

การเรียนรู้และกลยุทธ์ในการศึกษา กับผลสัมฤทธิ์ทางการเรียน

The Effects of Learning and Study Strategies on Academic Achievement

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บทคัดย่อ

วัตถุประสงค์ของงานวิจัยคือ 1) ศึกษาการใช้กลยุทธ์ในการเรียนของนักศึกษา 2) ค้นหากลยุทธ์ในการเรียนที่จำเป็นสำหรับนักศึกษาระดับมหาวิทยาลัย 3) ศึกษาปัจจัยที่ส่งผลให้นักศึกษามีเกรดเฉลี่ยต่ำและมีสภาพรอนิจ กลุ่มตัวอย่างเป็นนักศึกษามหาวิทยาลัยอัสสัมชัญ จำนวน 1,501 คน ผลการวิจัยพบว่า นักศึกษาภาควิชาภาษาอังกฤษธุรกิจ มีคะแนนเฉลี่ยสูงเกือบทุกสเกล ยกเว้นสเกลการจัดการความวิตกกังวล นักศึกษาคณะวิศวกรรมศาสตร์มีคะแนนเฉลี่ยสูงในเรื่อง กระบวนการใช้ความรู้ การจัดการความวิตกกังวล และกลยุทธ์เกี่ยวกับการสอบ โดยเฉพาะตัวแปรแรกสูงกว่าทุกกลุ่ม ส่วนอีก 4 สเกล คะแนนเฉลี่ยอยู่ในระดับค่อนข้างสูง มีเพียงสเกลเดียวที่ค่าเฉลี่ยต่ำ คือ กลยุทธ์การจัดสรรเวลาเรียน ส่วนอีกสามคณะ/ภาควิชา พบว่า มีคะแนนเฉลี่ยระดับปานกลาง หรือต่ำทุกสเกล อย่างไรก็ตามพบว่าทุกกลุ่ม มีคะแนนเฉลี่ยสูงสุดหรือสูงในเรื่องแรงจูงใจ และมีคะแนนเฉลี่ยต่ำสุดในเรื่องการจัดการความวิตกกังวล สำหรับกลุ่มนักศึกษาที่มีผลสัมฤทธิ์ทางการเรียนสูงมีคะแนนเฉลี่ยสูงในเรื่องแรงจูงใจ กระบวนการใช้ความรู้ กลยุทธ์เกี่ยวกับการสอบ และการจัดการความวิตกกังวล แต่กลุ่มที่มีผลสัมฤทธิ์ทางการเรียนต่ำ มีคะแนนเฉลี่ยสูงในเรื่องกลยุทธ์การจัดสรรเวลาเรียน การตรวจสอบงานตนเอง การแสวงหาความรู้ นอกจากนี้ยังพบว่า กลยุทธ์ในการเรียน

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สามารถจำแนกนักศึกษาที่มีระดับผลสัมฤทธิ์ทางการเรียนสูงต่ำต่างกัน 4 กลุ่มได้ถูกต้องถึงร้อยละ 43 ซึ่งพบว่าสูงพอ ๆ กับชุดตัวแปร ความมุ่งมั่นในเรื่องเรียน ทักษะภาษาอังกฤษ การคบเพื่อนที่รักเรียน รวมกับชุดตัวแปรภูมิหลังของนักศึกษา แสดงว่ากลยุทธ์ในการเรียนเป็นปัจจัยสำคัญต่อผลสัมฤทธิ์ทางการเรียนของนักศึกษามาก

Abstract

The objectives of the research were (1) to study the use of learning strategies of students(2) to find out crucial learning strategies necessary for students at the university level; and (3) to reveal the factors causing students to have low grades and to be on probation. The sample included 1,501 undergraduate students at Assumption University (ABAC). It was found that business English students had a high mean in every scale except anxiety. The engineering students had a high mean in information processing, anxiety management and testing strategies. The other four scales had rather high means and the only scale found to have a low mean was time planning and management. The other three groups had a moderate or low mean in every scale. However, all faculties were found to have the highest or a high mean in motivation scale and to have the lowest mean in anxiety management. The high academic achievement group had a high mean in motivation, information processing, testing strategies and anxiety management scales. The low academic achievement group had a high mean in time planning and management, self-testing, and information acquisition. Moreover, it was found that learning strategies can discriminate students with different degrees of academic achievement in 4 levels with 43 percent correct, which was more or less the same as the set of variables concerning study commitment, English language skills, and learned friends, and the set of background variables. The findings thus showed that learning strategies strongly influenced academic achievement.

