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ABSTRACT

The longitudinal changes in the causal attributions, academic self-concept, and learning approaches of 549 university students in Hong Kong were studied. Students were enrolled in two different disciplines: language/health studies (n=272) and construction/engineering (n=277). Measurements of causal dimensions, academic self-concept, learning approaches, and achievement were obtained on two occasions with an interval of about 6 months. Causal dimensions, academic self-concept, and learning approaches showed significant change over time for the sample. In general, students exhibited a decrease in internal attributions and a drop in deep approach to learning. The construction and engineering group tended to be less internal in attribution and less deep in learning approach than the language and health studies group. Overall, the causal influence of the variables of attribution, self-concept, and learning approaches on academic achievement, although significant, was relatively weak. (Contains 1 figure, 8 tables, and 39 references.) (SLD)

A Longitudinal Study of Hong Kong Chinese University Students' Academic Causal Attributions, Self-Concept, Learning Approaches and Their Causal Effects on Achievement.

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A Longitudinal Study of Hong Kong Chinese University Students' Academic CausalAttributions, Self-Concept, Learning Approaches and Their Causal Effects on Achievement.

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Introduction

Recent research in student learning, particularly in higher education, has focused on the modern cognitive and affective approaches to learning which emphasized the importance of the learner's cognitive and affective processes in mediating the effects of instructional environment upon academic achievement. A large number of studies have also concentrated on the differences that exist between individual learners in terms of their motivational orientations, affective characteristics, learning styles and metacognitive capabilities in relation to the learning outcomes (Jonas sen & Grabowksi, 1993; Richardson, 1987). Consistent with this line of research, the present study attempts to investigate individual learners' causal attributions, academic self-concept, learning approaches and their causal influences on achievement outcomes among Hong Kong Chinese university students.

Previous studies on causal attributions, self-concept, and learning approaches have shown that these variables are closely related to achievement outcomes. However, there are few studies, particularly in a non-Western culture, that examine these variables among university students in developmental perspective. The aim of the present study is (1) to investigate the longitudinal change of university students' causal attributions, academic self-concept, learning approaches and (2) to investigate the causal influences of the variables on achievement over a period of six months. The findings are expected to help deepen our understanding into student learning at university level and subsequently help produce an environment that is conducive to learning.

Method

Participants

The participants of the study were 549 Hong Kong Chinese university students whose average age were 20 years. They were full-time first year students who were enrolled in two major disciplines of study, viz, language/health studies (n=272) and construction/engineering (n=277).

Measuring Instruments

Measurements on students' causal dimensions, academic self-concept, learning approaches and achievement were obtained on two occasions (Time 1 and Time 2) with an interval of about six months.

For causal attributions measurement, McAuley et al's (1992) Revised Causal Dimensions Scale (CDSII) was used. The participants were instructed to place their perceived causes of academic success and failure along four different dimensions of causality, i.e. locus, stability, personal control and external control.

Academic self-concept measurement was based on Fleming and Whalen's (1990) Personality and Academic Self-Concept Inventory (PASCI). The Inventory comprises eight sub-scales and the choices are 7-points along the semantic differential scale. Academic self-concept scores were obtained from the aggregated scores of verbal and math sub-scales.

For learning approaches measurement, Biggs' (1987) Study Process Questionnaires (SPQ) were used. The SPQ comprises six sub-scales of which three are motive and three are strategy sub-scales. The motive and strategy subscale scores were summed to form the scores for surface, deep and achieving learning approaches respectively.

Academic achievement for Time 1 was based on the students' Advanced Level Examination results obtained from the students when they first joined the university. Time 2 academic achievement was based on the participants overall end-of-year results obtained at the end of their first year of study at the university.

Methods of Analysis

(1) Two-way Anova with Repeated Measures

To investigate the changes in causal dimensions, self-concept, learning approaches and academic achievement over time between the two disciplines groups, a series of Time x Discipline two-way analyses of variance with repeated measures were carried out. All the scales were examined separately.

(2) LISREL Analysis

To test the causal relationships among locus of causality, academic self-concept, learning approaches and academic achievement, structural equation modeling (SEM) procedures using Joreskog's LISREL 8.02 were carried out. Only locus of causality, academic self-concept, surface approach, deep approach and academic achievement were included for model testing in this study.

