kaiser Rotated Factor Loadings for 1396 subjects on 5 subscales over 46 items

	#	Fac4	Fac2	Fac1	Fac3	Fac5	Wording of Item
I N N O V A T I O N	08	-11	-2	-2	2	54*	I learn in set places.
	07	-7	-6	0	4	44*	We learn from set texts.
	03	-4	-1	-2	-7	44*	The instructor decides where the group will learn.
	37	-4	-16	3	8	41*	The instructor determines learning outcomes.
	24	12	6	-1	3	40*	Others decide what I will learn.
	47	-4	21	-14	-4	39*	We do routine things.
	14	-3	6	-9	1	36*	We are all expected to achieve to the same level.
	02	11	-10	1	-4	26*	I learn at set times.
NOTE: Factor loadings are multiplied by 100 and rounded to the nearest integer. Highest loading for each item has been flagged by an '*'.							

The literature on adult learning suggests that adults learn in different ways from students in school and are motivated by different factors. Knowles (1970, 1975) holds the view that adults prefer more self-directedness in their learning and learn more efficiently through experimental techniques. Knowles drew attention particularly to the pro-active role of the adult learner. This emphasis on self-responsibility and learning processes is reflected in the Independence subscale which emerged in the Training Environment Questionnaire.

The importance of Moos' relationship dimension for adult learning is also apparent in the principles of adult learning, particularly in relation to learning processes. Knowles and subsequent writers have emphasised the importance of learning processes in adult learning settings, e.g. Zemke and Zemke (1981) refer to the importance of protecting self-esteem when adults confront changing values and beliefs and Brookfield (1988) refers to the need to nurture self-directedness and empowerment, fostering critical reflection, respect and collaboration. In the Training Environment Questionnaire, learning processes are reflected in the Instructor Support and Collaboration subscales with their emphasis on teacher-student and student-student relationships and sharing. Thus, in the settings examined here, there is evidence of a strong relationship dimension as envisaged by Moos. This is also in line with Billett (1994a,b) who argues that social interaction situated within a culture of practice is a major source of workplace learning.

Moos' system maintenance and change dimension is concerned with clarity, orderliness, control and responsiveness to change. It was expected that in adult learning classrooms, there would be less emphasis on external control by the instructor than in school classrooms and that the system maintenance and change dimension would focus on structure, clarity and innovation. The structure subscale expected did not arise as a separate identity. However, the system maintenance dimension emerged as a Clarity subscale and the system change dimension as an Innovation subscale of the Training Environment Questionnaire.

Table 6 provides the inter-correlations among subscales and Table 7 summarises the analysis of the five subscales which emerged from the factor analyses. As subscales of Clarity and Innovation consisted only of negatively worded items, the scoring of these items was reversed in further analyses, so that higher scores correspond to higher degrees of clarity and innovation respectively. The relatively high correlations between Instructor Support with Collaboration (.49) on the one hand and with Clarity (.49) on the other is expected since the instructor's role is important in formal settings in promoting group work and in responding to questions with meaning and precision. Indeed, the absence of the predicted Structure subscale may be accounted for by some combination of support, clarity and collaboration. The

emergence of the subscales confirms the existence of the constructs which underlie Moos's dimensions, but there are some substantial differences from Fraser's instruments (See Table 1). The theorised subscales of Investigation and Structure did not emerge. It is suggested that Investigation may not have arisen as a separate factor as adults may not differentiate independence and investigation. An adult environment characterised by independence is likely to be one where adults will individualise their own investigative activities. It is suggested that structure may not have arisen because aspects of structure important to adults may already be encompassed as Clarity and Instructor Support. In general terms then, the analysis confirms predictions about adult learning environments made on the basis of adult learning theory.