Introduction

It is commonly agreed that academic achievement is affected by intelligence, aptitude, interest, learning competency, and study habits, etc. Recently, diverse groups of scholars have also paid great attention to self-regulated and study strategies. Although their studies differ in the number of dimensions they measured but the main issues remain quite the same. For example, Zimmerman and Martinez-Pons (1986) measured 15 dimensions of learning strategies using the total scale called "Self-regulated Learning Strategies", while Weinstein, Palmer and Schulte (1987) measured only 10 dimensions and used the total scale called "Learning and Study Strategies Inventories" (LASSI). The additional dimensions included by the former were request for social assistance from peers, relatives and teachers upon coming across study problems; reviewing notebooks, papers, and textbooks; and setting up of favorable environment for learning. These were claimed by the latter to have already been included in the ten dimensions they studied.

The Self-regulated Learning Strategies or the Learning and Study Strategies Inventories both entail assessment, control of learning behavior and learning environment which helps students achieve academic success. Zimmerman (1988) and Pintrich (1995) affirmed that self-regulated learning strategies could be acquired and developed and would help promoting learning, developing study skills, creativity, motivation, concentration and others that facilitated the academic achievement. Students who scored high in learning strategies would be those who were highly responsible for their study, and consistently worked out their study plan, because they believed that learning was a controllable

process. Hence, they always strived to find out an effective learning strategies to improve their study skills and knowledge, examine their learning at every stage, as well as set up favorable environment for learning.

This study is an integration of the two aforementioned concepts, with more emphasis on that of Weinstein, Palmer and Schulte (1987). The questionnaire was used in place of the interview. Only 8 dimensions or subscales were included, namely 1) time planning and management 2) motivation 3) concentration 4) information acquisition and selecting main ideas 5) anxiety management 6) information processing 7) self testing and 8) testing strategies. Other two dimensions, attitude and study aids, were thought to be already included in many dimensions mentioned above. Moreover, some research findings reported a high correlation between the two dimensions with other dimensions, for example, the correlation between attitude and motivation ($r = .41$); attitude and concentration ($r = .40$); attitude and testing strategies ($r = .49$). This is also the case with the study aids dimension, which was found to be highly correlated with the information processing ($r = .57$), and with self testing ($r = .58$) (Prus et al. 1995 : 14).

Although most studies agreed that learning and study strategies or self-regulated learning strategies affect academic achievement, but previous research findings were not consistent with one another. In most findings, there was a significant relationship only between academic achievement and some subscales. However, there was no agreement on which subscales were significant. For example, Seymour and others (1991), and Culick and Higginson (1989) found a positive correlation between GPA and study strategies in motivation, concentration and testing strategies. On the other hand, Nist and others (1990)

quoted by Albaile (1997:173) studied from 71 students and found out that motivation, anxiety management, concentration, and self-testing were moderately correlated to the first semester examination results ($r = .47, .48, .40,$ and $.39,$ respectively). Van Aardt and Van Wyk (1996:173) studied first year students from two faculties and found a high correlation between GPA of the final examination and motivation, time planning and management, anxiety management, concentration, selecting main ideas, and testing strategies. However, no relationship with any subscale was found at the beginning of the school year. His seeming explanation was that students at the beginning of their first year still used the learning strategies they had used while in high school. For faculty variable, no significant difference was found. Prus and others (1995) also studied first year college students and found that there was a significant relationship between GPA and motivation, time planning and management, testing strategies, self-testing, and concentration ($r = .32, .21, .20, .20,$ and $.19$ respectively). But in using multiple regression analysis, they found that only concentration had a significant correlation coefficient, and all the ten subscales could explain only 11.8 percent of the GPA, while the background variables (namely, gender, race, SAT score, and high school rank) could explain up to 37.6 percent of the GPA. A separate analysis of the colored students ($n = 84$) and the white students ($n = 229$) revealed in higher correlation coefficients ($r = .40, .28, .26, .22$ and $.22$ respectively) amongst the white. Amongst the colored students, most correlation were low only on one subscale, namely self-testing had a moderate correlation coefficient ($r = .23$).

Not many studies found a significant relationship between the two variables in all subscales or in the total score. For example, Zimmerman and Martinez-Pons (1986, 1988, 1990)

studied 80 to 90 high school students by the interview method and using standardized tests (numerical and verbal) for academic achievement instead of GPA. They found a high correlation between learning strategies and academic achievement. Lindner and Harris (1992) studied 160 students also found a high correlation ($r = .54$) between learning strategies and GPA. They concluded that self-regulated learning strategies affected academic achievement. McKeachie and others (1985) quoted by Albaile (1997:172), and reported that there was a significant correlation ($r = .38$) between the learning and study strategies (LASSI) and academic achievement in a sample of 193 first year college students.

Albaile (1997) studied LASSI of 168 students divided into three groups by their GPA, and found the difference in study strategies between the "low" group and the other two groups in all subscales, but no difference in even a single subscale between the "middle" and "high" groups.

