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A goal-mediational model of personal and environmental influences on tertiary students' learning strategy use

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Introduction

Research on student learning at the tertiary level has emphasised the importance both of students' personal characteristics and the context of learning in affecting students' adoption of surface or deep approaches to learning (Dart and Clarke 1991, 1992; Entwistle, 1987; Ramsden, 1992; Ramsden and Entwistle 1981). Recently, there has been heightened interest in the study of achievement-goal oriented activity at the primary and secondary school levels (Ames, 1992; Ames and Ames 1984; Ames and Archer 1988; Archer 1992; Dweck 1986; Elliott and Dweck 1988; Meece, Blumenfeld and Hoyle 1988; Nicholls/ 1984; Nicholls, Patashnick and Nolen 1985). Interest has focussed on how these achievement goals relate to achievement behaviour, and which classroom structures and personal characteristics influence the adoption of particular goals. However, there has been little similar research at the tertiary level (Archer, Scevak and Monfries 1991; Volet and Chalmers 1992).

This paper proposes an arrangement of constructs where motivational variables (M) mediate the influences of environmental (E) and personal (P) variables to produce outcome variables (B). It is proposed that these macrolevel constructs can be represented at the microlevel by students' goal orientation (M); by the perceived goals of lecturers and perceived value of the subject (E); by perceived own ability (P); and by students' reported use of learning strategies (B). The development of these microlevel constructs resulted from the qualitative analysis of responses by 154 Post Graduate Diploma of Education students to open-ended questions relating to their learning (Dart 1992). These constructs were the most frequently mentioned influences on the learning and strategies used. They also reflect important variables proposed in other learning models (e.g. Biggs, 1991; Nolen and Haladyna, 1990; Pintrich and Garcia, 1991; Ramsden, 1992).

Individual student perceptions and meanings of learning experiences are used in this study, given that the importance of personal interpretations of classroom events has already been well established (Ryan and Grolnick 1986) and Weinstein (1989).

Goal Orientation

The research literature in achievement goals refers most frequently to two disparate goal orientations that have been variously labelled as learning and performance goals (Dweck 1986; Elliott and Dweck 1988), task-involvement and ego-involvement goals (Nicholls 1984; Nicholls *et al.* 1985), and mastery and performance goals (Ames and Archer 1988; Archer 1992). Learning, task-involvement and mastery goals differ from performance and ego-involvement goals in respect to conceptions of success and reasons for achievement behaviour. On the one hand, underlying the first type of goal is an intention by learners to develop skills or a deeper understanding of a subject, together with a belief that effort and outcome are related, whereas on the other hand, the intention in the second type of goal is to demonstrate ability by outperforming others, particularly with the exertion of little effort. Research cited by Ames (1992) suggests that orientation toward a goal is influenced by both individual differences and environmental factors.

Positive relations between task-involvement and ego-involvement have been reported by Nicholls *et al.* (1985) and Meece *et al.* (1988). Such an association seems reasonable, as Dweck (1986) points out that it is possible for learners to subscribe to both goals simultaneously. It also accords with the motive underlying Biggs' (1987) deep achieving approach.

In this paper the two goals are referred to as learning and performance goals.

Learning Context and Goal Orientation

Ames (1992) provides a comprehensive review of the classroom structures affecting learners' goal orientations, emphasising the design of tasks and learning activities, evaluation practices and use of reinforcement, as well as the degree to which learners are given the opportunity to be autonomous in their learning.

Research by Dart and Clarke (1992) has shown that a learning environment with a high press for cognitive and metacognitive behaviour, termed constructive cognitive press (CCP) (Clarke and Dart 1991a), increases the probability that students will use deep strategies in their learning. This resulted from the direct effect that CCP had on students' intrinsic motivation, which in turn exerted a direct influence on the use of appropriate cognitive and metacognitive strategies associated with a deep approach to learning. The items used to evaluate the perceived CCP of the learning environment were measures of what students perceived their lecturers to be emphasising in the particular subject, that is, lecturers' goals perceived to be encouraging the development of a personal perspective on the content of the subject through the requirement to relate the new material to what they already know and to apply this new understanding so as to check its validity.

This was similar to a finding by Blumenfeld, Purot and Mergendoller (1992) who reported that the major factor influencing learners' reported use of self-regulatory and learning strategies in two classrooms, both perceived as being mastery oriented, was the 'press for understanding' in the classroom of the more strategic thinkers.

