*This issue of CDTL Brief on **Gender and Learning Styles** discusses gender in the context of learning as well as the cultural and social issues surrounding it.*

How Do Male and Female Students Approach Learning at NUS?

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The present article aims to:

- explore gender differences in NUS students' learning approach and academic performance;

- discuss any differences in light of previous research; and

- suggest possible steps to improve students' learning.

This article does not intend to stereotype any gender; rather, it is hoped that the findings reported here will shed more light on NUS students' approaches to learning.

The Study Process Questionnaire and approaches to learning

The Study Process Questionnaire by John Biggs (1987) based on Marton & Saljo's theory of deep and surface learners, operationalises approach to learning by measuring a student's learning motive and strategy. Motive refers to the reason why students approach learning tasks and their studies, while strategy refers to the methods and habits they engage in to accomplish the task. Surface motives include fear of failure, or wanting just to obtain a paper qualification, and may drive students to employ such surface strategies as memorising learning material without first comprehending it. Deep motives, on the other hand, entail an intrinsic interest in the subject and a desire for understanding per se, which usually drives students to deep strategies like taking the initiative to find out more about a topic and seeing interrelationships among different concepts.

In addition to deep and surface approaches, Biggs also defined a third: the achieving approach. The achievement-motivated student is driven by competition with peers for the highest marks. As such, achieving strategies are engaged, such as: choosing modules that the student feels confident in, and studying material deeply insofar as it is pertinent to the examination. In relation to academic outcomes, the use of a surface approach is associated with inappropriate learning and poor grades, while an achieving approach is associated with high grades. The deep approach is deemed best, as it both stimulates optimum learning and produces good grades.

The model of student approaches to learning outlined above is based on Biggs' (1987) 3P model, where learning comprises 3 inter-related components: **presage** (student-based factors and the learning environment), which affects the **process** (how students engage in the task), which determines the **product**—the learning outcome. The present study examines gender as a presage factor, particularly focussing on differences in dominant motives and preferred learning strategies.

CDTL's study on NUS students' approach to learning

Since 2001, CDTL has been working on a University-wide project to study the approaches to learning of NUS students over the course of their studies, using an adapted form of Biggs' (1987) SPQ. The details of this project are available at: *http://www.cdtl.nus.edu.sg/research/learnprofile.htm*. In this article, the following areas of gender differences are addressed:

1. performance at NUS in terms of CAP;

2. study motives and strategies; and

3. the influence of motives and strategies on performance (i.e., CAP).

Results

For the purposes of this article, only data collected in 2002 were analysed. The sample comprised 1061 first-year students (344 males; 717 females) across all faculties except Medicine, Dentistry, and Law, as these do not operate under the CAP grading system.

Gender differences in CAP scores

On average, males scored higher than females: 3.56 ($S.D.=.74$) vs. 3.34 ($S.D.=.67$) respectively. A stepwise regression confirmed that gender is a significant predictor of CAP ($adjusted\text{-}R^2=.021$, $F=23.261$, $p<.001$) and that gender differences in CAP are not due to differences in age ($R^2\text{-}change=.003$, $F\text{-}change=3.206$, $n.s.$). However, it should be noted that the size of this gender effect is rather small.

Gender differences in motives and strategies

Descriptive statistics, listed separately by gender, are summarised in Table 1 below.

Motive	Gender	Mean	SD
Deep motives (*DM*)	Male	24.21	4.26
	Female	24.27	4.12
Surface motives (*SM*)	Male	21.98	4.41
	Female	21.46	4.04
Achieving motives (*AM*)	Male	24.01	5.05
	Female	23.19	4.57
Deep strategies (*DS*)	Male	23.13	4.24
	Female	22.28	3.90
Surface strategies (*SS*)	Male	20.50	4.49
	Female	20.45	4.21
Achieving strategies (*AS*)	Male	21.74	4.56
	Female	21.68	4.52

Table 1. Learning motives and strategies by gender

Across genders, one-way ANOVAs revealed that males scored slightly higher than females on achieving motives ($F=7.033$, $p<.01$), although this effect was small. Males also scored slightly higher than females on deep strategies ($F=10.362$, $p<.001$).

Within each gender, one-way ANOVAs and post-hoc tests revealed that for males, both deep and achieving motives are the most dominant, with surface motives being less endorsed, i.e. **DM, AM > SM** ($F=39.586$, $p<.001$). However, for females, deep motives are the most dominant, followed by achieving motives, and then surface motives, i.e. **DM > AM > SM** ($F=112.346$, $p<.001$). Both genders also seem to prefer deep strategies the most, and achieving strategies over surface strategies, i.e. **DS > AS > SS** ($F=40.113$, $p<.001$ for males; $F=42.420$, $p<.001$ for females).

Do motives and strategies influence how gender affects CAP?

