

Locus of control and metacognition in open and distance learning: A comparative study of low and high achievers*

Olugbemiro Jegede¹
Rocky Y.K. Fan²
May S.C. Chan²
Jessie Yum¹
Margaret Taplin¹

¹ – Centre for Research in Distance & Adult Learning
² – School of Science & Technology
The Open University of Hong Kong
Hong Kong SAR, China

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LOCUS OF CONTROL AND METACOGNITION IN OPEN AND DISTANCE LEARNING: A COMPARATIVE STUDY OF LOW AND HIGH ACHIEVERS*

Olugbemiro Jegede
Rocky Y.K. Fan
May S.C. Chan
Jessie Yum
Margaret Taplin

The Open University of Hong Kong
Hong Kong SAR, China

Abstract

Amongst the list of variables which intervene in achievement-oriented studies, locus of control and metacognition have been found to exert considerable effect. The literature reports that in face-to-face traditional mode of learning, locus of control is associated with need for achievement, and a high desire to assume personal responsibility for performing a task. It also impacts on the correlation between academic achievement and internal belief. Similarly, metacognitive variables have been shown to be conceptually and theoretically linked to depth of perceptual processing in learning. Given the peculiar circumstances of learning at a distance in an isolated environment militated against by a myriad of personal, family and work-related issues, it is most probable that these two variables could in fact exert greater influence in distance learning than in traditional mode of education. This reason, above all others, warrants that the study of locus of control and metacognition is given greater attention than they have enjoyed in open and distance learning.

A total of 712 OUHK students, sampled from high achievers and low achievers as defined by their performances in their overall course scores in four consecutive semesters, participated in the study. An instrument, the Survey of Students' Study Preferences and Habits, developed and validated for the study was also used to collect data from the students who participated. The data collected through this instrument was complemented with in-depth telephone interviews using a sub-set of 32 from the main study sample.

The analysis of the data using both qualitative and quantitative methods which include descriptive and inferential statistics showed very interesting patterns of differences in locus of control and the use of metacognitive strategies by low achievers and high achievers. For instance high achievers rated themselves significantly higher than low achievers ($p < .01$) in a number of scales such as confidence with studies, ability to cope well with studying in distance learning mode, and motivation by the need to avoid failure. High achievers indicated that they always employed some strategies to learn in manners which showed significant differences ($p < .01$) from the way the low achievers learned to learn. For example, high achievers always tried to understand thoroughly the meanings of what they were asked to read, regulated their learning strategies to fit the purpose of study, and linked new knowledge to previous learning. The implications of these results to instructional design, material development, counselling and support services among others have been discussed in the paper

Introduction and Theoretical Background

Contemporary developments in investigations about and on learning appear to give more emphasis on attributional theory. This theory pertains to the tendency for learners to make self-attributions for one positive behaviours as they contribute or help to explain success with meaningful learning. The literature on attributional theory relating achievement outcomes to situational and personal variables implicates several factors which include achievement-related outcomes (Nathawat, Singh & Singh, 1997), motivational and non-motivational explanations (Nisbet & Ross, 1980), internality, stability and globality (Feather, 1983), locus of control (Ward, 1994; Riipinen, 1994) and metacognition (Romainville, 1994). Two of these factors, although central to but least investigated in the distance mode of learning, are locus of control and metacognition.

Locus of control (LOC) refers to a person beliefs about control over life events and describes individual differences (see Phares, 1976) as well as predicts behaviour in organisational settings (see Spector, 1982). LOC beliefs can either be internal (the feeling of personal responsibility for the things that happen to a person) or external (the feelings that events in a person life are determined by forces beyond his/her control). While the latter is fatalistic and seems to encourage resignation to whatever happens with little effort for change, the former is self-searching and has the tendency to be motivational leading to the need to take personal responsibility to make success happen. According to some earlier studies (Singh and Nathawat, 1989; Zuckerman, 1997), the reason positive outcomes, rather than negative outcomes, result in more internal attributions of a stable and global nature is that people tend to maintain and enhance their self-esteem by taking credit for success and avoiding self-blame for failures.

Distance education places heavy emphasis on individual management of and control of prevailing circumstances to engender meaningful learning leading to high achievement. It can therefore be hypothesised that any distance learner who maintains a fatalistic view (external belief) about determinants of successful learning may encounter a less than desirable level of achievement in their studies. Riipinen (1994) has argued that there are firm theoretical grounds for associating the need for achievement with locus of control. He opined that people with high need for achievement have a strong desire to assume personal responsibility for performing a task, tend to set difficult goals, and have a strong desire for performance feedback' (p. 577). The literature on motivation, a variable related

to locus of control and achievement, indicates that internal locus of causality is associated with intrinsic motivation. The need for achievement may be considered as a conceptualisation of intrinsic motivation because the need for competence and self-determination is characteristic to this motivation (Deci and Ryan, 1991). However, the literature is not affirmative regarding the relationship or association between the need for achievement and LOC especially regarding face-to-face mode of studies in educational institutions. On one hand, some studies (see Riiipinen, 1994; Phares, 1976; Findley and Cooper, 1983) have revealed that academic achievement correlates moderately with more internal beliefs. On the other hand, some studies did not reveal any correlation between academic achievement and locus of control (see Stipek and Weisz, 1981; Findley and Cooper, 1983). Some of the reasons suggested for the nonassociation of need for achievement and LOC are the presence of defensible external beliefs and situational cues. In order to better understand learning and achievement within educational settings and for appropriate provision of essential learning support and guidance for students, it is highly desirable that the issue of association between need for achievement and LOC be definitive. Part of the objective of this study, was an attempt to make empirical contributions to the literature in this area which might help to resolve the controversy.

Although some factors such as those mentioned above have repeatedly been mentioned as mediating the association between achievement and LOC, there are indications that some other factors such as age, gender, and race might be contributory to the strength and not the existence of association (Findley and Cooper, 1983; Riiipinen, 1994). It may well be that other dependent variables such as previous study experiences, study habits, purpose for learning, use of support systems, other commitments, motivational factors, or self-perceptions could be implicated. Distance learning involves the need to balance several factors within very complex and intertwined social, domestic and workplace environments. Perhaps investigation into locus of control should also take cognisance of variables which might be contributory, or mediating either in stand-alone forms or in combination with others as students attempt to grapple with studies. Additional to the fact that these factors have not been extensively investigated in education, our extensive review of the literature indicates that the relationship between locus of control and achievement has not been studied in distance education let alone the issue of looking into all the ramifications of the strength or existence of relationships among the variables. With the wide spread of distance learning and the ever-growing demand for this mode of education around the world, it is imperative that LOC and achievement be investigated to illuminate studying by the distance mode. On the basis that there is indication in the literature suggesting association between level of achievement and locus of control, it was hypothesised in this study that

subjects with high level of achievement needs would exhibit more internal beliefs. A second hypothesis for this aspect of the study was that a combination of the need to achieve and factors relating to distance studies itemised above may suggest different associations of need of achievement with LOC. Subjects with a high level of achievement and a combination of other factors have different LOC beliefs than subjects with low level of achievement.