Nolen and Haladyna (1990) included a similar variable, Perceived Teacher Goals, in their model on the basis that teachers' statements about the purpose of learning or studying may also influence the studying goals of students. They found that students' perceptions that their teacher wanted them to think independently, as well as to understand the material, positively influenced both the students' learning goal orientation and their beliefs about the value of alternate strategies.

The importance of the perceived value of the learning material and activities, in relation to both intrinsic value (interest) and utility value (importance for some future objective), has been emphasised by Wigfield and Eccles (1992). Miller, Behrens, Greene and Newman (1993) reported positive relationships between valuing a subject and a learning goal orientation, and Ames (1992) referred to work which claims that learners are more likely to adopt a learning goal orientation when the meaningfulness and personal relevance of the material is stressed.

Personal Characteristics and Goal Orientation

Findings tend to support a positive relationship between a learning goal orientation and attributions that effort leads to success, perceived control, valuing of, and interest in, learning activities, and positive attitudes towards learning (Ames and Archer 1988; Elliott and Dweck 1988; Meece *et al.* 1988; Nolen, 1988).

One individual difference variable that has received much attention in recent research on learning is self perception of ability. Most of this research has investigated the effects of perceptions of ability on the use of learning strategies and has found a strong connection between learners' use of self-regulatory and cognitive strategies and perceived self competence (Pintrich and De Groot 1990; Zimmerman and Martinez-Pons 1992). As well, Meece *et al* (1988) found that perceived competence related positively to motivation and task/mastery goals. Likewise, Archer *et al* (1991) reported significant positive correlations between both learning and performance goal orientations and perceived ability. Dart and Clarke (1991) reported that when students believed they were capable of learning effectively, and believed that they would do well in the subject, they were more likely to adopt a deep motive for learning. They were more interested in the subject, valued it, and sought understanding, all of which are characteristics of a learning goal orientation (Ames 1992).

Learning Strategies

There is a sizeable body of evidence that indicates that when learners report adopting a learning goal orientation they value and use cognitive (deep-processing) and metacognitive strategies as they engage the learning material (Ames and Archer 1988; Archer 1991; Dart and Clarke 1992; Meece *et al* 1988; Nolen 1988; Nolen and Haladyna 1990).

The strategies identified in this study–Elaboration, Metacognition, Collaboration

and Organised Study resulted from the responses given in an earlier study (Dart, 1992). Definitions of these strategies, and an example of an item used to measure each of them, are given in the Method section.

Justification for the inclusion of what is called Collaboration strategies is provided by Resnick (1987), who stressed the social nature of learning. She asserted that peer collaboration is essential to the learning process, as learners construct meaning and understanding through active participation and sharing of knowledge. Brown (1988) has also pointed to the importance of social interaction in facilitating deep understanding, through learners having to explain, elaborate and argue their position to others. Likewise, Biggs and Moore (1993) stated that peer interaction enhances learning through encouraging self-monitoring and reflection, as well as the acceptance of personal responsibility for learning. There is also evidence that a learning goal orientation is positively associated with working collaboratively with peers (Nicholls 1992; Nicholls *et al* 1985).

Learning strategies were selected as the outcome behaviour (B) to focus on in this study for two reasons:

(i) there are findings that indicate that the strategies a student uses when engaging a learning task are a major influence on the quality of the learning outcome (Biggs 1991; Dahlgren 1984; Dart and Clarke 1991; Pintrich and de Groot 1990; Ramsden 1992; Trigwell and Prosser 1991; Van Rossum and Schenck 1984; Vermunt 1989); and

(ii) no end-of-semester achievement results were available.

Analysis of Multivariate Data

Social science research in general, and educational research in particular, are by their very nature multivariate and typically analysed using "...data-driven exploratory regression and factor analysis techniques" (Rowe 1991, pp. 19-20). The use of such approaches has been increasingly criticised (e.g. Hoyle, 1991; Rowe, 1991). In particular, they do not account for measurement error associated with fallible indicators of theoretical constructs, nor is it possible to test mediated effects that specify an indirect effect of a predictor on a criterion through an intervening variable or process. Hence, an analytical technique which can specify mediating effects and evaluate the sequencing of constructs is required. Structural equation analysis or covariance structure analysis, commonly referred to as LISREL (Jöreskog and Sörbom 1989), is such a technique. This statistical procedure first uses confirmatory factor analysis to evaluate a measurement model where it is hypothesised that a set of measurable variables represent an unmeasurable or latent variable, and then uses path analysis to evaluate a structural model where relationships are hypothesised between latent variables.