Table 6: Inter-correlations of TEQ Subscales (Pearson Coefficients with Probabilities in Parenthesis)

	Independence	Instructor Support	Collaboration	Clarity
Instructor Support	.02 (.55)			
Collaboration	.05 (.05)	.49*** (.00)		
Clarity	-.01 (.82)	.49*** (.00)	.20*** (.00)	
Innovation	.28*** (.00)	-.25*** (.00)	-.16*** (.00)	-.05 (.07)

*** indicates a significant correlation at the .001 confidence level

Table 7: Summary Analysis of Revised Training Environment Questionnaire (N=1396)

Subscales	No of Items	Alpha Coeff	Mean	SD	Sample Items (+ and - indicate positive or negative loading respectively)
Independence	11	.77	3.24	0.66	69. I choose what to learn. (+)
Instructor Support	13	.89	3.64	0.70	30. The instructor helps me whenever I need it. (+)
Collaboration	7	.80	3.18	0.73	45. Others in the group help me learn. (+)
Clarity	7	.77	3.63	0.74	27. I am confused about what to do. (-)
Innovation	8	.61	2.53	0.65	47. We do routine things. (-)

The current study has confirmed the robustness of Moos' (Trickett & Moos, 1973, 1974) three dimensions of personal development, relationships, and system maintenance and change on which Fraser's instruments are based. However, the predictions that separate subscales of investigation (related to Moos' personal development dimension) and of structure (related to Moos' system maintenance and change dimension) has not been borne out. As argued above, the notions of structure and investigation are not seen as separate entities, but spread across other dimensions.

The findings of the current study confirm the robustness of dimensions identified by Moos' as underlying psychosocial aspects of classroom environments, which also underlie Fraser's instruments. Yet, at the same time, the findings show that, for adult learning environments, an instrument is needed which takes account of adult learning theory that emphasises learning processes and the roles of self-esteem, self-directedness and self-control for adult learners. The importance of the instructor in shaping the learning environment through providing support for learning and clarity in the learning environment is also confirmed. Furthermore, the importance of peer collaboration is highlighted. These conclusions have

particular implications for the current trends towards computer-based and print-based training in which learners are isolated from the instructor and their peers.

Discrimination ability of subscales

The validity of the instrument was further explored by partitioning and reanalysing the data to establish that the questionnaire would discriminate in hypothesised ways among different adult learning environments. The sample was structured so that trainees could be classified by employment group (see Table 2), training provider (see Table 3) and qualification sought (see Table 4). It was predicted that learning environments across settings would differ because of the differing goals, syllabuses, teaching methods, work-study arrangements and expectations of learners across types of institutions and the levels of courses that predominate in these institutions. Degree and graduate diploma studies are based largely in universities and are primarily of a pre-service nature with a limited amount of concurrent work experience. The emphasis in these courses is on the development of understanding and the subsequent application of conceptual knowledge in practice. Teaching often involves the separation of theory and practice through separate lectures and tutorials or workshops. It is expected that the learning environment will require learners to be more independent, engage in more learning outside of class time, and learn in ways that are more determined by and suited to student needs. Overall, the learning environment at this level is seen as being loosely defined and prescribed and that learners will need to show more initiative and responsibility for their own learning.

By contrast, non-award further education courses, particularly those offered by direct federally funded institutions such as the armed services, were expected to be more rigidly prescribed and supported. Goals are more often concerned with the replication of knowledge and good practice, with instruction largely by modelling and demonstration during practice periods within classes which are an integral part of the job. Learners are expected to conform rather than be creative, often attending training at the behest of employers, rather than by choice.

As learning environments, TAFE colleges and private providers are predicted to be intermediate between universities and federally funded providers. TAFE colleges with an increasing focus on a wide variety of associate diploma courses are seen as closer to universities, with private providers delivering training more directly geared to conformity with workplace needs. Hence, it was predicted that there would be a continuum of learning environments across universities, TAFE colleges, private providers and direct federally funded providers from more loosely to more rigidly defined.