Results (1)

Internal Consistency Reliability Alphas

Table 1. shows the reliability alphas of the causal dimensions scale, the self-concept scales, and learning approaches scales for two occasions of measurement. The internal consistency reliability alphas for Time 1 and Time 2 for locus of causality were both 0.74; for

Scales	Coefficients Alphas	
	Time 1	Time 2
Causal Attributions		
Locus of causality	0.74	0.74
Personal control	0.74	0.75
Stability	0.75	0.72
External control	0.63	0.65
Self-Concept		
Math scale	0.89	0.90
Verbal scale	0.64	0.69
Academic self-concept	0.78	0.79
General self regard	0.62	0.63
Social esteem	0.76	0.81
Physical appearance	0.48	0.36
Physical ability	0.75	0.73
Perceived parental acceptance	0.47	0.38
Social anxiety	0.67	0.68
Learning Approaches		
Surface motive	0.52	0.52
Surface strategy	0.43	0.51
Deep motive	0.58	0.60
Deep strategy	0.64	0.66
Achieving motive	0.66	0.71
Achieving strategy	0.71	0.70
Surface approach	0.64	0.66
Deep approach	0.73	0.76
Achieving approach	0.74	0.77

Table 1. Reliability coefficient alphas for causal attributions, academic self-concept, and learning approaches scales at Times 1 and 2

Scale	Time 1		Time 2	
	M	S.D.	M	S.D.
Causal Dimension				
Locus of causality	19.69	4.14	18.67	4.27
Personal control	19.12	4.22	18.52	4.12
Stability	15.63	4.95	14.88	4.46
External control	12.96	4.51	13.33	4.22
Self-Concept				
Maths self-concept	17.80	6.37	18.29	6.35
Verbal self-concept	18.90	4.14	19.45	4.22
Academic self-concept	36.70	8.27	37.69	8.29
Self-regard	22.28	4.28	22.13	4.14
Social esteem	17.26	5.34	18.11	5.35
Physical appearance	18.65	3.84	19.25	3.45
Physical ability	19.97	5.34	20.10	5.06
Perceived parental acceptance	22.21	4.24	22.20	3.81
Social anxiety	23.27	5.78	23.42	5.55
Learning Approaches				
Surface motive	23.48	4.03	23.48	3.83
Surface strategy	21.66	3.49	21.53	3.50
Surface approach	45.16	6.37	45.00	6.27
Deep motive	22.16	4.00	21.91	3.86
Deep strategy	22.21	3.78	21.70	3.64
Deep approach	44.38	6.70	43.61	6.66
Achieving motive	21.65	4.49	21.11	4.45
Achieving strategy	21.49	4.53	20.01	4.25
Achieving approach	43.13	7.29	41.12	7.24

Table 2. Means and standard deviations for causal dimension, self-concept and learning approaches scales for the entire sam ple at Times 1 & 2.

academic self-concept were 0.78 and 0.79; for surface approach were 0.64 and 0.66; for deep approach were 0.73 and 0.76 respectively. The coefficient alphas for Time 1 and Time 2 measurements for the various scales were reasonably good and were considered adequate for research purposes (see Nunnally, 1978).

Descriptive Statistics

Table 2. shows the means and standard deviations of the causal dimensions, self-concept and learning approaches scales for the whole sample. Table 3 shows the statistics for the two discipine groups.

ANOVA on Causal Dimensions

Table 4 shows the ANOVA results for the causal dimension scales. The F-statistics for Time, Discipline, and Time x Discipline interaction effects were presented.

Locus of Causality. The ANOVA results show that for locus of causality, there was a significant main effect of Time, $F(1, 503)=16.52$, $p < 0.001$. A significant main effect was also found for Discipline, $F(1, 503)=25.73$, $p < 0.001$. The interaction effect of Time x Discipline, however, was not significant.

The results for the entire sample showed that the mean score for locus of causality had reduced significantly from 19.59 in Time 1 to 18.70 in Time 2 indicating a tendency in the students generally becoming less internal in attributions as time went by. The same trend of reduction was found in both the Language/Health Studies and Construction/Engineering groups of students. The Construction/Engineering group showed lower mean scores in locus of causality than the Language/Health Studies group in both occasions (Means= 18.84 & 17.94 for CE group and 20.32 & 19.44 for LHS group in Time 1 and Time 2 respectively).

Personal Control. The main effects of Time and Discipline were both found to be significant for the personal control dimension. For Time, $F(1,502)=7.33$, $p < 0.001$ and for Discipline, $F(1,502)=16.41$, $p < 0.01$. The interaction effect was not significant. The mean scores for the whole sample has dropped significantly from 19.08 in Time 1 to 18.48 in Time 2. The overall trend has reflected that, in general, the participants have weakened in their belief that learning was within their control. The CE group also obtained lower mean scores than the LHS group for personal control over two occasions (Means=18.48 & 17.88 for CE group and 19.66 & 19.07 for LHS group for Time 1 & Time 2 respectively).