LISREL has been used to establish such findings as follows:

(i) students with high levels of self-efficacy and intrinsic goal orientation, who perceive the task as having high value and interest are more likely to use

strategies associated with deep processing and to engage in self regulation (Pintrich and Garcia, 1992);

(ii) both students' goals (level of task orientation) and their perceptions of their teachers' goals (for students to master content and think independently) relate to their subsequent task orientation, as well as to how they value effective strategies while learning (Nolen and Haladyna, 1990);

(iii) students with a learning goal orientation report more active cognitive engagement; those who have a high level of intrinsic motivation emphasise learning goals more; and high perceived self ability is associated with intrinsic motivation and a learning goal orientation (Meece *et al.* 1988).

(iv) a deep motive significantly influences the use of deep strategies (Dart and Clarke 1992); and

(v) environmental press for cognitive and metacognitive behaviour arouses a deep motive and leads to the use of deep learning strategies (Dart and Clarke 1992)

This paper explores the usefulness of a goal mediational model for determining how personal and environmental variables impact on learners' goals in influencing learning strategy use. The model assumes that learners' goal orientations are important mediators of the effects of personal and environmental variables and, by combining these two determinants of influence, such a model should help explain differences in learners' use of learning strategies.

This paper also seeks to extend previous work by bringing together these significant variables and using a much larger and diverse student sample at the tertiary level.

The proposed model contains nine latent variables:

E:	(i)	perceived lecturers' goals	(PLG)
	(ii)	perceived subject value	(PSV)
P:	(iii)	students' perceived self ability	(PSA)
M:	(iv)	students' learning goal orientation	(LGO)
	(v)	students' performance goal orientation	(PGO)
B:	(vi)	elaboration strategies	(ELAB)
	(vii)	metacognition strategies	(META)
	(viii)	collaboration strategies	(COL)
	(ix)	organised study strategies	(ORG)

On the basis of previous research and theory the model tested is shown below in Figure 1, in which Unidirectional arrows represent paths of influence and two-way arrows represent relationships.

The model can be conceived as reflecting the first two phases of Biggs' 3P Model (1987), where perceived lecturers' goals and perceived subject value represent Situational Presage factors; perceived self ability represents a Personal

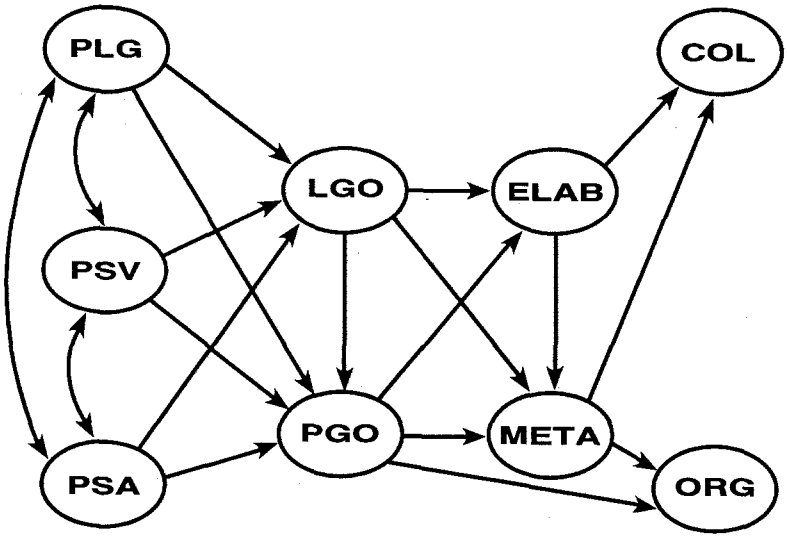

Figure 1. Proposed structural model

Presage factor; and reported learning goal orientations and learning strategies represent Process factors.

In this mediational model, students' learning goal orientation is hypothesised to directly influence the use of elaboration and metacognitive strategies; students' performance goal orientation is expected to influence (negatively) elaboration, metacognition and organised study strategies; both goal orientations are predicted to mediate the effects of perceived lecturers' goals, perceived subject value and perceived self ability on learning strategies. As well, it is expected that elaboration strategies will influence the use of metacognition strategies and collaboration strategies; and metacognition strategies will influence collaboration strategies as well as organised study strategies. The influence of perceived lecturers' goals on performance goal orientation, is expected to be negative, while it seems likely that perceived lecturers' goals, perceived subject value, and perceived self ability, will be positively related to each other.