Noticeably, most scholars studied students from only one faculty or one class; thus the sample size was small and homogeneous. Moreover the interview method was used to collect the data. No study was made for other relevant variables. This study therefore was aimed at extending the body of knowledge in this area by finding out the answers to the following issues:

Research Questions

1. Is there any difference in study strategies amongst students from different faculties and year of study ?
 2. How is the difference in study strategies among student groups with different level of academic achievement, and between students on probation and regular students ?
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3. Which study strategies subscales affect the academic achievement of students in each faculty ?

4. Are learning and study strategies as important to academic achievement as other relevant variables ?

Significance of the Study

1) The findings of this study can be used in the policy formulation regarding how to deal with low performance students, particularly with those on probation, from the very first moment when the learning problems begin to surface (at the end of the first year or the beginning of the second year).

2) The findings from the study can be used to formulate necessary and important learning strategies for students in each faculty

3) The findings can contribute to an academic pool of knowledge for researchers in education who might be interested in the same or similar area.

METHODOLOGY

Sample

The sample consisted of Assumption University students from the Faculty of Business Administration ($n = 870$); the Faculty of Arts ($n = 381$); the Faculty of Engineering ($n = 139$); the Faculty of BioTechnology ($n = 19$); the Faculty of Science and Technology ($n = 31$); the Faculty of Risk Management and Industrial Services ($n = 19$); and the Faculty of Communication Arts ($n = 22$). The sample also included other 20 students who did not specify their faculties. Therefore, the total subjects were 1,501 students who enrolled in the first semester of 1999.

Data Collection

An eight-page constructed questionnaire was used as the instrument. With the cooperation of the instructors, the students were asked to spend about 25 minutes to answer the questionnaire during the class period. The following sets of questions were included in the questionnaire:

1. Questions about student background: gender, age, high school study program, high school GPA, reasons for choosing ABAC, education and occupation of their parents.
2. Fifty-six questions about eight dimensions concerning learning and study strategies.
3. Twenty-five questions about five dimensions concerning the English language skills
4. Questions to assess the academic achievement: GPA at ABAC; probation status and number of times on probation, number of times getting grade F; number of times getting grade D; and number of times getting W, as well as their satisfaction with their own performance.
5. Questions about negative factors affecting their study, their probation status, obstacles to their study at ABAC, and the first four most difficult subjects
6. Questions about the nature of their close friends in the university concerning learning and study strategies
7. Questions about their commitment to study, their attendance to tutorial courses, and so on.

The questions on learning and study strategies made use of seven rating levels based on Likert's Scale, but the middle level was excluded in order to force the students to make an evaluation. The computation, however included all the seven rating levels. The questions concerned eight dimensions of the study strategies, each of which had seven questions.

These questions were developed on the basis of the concepts of Zimmerman and Martinez-Pons (1986) and Weinstein, Palmer and Shulte (1987). Some were adapted from those in the latter's study. Of all 56 questions, those that were highly correlated with the subscales, but slightly correlated to the total score were deleted from the total scale. For this reason six questions were removed and the total scale included only 50 items. The reliability which computed from 1501 samples yielded the value of 0.89.

Individual values of the reliability from subscales 1 to 8 (as shown in Table 3) were .75, .67, .74, .55, .68, .64, .73, .66, respectively.

Likert's scale was also employed for constructing questions to measure five dimensions of English language skills : listening, speaking, reading, writing, and presentation skills. Five questions were used to measure each dimension. There were 25 questions in total. The reliability computed from the sample of 1501 yielded the value of .95. The reliability of individual scale was quite high too : (.79 for the listening skill; .86 for the speaking skill; .87 for the reading skill; .79 for the writing skill and .83 for the presentation skill).

The researcher has developed survey questions for English language skills, some of which were later revised by the researchers of the Institute and by the instructors from the English Department of the Faculty of Arts.

Data Analysis

1. Descriptive statistics, i.e., percentage, mean and standard deviation, were used to describe the characteristics of the sample. The details were as follows:

1.1 Background variables : gender, age, residence, reasons for entering ABAC, high school study program, education and occupation of their parents

1.2 Other variables : current probation status and number of time under probation, causes of being on probation, causal factors affecting their study and spending of free time, obstacles to their study at ABAC, year of study, and faculty.

2. Inferential statistics, i.e., T-test, ANOVA, and Discriminant Analysis, were used to analyze the data to find out the causal factors for academic achievement, which were compared to the background variables (gender, high school GPA, high school study program, and father education), study commitment, association with studious friends, and English language skills.