Stability. For the stability dimension, only the Time main effect was significant, $F(1, 507)=10.44$, $p < 0.001$. There was a general drop in scores in the stability dimension in attributions as time went by. This trend applied to the entire sample and there was no significant difference between the two groups of participants.

External Control. For this causal dimension, only the main effect of Discipline was

Scale	Time 1				Time 2			
	LHS		CE		LHS		CE	
	M	SD	M	SD	M	SD	M	SD
Causal Dimension								
Locus of causality	20.32	4.05	18.84	4.02	19.44	4.14	17.94	4.23
Personal control	19.66	4.32	18.48	3.99	19.07	4.08	17.88	4.12
Stability	15.78	5.22	15.48	4.60	15.12	4.63	14.56	4.25
External control	12.42	4.52	13.62	4.36	12.39	4.21	14.30	3.99
Self-Concept								
Maths self-concept	16.66	5.88	18.81	6.60	17.49	6.28	18.92	6.32
Verbal self-concept	19.03	4.32	18.64	3.97	19.40	4.67	19.41	3.62
Academic self-concept	35.66	7.37	37.38	8.86	36.91	8.50	38.30	7.93
Self-regard	22.45	4.56	22.10	4.32	22.28	4.28	21.77	3.94
Social esteem	17.17	5.57	17.36	5.11	17.72	5.46	18.50	5.22
Physical appearance	18.40	4.08	18.90	3.58	19.07	3.60	19.43	3.30
Physical ability	19.83	5.87	20.10	4.74	19.88	5.64	20.32	4.41
Perceived parental acceptance	22.63	4.64	21.78	3.75	22.36	4.26	22.04	3.28
Social anxiety	23.15	5.96	23.39	5.60	23.54	5.87	23.30	5.20
Learning Approaches								
Surface motive	22.87	4.00	24.06	3.94	22.83	3.80	24.18	3.68
Surface strategy	21.34	3.77	21.98	3.16	21.26	3.64	21.80	3.39
Surface approach	44.31	6.46	46.00	6.15	44.10	6.46	45.91	5.95
Deep motive	22.55	4.22	21.58	3.78	22.48	3.86	21.33	3.77
Deep strategy	22.32	3.85	21.92	3.63	22.16	3.87	21.23	3.35
Deep approach	44.85	6.98	43.50	6.31	44.64	6.93	42.54	6.25
Achieving motive	20.81	4.84	22.37	4.04	20.31	4.72	21.87	4.05
Achieving strategy	21.19	4.70	21.72	4.33	19.87	4.30	20.13	4.22
Achieving approach	42.05	7.77	44.03	6.70	40.22	7.63	41.98	6.82

Table 3. Means and standard deviations for causal dimension, self-concept and learning approaches scales for the language and health studies (LHS) and the construction and engineering (CE) groups at Times 1 & 2.

	Effects		
Scales	Time F-value	Discipline F-value	Time x Discipline F-value
Locus of causality	16.52**	25.73**	0.00
Personal control	7.33*	16.41**	0.00
Stability	10.44**	1.63	0.28
External control	2.07	25.40**	2.60

* $p < 0.05$ ** $p < 0.01$

Table 4. Summary F-statistics from Time x Discipline ANOVA for causal dimensions scales

significant, F (1, 502)=25.40, $p < 0.001$. The CE group scored significantly higher in external control than the LHS group (Means=13.62 & 14.30 for CE group and 12.42 & 12.39 for LHS group for Time 1 and Time 2). This indicated that when comparing the two groups, the CE group was more external-oriented than the LHS group and this trend remained unchanged over time.

ANOVA on Self-Concept

Table 5. shows the F-statistics for the self-concept scales. For mathematics self-concept, verbal self-concept, academic self-concept, social esteem and physical appearance, all had shown significant Time or Discipline differences.

Mathematics self-concept. The ANOVA results showed that there was a significant main effect for Discipline F (1, 497) = 11.49, $p < 0.001$ whereas the main effect for Time was n ot significant. There were no significant interaction effect of Time x Discipline either. The mean score for the LHS group was significantly lower than the CE group and this trend remained the same over time (Means=16.66 & 17.49 for LHS group and 18.81 & 18.92 for the CE group in Times 1 and 2)

Verbal self-concept. The results indicated that Time has shown significant main effect on the verbal self-concept of the entire sample, F (1, 500) = 12.79, $p < 0.001$. There was no significant Discipline main effect nor interaction effect. There was a general increase in verbal self-concept for both groups as time went by (Means=18.84 & 19.41 for CE and 19.03 & 19.40 for LHS in Times 1 and 2).