Methods

Subjects

The sample included 1170 students enrolled in courses within 10 Schools at the Queensland University of Technology. The students came from the classes of 21 lecturers who volunteered to become involved in a project designed to improve their teaching and their students' learning (T&LITE, 1992).

Procedure

Subjects were asked to complete a questionnaire during a lecture/tutorial period in the middle of the semester. They were asked to respond to the questionnaire in relation to the particular subject they were engaged in at the time of administration of the questionnaire.

Confirmatory Factor Analysis

In confirmatory factor analysis, *a priori* factors are specified based upon theoretical expectations. Confirmatory analytic techniques then seek optimally match the observed and theoretical factor structures for a given data set to determine the goodness of fit of the hypothesised factor model.

Goodness-of-Fit

There is a lack of consensus among theorists concerning how best to evaluate the extent to which a proposed model accounts for a set of observed variances and covariances. The solution is to use a range of goodness-of-fit indexes which, collectively, indicate the efficacy of the proposed model (Hoyle 1991; Rowe 1991). The LISREL program provides a number of fit statistics, including a fitting function distributed as a chi-square ($\chi 2$) with degrees of freedom (df) given by the number of observed variances and covariances less the number of unknowns in the hypothesised model; a goodness-of-fit index, GFI; an adjusted goodness-of-fit index (adjusted for the degrees of freedom relative to the number of variables), AGFI; and the root mean square residual, RMR.

The chi-square test is extremely sensitive to sample size and will almost always reject a model on statistical bases (Bentler, 1990), that is, chi-square often attains significance when there are relatively unimportant differences in the latent and measured variables. As a result of this, alternative assessments of fit that are less dependent on sample size have been proposed. McDonald and Marsh (1990) suggest that, of the relative goodness-of-fit indices available, only the Relative Noncentrality Index, RNI, and the Tucker-Lewis Index, TLI, avoid problems resulting from sample size. However, the TLI penalises model complexity for estimating more parameters. Marsh (1991) states that a commonly accepted guideline for goodness of fit for relative indexes, such as the RNI and TLI, is 0.90. An index of 0.90 can be thought of as approximately explaining 90% of the covariation among the measured variables (Marsh, 1991). It is generally accepted that values of AGFI >0.90 represent a good fit (Reynolds & Walberg, 1991); a $\chi 2$/df ratio < 5 represents a reasonable fit (Marsh and Hocevar, 1985); and a RMR$\leq$0.05, an acceptable fit (Coovert, Penner, and MacCallum, 1990).

Measurement Model

Items were developed on the basis of theory and research to measure the hypothesised constructs. Confirmatory factor analytic procedures implemented by LISREL 7 (Jöreskog & Sörbom 1989) were then applied, with each item being constrained to load only on the latent variable it was designed to indicate. Items were refined using a method developed by Burnett (1993), in which two criteria were used to refine the measurement model. Firstly, items were deleted, using an iterative process, if their squared multiple correlation or the proportion of variance accounted for was less than 0.3. and, secondly, when all squared multiples were above 0.3, items which had an estimated change in lamda X of greater than 0.4 were deleted (see Stevens 1986).

The confirmatory factor analysis showed that the hypothesised factor structure fits the data reasonably well (GFI=0.93; AGFI=0.91; RMR=0.05; RNI=0.92; TLI=0.91).

The resulting subscales, a brief description of each, and an example of an item from each, are indicated below. These five subscales represent the E, P, and M variables. Items for these subscales were rated by the subjects on a 5-point Likert scale (5=strongly agree, 1=strongly disagree).

Environmental variables

Perceived lecturers' goals: (indicates the extent to which students perceive their lecturers emphasising student control over their own learning, being an independent thinker and seeking understanding):

My lecturer encourages me to develop my own perspectives on the topics addressed.

Perceived subject value: (measures the perceived value of the subject in terms of interest and importance for the profession and one's own professional development):

The content and tasks will contribute significantly to my professional development.

Personal variables

Perceived self ability: (represents how confident students feel in relation to the tasks of the subject and to other students):

I am confident I can understand difficult content.

Student's goal orientation

Learning goal orientation: (measures students' intentions for learning the subject in

terms of interest and challenge for learning new material):

I like the challenge of learning new material.