Table 1 Frequency, mean, and the total score of all the eight subscales of the Learning and Study Strategies

	Year 1	Year 2	Year 3	Year 4	Total
Business Administration	175.67	176.24	186.77	186.78	182.52
	15	58	43	67	183
Engineering	196.33	184.95	185.36	193.94	189.04
	9	40	36	47	132
Bio & Science Technology	177.15	179.43	187.60	187.30	181.19
	20	7	5	10	42
Business English	187.36	184.93	192.77	195.17	192.53
	11	27	35	96	169
Business Chinese	190.71	180.14	201.83	173.09	183.65
	7	7	12	23	49
Total	182.92	180.79	189.40	190.20	186.96
	62	139	131	243	575

**Summary of ANOVA analysis of the eight subscales in the Learning
and Study Strategies**

Source of Variance	Sum of Squares	df	Mean Squares	F	Sig F
Major	8626.59	4	2156.65	3.50	0.01
Year of study	6918.73	3	2306.24	3.75	0.01
Major	8363.02	4	2090.75	2.78	0.03
Year of study	10332.64	3	3444.21	4.58	0.00
GPA at AU	18808.28	1	18808.28	25.02	0.00
Interaction	11667.58	12	972.30	1.29	0.22
Residual	416443.57	554	751.70	-	-
Total	465179.00	574	810.42	-	-

RESULTS

Table 1, which concerns the total score of all the eight subscales of the Learning and Study Strategies, shows a significant difference in two variables: faculty/department and year of study. The Business English Department got the highest mean, followed by the Faculty of Engineering. While the other three had more or less the same mean. This was the case for students in the second and fourth year. Regarding the difference between year of study, the mean of the third and fourth year students are higher than those of the first and second year students. Such findings applied to all the three groups except for the students of Faculty of Engineering and the Business Chinese Department.

Regarding the year of study variable, the difference was found to be inconsistent. For some faculties; the third and fourth year students got higher means than those of the first and second year students. But for other faculties and departments, the means of the first and third year students were higher than those of the second and fourth year students. For some faculties the means of the second and the third year students were still higher than those of the first and fourth year students. Therefore, no conclusion could be made about which year of study got a higher mean. This finding was different from the result of comparison between faculties and majors, where the difference was consistent that the students from the Department of Business English and the Faculty of Engineering had higher means compared to the other three groups. This was also the case for almost all the students of different years of study in each faculty and department. However, it could be concluded that the scores of the study strategies rose in accordance with the years, of study in all the faculties. This means that students' learning and study strategies develop gradually.

The analysis of each scale in Table 2 shows that the students of the Business English Department, in the Faculty of Arts scored high in almost all the subscales, except anxiety management. Students in the Faculty of Engineering scored high in information processing, anxiety management and testing strategies, and rather high in the other four subscales, but they got rather low scores in time planning and management. The other three faculties/departments scored more or less the same at the moderate and low levels.

Comparing the means of individual subscales, it was found that the students in all the faculties scored high in motivation, but low in anxiety management and time management. The difference

among them was found in information processing and information acquisition strategies. In fact, the Faculty of Engineering scored high in the first and low in the second. This was in contrast with those of the Business English and Business Japanese majors, who scored low in information processing, but high in information acquisition strategies. Regarding the concentration and testing strategies, the means of both subscales stayed at the fifth rank for almost all the faculties. For the scale of self-testing, the Faculty of Engineering also had a rather low score.

Table 2 Means of individual scales and the total scale of the study strategies by faculty and major

	Time management	Concentration	Information Strategies	Self Testing	Information Processing	Motivation	Self Strategies	Anxiety Management	Total
Business Administration (n = 184)	22.10	24.46	27.51	27.22	27.82	33.06	24.65	17.44	184.42
Engineering (n = 133)	21.36	24.89	28.74	27.02	30.03	34.29	25.12	18.29	189.49
Bio & Science Technology (n = 45)	23.02	23.80	29.76	26.13	26.82	33.07	22.96	16.64	181.73
Business English (n = 173)	23.92	25.05	30.14	29.06	28.14	35.12	25.27	16.03	193.08
Business Japanese (n = 65)	23.86	23.03	28.43	27.38	25.09	33.25	23.74	14.80	180.68
Total	22.85	24.25	28.92	27.36	27.58	33.76	24.35	16.64	185.88
F	3.39	1.04	5.90	3.17	9.61	2.34	1.71	5.03	3.79
Sig F	0.00	0.39	0.00	0.01	0.00	0.04	0.13	0.00	0.00

* Result from two-way analysis of variance using faculty, department, and reasons for coming to study at ABAC as independent variables, and GPA at high school as covariate

Comparing those who claimed to succeed in study and to have high GPA with those who considered themselves being unsuccessful in study and having low GPA (Table 3) yielded the same result. That is, motivation was ranked the first and anxiety management was ranked the last. However, both subscales had a higher mean in the first group than in the second. In particular, motivation, as well as testing strategies, was significantly higher in all the faculties. This is true for all the three faculties. The low GPA and unsuccessful group had significantly a higher mean for time planning and management and information acquisition in the Faculty of Business Administration and for self testing in the Faculty of Arts. However, self testing was nearly significant in the Faculty of Business Administration.