Metacognition has been defined variously by different authors. It, however, generally refers to a learner awareness of or control over cognitive processes (Bessant, 1997). It represents how learners learn to learn within the framework of human information processing (Flavell, 1979; Glaser, 1984; Garner and Alexander, 1989). As explained by Flavell (1979), metacognitive knowledge can lead a learner to select, evaluate, revise, and abandon cognitive tasks, goals, and strategies in light of their relationships with one another and with a learner ability and interest in what is being learned. While cognitive strategies deal with learning, metacognitive strategies deal with how learning is monitored, organised and reflected upon as the process continues. Metacognition consists of two distinct aspects: knowledge about and regulation of cognition which Garofalo and Lester (1985) have argued as necessary for information processing.

The application of metacognitive studies has essentially focused on instructional activities that aim to foster students' ability to construct knowledge, and how metacognition affects academic performance. The concern about the difficulties students have with learning in higher education has led to a number of studies which attempt to unravel specific issues implicated in learning (Biggs, 1986; Lawson, 1984; Entwistle & Ramsden, 1983; Marton & Saljo, 1984, Tang, 1998). Romainville (1994) asserts that university students must be able to manage their own cognitive strategies for them to succeed. Students must be able to adapt the strategies to their personal characteristics and to the context of their learning. The first stage in this process is probably that students, must be aware of their cognitive strategies and should be able to describe and critically reflect on them. Indeed, according to Romainville (1994), the high failure rate experienced at the end of the first academic year in continental universities is adduced to the absence of appropriate and guided use of metacognitive strategies and of studies to improve understanding of the difficulties students face in learning at the university level.

Although some studies have been reported on metacognitive strategies of university students in the traditional face-to-face mode of education (see Flavell, 1979; Biggs, 1986; Glaser, 1989; Garner and

Alexander, 1989; Bessant, 1997; Romainville, 1994), those investigating the phenomenon in the distance education mode are rather scanty. Recent studies in this regard have touched on the novice expert shift issue (Jegade, Naidu, Taylor & Carr-Spencer, 1995; Taylor, Jegede & Naidu, 1995). For students who study on their own remotely distant from their tutors, peers and other support facilities, understanding and guiding their metacognitive strategies appear to be of utmost importance. Understanding their knowledge about their learning and how they regulate their learning within a mesh of several intervening variables which include personal, occupational and learning difficulties would provide open and distance learning institutions to better tailor instructional materials and teaching to suit the personal characteristics of adult learners and context of learning.

In some recent studies with on-campus face-to-face university students, it was found that a relationship exists between academic performance and some students' metacognitive knowledge characteristics (Romainville, 1994). In addition, it was revealed that high achieving students seem to be aware of more cognitive rules and to evoke metacognitive knowledge about cognitive processes and cognitive results. They have also been found to be able to describe more frequently, in comparison with their low achieving counterparts, their cognitive strategies. One purpose of this study is to investigate the potential relationship between university distance education students' achievement level and metacognitive strategies. Are higher achievers, for example able to manage their cognitive strategies more effectively than low achieving students as measured by the final semester examinations? This study therefore hypothesised that there is a positive relationship between students' cognitive proficiency and their metacognition. If a relationship exists between the two variables mentioned, are students able to describe how their level of performance and ability to identify the various characteristics of the metacognitive strategies they employ in the study of their course materials? For example, do high achieving learners question ideas presented in their study materials when reading them; and do they reflect on the processes they use in learning and the decisions made in their learning? This study also attempts to investigate the knowledge which some selected Open University of Hong Kong students can articulate about their cognitive strategies.

Methodology

Instrumentation

In order to find out about the nature and extent of the factors affecting students' achievement, a questionnaire was developed to measure six aspects: background information about previous study experiences; study habits; purpose for learning; approaches to study; use of support systems; other commitments and self-perceptions. To ensure content validation, items were selected from submissions drafted independently by members of the research team and examined collectively by the team for their consistency with the theoretical framework. A pilot study was conducted with a sample of 61 students who did not participate in the main study. Based on the results from the pilot, the length, arrangement and some wordings of questionnaire items were modified. The final instrument showed a high reliability coefficient of 0.83. Cronbach alpha coefficients were calculated for sections pertaining to self-perception, other commitments, work-related factors, cognition, perceived difficulties, and help-seeking. Four of these were above the value of 7.0 that is generally accepted as an indicator of internal consistency, while two others, self-perception and other commitments, were 6.5 and 6.8 respectively.

The questionnaire was followed up by a semi-structured telephone interview. Items were developed to explore the key findings of the questionnaire in greater depth. The interviews, which were conducted in Cantonese, were tape-recorded and transcripts were summarised in English. In order to validate these transcriptions, three members of the research team listened to a random selection of the tape recordings and agreed that the transcriptions were accurate reflections. The issues that were explored in the interview were: the choice of study place, the way students balance their studies with work, family and social commitments, preferred ways of organising their study time, learning strategies, self-perceptions, use of student support services and help-seeking behaviours.

Sample

A sample of 3173 high achieving and low achieving students was selected from all the courses which were examined in August 96, February 97, August 97 and February 98. For this study, high achievers and low achievers are defined as the top 5% of students listed in the

achievement ranking list for a course and the bottom 5% of students listed in the achievement ranking list for a course respectively.

It should be noted that the low achievers group encompasses students who did poorly, as well as those who failed to complete all course requirements. It was considered to be important to include both of these categories of student, since both can be considered as having failed to achieve. 726 questionnaires were returned (24.2%), of which 712 were valid. 460 of these (63.4%) were from the group of high achievers, and 252 (34.7%) were from the group of low achievers. The other 14 were invalid because they were returned incomplete.

The sub-sample for the follow-up interview was selected randomly from a pool of respondents who indicated on their questionnaire that they were willing to be interviewed and to provide contact details. The size of this sub-sample was restricted by the need to maintain a balance between high and low achievers in foundations and non-foundations courses, and was therefore determined by the number of volunteers in the smallest cell, 8. Consequently, a total of 32 students were interviewed.

Results

The report in this paper is only a part of a larger study as described earlier and will therefore focus exclusively on locus of control and metacognitive strategies as they relate to the achievement level of distance education students at the Open University of Hong Kong. Other aspects of the study have been reported elsewhere (Chan, Jegede, Fan, Taplin, Yum, 1999; Fan, Taplin, Chan, Yum & Jegede, 1999; Taplin, Yum, Jegede, Fan & Chan, 1999). Therefore, this study, also being rather exploratory, will merely report on a number of factors which the students, through their responses to questionnaire and telephone interview, suggest could be connected to their level of performance.