To answer this question, each individual was assigned a highest-motive and a highest-strategy based on his or her highest score on deep, achieving or surface dimensions. Individuals with equally high scores on more than one dimension were grouped uniquely according to the combination of dimensions they scored highest on. All the groups had more than 20 cases each, except for the groups with all three dimensions at equally high levels. These two groups were excluded from the analysis, leaving 340 male and 710 female cases for the gender by highest-motive analysis, and 343 male and 713 female cases for the gender by highest-strategy analysis. Following this, separate two-way ANOVAs were performed against CAP, with gender and each of the new grouping variables as independent variables.

No significant interaction was found between gender and either highest-motive or highest-strategy. However, these analyses revealed that motive, at least slightly, related to CAP ($F=3.485$, $p<.01$). Students who scored the highest on only achieving motives obtained higher CAP than those who scored the highest on just deep or surface motives. No effect was observed for strategy.

Discussion

In summary, the analyses revealed several gender differences. In comparison to females, males

1. performed slightly better in terms of CAP;

2. endorse Achieving Motives slightly more; and

3. utilise marginally more Deep Strategies.

It should be noted, however, that all of these gender differences were small in magnitude, and that motives and strategies do not influence how gender affects CAP.

How then can males' better grades be explained? A review of gender research using Kolb's Learning Style Inventory found that males scored higher on the Abstract Conceptualisation scale, indicating a preference for logical thinking and rational evaluation, which are deep strategies; they were also found to excel in impersonal learning situations emphasising theory and systematic analysis (Severiens & Ten Dam, 1994). In contrast, female students using a deep approach (identified as 'comprehension approach') tend to look for personal connections and relevance (identified as 'elaborative processing') with learning material (Meyer *et al.*, 1994).

These two findings could explain why female NUS students score lower on deep strategies, since they may find it harder to relate some course material to their personal experiences. It is also possible that if the more distinct deep strategies of abstract conceptualisation and elaborative processing were studied, then it would be found that males' higher grades reflect an emphasis on learning outcomes associated more with abstract

conceptualisation than with elaborative processing. However, this calls for further research.

Finally, it is surprising to note that those who scored the highest on just deep motives or strategies performed no better than those who scored the highest on just surface motives or strategies, since deep learning is supposed to be a fundamental goal of education. Although no gender differences were found with regards to this, it is an important issue that should be addressed in the future.

Teaching implications

Although the SPQ has been noted for its tenuous relationship with grades (Najar & Davies, 2001), it is still helpful for examining the quality of student learning (Sivan *et al.*, 2000)—seeing how deeply students engage in their learning, as defined by a propensity toward deep motivation and deep strategies. The present results suggest that both male and female students here at NUS are comparably deep learners, but male students tend to be more achievement-driven, and seem to have a slight edge over their female peers in their usage of deep strategies.

Raise awareness of effective learning strategies

Taking a closer look at gender differences in specific responses to the SPQ, males were more likely than females to engage the following deep strategies: thinking of real-life applications of subject material, and drawing links between previous knowledge and new information. As such, instructors could take care to present new knowledge by building on students' existing knowledge base, and teach them to reflect and do the same.

Assign mixed-gendered discussion and study groups

Another way to increase students' awareness of learning strategies is to encourage them to learn from each other— mixed-gendered groups afford the opportunity for both male and female students to benefit from each others' strengths as they collaborate on assignments, prepare tutorial questions, compare notes and prepare for examinations. In class, friendly debates among groups provide an avenue for students to find out each others' unique perspectives. Out of class, these study groups would also provide good support, especially given that this is when most learning happens, and will moreover help students to move away from over-reliance on the instructor.

Help students connect personally with subject material

It was suggested earlier that female students may encounter difficulties with subjects that are not perceived as being personally relevant to them. To address this need for personal connection with subject material, instruction can be designed to create engaging experiences with course content. Examples include talks or seminars by renowned females in respective fields; role-play exercises [an example is described in Sivan *et al.*, (2000)]; or even spending some time to introduce course material as a personal story. Additionally, faculty can find out about students' study approaches, and address the appropriateness of these in the context of course content, delivery and requirements (Meyer *et al.*, 1994). This may actually help remove perceived barriers to learning—including the challenge of finding personal relevance to subject material—and to enable students to understand learning at a higher level.

Concluding remarks

The findings reported here are based on first-year students at NUS. It has been observed elsewhere that students tend to move toward a more surface approach to learning as they continue in their studies, and that gender differences become more apparent over the years at University [e.g. Najar & Davis, (2001)]. CDTL will be continuing this project to determine how NUS students change their approaches over time. Lastly, the present study also shows that gender differences are best understood within a broad framework, of which the SPQ is just one aspect. It is hoped that this article will encourage instructors to consider alternative ways of making learning at NUS a deeper and more rewarding experience for both genders.

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Acknowledgement

Learning Goals and Styles by Gender—A Study of NUS Students

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Do men and women learn differently? This seemingly simple question is very difficult to answer. This is because men and women are not only biologically different, but they are also brought up in different ways with different social expectations. As a result, men and women behave differently and such behavioural differences are reflected in academic aptitudes.