Thus, in terms of the subscales of TEQ, it was hypothesised that, compared to on-the-job training from federally funded and private providers, universities and TAFE colleges would provide learning environments characterised by greater independence and innovation, and by less instructor support, collaboration and clarity.

Since there is a high degree of coincidence between training provider and course offered, it was also hypothesised that similar findings would apply across a continuum from degrees and diplomas, to associate diplomas, trade certificates and non-trade further education courses.

These relationships were explored using multivariate analyses of variance, which established that, while significant relationships existed across all three classification variables, the amount of variance explained by employment group was quite small. Consequently, results are reported only for the classification variables of training provider and qualification sought. For both of these variables significant associations at the .0001 level were found overall and for each of the questionnaire subscales. The means, standard deviations, significance tests and the variance explained are summarised by categorisation for training providers in Table 8 and for qualification sought in Table 9. Because the variance explained is small (ranging from 4.1% to 13.9% across categories of training provider and qualification sought) some caution is needed in making generalisations from the findings.

Table 8: Subscale means (and standard deviations) by training provider (with variance explained and F value; overall F of 32.5 for Wilks' λ with $df=(15/3832)$; all F's significant at .0001 level.

Type of training provider						
	Direct federal funding (N=232)	Private provider (N=280)	TAFE college (N=550)	University (N=334)	OVERALL (N=1396)	Variance F for df 3/1392
Independence	2.75 (0.70)	3.32 (0.72)	3.34 (0.54)	3.46 (0.56)	3.26 (0.66)	R ² =.124 F=65.5
Instructor Support	3.98 (0.72)	3.81 (0.70)	3.53 (0.64)	3.37 (0.64)	3.64 (0.70)	R ² =.092 F=47.0
Collaboration	3.56 (0.73)	3.23 (0.74)	3.08 (0.70)	3.00 (0.69)	3.18 (0.73)	R ² =.065 F=32.1
Clarity	3.85 (0.79)	3.80 (0.73)	3.52 (0.67)	3.48 (0.73)	3.63 (0.74)	R ² =.045 F=21.9
Innovation	2.05 (0.64)	2.58 (0.67)	2.62 (0.54)	2.71 (0.63)	2.53 (0.65)	R ² =.116 F=61.0

Table 9: Subscale means (and standard deviations) by qualification sought (with variance explained and F value; overall F of 30.0 for Wilks' λ with $df=(15/3832)$; all F's significant at .0001 level.

Type of qualification sought						
	Non-Trade further education (N=394)	Trade Certificate or equivalent (N=325)	Associate Diploma (N=507)	Degree or Post Grad Diploma (N=170)	OVER-ALL (N=1396)	Variance F for df 3/1392
Independence	3.02 (0.73)	3.12 (0.62)	3.44 (0.56)	3.53 (0.60)	3.26 (0.66)	R ² =.095 F=48.6
Instructor Support	4.06 (0.64)	3.51 (0.68)	3.45 (0.64)	3.50 (0.62)	3.64 (0.70)	R ² =.139 F=75.2
Collaboration	3.45 (0.72)	3.22 (0.71)	3.02 (0.69)	2.95 (0.74)	3.18 (0.73)	R ² =.069 F=34.5
Clarity	3.87 (0.72)	3.55 (0.71)	3.54 (0.72)	3.52 (0.78)	3.63 (0.74)	R ² =.041 F=19.8
Innovation	2.37 (0.72)	2.43 (0.63)	2.63 (0.56)	2.80 (0.59)	2.53 (0.65)	R ² =.055 F=26.9

From Table 8, the means across the four categories of training provider for each of the five subscales show consistent trends. The means for independence and innovation increase from providers who are funded directly by the federal government, through private and TAFE providers to universities, while those for support, collaboration and clarity decrease across the same range. This is consistent with the posed hypotheses.