Descriptive and inferential statistics were employed to analyse the data from the responses of the subjects of the study. Four levels of analysis were undertaken in order to provide a comprehensive set of results examining all related issues germane to the study. The first level analysis engaged descriptive statistics to analyse the mean scores and standard deviations on all the items related to locus of control and metacognition. This was followed by the use of inferential statistics to seek for any significant differences in the responses of the high and low achievers on all the items related to locus of control and metacognition. The items which recorded statistical significance ($p < .01$) were

isolated and used for the third level of analysis which compared the mean scores for low and high achievers on locus of control and metacognition according to three independent variables of course registration (foundation/non-foundation), level of education (up to form five/above form five) and gender (male/female). This third level analysis also incorporated test of the interaction effect using multivariate analysis of variance on the three independent variables and the two dependent variables of locus of control and metacognition. The fourth level of analysis focused on the use of path analysis to determine association and the strength of such association amongst all the variables identified in the study as affecting achievement.

Table 1 contained the results of the exploratory analysis for level of achievement and locus of control. The mean scores for low achievers ranged from 2.31 (S. D = .94) to 3.47 (S. D. = .91) while those for the high achievers used in this study ranged from 2.20 (S. D. = .92) to 3.85 (S. D. = .80) respectively. When the differences in the mean scores between high and low achievers in each item on locus of control were compared, the t-test results indicated that significant differences ($p < .01$) were recorded in seven out of 13 items. The differences showed that high achievers were significantly more confident with their studies, tended to be perfectionist, were competitive, interested in achieving excellence and success, motivated by the need to avoid failure, and able to cope with studying in a distance learning mode. On the other hand, the results showed that low achievers were significantly more likely to be satisfied to do just the minimum requirements needed to succeed. High achievers would persevere more in the face of failure.

TABLES 1 & 2 HERE

Table 2 contained the results of the exploratory analysis for level of achievement and metacognitive skills or strategies. Compared with the results on locus of control, the means for metacognition are generally much lower. The mean scores for low achievers ranged from 2.63 (S. D = 1.09) to 3.87 (S. D. = .76) while those for the high achievers used in this study ranged from 2.49 (S. D. = 1.07) to 3.87 (S. D. = .76) respectively. When the differences in the mean scores between high and low achievers in each item on metacognitive skills were compared, the t-test results revealed that only three items indicated significant differences ($p < .01$). Significant differences to the advantage of the high achievers were found in items relating to if the learners tried to understand thoroughly

the meanings of what I was asked to read', regulated my learning strategies to fit the purpose of study', and linked new knowledge to my previous learning'. The results also showed that for the item which concerned if students concentrated on memorising enough to pass the assignments and exam without worrying about understanding' although the mean difference was shown not to be significant low achievers recorded higher mean score (Mean = 2.64, S. D. = 1.04) than higher achievers (Mean = 2.49, S. D. = 1.07).

The next group of results is on the comparisons of the mean scores for high and low achievers that were found to be statistically significant in the first set of the general analyses. These subsequent analyses were done for the independent variables of course registration, educational level, and gender regarding locus of control. Table 3 indicated that when the mean scores on the responses of high and low achievers registered in foundation courses were compared on their locus of control, only two items, achieving excellence and success' and able to cope well' were significant ($p < .01$). High achievers recorded higher means than low achievers in these two items. The situation is quite different for those registered in the non-foundation courses. The results on Table 4 showed that significant differences were recorded for all the seven items. While the high achievers recorded significantly higher means in six of the items, low achievers recorded a higher mean score in one item, satisfied to do just minimum requirements'. This means that for the locus of control variable it is more likely for low achievers in non-foundation courses to be easily content with just minimal success. Tables 5 and 6, which contained results for educational background of the low and high achievers with regard to LOC, followed exactly the same patterns as were found for course registration. It also means that it is more likely for low achievers than for their high achieving colleagues with educational level of above form five to be easily content with just minimal success. Tables 7 and 8 pertain to the comparison of means scores by gender on LOC. Results in Table 7 indicated that high achieving males are significantly more able to cope well', motivated by the need to avoid failure', work towards achieving excellence and success', competitive' and confident with my studies' than their low achieving counterparts. Table 8 indicated that significant differences between high and low achieving females were recorded for all items except being able to cope well', while the low achievers are significantly more likely to be satisfied to do just minimum requirements'.

TABLES 3 TO 8 HERE

The analyses done for the three independent variables for the metacognition are contained in Tables 9, 10 & 11. Table 9 showed that the differences in the mean scores were statistically significant ($p < .05$) for non-foundation courses only, with high achievers recording higher means than the low achievers. With regard to educational level as shown in Table 10, only two items recorded significant differences in the perception of low and high achievers. High achievers with an educational level of form five and below were more likely to 'link new knowledge to learning' than their low achieving colleagues, while for those with educational level above form five, high achievers are more significantly likely to use 'regulated learning strategies to fit purpose'. With regard to gender and metacognition, Table 11 indicated that while both low and high achieving males recorded comparable mean scores in the three items, female high achievers recorded significant mean differences with regard to two items: 'tried to understand the meaning of the readings', and 'regulated learning strategies to fit purpose'.

TABLES 9 TO 11 HERE

The third level of analyses of the results of this study with regard to LOC and metacognition used the multivariate analysis of variance (MANOVA). For the multivariate analysis of variance, a two-way fixed-effects model with interaction was used for the 2X2 matrix of achievement and the independent variables taken one at a time. Four commonly used test statistics for multivariate analysis are Pillai trace, Wilks' lambda, Hotelling trace, and Roy largest root. Of the four test statistics, Wilks' lambda has the virtue of being convenient and related to the likelihood-ratio criterion. However, for the kind of exploratory analysis and the type of results we sought in this study, Pillai trace was found to be the most robust and powerful tool amongst the four as recommended by Olsen (1976)

TABLES 12 TO 14 HERE

The results of the multivariate analysis on locus of control are as shown on Tables 12 to 14, while the ones for metacognition are shown on Tables 15 to 17. In cases where the F statistics are significant, they indicated that changes in the level of achievement is affected by the independent variable examined. For LOC, the results on Table 12 indicated that there is no interaction between

level of achievement and course registration, however as shown on Tables 13 and 14, there are some significant interactions between education level and achievement; and gender and achievement. The results translate to mean that the higher the education level of a learner, the more s/he is able to use LOC to enhance achievement, and that gender is associated with the use of locus control for achievement purposes. These results on gender and achievement confirm the ones discussed for Tables 7 and 8 above which indicated that for both males and females, high achievers are more likely to use the LOC to positively affect their achievement in distance learning.

TABLES 15 TO 17 HERE

The result of the multivariate analysis for metacognition as shown on Tables 15, 16 & 17 indicated quite the opposite as found for LOC. None of the three independent variables of course registration, educational level and gender indicated any significant interactions with level of achievement of the students who participated in this study.