One interesting finding was that only in the Engineering Faculty, the high achiever group scored higher than the low achiever group in all the subscales; almost all means were significantly higher except for the means of the information acquisition, anxiety management, and time planning and management.

Comparing regular students and students on probation, the overall results were not different from the results found in the high and the low performing students. Only for motivation, there was no significant difference in both faculties (Business Administration and Arts). For the Faculty of Business Administration, another subscale that had no significant difference was testing strategies. In the Faculty of Engineering, though regular students scored higher than those on probation, only, in two subscales (motivation and testing strategies) showed significant difference.

Table 3 T-test results of the Study Strategies between high and low achiever students and between regular and on probation students from the faculty of Business Administration, Engineering and Arts

	High Achievers (1)		Low Achievers (2)		t-value	sig t
	Mean	S.D	Mean	S.D		
Business Administration (n₁=115 n₂=132)						
Time Planning and Management	21.69	6.71	24.39	5.61	3.40	0.00
Concentration	25.23	7.00	25.04	6.30	0.21	0.83
Information Acquisition	27.14	4.96	29.11	5.46	2.96	0.00
Self Testing	27.78	5.52	29.08	6.05	1.75	0.08
Information Processing	28.35	6.24	27.15	5.60	1.59	0.11
Motivation	36.57	5.86	30.51	6.48	7.66	0.00
Testing Strategies	26.58	6.43	23.50	5.26	4.09	0.00
Anxiety Management	18.49	6.18	17.69	5.70	1.07	0.29
Engineering (n₁=26 n₂=25)						
Time Planning and Management	23.11	6.31	20.04	5.83	1.81	0.08
Concentration	28.54	8.34	22.64	7.58	2.64	0.01
Information Acquisition	29.08	6.59	28.60	6.63	0.26	0.80
Self Testing	29.08	6.54	24.64	6.10	2.50	0.02
Information Processing	33.23	7.31	28.84	7.40	2.13	0.04
Motivation	40.50	4.40	30.16	5.88	7.13	0.00
Testing Strategies	29.38	7.84	22.56	5.34	3.62	0.00
Anxiety Management	18.61	6.57	18.20	5.96	0.24	0.81
Arts (n₁=52 n₂=59)						
Time Planning and Management	23.35	5.83	24.74	5.60	1.29	0.20
Concentration	26.04	7.03	24.07	6.33	1.55	0.13
Information Acquisition	29.38	5.03	28.97	6.17	0.39	0.69
Self Testing	27.04	5.13	29.46	5.46	2.40	0.02
Information Processing	27.77	5.52	26.59	6.85	0.99	0.32
Motivation	37.36	5.49	31.56	5.86	5.36	0.00
Testing Strategies	27.27	5.56	23.44	5.24	3.73	0.00
Anxiety Management	17.52	5.97	14.56	4.37	2.95	0.00

Table 3 (continued)

	Regular Students		Probation Students		t-value	sig t
	Mean	S.D	Mean	S.D		
Business Administration (n₁=62 n₂=142)						
Time Planning and Management	21.45	6.66	25.32	5.82	4.17	0.00
Concentration	24.21	7.15	25.61	6.22	1.41	0.16
Information Acquisition	27.72	6.41	29.65	5.57	2.17	0.03
Self Testing	26.72	6.74	29.34	6.05	2.75	0.01
Information Processing	28.27	6.28	27.96	5.27	0.36	0.72
Motivation	33.26	7.05	31.86	6.24	1.42	0.16
Testing Strategies	24.11	6.96	24.71	4.96	0.61	0.54
Anxiety Management	17.13	5.35	18.28	5.81	1.33	0.18
Engineering (n₁=46 n₂=37)						
Time Planning and Management	22.28	6.16	21.08	5.59	0.92	0.36
Concentration	26.54	7.84	24.35	7.18	1.31	0.19
Information Acquisition	29.09	6.45	29.43	6.38	0.24	0.81
Self Testing	26.91	6.48	25.97	6.10	0.67	0.50
Information Processing	30.98	6.87	29.08	7.50	1.20	0.23
Motivation	35.98	7.16	30.30	6.37	3.77	0.00
Testing Strategies	27.35	7.27	23.54	6.20	2.53	0.01
Anxiety Management	18.65	6.14	17.27	5.89	1.04	0.30
Arts (n₁=88 n₂=79)						
Time Planning and Management	22.52	5.64	24.76	6.19	2.44	0.02
Concentration	23.29	6.33	24.95	6.38	1.68	0.09
Information Acquisition	28.85	4.83	30.13	6.85	1.37	0.17
Self Testing	26.87	5.59	28.87	6.20	2.19	0.03
Information Processing	28.26	6.20	28.56	6.40	0.30	0.76
Motivation	34.04	6.59	33.96	5.96	0.09	0.93
Testing Strategies	26.07	5.80	24.29	5.06	2.10	0.04
Anxiety Management	16.69	5.51	15.28	5.43	1.67	0.10