Academic Self-Concept. This was an aggregated variable which was derived from combining the mathematics and verbal self-concept scores. There was a significant Time effect, F (1, 490)=15.66, $p < 0.001$. The main effect of Discipline of study was also significant, F (1, 490)=5.12, $p<0.05$. However, the interaction effect of Time x Discipline was not significant.

The mean score for academic self-concept in Time 1 and Time 2 for the whole sample were 36.52 and 37.60 respectively showing that there was a significant gain over the academic year. The CE group obtained significantly higher academic self-concept scores than the LHS group. (Means=37.38 & 38.30 for CE and 35.66 & 36.91 for LHS in Times 1 and 2).

ANOVA on Learning Approaches

Table 6 shows the ANOVA results for the six subscales and the three approaches to learning. For the surface approach, there was a significant main effect for Discipline, F (1, 499)=13.44, $p < 0.001$, but no significant main effect for Time was found. The interaction effect of Time x Discipline of study was also insignificant. There was no significant change in the surface approach scores of the students over the year indicating that the surface approach had remained quite stable (mean scores for Time 1 and Time 2 were 45.16 and 45.00 respectively). However, comparison of the two groups shows that the CE group scored significantly higher in

Scale	Effects		
	Time F-value	Discipline F-value	Time x Discipline F-value
Maths self-concept	5.99*	11.49**	3.53
Verbal self-concept	12.79**	0.31	1.61
+Academic self-concept	15.66**	5.12*	0.35
Self-Regard	0.95	2.37	1.20
Social Esteem	19.89**	1.22	2.31
Physical Appearance	15.96**	2.15	0.22
Physical Ability	0.73	0.67	0.28
Perceived Parental Acceptance	0.00	3.49	2.27
Social Anxiety	0.60	0.00	1.38

* $p < 0.05$ ** $p < 0.01$ + Maths and verbal self-concept combined

Table 5. Summary F-statistics from Time x Discipline ANOVA for personality and academic self-concept scales

Scale	Effects		
	Time F-value	Discipline F-value	Time x Discipline F-value
Surface motive	0.05	20.19**	0.18
Surface strategy	0.59	4.89*	0.08
Deep motive	0.80	12.49**	0.25
Deep strategy	6.29*	5.61*	2.56
Achieving motive	6.38*	20.85**	0.00
Achieving strategy	63.85**	1.30	0.54
Surface approach	0.28	13.44**	0.04
Deep approach	4.09*	11.12**	1.69
Achieving approach	40.88**	10.66**	0.13

* $p < 0.05$ ** $p < 0.01$

Table 6. Summary F-statistics from Time x Discipline ANOVA for learning approaches scales

the surface approach than the LHS group (Means=46.00 & 45.91 for CE and 44.31 & 44.10 for LHS for two occasions.). This indicated that the former group reported adopting a more superficial approach to learning than the latter group.

For the deep approach, the Time main effect was significant at 0.05 level, $F(1, 500)=4.09$, $p < 0.05$. The Discipline of study main effect was also significant, $F(1, 500)=11.12$, $P = 0.001$. However, the interaction effect of Time x Discipline was not significant. For the entire sample, the results have shown that there was a significant drop in the students' scores on the deep approach to learning (mean scores were 44.38 and 43.61 for Time 1 and Time 2, respectively). The students have apparently become 'less-deep' as time passed by. For the two groups, the LHS group (M=44.85 & 44.64 for Time 1 & Time 2) scored significantly higher in the deep approach than the CE group (M=43.50 & 42.54 for Time 1 & Time 2) indicating that the former group of students adopted a deeper approach to learning than the latter group.

For the achieving approach, both the Time and Discipline main effects were significant, $F(1,498) = 40.88$, $p < 0.001$, and $F(1, 498) = 10.66$, $p < 0.001$ respectively. However, the interaction effect of Time x Discipline was not significant. For the entire sample, the mean scores at time 1 and time 2 were 43.33 and 41.12 respectively showing a general decline in the participants' achieving approach to learning as time went by. In comparing the two groups, the LHS group (M=42.05 & 40.22 for Time 1 & Time 2) has shown a significantly lower score in achieving approach than the CE group (M=44.03 & 41.98 for Time 1 & Time 2).

ANOVA on Academic Achievement

For academic achievement, the results showed that neither Time nor Discipline had any significant main effect. The interaction of Time x Discipline was also non-significant. For the entire sample, the achievement level has remained quite stable over time. There were no significant differences between the two discipline groups either.

Discussion

Longitudinal Changes

The ANOVA results showed that for the four causal dimensions scales, all, except for external control, have shown significant main effect of Time. There were significant changes in locus of causality, personal control and stability over time for the entire sample. For the self-concept scales, academic self-concept, mathematics self-concept and verbal self-concept all showed significant main effects of Time. For learning approaches, both deep and achieving approaches showed significant main effects of Time as well.