The final and fourth level of analysis was the use of the path analytical model to examine the strength and pattern of association with all the variables. The use of structural equation modelling was done using AMOS graphics version 3.6. This analysis used the nested model procedure as suggested by Maruyama (1998). After subjecting the nested models to statistical comparisons using the change in the chi-square with degrees of freedom, it was found that the four-factor model was the most suitable and therefore used. The nested models' had four major variables with two groups each. These variables are called the latent factors and are achievement, course registration, educational level and gender. Figure 1 and 2 contained the results for all indicators, including the goodness-of-fit and the probability level of the chi-square. The results indicated that the chi-square ($\chi^2 = 394.03$ and $\chi^2 = 565.23$) for both the locus of control and metacognition respectively were significant at $p < .01$.

A number of factors correlated quite well with LOC and metacognition. For LOC, achievement correlated significantly but negatively with personal characteristics ($R = -.22$, $p < .01$), and positively with commitment ($R = .13$, $p < .01$), while LOC correlated significantly with persistence ($R = .49$, $p < .01$), with support ($R = .16$, $p < .01$), with personal characteristics ($R = .20$, $p < .01$), and with metacognition ($R = .23$, $p < .01$). With metacognition, achievement correlated significantly with

commitment ($R = .13, p < .01$), and negatively with personal characteristics ($R = -.21, p < .01$). While persistence correlated significantly with gender ($R = .11, p < .01$), metacognition correlated significantly with organisational style ($R = .24, p < .01$), with personal characteristics ($R = .13, p < .01$) and with locus of control ($R = .30, p < .01$).

Discussion and Implications

Concerned that the literature on attributional theory relating achievement outcomes to locus of control (Ward, 1994; Riipinen, 1994) and metacognition (Romainville, 1994) is sparse, this study set itself to investigate a number of issues. A major aim was to bring to the fore two factors which are central to but least investigated in the distance mode of learning, and to contribute to the limited information currently available. First, it tested the hypothesis that there is a relationship between LOC and metacognition, between achievement and LOC on one hand and between achievement and metacognition on the other. Second, it sought to find out if variables such as previous study experiences, study habits, purpose for learning, use of support systems, other commitments, persistence, motivational factors, organisational style, level of course registration, educational level, help seeking, co-operation with other students, or self-perceptions could be implicated with LOC, metacognition and achievement. Third, two secondary hypotheses were tested. These were that (i) there is a positive relationship between students' cognitive proficiency and their locus of control, and (ii) that there is a positive relationship between students' cognitive proficiency and their metacognition. Fourth, this study also attempted to investigate the knowledge which some selected Open University of Hong Kong students can articulate about their cognitive strategies.

In summary, the results showed a number of trends with the subjects used in this study. The results on LOC showed that high achievers were significantly more confident with their studies, tended to be perfectionist, were competitive, interested in achieving excellence and success, and motivated by the need to avoid failure and able to cope with studying in a distance learning mode. On the other hand, the results showed that low achievers were significantly more likely to be satisfied to do just the minimum requirements needed to succeed. High achievers persevere more in the face of failure. These results relating achievement to LOC agree with earlier findings of Riipinen (1994), Phares (1976) and Cooper (1983) but not with those reviewed by Stipek and Weisz (1981). The following excerpts from responses during the interview sessions illustrate the points being made very vividly.

guess yes. You would work hard if you've this standard. I don't think that you would put much effort in doing such if you only think of getting the minimum. For example, I would continue make revision on the assignment until I am satisfied with it if I want to get a better grade. You don't want to improve the assignment anymore if you think that as long as you meet the minimum then you let it be.”

admitted I did extra work. I did look for other books besides the course materials and textbook. I also discussed the questions with friends and colleagues at work from outside.”

believed that this course was different from other management courses, the marking would be lower if I didn't provide the accurate answers. I could just write up a whole paragraph with a conclusion at the end for the other courses. However this one was based on the mathematics' theories which directly effect whether they're right or not. So I thought that I should do more exercises. You know better with more practices and you will be better off.”

With regard to metacognition and achievement, the means for metacognition are comparatively generally much lower. High achieving distance learners more likely 'tried to understand thoroughly the meanings of what I was asked to read', 'regulated learning strategies to fit the purpose of study', and 'linked new knowledge to my previous learning'. The results also showed that for the item which concerned 'if students 'concentrated on memorising enough to pass the assignments and exam without worrying about understanding' although the mean difference was shown not to be significant low achievers recorded higher mean score. According to many of the students as typified by the quotes from two of them:

es. I got better memorisation to the answers.
ust did more exercises and memorise all the definition and pass papers.”

The following excerpts from students responses to interview questions which probed into their metacognitive strategies revealed that both the high and low achievers do not really have any organised way of doing their studies meaningfully. In addition, from the previous interview notes quoted above, they merely relied on being proficient in memorisation of facts to pass examinations.

ometimes. Highlighted. I would summarise for those that I didn't understand. Jotted down the point at the margin in which related to my daily living. I put labels on those that I think were important as referencing so that I could easily locate the information in class.

he most important factor was to arrange a timetable to read the suggested reading, do the assignment, follow the course guide, and attend the tutorials. I tried to prepare and then jot down as much notes as I could while attending the tutorial. I would also mark down the suggestions and opinions given by the colleagues or tutor so that later on when I re-read the materials I still had the

important points. The most important was to arrange the time I believed and not to go behind the scheduled of the suggested reading. As long as one followed the scheduled of the suggested reading given by the tutor then he/she should be all right. “

didn't (do any of the above). I just read and remember as much as I could. I did if I was able to reread. I didn't use any strategies. I do believe that there should be more tutorials. More group study with colleagues and tutor is better I think. At that time there was problem”

ctually I had taken this course two times already and I felt that there was a problem. I had taken four examinations and deceived two times and failed every time. I was not sure whether I was reading the materials details or not. Even I read in details, when it came to the examination I didn't need to answer the materials from books in which I think that I should be using those information. I didn't think that I was able to answer since all the questions were related to problem solving on the examination. So I believed that I should read some extra curriculum materials other than the course materials. There were examples on problem solving materials on the textbook for me to look at. “

These results implicate the need for further investigation as to the causes of low metacognitive strategies by distance education learners. It may well be that environmental and cultural factors come into play here (Watkins and Biggs, 1996).

Regarding LOC and some independent variables, the results seem to confirm that certain factors relating to distance studies suggest different levels of association of need of achievement with LOC. For an example, as the results indicated, high achievers registered in foundation courses and with qualification of matriculation and above were more likely than their low achieving counterparts to strive towards, 'achieving excellence and success' and 'able to cope well' with their studies. But for those registered in non-foundation courses and with qualification lower than matriculation level, low achievers were more likely to be easily 'satisfied to do just minimum requirements'. This means that for the locus of control variable it is more likely for low achievers in non-foundation courses to be easily content with just minimal success. Results in Table 7 indicated that high achieving males are significantly more 'able to cope well', 'motivated by the need to avoid failure', work towards 'achieving excellence and success', 'competitive' and 'confident with my studies' than their low achieving counterparts. High achieving exhibited more internal beliefs than lower achieving females, while the low achievers females are significantly more likely to be satisfied to do just minimum requirements'.

