How Do They Manage It?
An Investigation on the Study and Learning Strategies of Year 1 HKUST Students

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ABSTRACT

Much effort has been expended improving the quality of higher education globally. The recent trend, when measuring the effectiveness of education, is to place a substantial emphasis on the outcome of students' learning, resulting in the emergence of outcome- based education. This has given rise to a shift in instructional methods and a change of curriculum in many programs, from ones that are more didactic and teacher-centered to ones that are more student-centered (Biggs, 1996, 2003; Kember, 1997; Spady & Marshal, 1991). These student-centered instructional models, such as problem based learning, promote active learning that engages students in the learning process rather than merely transmitting knowledge from teachers to students. A crucial step when adapting to the global trend and making teaching a student-centered activity is to first understand the "students".

The purpose of this study is to further our understanding of how students at HKUST learn, such as the way they study for a test, their time management skills and study motivation, etc. We intend our findings to assist faculty and instructors at HKUST to build a scientific and evidence-based understanding of how students learn, thus to provide them with additional information when developing their student-centered curriculum and implementing outcome-based learning programs.

In this study, LASSI, an instrument consisting of 10 scales was used to investigate the study skills of a random sample of year one students at HKUST. Results show that there is a statistically significant difference ($p<0.05$) between male and female in the Attitude and Study Aids scales. In addition, there is a statistically significant difference ($p<0.05$) between the schools in the anxiety, attitude, motivation, self-testing, selecting main ideas and test strategies. Out of the 10 LASSI scales, other than Attitude and Study aids, A-level results were found to correlate with the LASSI scales.

Keywords

Study strategy, learning strategy, learning skill, motivation, self-regulation

INTRODUCTION

As stated in the mission statement of the Center for Enhanced Learning and Teaching (CELT), the main focus of its work is to provide a dynamic and supportive environment for the continuous improvement of teaching and learning in HKUST. CELT recently made a strategic decision to strengthen its student learning research, so as to strengthen its support to faculty and instructors in their teaching activities. The research program's objective is to conduct systematic investigations into students' learning attitudes, study strategies, and the difficulties they encounter in learning.

Findings will help faculty and instructors build a scientific and evidence-based understanding of how the students they teach learn, and provide a knowledge base through which to improve the student experience, including curricular, co-curricular and extra-curricular aspects.

What Is LASSI?

In this study, an instrument called LASSI (Learning and Study Strategies Inventory) was used to investigate the study skills of HKUST's year one students. LASSI is an assessment developed in the U.S. to evaluate students' awareness as well as their use of learning and study strategies (Weinstein, Schulte, & Palmer, 1987). It was revised and a second edition released in 2002. Using 10 scales and 80 items, this inventory examines students' learning and study strategies related to three major components, Skill, Will and Self-regulation. Different scales are used to assess different components of students' study strategies as shown below.

i) *Skill*: Information Processing Scale, Selecting Main Ideas Scale, Test Strategies Scale
ii) *Will*: Anxiety Scale, Attitude Scale, Motivation Scale
iii) *Self-Regulation*: Time Management Scale, Concentration Scale, Study Aids Scale, Self-Testing Scale

LASSI has been used in over 2,200 institutions around the world. Its ten different scale scores aim to give students a better understanding of the strengths and weaknesses in their learning and study strategies as compared with other university students, thus allow them to make improvements in specified areas (see appendix). For example, students' scores on Motivation reflect the extent to which they take responsibility for their own studies. Those with low scores on this scale should learn how to set goals, accept responsibility for their studies and attribute the events in school to their own efforts instead of to other external reasons such as luck or poor instructions. It should be noted that a low score on the Anxiety scales means a student's anxiety is high. Thus, the higher the score in all ten scales, the more desirable it is.

METHODOLOGY

Sample

Four hundred and fifty five first year students from the 2007-08 cohort were randomly selected and invited to fill out the second edition of LASSI in Fall, 2007. Stratified sampling by schools using equal sampling fractions was employed. The total number filling out the

online LASSI (2nd ed.) was 398. Six were excluded; hence the sample used in this analysis consists of 392 students.