While these scales have shown developmental changes over time, the direction and magnitude of changes, however, varied for different variables. For locus of causality, personal control, and stability, there was an overall significant reduction in the mean scores whereas for external control, there was an increase. This indicated that the students in general have become

less internal and has reduced their belief in personal control. The opposite trend was seen in the self-concept scales as academic self-concept, mathematics self-concept and verbal self-concept all showed a gain in the mean scores over time. For the learning approaches, except for surface approach which had no significant change over time, both deep and achieving approaches have shown a significant reduction in mean scores during the time interval.

Within the first year of study in the university, the students' scores in internality decreased, i.e. they became 'less internal' as time went by. They also showed weaker belief in personal control over their academic studies. Factors that affect academic achievement were perceived by the students as becoming less stable. For the deep approach to learning, there was also a reduction in scores which indicated that students' intrinsic interest in learning declined and they were less likely to employ meaningful learning strategies as they progressed through their first year of study. This finding was consistent with research findings in previous studies in Hong Kong Chinese university students. Gow & Kember (1991) and McKay (1995) had reported that students became 'less deep' in their learning approach as they progressed through their studies at the same university where the present study took place.

The causes for the decline in scores in internal attributions and in deep approach could be complex. It is speculated that the conditions in the learning environment may have influenced students' attributions for academic performance. It has also been claimed that contextual factors influence the learning approaches the students adopt. Previous research findings have suggested that contextual factors such as methods of assessment can influence the way students learn (Entwistle, 1987; Newble & Clarke, 1986; Ramsden, 1984). Students learn in ways that they perceive will meet or satisfy the requirements of their study. Their perception of the task demand will affect their learning strategies.

In a study of how Hong Kong students cope with assessment, Tang and Biggs (1996) found that Hong Kong Chinese students responded to the assessment requirement and developed their coping strategies according to their perception of the task demand. When students perceived that task demand in the particular learning environment could be coped with by the surface strategy, it was likely that they adopted the surface approach and moved away from the deep approach.

Whether the decline in internality and deep approach in the present sample was due to different practices in the assessment procedures cannot be taken with absolute certainty at this point. Until further evidence is available, this can only remain a speculative explanation.

With regard to self-concept of the participants, there was an increase in academic self-concept scores for the entire sample over time. A plausible explanation for the gain in academic self-concept was due to the prior success in academic achievement of the students. Hong Kong students gained access into university through a series of highly competitive examinations. To obtain a place in university was a sign of great academic achievement and of personal glory. Admission into university reflects one's academic success, which a student could be proud of. It could be argued that if self-concept is a consequence of achievement, it would not be a surprise to find that first year students were confident in their academic ability and develop higher academic self-concept. However, how the initial high self-concept

enhanced further increase during the first year of study is complex and would require further investigation.

Comparison Between Groups

The ANOVA results also revealed that there were significant differences between the two discipline groups. The main effect for Discipline was found in locus of causality, personal control, and external control. Students of the language and health studies (LHS) group scored higher for locus of causality, personal control, and deep approach than students of construction and engineering group (CE) at both Time 1 and Time 2 measurements. Conversely, the CE students scored higher than the LHS students for external control, academic self-concept, surface approach and achieving approach to learning on the two occasions of measurement.

With respect to group differences it was revealed that LHS students showed more internal attributions than the CE students did. LHS students have been shown to believe that academic studies were, relative to their CE peers, more dependent on factors that reside within themselves such as ability and effort, and that they take more personal responsibilities over their learning. The LHS students have also shown to adopt a deeper approach to studying than the CE students.

Peers and Johnston (1994) had suggested that perhaps in language and social sciences studies, acquiring factual knowledge was not as important as to assimilate and organize unfamiliar material, whereas in some other disciplines, acquisition of knowledge and the habit of accumulating factual information might be more emphasized. Other researchers also suggested that science students tend to have higher scores on surface approach than arts students, while the reverse is true for deep approach (Biggs & Kirby, 1983; Ramsden & Entwistle, 1981; Watkins & Hattie, 1981). Following the same line of thought, one might speculate whether such conjecture also applied to the LHS group whose discipline was art and social science oriented whereas the CE discipline was more science-oriented.