The trends across Table 9 are similar, although means for Instructor Support for associate diploma and degree categories, while inverted compared to that expected, are not very different. Thus, there is strong supporting evidence for the hypotheses and it appears that traditional training institutions such as universities and TAFE colleges offering associate diplomas or higher qualifications provide training environments which are less precisely defined, which require more initiative on the part of trainees and which are perceived as more innovative.

CONCLUSION

These findings contribute to confidence in the validity of instrument, since predictable trends about the nature of learning environments across providers and course were substantiated. The development of a new instrument from this research will contribute to valid and reliable measurement of psychosocial aspects of classroom environments in vocational education. Such measurement is necessary for research which examines the inter-relationships between teaching and learning in these settings. An understanding of these relationships will enable modelling of vocational instruction and facilitate the improvement of instructional practices.

REFERENCES

- Billett, S. (1994a). Searching for authenticity: a socio-cultural perspective of vocational skill development. Vocational Aspect of Education, 46(1), 3-16.
- Billett, S. (1994b). Situated learning in the workplace. Australian Vocational Education Review 1(1), 7-14.
- Brookfield, S. D. (1988) Understanding and facilitating adult learning. San Francisco: Jossey Bass.
- Candy, P. (1987). Evolution, revolution or devolution: Increasing learner-control in the instructional setting. In D. Boud & V. Griffin, Appreciating adults learning: From the learners' perspective. London: Kagen Page.
- Candy, P. C. (1991). Self-direction for life-long learning. San Francisco, CA: Jossey-Bass.
- Fraser, B.J. (1980). Criterion validity of an individualised classroom environment questionnaire. Macquarie University: Report to the Education Research and Development Committee.
- Fraser, B. J. (1990). Individualised classroom learning environment questionnaire. Hawthorn, VIC: Australian Council for Educational Research.
- Fraser, B. J., & Rentoul, A. J. (1980). Person-environment fit in open classrooms. Journal of Educational Research, 73, 159-167.
- Fraser, B. J., & Treagust, D. F. (1986). Validity and use of an instrument for assessing classroom psychosocial environment in higher education. Higher Education, 15, 37-57.

- Fraser, B. J., Treagust, D. F., & Dennis, N. C. (1986). Development of an instrument for assessing classroom psychosocial environment at universities and colleges. Studies in Higher Education, 11(1), 43-54.
- Insel, P. M., & Moos, R. H. (1974). Psychological environments: Expanding the scope of human ecology. American Psychologist, 29, 179-188.
- Knowles, M. S. (1970). The modern practice of adult education: Andragogy versus pedagogy. Chicago, Ill: Association Press/Follett Publishing Co.
- Knowles, M. S. (1975). Self-directed learning: A guide for learners and teachers. New York: Association Press.
- Knowles, M. S. (1980). The modern practice of adult education: Andragogy versus pedagogy. New York: Association Press
- McKavanagh, C. W., & Stevenson, J. C. (1992). Measurement of Classroom Environment Variables in Vocational Education. Paper presented to the joint conference of the Australian Association for Research in Education and the New Zealand Association for Research in Education Conference, Deakin University, November, 1992.
- Moos, R. H. (1974). The social climate scales: An overview. Palo Alto, CA: Consulting Psychologists Press.
- Rentoul, A. J., & Fraser, B. J. (1979). Conceptualisation of enquiry-based or open classroom learning environments. Journal of Curriculum Studies, 11, 233-245.
- SAS Institute Inc. (1989). SAS/STAT® User's Guide (Version 6, 4th ed, vol 1). Cary, NC: SAS Institute Inc.
- Trickett, E. J., & Moos, R. H. (1973). Social environment of junior high and high school classrooms. Journal of Educational Psychology, 65(1), 93-102.
- Trickett, E. J., & Moos, R. H. (1974). Personal correlates of contrasting environments: Student satisfactions in high school classrooms. American Journal of Community Psychology, 2(1), 1-12.
- Zemke, R. & Zemke, S. (1981). Thirty things we know for sure about adult learning. Training, 18(6), 45-52.