Performance goal orientation: (measures the extent to which students want to be successful through getting high grades):

I want to get the best mark possible.

The following subscales represent learning strategies reported to be used by students. The items were intended to represent general learning strategies (cognitive, metacognitive, study) that can be used in multiple contexts and that should facilitate learning in different knowledge domains. Items for these four subscales were rated on a 5-point Likert scale (5=almost always, 1=almost never).

Learning strategies used

Elaboration: (indicates the extent to which students personalise material by relating it to their prior knowledge and applying it in order to develop understanding):

I take time to think how this material relates to me and how I might use it.

Metacognition: (measures the degree to which students plan for their learning, monitor their understanding and evaluate this).

When working on tasks I stop and check that what I am doing makes sense to me.

Collaboration: (measures the extent to which students interact with other students to facilitate their learning).

I discuss my understanding of the content with other students.

Organised study strategies: (indicates the frequency with which students plan and structure their study).

I set goals for myself in order to structure my activities in each study period.

Analysis

Descriptive analyses of the measured variables were carried out and then the structural model was analysed using the maximum likelihood estimate of parameters in Lisrel 7 (Jöreskog and Sörbom 1989).

Table 1. Means and Standard Deviations of Measured Variables

Variable	Mean	Standard Deviation
PLG	3.47	.75
PSV	3.69	.78
PSA	3.51	.71
LGO	3.82	.68
PGO	4.35	.61
ELAB	3.43	.83
META	3.81	.71
COL	3.17	.96
ORG	2.80	1.05

Results

Descriptive Analyses

Means and standard deviations for all measured variables are shown in Table 1. Performance goals (M=4.35) received higher endorsement than learning goals (M=3.82) and metacognitive strategies are reported as being used more frequently than other strategies (M = 3.81).

Evaluation of Structural models

Maximum likelihood parameter estimates were obtained for the proposed structural model. These are reported in Figure 2 below. All hypothesised paths have the suggested signs and are significant at the .05 level, with the exception of perceived self ability on performance goal orientation, and learning goal orientation on metacognition strategies.

It is evident that the use of elaboration strategies is heavily influenced by the learner having a learning goal orientation. Consequently, using elaboration strategies leads to learners using collaboration strategies and employing metacognition strategies which, in turn, further increases the likelihood of learners engaging in collaboration strategies, as well as applying organised study strategies. Learners holding a learning goal orientation are also likely to support a performance goal orientation, which leads to the use of metacognition and organised study strategies but is unlikely to induce the use of elaboration strategies.

As anticipated, perceived lecturers' goals influence the adoption of a learning goal orientation but have a negative effect on performance goal orientation, whereas perceived subject value influences both goal orientations, more so a learning goal orientation, and perceived self ability impacts positively on learning goal orientation. Environmental and Personal variables are positively related to each other. Students who perceive their subjects as being highly interesting and relevant also perceive their lecturers as encouraging autonomy, independence, and

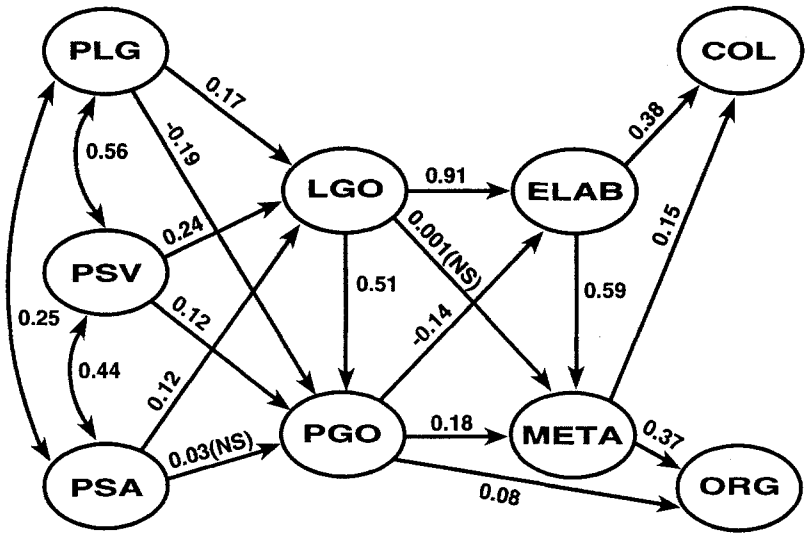

Figure 2. Maximum likelihood estimates for the parameters in the proposed model (NS = not significant at the .05 level)

understanding, as well as believing they have high ability.