When the three independent variables were considered with metacognition, higher achievers in non-foundation courses showed greater metacognitive application. High achievers with an educational

level of form five and below were more likely to 'link new knowledge to learning' than their low achieving colleagues, while for those with educational level above form five, high achievers are more significantly likely to use 'regulated learning strategies to fit purpose'. With regard to gender and metacognition, while no difference were found between low and high achieving, female high achievers more than their low achieving counterparts 'tried to understand the meaning of the readings', and 'regulated learning strategies to fit purpose'

While no interaction was found between level of achievement and course registration, some significant interactions were discovered between education level and achievement; and gender and achievement when LOC was considered. The result of the multivariate analysis for metacognition shown quite the opposite as found for LOC. None of the three independent variables of course registration, educational level and gender indicated any significant interactions with level of achievement of the students who participated in this study. Again, these results appear to substantiate the assertion that some other personal and demographic factors including gender might be contributory to the strength of association but not necessarily determine the essence of such association (see Findley and Cooper, 1983; Riipenen, 1994).

Path analyses revealed that the two factors of locus of control and metacognition show some association when considered in relation to achievement in distance learning. However for both locus of control and metacognition, those who rated their personal ability as high seemed to achieve lower than others who did not, while achievement level was found to be positively associated with other personal commitments. This is somehow opposed to what should normally be expected. It says that the more pressure students encounter the more they are determined to succeed. The results regarding LOC also showed that those who are more persistent with their studies, seek the use of support services and rate themselves with high ability to succeed have higher internal belief. Metacognition seemed to be associated with organisational style of learning, and with the way learners rate their ability. Finally, the results indicated that male students showed more persistence in their distance education than their female peers. Given the myriad of domestic and personal problems that might plague females more than males, one should not be too surprised this result. And yet, as mentioned earlier understanding distance learners' knowledge about their learning and how they regulate their learning within a mesh of several intervening variables such as personal, occupational and learning difficulties is central to the success tailoring instructional materials and

teaching to suit the personal characteristics of adult learners and their peculiar context of learning. This certainly begs the need for an extensive more in-depth study with a larger sample spread across other distance learning institutions in order to critically determine how to deliver instruction at a distance to students who are already handicapped by personal and environmental factors they come across while opting to study at a distance.

The results obtained in this study did not show that our subjects engaged in meaningful metacognitive strategies to monitor, organise and reflect upon their information processing. Indeed, as Romainville (1994) has suggested, the results here confirm that low achievement could be adduced to the absence of appropriate and guided use of metacognitive strategies. We support the call which he has made for studies to improve understanding of the difficulties students face in learning at the university level.

Conclusion

Results from a study such as this, which may probably have suffered from design, should necessarily be treated with caution. Given that we used a limited sample drawn from only one distance education institution, broad generalisations from this one shot investigation may be spurious and fraught with some dangers. However, one cannot but point out the glaring salient conclusions which seem to arise from the study, tentative as they may be. One might conclude on the basis of the results of this study and of earlier studies mentioned above, that distance learners with high level of achievement needs would exhibit more internal beliefs. Second, another conclusion is that a combination of the need to achieve and factors relating to distance studies itemised in this study suggests different associations of need of achievement with LOC. Third, while the study may have established that there is a positive relationship between students' cognitive proficiency and their metacognition, there was nothing pointing to the fact that higher achievers are able to manage their cognitive strategies more effectively than low achieving students. In addition, while the students used in this study were able to describe their level of performance and ability to identify the various characteristics of the metacognitive strategies they employ in the study of their course materials, they opined that they hardly question ideas presented in their study materials when reading them neither do they reflect on the processes they use in learning and the decisions made in their learning. In other words, whereas the Open University of Hong Kong students who participated in this study

seemed to be very alert to knowledge about cognition, regulating their cognition is very much lacking in the way they study at a distance..

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About the Authors

This is one of a series of four papers reporting on a project titled 'Factors that enhance high achievers' success in open learning: A comparative case study of high achieving and low achieving students at OUHK' to be presented in a symposium at the AAOU Conference. The first author of this paper, Olugbemiro Jegede, is Professor and Director, Centre for Research in Distance & Adult Learning at The Open University of Hong Kong. Prior to this he was Foundation Head of the Research and Evaluation Unit, Distance Education Centre, the University of Southern Queensland, Toowoomba, Queensland, Australia. He was also the Foundation Dean and Professor at the Faculty of Education, The University of Abuja, Nigeria. He is the Editor-in-Chief of the electronic *Journal of Instructional Science and Technology* and serves on the Board of a number of other journals in distance and open learning, science education, and computer-mediated communications.

Table 1: Comparison of the mean scores for low and high achievers on Locus of Control

Item	Achievement Level	Mean	SD	df	Mean difference	t
confident with my studies.	high	3.77	.74	705	.39	6.50*
	low	3.37	.83			
dependent on my course co-ordinator/tutor to tell me what to learn.	high	2.77	1.08	702	1.31E-02	.152
	low	2.76	1.12			
a perfectionist.	high	3.12	.89	693	.20	2.97*
	low	2.91	.83			
satisfied to do just the minimum requirements.	high	2.65	1.02	694	-.22	-2.86*
	low	2.88	.94			
competitive (i.e. I strive to do things better than other people).	high	3.41	.91	695	.36	4.78*
	low	3.05	1.03			
interested in achieving excellence and success (more than money or status).	high	3.85	.80	698	.38	5.76*
	low	3.47	.91			
persevering in the face of failure.	high	3.17	.87	692	7.57E-02	1.14
	low	3.09	.79			
motivated by the need to avoid failure.	high	3.53	.88	694	.24	3.52*
	low	3.29	.83			
able to cope well with studying in distance learning mode.	high	3.72	.78	702	.35	5.41*
	low	3.37	.88			
regarding failure positively as a way to improve next time.	high	3.40	.84	697	-1.18E-03	-.02
	low	3.41	.88			
blaming difficulties or failure on my lack of effort.	high	2.85	1.01	696	-.13	-1.63
	low	2.98	.98			
blaming difficulties or failure on my lack of ability.	high	2.52	.92	693	-2.17E-02	-.30
	low	2.54	.88			
blaming difficulties or failure on something beyond my control (e.g. bad luck or bad teaching).	high	2.20	.92	695	-.11	-1.48
	low	2.31	.94			

- p<.01

Table 2: Comparison of the mean scores for low and high achievers on Metacognition