When dividing subjects into 4 subgroups by GPA, the number of times on probation, the number of times getting F, D, and W, and academic achievement (high, above average, below average and low), it became clearer that the higher groups had a higher mean in motivation and testing strategies in the Faculty of Business Administration and the Faculty of Arts. Unfortunately, the analysis for other faculties could not be carried out owing to the fact that the number of replies to the questionnaire was not sufficient. The low group scored high in time planning and management, self testing, and information acquisition. As for anxiety management, though no significant difference was found, the high group tended to manage their anxiety better than the low group. Also no significant difference was found between the two group in information processing. For the concentration dimension, both high and low achievers scored quite high, and significantly higher than the above average and the below average group in both faculties. This showed that the relationship between this variable and academic achievement was in U-shape, which was different from other subscales, which had a linear relationship.

The above findings were confirmed when all the eight subscales were subjected to factor analysis, which yielded a new finding that Factor I consisted of concentration, information processing, motivation, testing strategies, and anxiety management; and factor II consisted of time planning and management, self testing, and information strategies (Table 4). The two factors were then analyzed to see their effects on academic achievement, which were classified into 4 levels as mentioned earlier. The results showed that the high achieving group scored high in Factor I and the mean score was proportionate to the academic achievement, while the low achieving group had high mean score in Factor II and the mean was in reverse proportion to the

academic achievement. This led to the conclusion that the earlier analysis was correct, i.e. the variables in Factor I had a positive relationship with the academic achievement, while the variables in factor II had a negative relationship with the academic achievement. Moreover, it was found that both Factor I and II had a linear relationship with the academic achievement.

Table 4 Results of ANOVA for study strategies in factor form between groups of different levels of academic achievement

		Varimax Rotation			
		Factor I		Factor II	
Learning and Study Strategies					
	Time Planning and management	0.17		0.83	
	Concentration	0.63		0.38	
	Information Acquisition	0.15		0.74	
	Self Testing	0.17		0.83	
	Information Processing	0.69		0.19	
	Motivation	0.56		0.17	
	Testing Strategies	0.78		0.23	
	Anxiety Management	0.71		-0.41	
Factor 1					
		Mean	S.D		n
	High Achievers	0.37	1.16		30
	Above average Achievers	0.15	0.97		35
	Below average achievers	-0.17	0.88		83
	Low achievers	0.02	0.88		94
		.37 > .15 , -.17 , .02			
Source of Variance	df	SS	MS	F	sig F
Between groups	3	7.30	2.43	2.80	0.04
Within groups	238	207.21	0.87		
Total	241	214.51			
Factor 2					
		Mean	S.D		n
	High Achievers	-0.28	0.89		30
	Above average Achievers	-0.42	0.96		35
	Below average achievers	-0.12	1.02		83
	Low achievers	0.29	0.95		94
		.29 > -.42 , -.28 , -.12			
Source of Variance	df	SS	MS	F	sig F
Between groups	3	17.86	5.95	6.32	0.00
Within groups	238	224.23	0.94		
Total	241	242.09			

When the two factors, together with the other nine variables in the four groups of academic achievers were subject to Discriminant Analysis (Table 5), the result was that the discriminant coefficient values of both factors ranked second to the highest, following only the high school GPA. It was also found that study strategies could predict academic achievement as precisely as background variables, commitment to study, association with studious friends and proficiency in English language skills. The study strategies (6 variables) could predict 43.3 % and other variables (7 variables) 44.7 % correctly. The background variables were high school GPA, high school study program (Science and Mathematics and Arts), gender, and education of the father. Therefore, it can be concluded that study strategies are important to the academic achievement (Table 6).

Table 5 Results of the Discriminant Analysis concerning study strategies in terms of the background variables and English language skills between different academic achiever groups in the Faculty of Business Administration

English Skills	Varimax Rotation	
	Factor I	Factor II
Listening	0.79	0.41
Speaking	0.42	0.83
Reading	0.90	0.24
Writing	0.71	0.47
Presentation	0.29	0.90

NB: Factor I and II of the Study Strategies as in Table 4

Variables	Order of Selection	Discriminant Coefficients		F for Deletion	Wilks' Lambda	sig
		Standard	Raw score			
High school GPA	1	0.78	0.016	24.91	0.83	0.000
Study strategy I	2	-0.54	-0.560	13.71	0.75	0.000
Learned friends	3	0.41	0.253	5.83	0.71	0.000
Study strategy II	4	0.39	0.388	6.85	0.68	0.000
Study commitment	5	-0.16	-0.253	2.49	0.66	0.000
English language skills	6	0.25	0.252	2.18	0.65	0.000
Math&Arts program (H.S.)	7	0.27	0.614	3.27	0.64	0.000
Science program (H.S.)	8	0.29	0.619	3.00	0.62	0.000
Father's Education	9	-0.18	-0.117	1.35	0.62	0.000
Constant			-4.745			