The indices in Table 2 suggest that the model fits the data reasonably well.

On the basis of substantive theory and modification indices produced in the analysis of the proposed model, minor modifications were made and a revised model was tested. In this revised model the influences of perceived self ability on performance goal orientation and that of a learning goal orientation on metacognition strategies were deleted,, while direct effect paths from perceived lecturers' goals to collaboration strategies and from perceived self ability to organised study strategies were introduced, as both of these were theoretically plausible. All paths were significant at the .05 level. This model fits the data marginally better than does the model originally proposed, as evidenced by the indices of fit shown in Table 2.

For comparison with the mediational models, a direct-influence model was tested. This model proposes that all environmental and personal variables directly (rather than indirectly) influence learning strategies, that is, perceived lecturers' goals, perceived subject value, and perceived self ability have direct effects on elaboration, metacognition, organised study, and collaboration strategies. Maximum likelihood parameter estimates are shown in Figure 4 below. The significant paths from environmental to strategy at the .05 level involve perceived lecturers' goals linking to collaboration strategies, perceived subject value to elaboration and collaboration strategies, and perceived self ability to metacognition and organised study strategies. The fit indices in Table 2 show that this direct influence model does not fit the data as well as the proposed or revised mediational models.

Both mediational models, the proposed and revised, provide a better fit than does

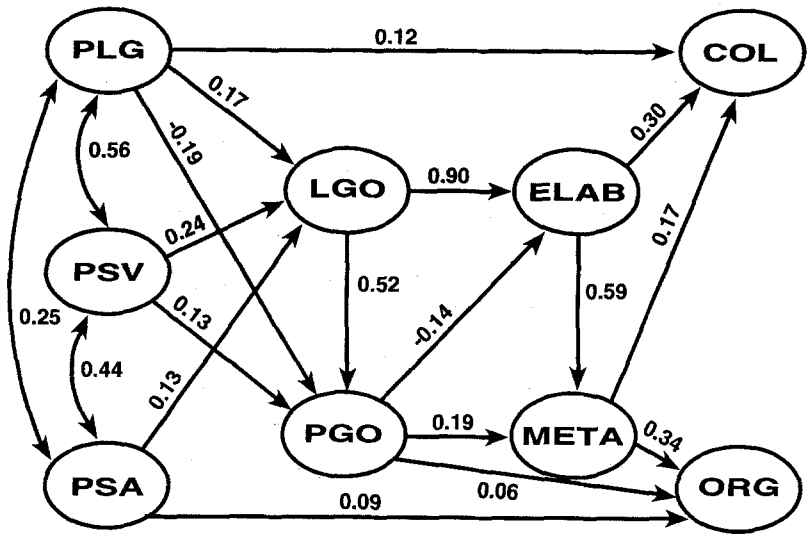

Figure 3. Revised model with maximum likelihood estimates significant at the .05 level

the direct effects model, and both are similar in fit to the measurement model (confirmatory factor analysis model). This resemblance is indicative of good model fit (Anderson and Gerbing 1988). On the basis of the indexes of fit it is apparent that the revised structural model provides a marginally better fit than does the proposed model.

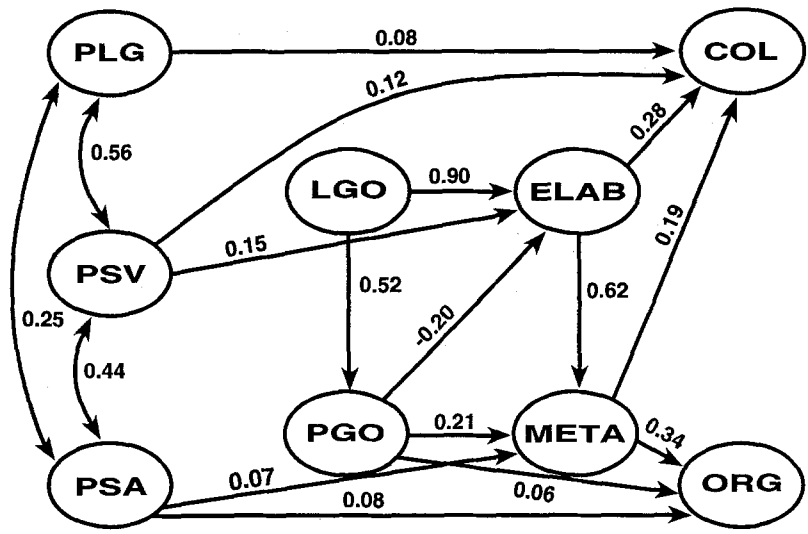

Figure 4. Maximum likelihood estimates for the direct effects model (only paths significant at 0.05 level are shown)