Item	Achievement Level	Mean	SD	df	Mean difference	t
questioned ideas presented in my study materials when reading them.	High	3.26	.77	703	4.08E-02	.65
	low	3.22	.83			
put a lot of effort into trying to understand the difficult parts.	High	3.65	.90	704	2.29E-02	.33
	low	3.62	.86			
reflected on the processes I used and the decisions I made in my learning.	High	3.17	.74	693	5.14E-03	.09
	low	3.17	.65			
looked for multiple solutions to any particular problems given.	High	3.15	.84	703	-1.82E-02	-2.8
	low	3.17	.80			
tried to understand thoroughly the meanings of what I was asked to read.	High	3.87	.76	703	.18	2.81*
	low	3.69	.88			
tried to think about the implications of what I read	high	3.61	.81	705	7.65E-03	.12
	low	3.60	.82			
read extra materials beyond what the study materials recommended.	High	2.71	1.13	703	8.20E-02	.93
	low	2.63	1.09			
regulated my learning strategies to fit the purpose of study.	High	3.33	.85	703	.21	3.11*
	low	3.12	.89			
linked new knowledge to my previous learning.	High	3.49	.88	705	.17	2.58*
	low	3.31	.84			
related what I have learnt to daily applications.	High	3.27	.96	701	1.11E-02	.15
	low	3.26	.89			
concentrated on memorising enough to pass the assignments and exam without worrying about understanding.	High	2.49	1.07	703	-.14	-1.72
	low	2.64	1.04			

* p<.01

Table 3: Comparison of the mean scores for low and high achievers registered in Foundation courses on Locus of Control items found to be statistically significant ($p < .05$)

Item	Achievement Level	Mean	SD	df	Mean difference	t
Confident with my studies	high	3.62	.72	93	.20	1.244
	low	3.42	.82			
Perfectionist	high	2.96	.88	90	.10	.561
	low	2.86	.87			
Satisfied to do just minimum requirements	high	2.65	1.04	90	-.23	-1.077
	low	2.88	1.00			
Competitive	high	3.29	.94	90	7.46E-02	.378
	low	3.22	.94			
Achieving excellence and success	high	3.83	.81	91	.49	2.946*
	low	3.34	.76			
Motivated by the need to avoid failure	high	3.40	.81	88	.23	1.309
	low	3.18	.81			
Able to cope well	high	3.63	.72	91	.41	2.759*
	low	3.21	.72			

* $p < .05$

Table 4: Comparison of the mean scores for low and high achievers registered in Non-Foundation courses on Locus of Control items found to be statistically significant ($p < .05$)

Item	Achievement Level	Mean	SD	df	Mean difference	t
Confident with my studies	high	3.79	.74	610	.42	6.423*
	low	3.36	.84			
Perfectionist	high	3.14	.90	601	.21	2.862*
	low	2.92	.82			
Satisfied to do just minimum requirements	high	2.65	1.02	602	-.22	-2.641*
	low	2.88	.93			
Competitive	high	3.43	.91	603	.41	4.989*
	low	3.02	1.04			
Achieving excellence and success	high	3.85	.79	605	.36	4.951*
	low	3.50	.93			
Motivated by the need to avoid failure	high	3.54	.89	604	.24	3.150*
	low	3.31	.84			
Able to cope well	high	3.73	.79	609	.33	4.627*
	low	3.40	.91			

* $p < .05$

Table 5: Comparison of the mean scores for low and high achievers with up to Form Five Educational level on Locus of Control items found to be statistically significant ($p < .05$)

Item	Achievement Level	Mean	SD	df	Mean difference	t
Confident with my studies	high	3.58	.68	216	.14	1.386
	low	3.44	.76			
Perfectionist	high	3.10	.84	215	.13	1.202
	low	2.97	.76			
Satisfied to do just minimum requirements	high	2.63	.98	212	-.23	-1.785
	low	2.87	.92			
Competitive	high	3.40	.92	211	.25	1.872
	low	3.15	1.01			
Achieving excellence and success	high	3.80	.86	215	.29	2.540*
	low	3.51	.84			
Motivated by the need to avoid failure	high	3.69	.84	212	.26	2.351*
	low	3.43	.76			
Able to cope well	high	3.61	.71	215	.27	2.548*
	low	3.35	.83			

* $p < .05$

Table 6: Comparison of the mean scores for low and high achievers registered with Educational Level of above From Five on Locus of Control items found to be statistically significant ($p < .05$)

Item	Achievement Level	Mean	SD	df	Mean difference	t
Confident with my studies	high	3.84	.74	450	.56	7.081*
	low	3.27	.87			
Perfectionist	high	3.14	.89	439	.28	3.037*
	low	2.86	.87			
Satisfied to do just minimum requirements	high	2.64	1.03	443	-.27	-2.592*
	low	2.91	.96			
Competitive	high	3.44	.91	445	.49	5.038*
	low	2.95	1.03			
Achieving excellence and success	high	3.89	.75	444	.49	5.871*
	low	3.40	.94			
Motivated by the need to avoid failure	high	3.47	.88	443	.31	3.519*
	low	3.16	.84			
Able to cope well	high	3.76	.79	448	.38	4.484*
	low	3.38	.93			

* $p < .05$

Table 7: Comparison of the mean scores for low and high achieving males on Metacognitive Skills items which were found to be statistically significant ($p < .05$)

Item	Achievement Level	Mean	SD	df	Mean difference	t
Confident with my studies	high	3.91	.75	338	.55	6.287*
	low	3.37	.84			
Perfectionist	high	3.12	.89	332	.17	1.717
	low	2.95	.89			
Satisfied to do just minimum requirements	high	2.67	1.08	331	-.22	-1.917
	low	2.89	1.02			
Competitive	high	3.39	.91	334	.31	2.819*
	low	3.08	1.09			
Achieving excellence and success	high	3.89	.80	334	.42	4.362*
	low	3.48	.95			
Motivated by the need to avoid failure	high	3.54	.94	330	.24	.386*
	low	3.30	.84			
Able to cope well	high	3.82	.77	337	.54	5.994*
	low	3.28	.89			

* $p < .05$

Table 8: Comparison of the mean scores for low and high achieving females on Locus of Control items which were found to be statistically significant ($p < .05$)

Item	Achievement Level	Mean	SD	df	Mean difference	t
Confident with my studies	high	3.66	.71	365	.28	3.249*
	low	3.38	.83			
Perfectionist	high	3.11	.90	359	.25	2.581*
	low	2.86	.75			
Satisfied to do just minimum requirements	high	2.64	.97	361	-.22	-2.017*
	low	2.86	.83			
Competitive	high	3.43	.92	359	.42	3.925*
	low	3.01	.95			
Achieving excellence and success	high	3.82	.79	362	.36	3.811*
	low	3.46	.85			
Motivated by the need to avoid failure	high	3.52	.84	362	.25	2.602*
	low	3.27	.83			
Able to cope well	high	3.64	.78	363	.15	1.620
	low	3.49	.85			