Newble and Clarke (1986) argued that although it was likely that some of the differences in students' learning approaches might relate to students' choices of subjects which appear to be more compatible with their preferred learning style, there were undoubtedly a considerable contextual influence. Generally, different contextual factors are found in different disciplines of study and learning approaches do vary between disciplines. Departmental differences in terms of curriculum content, methods of teaching, assessment procedures, workload amount, availability of study skills support can influence learning approaches. Ramsden and Entwistle (1981) also claimed that the ways in which courses are organized and taught may affect students' approaches to learning. They pointed out that students respond to the context of learning as defined by the teaching and assessment methods of academic departments. Some departments and some lecturers seemed to facilitate a deep approach, while others used methods of teaching, or set course work demands that could force students into adopting surface approach. Entwistle and Entwistle (1991) showed that some methods of assessment in use at universities encourage superficial learning and militate against the development of conceptual understanding. Whether the findings that the CE students were 'less internal' in causal attributions and 'less deep' in learning approaches than the LHS students was due to different characteristics in their respective

	Mean	S.D.	1	2	3	4	5	6	7	8	9
Locus of causality											
1. Time 1	19.69	4.14	1.00								
2. Time 2	18.67	4.27	.31**	1.00							
Academic self-concept											
3. Time 1	36.70	8.89	.11	.11	1.00						
4. Time 2	37.69	8.90	.10	.18**	.74**	1.00					
Surface approach											
5. Time 1	45.16	6.37	-.11	-.03	-.16**	-.13*	1.00				
6. Time 2	45.00	6.27	-.05	.00	-.01	.02	.47**	1.00			
Deep approach											
7. Time 1	44.38	6.70	.05	.10	.14*	.14*	.04	.02	1.00		
8. Time 2	43.61	6.66	.16**	.19**	.10	.19**	-.03	.17**	.54**	1.00	
Academic achievement											
9. Time 1	0.00+	1.00+	.02	.08	.06	-.01	-.01	-.10	.02	-.04	1.00
10. Time 2	0.00+	1.00+	.02	.09	.05	.07	-.06	-.05	.10	.11	.26**

*p<0.05 ** p<0.01 + standardized scores retest correlations are underlined

Table 7. Means, standard deviations and correlations of locus of causality, academic self-concept, surface approach, deep approach and academic achievement for the whole sample

	Factor loadings		Uniqueness	
	Time 1	Time 2	Time 1	Time 2
Locus of causality				
LC1	.62	.56	.62	.68
LC2	.82	.86	.32	.27
LC3	.65	.74	.58	.46
Academic self-concept				
Math	.26	.25	.93	.94
Verbal	.55	.74	.70	.46
Surface approach				
Surface motive	.53	.58	.72	.66
Surface strategy	.86	.84	.27	.29
Deep approach				
Deep motive	.56	.65	.69	.57
Deep strategy	.90	.87	.19	.25
Academic achievement	.91	.92	.17	.16

Table 8. Factor loadings and uniqueness on the latent variables of locus of causality, academic self-concept, surface approach, deep approach and academic achievement

learning environments was difficult to determine at this stage. Follow-up studies, preferably using the qualitative approach would be needed to investigate the contextual influences that may have caused the differences.

As far as academic self-concept was concerned, the CE students exhibited higher academic self-concept than the LHS students did. This phenomenon might be interpreted in the light of sex differences. An analysis of the students statistics revealed that a high percentage of the LHS group was female (67%) whereas the male constituted the majority of the CE group (81%). The significant difference between the two groups in academic self-concept could be seen as a difference between male and female students. A separate analysis of variance with repeated measures comparing the mean differences of academic self-concept of male and female students had been carried out. The results showed that the Gender main effect was significant indicating that the male students had a significantly higher academic self-concept than the female students. Previous research studies have reported that Chinese male students assumed higher self-concept than female students (e.g. see Cheng, 1997; Drew and Watkins, 1996; Lau, 1989). In the traditional Chinese cultural and social context where the male still takes up a dominant role and status in society and family, it is not surprising to find that male students tend to assume a more favourable image of themselves than their female counterparts.

Results (2)

RISREL Analysis

Table 7 shows the intercorrelations of locus of causality, academic self-concept, surface approach, deep approach and achievement for the entire sample. The correlations between Time 1 and Time 2 of the variables themselves were all significant at 0.05 level. Table 8 shows the LISREL results which indicated the factor loadings of the observed variables and their uniqueness on locus of causality, academic self-concept, learning approaches and academic achievement. All the factor loadings were significant at 0.05 level. The significant factor loadings for the various variables have confirmed the relationship between locus of causality, academic self-concept, learning approaches and their observable indicators. They generally supported the construct validity for the various construct in the model.

The LISREL results also showed that the goodness-of-fit index (GFI)=0.95, the adjusted goodness-of-fit index (AGFI)=0.92; and the Tucker-Lewis Index (TLI)=0.93. The chi-square statistics =310.90, df=141, N=549. The X^2/df ratio (2.2) also showed that the data fitted the model well.