Non significant Variables were gender and English skills (listening, reading and writing)

Eigenvalue	Can Corr	Wilks' Lambda	Chi Square	df	sig
0.48	0.57	0.62	173.06	27	0.000

Classification Results

Actual groups	No. of Cases	Predicted Group Membership			
		(1)	(2)	(3)	(4)
High achievers (1)	84	52 61.9%	12 14.3%	10 11.9%	10 11.9%
Above average achievers (2)	95	25 26.3%	30 31.6%	24 25.3%	16 16.8%
Below average achievers (3)	78	12 15.4%	19 24.4%	26 33.3%	21 26.9%
Low achievers (4)	109	6 5.5%	10 9.2%	18 16.5%	75 68.8%

Percentage of "grouped" cases correctly classified : 50.00 %

Table 6 Comparison of the Discriminant Analysis between study strategy variables and the set of variables without study strategies

Variables	Order of Selection	Discriminant standard	Coefficients		F for Deletion	Wilks' Lambda	sig
			Raw score				
High school GPA	1	0.84	0.017		20.71	0.83	0.000
English language skills I	2	-0.39	-0.397		4.94	0.79	0.000
Study commitment	3	-0.14	-0.230		2.46	0.77	0.000
English language skills II	4	0.21	0.207		2.25	0.76	0.000
Science program (H.S.)	5	0.32	0.681		3.14	0.74	0.000
Math & Arts program (H.S.)	6	0.24	0.552		2.54	0.73	0.000
Association	7	0.27	0.170		2.10	0.71	0.000
		Constant	5.099				

Non significant variables are gender and father education

Classification Results

Actual groups	No. of Cases	Predicted Group Membership			
		(1)	(2)	(3)	(4)
High achievers (1)	85	53 62.4%	14 16.5%	11 12.9%	7 8.2%
Above average achievers (2)	95	27 28.4%	25 26.3%	26 27.4%	17 17.9%
Below average achievers (3)	78	15 19.2%	15 19.2%	27 34.6%	21 26.9%
Low achievers (4)	109	9 8.3%	17 15.6%	24 22.0%	59 54.1%

Percentage of grouped cases correctly classified : 44.69 %

Variables	Order of Selection	Discriminant standard	Coefficients		F for Deletion	Wilks' Lambda	sig
			Raw score				
Time management	1	0.69	0.117		7.23	0.91	0.000
Motivation	2	-0.59	-0.096		7.96	0.83	0.000
Testing strategies	3	-0.68	-0.116		8.27	0.80	0.000
Information strategies	4	0.29	0.057		2.92	0.78	0.000
Anxiety management	5	0.36	0.061		2.57	0.76	0.000
Concentration	6	0.18	0.027		1.72	0.75	0.000
		Constant	0.124				

Non significant variables are self testing and information processing

Actual groups	No. of Cases	Predicted Group Membership			
		(1)	(2)	(3)	(4)
High achievers (1)	99	52 52.5%	18 18.2%	15 15.2%	14 14.1%
Above average achievers (2)	91	28 30.8%	26 28.6%	16 17.6%	21 23.1%
Below average achievers (3)	77	11 14.3%	17 22.1%	26 33.8%	23 29.9%
Low achievers (4)	107	13 12.1%	15 14.0%	21 19.6%	58 54.2%

Percentage of grouped cases correctly classified : 43.32 %

DISCUSSION

The findings of this study indicated that motivation, testing strategies, concentration, anxiety management and English language skills were important for academic achievement of the students in various faculties. Hence these factors can be acquired and developed. Therefore the University should set up training programs to help the first and second year students who have low GPA and lack certain aspects of the study strategies or have poor English language skills. This will help to reduce the number of students on probation.

For Engineering students, one of the important study strategies was information processing, which means the capability to use elaboration and organization strategies, knowledge integration, learning the relationship between events, and using analytical and synthetic reasoning skills. All these are important for studying in this faculty. Training on study strategies for them should include the information processing aspects.

Another finding of this study was that amongst the above four dimensions of study strategies, motivation was the most important factor affecting the academic achievement of the students. This is in consonant with the finding of most researchers who are interested in this area, particularly Sinkavick (1991); Schunk and Zimmerman (1994); Butler and Winne (1995), and Prus and others (1995).

Especially, Prus and others found that the correlation between the motivation and GPA was not only the highest ($r=.32$) relative to all other dimensions of study strategies, but also as high as the correlation between GPA and the verbal part, and between GPA and the numerical part, in the SAT test ($r=.35$ and

.34 respectively). Noticeably, the motivation scale contains only eight questions.