Methods of Data Analysis

The data of this study is analyzed using SPSS 15.0. The descriptive statistics and reliability of each scale (Coefficient Alpha) are computed. Data was subjected to an analysis by t-test to see if there are any differences between male and female students in each of the LASSI scales. ANOVA was then used to test if there are differences in scale scores between schools.

Students' Hong Kong Advanced Level examination (A-level examination) results were used to investigate the relationship between study skills and academic results. A-level results for 312 of the 398 students were available. Each student's A-level results were aggregated into a single score using his or her three best A-level subjects. The letter grade is converted into a numerical value using the following table:

A	B	C	D	E	F
10	8	6	4	2	0

The A-level score was then correlated with the LASSI scale scores. Regression analysis was also used to determine the extent to which the students'10 LASSI scale scores predicted their A-Level score.

RESULTS

LASSI Scale Reliability

The reliability of each scale in this study and its comparison with reliability provided by the LASSI publisher is shown in Table 1. The coefficient alphas range from 0.607 to 0.807. When compared with the reliability provided by the LASSI publisher, the reliability of the scales in this study is slightly lower.

Table 1 Reliability of Scales

Scale	**Reliability in this study**	**Reliability in LASSI Manual**
Anxiety	0.807	0.87
Attitude	0.635	0.77
Concentration	0.783	0.86
Information Processing	0.751	0.84
Motivation	0.785	0.84
Self Testing	0.709	0.84
Selecting Main Ideas	0.780	0.89
Study Aids	0.607	0.73
Time Management	0.664	0.85
Test Strategies	0.729	0.80

Descriptive Statistics of the Scores

Students' mean percentile scores in attitude and motivation percentile are significantly lower compared to the U.S. norm. The mean percentile scores of the other eight scales fall between 38.11 and 51.52 with Information Processing being the highest. Nevertheless, the mean raw scores of these scales show a different picture. They range from 22.52 to 28.37 with attitude and motivation mean raw scores being the highest among the ten scales. This phenomenon is discussed in the Summary and Discussion section.

Differences by Gender

The T-test result shows that there is a statistically significant difference ($p<0.05$) between male and female students in the **Attitude** and **Study Aids** scales.

Differences by School

Analysis using ANOVA shows a statistically significant difference ($p<0.05$) between the schools in the Anxiety, Attitude, Motivation, Self-testing, Selecting Main Ideas and Test Strategies scales.

Specifically, schools 2 & 3 have statistical significant differences ($p<0.05$) in Anxiety, Attitude, Self-Testing, Selecting Main Ideas, and Test Strategies, while there is a statistically significant difference in Motivation, Selecting Main Ideas and Test Strategies between schools 1 & 3.

Correlation with A-level results

With the exception of the Attitude and Study aids scales, the A-level results correlate with all the other LASSI scales (Anxiety, Concentration, Information Processing, Motivation, Self Testing, Selecting Main Ideas, Time Management, Test Strategies) as shown in Table 2.

Table 2 Correlations with A-level scores

Scale	Pearson Correlation
Anxiety	.189**
Attitude	.107
Concentration	.126*
Information Processing	.127*
Motivation	.241**
Self-Testing	.164**
Selecting Main Ideas	.159**
Study Aids	-.013
Time Management	.120*
Test Strategies	.212**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Regression analysis results

Results of the linear regression indicate that the multiple correlation between the 10 scales and A-level score is 0.340, accounting for 11.6% of the total variance of the A-level scores.

Specifically, the standardized regression coefficients of Anxiety, Motivation, Self-testing and Study Aids scale scores are statistically significant ($p<0.05$).

SUMMARY & DISCUSSION

The data in this study gives faculty and instructors a general picture of the learning and study strategies of the 07-08 cohort year one students at HKUST.

As the results show, students' mean percentile scores show they score the lowest in the attitude and motivation scales when compared to the U.S. norm. However, the mean raw scores in the attitude and motivation scales suggest differently. These are the highest among the 10 scales. One possible explanation is that students in the U.S. rate themselves significantly higher in attitude and motivation out of the 10 scales, thus creating a higher percentile score in them. We hypothesize that this could be due to a cultural difference between the U.S. and Hong Kong students when rating the will component of the LASSI scale. However, this does not rule out the possibility that Hong Kong students have lower attitude and motivation compared to their counterparts in the U.S. In such a case, efforts should be made to help them acquire a better understanding of how a university education relates to their future and how they should set goals in their academic studies.