As can be seen from Figure 1 the final results of the model show that all the variable at Time 1 made positive and significant contributions to the same variables at Time 2. The beta coefficients for locus of causality, academic self-concept, surface approach, deep approach and academic achievement from Time 1 to Time 2 were 0.41; 0.73; 0.67; 0.61 and 0.32 respectively. Locus of causality at Time 1 had a positive and significant influence on deep approach at Time 2 (beta coefficient=0.13). Deep approach at Time 1 also had positive contribution to academic achievement at Time 2 (beta coefficient=0.11) The signinficant paths indicated that locus of

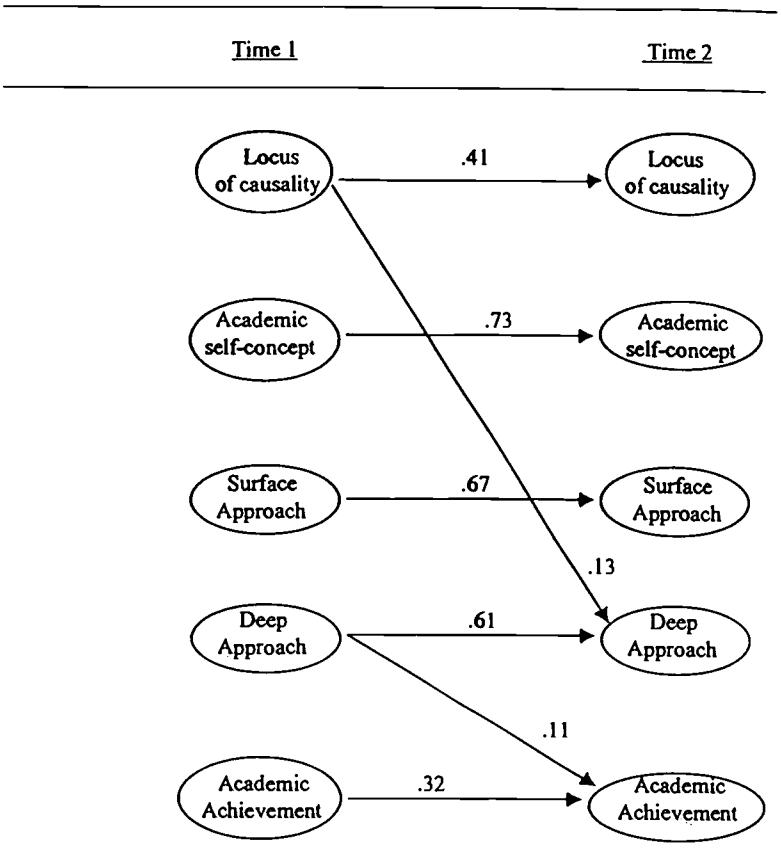

Figure 1. The final model of causal relationships (with beta weights) among locus of causality, academic self-concept, surface approach, deep approach and academic achievement using longitudinal data.

causality had causal predominance over deep approach whereas deep approach had causal predominance over academic achievement.

Discussion

With longitudinal data, the causal influences of locus of causality, academic self-concept, learning approaches on academic achievement could be examined in better clarity. For all the variables, Time 1 measurement had a direct contribution to their values at Time 2, i.e. their autoregressive paths were all significant. Locus of causality had a positive influence over deep approach which in turn had a positive effect on academic achievement. Locus of causality did not have any significant direct causal effect on academic achievement. Its influence on achievement was indirect via the learning approaches.

The lack of a direct relationship between motivational orientation variables and achievement have been reported before in the study carried out by Greene and Miller (1996). They tested the causal relationship between goal orientations, perceived ability, cognitive engagement and midterm test performance and found that there was no direct causal effect from goal orientations to achievement. Attributions do not predict actual achievement directly, but rather predict performance mediators such as self-esteem, self-efficacy, effort, affect, motivation and expectations. Attributional beliefs themselves may not directly cause achievement but may do so via some other variables. Attributions may affect academic achievement via variables such as those concerned with the quality of instruction, learning processes or learning strategies (Graham, 1991; Perry, 1993). On the other hand, an examination into how attributions affect the cognitive processes that are causally related to achievement can be important for our understanding of the relationship between attributions and achievement (Graham, 1991; Stipek and Weisz, 1981). The results of this study supported such claim.

Even though locus of causality did not have a direct influence on achievement, it had, however, a direct positive contribution to the deep approach to learning. The deep approach in turn had a positive direct effect on academic achievement. There was no direct significant path from academic self-concept to surface approach, deep approach, or academic achievement. The direction of causality in the causal model was from locus of causality to deep approach to academic achievement.