Many findings confirm that achievement motivation is important to the academic achievement and could be further developed through new motivations and positive feedback. Moreover, past achievement is a motivation contributing to higher academic achievement. To help the students to achieve better academic achievement, all these factors are to be taken into consideration.

Another finding inconsistent with other research findings was that one group of students had a low GPA, but had a high score in the study strategies, while the other group had a high GPA but the study strategies score was low. This might be due to the difference in the study goal of the two groups. The former group studies for knowledge. The course selection, therefore, depend on the value and benefit of that course. Hence, though the course might be difficult and the chance to get low marks is high, Dweck and Elliot (1983) mentioned that the study of this group was driven by intrinsic motivation and by learning-oriented goal. Also, Nicholls (1984) reported that students who had task-oriented goals, and worked for esteem, success, and satisfaction of knowledge acquisition, preferred difficult tasks, that required special aptitudes and new challenges. For the latter group, the goal is the grades. They, therefore, select easier courses to get better marks more easily. Some also cheat in the examinations. Some copy their peers' assignments and submit them to the instructors. Satisfaction for them is getting better grades than their peers. This group holds on to the social criterion. Esteem and success come from putting the least effort but getting the best grades. According to Dweck and Elliot, the students in this group was driven by extrinsic motivation, and had performance-oriented goals or what Nicholls called an ego-oriented goals.

Thus, the first group might have a low GPA, but they scored high in the study strategies, while the second group could have a high GPA, but scored low in the study strategies. Therefore, a low correlation was found between the study strategies and the GPA or the number of times on probation. Only in the Faculty of Engineering was the total score of the study strategies correlated with the GPA and the number of times on probation, ($r = .32$ for both variables at the significant level of .01). This was partly due to the fact that Engineering students must have thorough knowledge and skills in the subject they learn in order to succeed in their career. Moreover, the sample size of this research was small, a bit over 100, while most studies in the past that found high correlation had about a hundred subjects or less. Therefore, students with a low GPA but a high score in study strategies or vice versa were small in number. In this study, such students comprised around 5 percent of the students in the Faculty of Engineering ($n=136$) and 9.8 and 7.1 percent of the samples of 354 and 353 students respectively from the other two faculties. The high GPA group who scored low in the study strategies scale was found to be 3.7 percent in the Faculty of Engineering, and 8.2 and 6.5 percent respectively in the Faculty of Business Administration and the Faculty of Arts. One interesting thing was that though this group scored low in almost all the study strategies scales, the motivation scale received a much higher score than the average score of the overall sample. This means that no matter which type the goal is, both groups have sufficiently high motivation to drive them to attain the desired goal.

The low correlations between the total score of the study strategies with the GPA and the number of times on probation were found in the Faculty of Business Administration ($r = -.07$) and the Faculty of Art ($r = .08$). These might due to differences

in students' study goal as mentioned above. Some dimensions also showed high negative correlations with GPA and the number of times on probation, such as : time planing and management ($r = -.27$) information acquisition ($r = -.22$) and self-testing ($r = -.23$) in the Faculty of Business Administration. Therefore, it is worthwhile to reinvestigate this issue in the two faculties again and students' study goals should be included in the study for reviewing the results with previous research finding.

One interesting finding was the result of open-ended questions concerning the causes of being on probation. The reasons that most students mentioned were related to the learning and study strategies. These reasons were, for example, no interest in study and reading, recklessness, peer pressure, more interest in other things than study, difficult subjects, inability to detect the main ideas, difficult content, not enough time to study before examinations, using ineffective study planning, selecting many difficult subjects in the same semester, Problem related to English language skills, and so on.

It is obvious that the significant causes for the students to be on probation are study methods and strategies, which refer to the motivation, time management, study planning, tactics reading and grasping main ideas, testing strategies and information processing. At all levels of education, there has so far been no instruction of this sort, notwithstanding the fact that each lecturer has long experienced with this issue. All instructors emphasize only the content of the subject matter, neglecting efficient learning methods and strategies that lead to success in the study. Weinstein and Mayer (1986: 315) mentioned the two goals of instructors when entering the class should be 1) transfer of academic knowledge and 2) teaching learning methods. What they mean to say is that besides the subject matter, the instructors

also have the responsibility to teach learning methods, reading strategies, information application and integration of the acquired knowledge with previous experience, examination preparation strategies, problem solving for study, and so on. All these will help students learn new things, with efficient and good study strategies, so that they could learn new knowledge in the right way, without wasting their time with trial-and-error.

For students on probation, department advisors should be assigned to assist them to go through the study program at the onset of the problem. Classroom learning might be insufficient for this group. Study methods and strategies should be given to the students through training programs, in which they can develop learning skills. However, training must be seriously operated and evaluated. Punishment must be enforced if any student does not pass the evaluation.

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