* $p < .05$

Table 9: Comparison of the mean scores for low and high achievers registered in Foundation and Non-Foundation courses on Metacognitive Skills items found to be statistically significant ($p < .05$)

Item	Achievement Level	Mean	SD	df	Mean difference	t
Foundation Courses						
Tried understand the meanings of the readings	high	3.98	.68	90	.30	1.868
	low	3.68	.85			
Regulated learning strategies to fit purpose	high	3.29	.78	91	.29	1.650
	low	3.00	.94			
Linked new knowledge to learning	high	3.39	.83	92	-3.19E-03	-0.18
	low	3.40	.85			
Non-Foundation Courses						
Tried understand the meanings of the readings	high	3.85	.77	611	.16	2.351*
	low	3.69	.89			
Regulated learning strategies to fit purpose	high	3.33	.86	610	.19	2.599*
	low	3.14	.88			
Linked new knowledge to learning	high	3.50	.88	611	.20	2.749*
	low	3.30	.84			

* $p < .05$

Table 10: Comparison of the mean scores for low and high achievers according to their Education Level on Metacognitive Skills items which were found to be statistically significant ($p < .05$)

Item	Achievement Level	Mean	SD	df	Mean difference	t
Form Five and Below						
Tried understand the meanings of the readings	high	3.86	.74	219	.20	1.881
	low	3.66	.87			
Regulated learning strategies to fit purpose	high	3.36	.85	218	.14	1.225
	low	3.21	.87			
Linked new knowledge to learning	high	3.49	.91	219	.29	2.457*
	low	3.20	.82			
Above Form Five						
Tried understand the meanings of the readings	high	3.85	.78	445	.15	1.853
	low	3.69	.89			
Regulated learning strategies to fit purpose	high	3.31	.85	446	.26	2.999*
	low	3.04	.89			
Linked new knowledge to learning	high	3.47	.86	447	.11	1.221
	low	3.36	.85			

* $p < .05$

Table 11: Comparison of the mean scores for low and high achievers according to Gender on Metacognitive Skills items which were found to be statistically significant ($p < .05$)

Item	Achievement Level	Mean	SD	df	Mean difference	t
Male						
Tried understand the meanings of the readings	high	3.86	.75	336	.15	1.701
	low	3.70	.90			
Regulated learning strategies to fit purpose	high	3.35	.88	336	.18	1.844
	low	3.17	.88			
Linked new knowledge to learning	high	3.52	.86	337	.18	1.925
	low	3.34	.86			
Female						
Tried understand the meanings of the readings	high	3.87	.76	365	.21	2.261*
	low	3.67	.86			
Regulated learning strategies to fit purpose	high	3.31	.83	365	.27	2.754*
	low	3.05	.89			
Linked new knowledge to learning	high	3.46	.88	366	.18	1.854
	low	3.28	.82			

* $p < .05$

Table 12: Multivariate analysis to test the interaction effects between Achievement (High/Low) and Course of Registration (Foundation/Non-Foundation) on Locus of Control

Variable	Pillai's Trace Value	F	Hypothesis df	Sig.	Noncentrality Parameter	Observed Power*
Intercept	.96	2285.30	7.0	.00**	15997.11	1.00
Level of Achievement	.04	4.32	7.0	.00**	30.24	.99
Course Registration	.01	.99	7.0	.43	6.93	.43
Achievement Vs Course Registration	.01	1.08	7.0	.37	7.56	.47

*computed using alpha=.05

** significant at $p < .05$

Table 13: Multivariate analysis of variable to test the interactions between Achievement (high/low) and Education Level (below form 5 and above form 5) on Locus of Control

Variable	Pillai's Trace Value	F	Hypothesis df	Sig.	Noncentrality Parameter	Observed Power*
Intercept	.95	1823.66	7.00	.00**	12765.65	1.00
Level of Achievement	.01	1.15	7.00	.32	8.07	.50
Education	.04	2.01	14.00	.01**	28.20	.95
Achievement Vs Education	.03	1.65	14	.05**	23.19	.89

*computed using alpha=.05

** significant at $p < .05$

Table 14: Multivariate analysis to test the interactions between Achievement (high/low) and Gender (male and female) on Locus of Control

Variable	Pillai's Trace Value	F	Hypothesis df	Sig.	Noncentrality Parameter	Observed Power*
Intercept	.98	4852.68	7.0	.00**	33968.81	1.00
Level of Achievement	.09	9.54	7.0	.00**	66.80	1.00
Gender	.01	.99	7.0	.43	6.95	.43
Achievement Vs Gender	.02	2.13	7.0	.03	14.94	.81

*computed using alpha=.05

** significant at $p < .05$

Table 15: Multivariate analysis to test the interactions between Achievement (high/low) and Course of Registration (Foundation/Non-foundation) on Metacognitive Skills

Variable	Pillai's Trace Value	F	Hypothesis df	Sig.	Noncentrality Parameter	Observed Power*
Intercept	.93	3406.73	3.00	.00**	10220.19	1.00
Level of Achievement	.01	3.10	3.00	.02**	9.31	.72
Course Registration	.00	.41	3.00	.74	1.25	.13
Achievement Vs Course Registration	.00	.96	3.00	.40	2.90	.26

*computed using alpha=.05

** significant at $p < .05$

Table 16: Multivariate analysis of variable to test the interactions between Achievement (high/low) and Education Level (below from 5 and above form 5) on Metacognitive Skills

Variable	Pillai's Trace Value	F	Hypothesis df	Sig.	Noncentrality Parameter	Observed Power*
Intercept	.91	2595.16	3.00	.00**	7785.48	1.00
Level of Achievement	.00	1.73	3.00	.15	5.21	.45
Education	.01	1.70	6.00	.11	10.21	.65
Achievement Vs Education	.00	.61	6.00	.72	3.67	.24