Table 2. Goodness-of-fit indices

Model	χ^2	df	RMR	GFI	AFGI	RNI	TLI
Null	10525.03	253	0.25	0.41	0.35		
Proposed	1065.68	214	0.05	0.93	0.91	0.917	0.90
Revised	1035.68	214	0.05	0.93	0.91	0.920	0.91
Direct Effects	1361.23	209	0.10	0.92	0.89	0.888	0.86
Measurement	981.23	203	0.05	0.93	0.91	0.924	0.91

Direct, Indirect, and Total Effects

Significant direct, indirect, and total effects are reported in Table 3. A direct effect is an unmediated relation between two variables, whereas an indirect effect is a relation between two variables that is mediated by one or more other variables. The total effect is the sum of these effects. The following description relates to the revised model in Figure 3.

All direct influence paths in this model are significant at the .05 level, as described in the previous section. A learning goal orientation is necessary for elaboration strategies to be employed and, if these are used, then collaboration, metacognition, and organised study strategies are likely to be utilised as well. If a performance goal orientation is adopted then use of metacognition and organised study strategies result. Furthermore, support of a learning goal orientation influences the adoption of a performance goal as well. It is notable that metacognitive strategies are applied directly as a result of a performance goal orientation, whereas they are a consequence of using elaboration strategies emanating directly from a learning goal orientation.

Perceived lecturers' goals increase the possibility of a learning goal orientation but decrease the chances of a performance goal orientation being chosen. They also influence the use of collaboration strategies. Perceived subject value influences the adoption of both goal orientations, but more so a learning goal orientation. Perceived self ability affects both learning goal orientation and the use of organised study strategies. This influence of perceived ability on learning goal orientation is interesting in that both Meece *et al* (1988) and Nolen and Haladyna (1990) found that it was not strongly related to motivational orientation and deleted it from further analyses. It appears then that, at the tertiary level, perceived self ability does assume importance in influencing the adoption of a learning goal orientation.

Whereas in the direct effects model (Figure 4) there are only four significant direct paths between environment and personal variables and learning strategies, all these variables have significant indirect effects on the use of all learning strategies. Perceived lecturers' goals has its greatest influence on elaboration strategies (β=.17) primarily through learning goal orientation. This variable also indirectly (β=.06) as well as directly (β=.12) affects collaboration strategies to have a total effect of β=.18. Perceived subject value influences both elaboration (β=.18) and metacognition (β=.16), mainly through its effect on learning goal orientation. Perceived self ability has its largest indirect effect on elaboration (β=.11) through

Table 3. Significant Direct, Indirect and Total Effects for the Revised Model

		LGO	PGO	ELAB	META	ORG	COL
	DE	0.17	−0.19	—	—	—	0.12
PLG	IE	—	0.09	0.17	0.08	0.02	0.06
	TE	0.17	−0.10	0.17	0.08	0.02	0.18
	DE	0.24	0.13	—	—	—	—
PSV	IE	—	0.13	0.18	0.16	0.07	0.08
	TE	0.24	0.26	0.18	0.16	0.07	0.08
	DE	0.13	—	—	—	0.09	—
PSA	IE	—	0.07	0.11	0.07	0.03	0.04
	TE	0.13	0.07	0.11	0.07	0.12	0.04
	DE	0.52	0.90	—	—	—	
LGO	IE		—	−0.07	0.59	0.23	0.35
	TE		0.52	0.83	0.59	0.23	0.35
	DE			−0.14	0.19	0.06	—
PGO	IE			—	−0.09	0.04	—
	TE			−0.14	0.10	0.10	—
	DE				0.59	—	0.30
ELAB	IE				—	0.20	0.10
	TE				0.59	0.20	0.40
	DE					0.34	0.17
META	IE					—	—
	TE					0.34	0.17

learning goal orientation. It also has an indirect (β=.03),as well as a direct (β=.09), effect on organised study strategies, for a total effect of β=.12. Thus, the main contribution of the personal and environmental variables seems to be through the formation of a learning goal orientation which then influences the use of elaboration strategies, which in turn, lead to the use of the other learning strategies.