In addition, a gender difference is found in two scales. Our year one male and female students have statistically significant differences in their Attitudes and use of Study Aids, with females scoring higher in both scales. This indicates that females have a higher interest in academic success and are able to make use of the resources available to help them in their studies. Students with lower scores in these two scales should be helped to develop a better understanding of how a university education relates to their future and to develop the ability to use the resources to help them learn more effectively.

Moreover, there is a statistically significant difference ($p<0.05$) between schools in Anxiety, Attitude, Motivation, Self-testing, Selecting Main Ideas, and Test Strategies. School 3 has the highest scores in these scales. Further investigation is needed to examine the possible sources of these differences. They might be related to the discipline that students studied in secondary school (e.g. science versus art). Students with low scores should develop techniques to cope with anxiety (Anxiety); have a better understanding of how a university education relates to their future (Attitude); develop techniques to monitor and redirect their attention (Concentration); learn to set goals and accept responsibility for the academic outcome (Motivation); develop effective skills to review information and monitor their level of understanding (Self-testing); develop skills to differentiate important information from the less important ones (selecting main ideas) and develop effective techniques to prepare for tests and to take tests (Test strategies).

Lastly, the results of the linear regression analysis show that students who can manage their anxiety, be motivated and able to use the right self-testing skills and study aids are likely to succeed. For those who enter university with fewer of these skills, we should help them reduce their anxiety in studies, set goals, accept responsibility for their studies, make use of resources available to them to study and monitor the level of understanding of the materials. Further data analysis such as path analysis will provide an understanding of the interrelationships of the variables and their impact on A-level results.

Future Research

CELT plans to conduct two lines of studies to further our understanding of how our students learn. One will survey the learning attitudes and study strategies of year one students at HKUST, such as in this study. This will provide us with much needed information about how the new cohort of students learns.

Another proposed line of investigation concerns the way students learn when studying a particular course. These studies will be carried out in collaboration with the course instructors, thus providing the instructor with an in-depth understanding of how his or her students learn and the kind of difficulties they encounter. Though the findings will be most relevant to the participating course instructors, they will also have relevance to other instructors, since some of them have general validity.

It is hoped that this student learning research will supply faculty and instructors at HKUST with scientific and evidence-based data on how students learn and thus provide them with additional information when developing their student-centered curriculum to implement outcome-based learning programs.

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APPENDIX

Scale	Area of Assessment	Interpretation of Low scores	Ways of Improvement
Anxiety	How much students worry about school	Low scores mean high anxiety	Develop techniques to cope with anxiety
Attitude	Students' interest in academic success	Low scores mean students think school is irrelevant or unimportant	Develop better understanding of how university education relates to their future
Concentration	Students' ability to maintain attention on required academic tasks	Low scores mean a low ability in maintaining attention	Develop techniques to monitor and redirect their attention
Information Processing	How well students acquire knowledge by using strategies such as elaboration and organization.	Low scores reflect difficulty in making information meaningful and storing it in the memory for future use	Develop elaboration or organizational strategies.
Motivation	Students' discipline, diligence and willingness to exert effort	Low scores represent low acceptance of responsibility for academic work	Learn to set goals and accept responsibility for academic outcome
Self-Testing	Students' use of techniques to monitor comprehension to determine the level of understanding of the to-be-learned materials	Low scores indicate lack of skills in reviewing information and low ability in monitoring their level of understanding	Develop effective skills to review information and monitor their level of understanding
Selecting Main Ideas	Students' skill at identifying what is important for studying	Low scores show a low ability in differentiating information.	Develop skills to differentiate important information from the less important.
Study Aids	Students' use of resources to help them learn	Low scores show a lack of understanding of the resources available and low ability in making use of them.	Develop ability to use resources to help them learn more effectively
Time Management	Students' ability in managing their time effectively in their studies	Low scores show a lack of ability to ensure completion of academic tasks on time	Develop effective techniques to maintain effective scheduling and monitor time to avoid procrastination
Test Strategies	Students' use of strategies to prepare for and take tests	Low scores indicate a lack of strategies to prepare for and take tests.	Develop effective techniques to prepare for tests and take tests