*computed using alpha=.05

** significant at $p < .05$

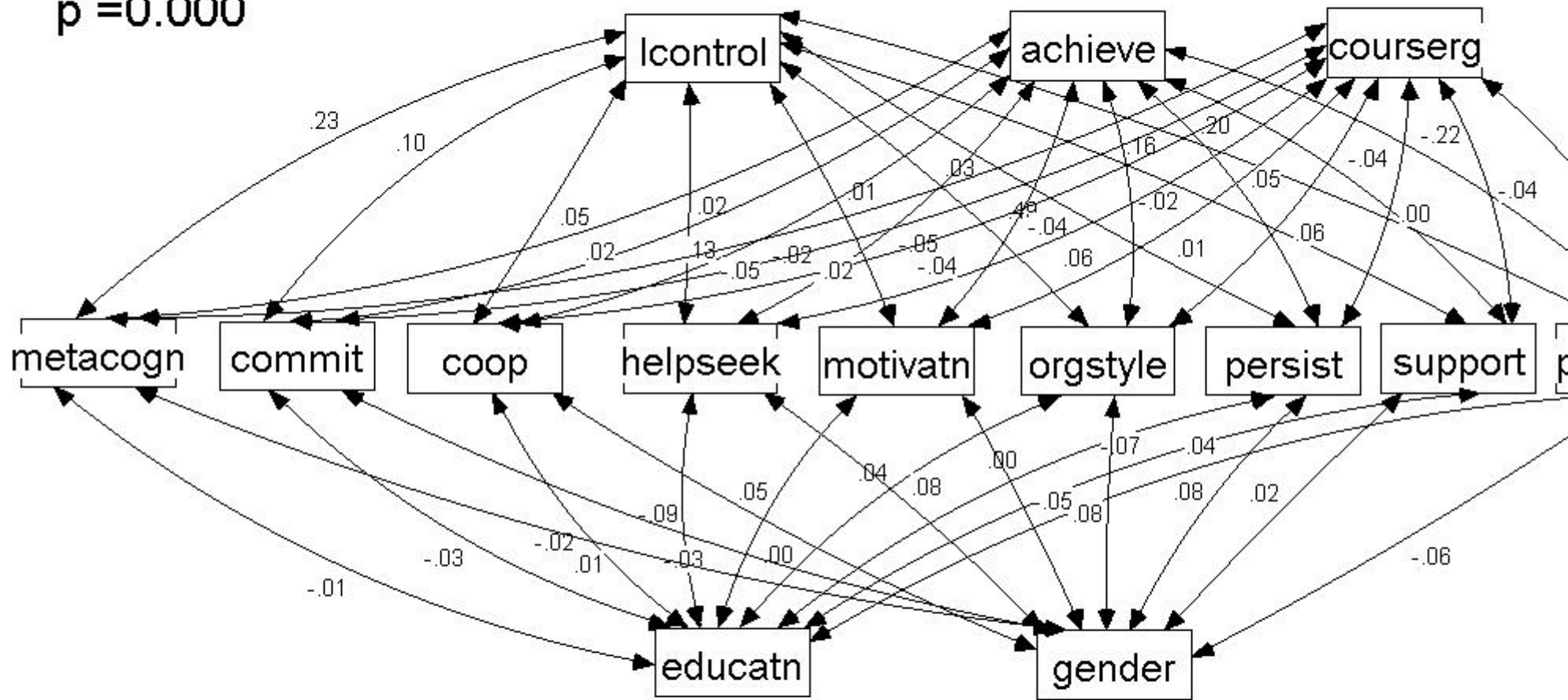
Table 17: Multivariate analysis of variable to test the interactions between Achievement (high/low) and Gender (male and female) on Metacognitive Skills

Variable	Pillai's Trace Value	F	Hypothesis df	Sig.	Noncentrality Parameter	Observed Power*
Intercept	.96	6889.20	3.00	.00**	20667.60	1.00
Level of Achievement	.02	5.19	3.00	.00**	15.58	.92
Gender	.00	.70	3.00	.54	2.12	.20
Achievement Vs Gender	.00	.23	3.00	.87	.70	.09

*computed using alpha=.05

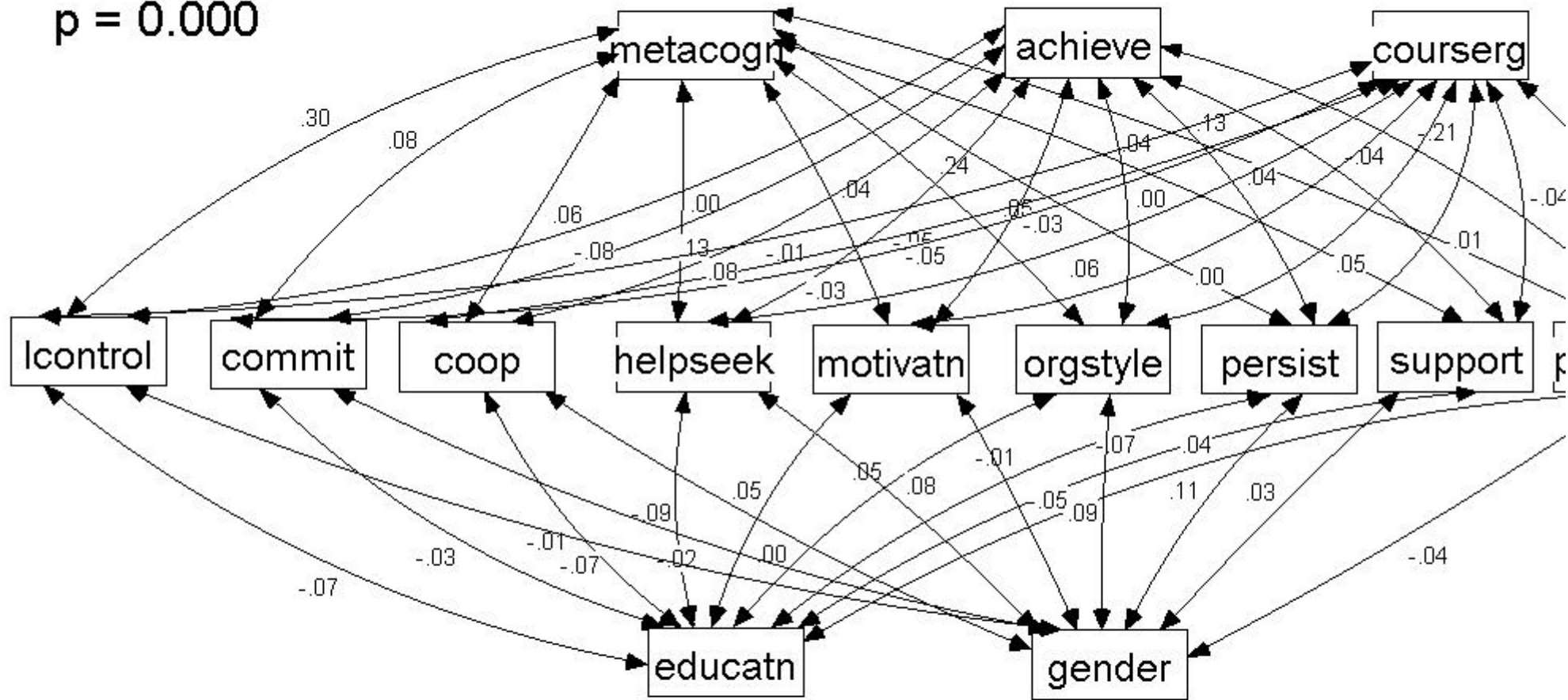
** significant at $p < .05$

chi square = 394.03
 df = 46
 p = 0.000



Title: Four-factor Recursive Model for Locus of Control (Achievement, Course Registration, Education and Gender) for High and Low Achieving Distance Learners

chi square = 565.23
 df = 46
 p = 0.000



Title: Four-factor Recursive Model for Metacognition (Achievement, Education, Course Registration and Gender) for High and Low Achieving Distance Learners