Locus of causality had a direct causal influence over deep approach. This finding is consistent with previous research findings which showed that internality is significantly related to deep approach to learning (Biggs, 1987a; Ramanaiah, Ribich and Schmeck, 1975; Sherman, 1985; Watkins, 1987; 1996). It appears that the belief that factors affecting learning reside within an individual is more likely to encourage a deeper approach to learning. McCombs, (1986); Zimmerman and Martineq-Pons (1990) also pointed out that the belief in internal factors and the ability to control one's own learning is important if high quality outcomes are to be achieved. Watkins (1987) also suggested that internality may be a prerequisite for a student to adopt a deep/achieving approach to their learning.

With regard to academic self-concept, it was found to be related to locus of causality, surface approach and academic achievement within each measurement occasion. However, no significant causal influence over surface approach, deep approach and achievement was found (its causal paths from Time 1 to Time 2 to these variables were not significant). The influence of academic self-concept on achievement has always been a controversial issue (see Reynold, 1981). On the one hand, Reynold et al (1980) reported that the correlations between academic self-concept and grade-point-average for an overall college sample was 0.49 and for freshmen, r=0.40. Thomas et al (1987b) and Wilhite (1990) also found that there was a positive relationship between academic self-concept and course achievement for college students. Yet on the other hand, Platt (1988) using structural equation modeling procedures to investigate the relationship reported an absence of a direct effect of academic self-concept on academic achievement. In a recent structural equation modeling study with longitudinal data on the causal ordering of academic self-concept and academic achievement, Helmke and Aken (1995) did not find any causal influence of academic self-concept on academic achievement either. It was suggested that prior self-concept did not significantly contribute to the prediction of subsequent achievement. In the present study, even though academic self-concept was found to have significant correlations with other variables within each of the two measurement occasions, the motivational properties of self-concept were perhaps not lasting enough to cause a significant effect on achievement over time.

The causal modeling results showed that the deep approach to studying had a direct causal influence on academic achievement. Conceptually, deep approach has been considered an important factor for students' learning progress at tertiary level. However, the results of this study showed that the magnitude of effect was very small. Its practical influence was close to negligible.

Although researchers have claimed that a deep approach to learning would lead to better learning outcomes, it does not necessarily relate to achievement performance. Watkins and Hattie (1985) in their study of the learning approaches of Australian tertiary students reported that the depth of the approach the students adopted did not correlate with achievement grade. Clarke (1986) found no correlations between learning orientations and end-of-year assessments for medical students. In a more recent study in the relationship between approaches to studying and academic performance, Provost and Bond (1997) found that deep approach did not predict academic performance in any way, while the surface approach had only a very small negative relationship with academic achievement. Again, in another similar study by Fogarty and Taylor (1997), it was also reported that the deep approach was not related to academic performance whereas the surface approach was negatively correlated with academic progress.

Research evidence has shown that learning approaches may not be a good predictor of achievement in the quantitative sense. A deep approach may bring about a deeper level of understanding of the learning materials and subsequently result in a better quality of learning outcome. However, this would not necessarily be reflected in achievement grades (Biggs, 1987a; Entwistle and Entwistle, 1991; Trigwell and Prosser, 1991; Watkins and Hattie, 1985).

Conclusions

This study has explored two important areas in longitudinal perspective. Firstly, it examined the developmental changes of causal attributions, academic self-concept, learning approaches and academic achievement. It also explored the differences for these variables between the language and health studies students and the construction and engineering students. Causal dimensions, academic self-concept, and learning approaches have showed significant change over time for the sample under study. These variables have changed as the students progressed through their first year of study at the university. In general, students have exhibited a decrease in internal attribution and a drop in deep approach to learning. Apart from this, the two discipline groups differed significantly in most of the variables. The construction and engineering group tended to be less-internal in attribution and less-deep in learning approach than the language and health studies group. As disciplines of study could be a reflection of contextual characteristics such as teaching methods or assessment procedures, it was suggested that the differences could be attributed to some contextual factors in the learning environment.

Second, the study has tested the causal influence of attribution, self-concept and learning approaches on academic achievement by using longitudinal data. The causal influence of these variables on academic performance, though significant, was relatively weak. The findings suggested that student cognitive and affective characteristics and the learning processes are theoretically important factors that affect academic achievement but they alone could not explain adequately academic performance. Previous research studies maintained that contextual characteristics are important factors for cognitive, motivational and affective characteristics of the learners (Peer & Johnston, 1994; Ramsden,1984; Entwistle and Entwistle, 1991; Marsh, 1984; Thomas et al, 1987b). It was hence suggested that contextual factors such as course requirements, workload pressure or methods of assessment may need to be taken into consideration in achievement outcome studies.

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