All environmental and personal variables have significant total effects on all learning strategy variables with perceived lecturers' goals having greatest influence on collaboration (β=.18) and elaboration (β=.17); perceived subject value on elaboration(β=.18) and metacognition (β=.16); and perceived self ability on organised study (β=.12) and elaboration (β=.11).

These results indicate that the environmental and personal variables used in this study exert most of their influence on learning strategy use through the mediating effects of goal orientation. Thus, they provide partial support for the hypothesised goal mediational model of the effects of environmental and personal variables on learning strategy use.

Discussion

The results of this study indicate that a model of learners' strategy use, emphasising

the mediating role of achievement goal orientation on the influences of situational and self variables, is consistent with the pattern of observed covariances in the sample data. Both the proposed and revised mediational models fit the data better than does the direct effects model.

The findings suggest that learners having a learning goal orientation characterised by interest, challenge, and meaning, are likely to use learning strategies for

(i) generating their own meaningful understanding;
(ii) planning, monitoring, and evaluating this learning;
(iii) working with colleagues to facilitate (i) and (ii); and
(iv) planning of study periods.

These learners also perceive their lecturers to be fostering such a goal orientation, that is, providing a learning-orientated climate; they perceive the subject as interesting, relevant and useful; and believe they are capable of understanding the content of the subject and doing well in it.

On the other hand, learners adopting a performance goal orientation represented by striving for high grades, are likely to use learning strategies for

(i) planning, monitoring, and evaluating their learning;
(ii) going about their study in an organised way; but not seeking personal meaning and understanding in this learning. However, it is probable that they will need to invest effort in the application of (i) and (ii).

They do not perceive their lecturers fostering a classroom climate emphasising interest, meaning and challenge; they do perceive the subject as having some interest and importance for them; however, their self perceptions of ability do not relate to their performance goal orientation.

Thus, the way in which learners interpret the learning environment determines to an important degree the goal orientation they pursue which, in turn, influences the learning strategies they employ. The study also provides support for the possibility of a learner holding both goals simultaneously, that is, wanting to develop understanding of the subject and at the same time producing work that is assessed highly in relation to their colleagues.

The implications of these findings are that if lecturers want to increase the probability that students will use cognitive and metacognitive strategies, assuming that students have available to them a repertoire of cognitive and metacognitive strategies, it is necessary that they endorse a learning goal orientation. To facilitate the development of this motivational focus, lecturers need to ensure that they structure their classroom environments and teach in ways that will enable students to

- experience being in control of their learning;
- be challenged by and interested in the content;
- develop understanding of the material both by themselves and with peers;
- identify the importance and relevance, both personal and professional, of the subject; and
- establish beliefs that they are capable of accomplishing the set tasks.

Intervention efforts designed to promote choice of a learning goal orientation

must address change in all necessary factors. Comprehensive suggestions for classroom intervention to achieve this have been reported by both Ames (1992) and Blumenfeld *et al.* (1992). Earlier work by the writer (Dart and Clarke, 1991) demonstrates that this can be accomplished. Teacher education students were involved in a specially designed programme in Educational Psychology. The programme encouraged students to take greater responsibility for their own learning, by exposing them to a variety of learning experiences. These experiences included negotiation of the curriculum; peer discussion and teaching; learning contracts; self, peer, and collaborative assessment; and critical reflection on these and other learning experiences by means of an ongoing learning journal. Results indicated an increase in deep motive, achieving strategy, deep approach, and deep achieving approach to learning for the whole group. The most significant message from this study was that if students perceive that the subject you offer them requires understanding, and provides opportunities to apply such knowledge and skills so as to enhance their personal competencies, they will choose to use a deep approach.

Conclusion

The significance of this study is reflected in the interdependence of the variables involved as shown by the emergence of total and indirect effects. Elsewhere, the importance of obtaining "ecological" maps of classrooms to provide a macro level understanding of what is happening has been stressed (Clarke and Dart, 1991b). This study has illustrated how the LISREL procedure provides the facility to obtain an insight into the complex of inter-relationships that exist in ecological maps.

The study provides reasonable support for the revised structural model. It also indicates ways in which lecturers may intervene in the classroom to increase the likelihood that students will use learning strategies associated with a deep approach to learning.

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