My students and I conducted a survey to look into whether men and women learn differently in NUS. Taking a relatively small sample of 45 males and 109 females (the uneven distribution of males and females is representative of the student body of Faculty of Arts and Social Sciences), we investigated the students' conceptualisation of mastery and performance goals while taking a required course. Mastery and performance are Individually Oriented Goals (IOAG). Mastery goals are goals that drive one to master a topic and learn it well, while performance goals are goals that drive one to perform to get good grades. Besides these two individually oriented goals, I have recently, based on the extensive studies conducted on Asian students, constructed a Socially Oriented Goals (SOAG) instrument to reflect the collective emphasis in the Asian cultures. SOAG looks at the motivation to learn or study in order to obtain acceptance and to avoid rejection by one's community. Together with the established framework of individually based mastery and performance goals, we developed a dichotomous framework to study how male and female students approach learning in the university through socially and individually oriented goals.

While both male and female students scored high on mastery and performance (the two individually-oriented goals), the females were higher on the performance goal orientation (i.e. working for tangible indices of performance such as marks or grades) than the males. Compared with male students, female students also scored higher on socially oriented goals. It is further noted that the individually and socially based performance goals are positively correlated thus, lending support to the notion that female students obtain grades for socially oriented purposes instead of seeing grades as an achievement or an end in itself.

We therefore come to an initial conclusion that males and females are equally high on the intrinsic motivation to achieve (i.e. mastery of skills and knowledge), but females also tend to work for grades for social purposes. I must emphasise here that the social orientation to learn and achieve can be found in both male and female Asian students, but more so for female students. In Asia, especially in communities influenced by Confucian Heritage such as Taiwan, Hong Kong, Japan, Korea and Singapore, academic achievement has always been considered as a means to social esteem. It is noteworthy that in this modern community of Singapore, such social pressure seems to affect women more. This could be because female students are more sensitive to social expectations, which results in an added motivation to achieve, not just for themselves, but also for the others around them. However, fortunately, the female students' sensitivity to social pressure does not come at the expense of their intrinsic motivation to learn and to achieve, as reflected by the high score in the individually based mastery goals and remain as high as those of their male counterparts.

So, are the differences in goal orientation between our male and female students relevant to us as lecturers? Is there anything that we can do with this information?

The answer is yes. As a teacher, I see it as my responsibility to facilitate learning by using a student-centred approach (i.e. teaching according to students' learning style). While there are students who learn in a more independent way, others prefer to learn in a more socially oriented way. For the latter, learning is motivated by social rewards. Therefore, when teaching students who are more socially oriented in their learning approach, we could provide more social encouragement and incentives for their learning, such as public recognition of a job well done and individual or small group consultations. Students with high socially oriented goals may also find it beneficial to study with a small group of friends. For large NUS courses, which might be impersonal, it would be a good practice to encourage students to form small study groups, as is the case in prestigious American universities.

In summary, while NUS male and female students were found to have high individually oriented goal conceptualisations, females are higher on socially oriented goal conceptualisations and tend to pay more attention to tangible performance indicators. Males and females however are equally high on mastery orientation—learning for the sake of mastering the knowledge and skills afforded in the university. It is proposed that attention be paid to help students who are more socially oriented in their learning approaches. ■

Are Learning Patterns Different on Mars and Venus?

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"Have you ever wondered if different genders learned differently?" This was the third question on the mini-questionnaire I posed to my colleagues and students at the Public Policy Programme for the purpose of this article. Admittedly, I had never really wondered about the question myself. However, as a lecturer specialising in empirical analysis for public policy, the temptation to create a mini-database on gender and learning differences was irresistible. To my surprise, two thirds of the 28 respondents[1] had thought about this question before and many other remarkable findings came out of the seven-question survey.

In the questionnaire, some examples of learning styles (each briefly explained) provided were: reflective-, non-reflective-, experimental-, experiential-, deep-, surface-, independent- and peer-learning. The question on whether the two genders learned differently led to statistically speaking, the most significant finding[2]: 60% of female respondents believed that the two genders have different learning patterns whilst only 43% of the males thought so.

In order to understand the divergences of opinions, the descriptive statistics emerging from the survey were summarised in Table 1 below. The table also represents the proportion of respondents who believed that the given factors were important to student learning and/or may differ between genders. The bold figures represent the most striking findings and that will be discussed in the following paragraphs.

Many deviations of opinions transpired from this survey. Although 86% of those surveyed considered the motivation of student for studying as the *most* important factor that influenced student learning, only 24% of the respondents believed that the factor would differ according to genders. However, the *least* important

FACTORS	Most Important to Student Learning			May Differ Between Genders		
	Total%	Male%	Female%	Total%	Male%	Female%
Interaction between students	**62**	59	67	**52**	53	50
Interaction with teacher	**69**	**76**	**58**	**55**	65	42
Work/life experience of student	41	47	33	59	53	67
Technical skills of student	35	35	33	38	41	33
Background knowledge of student	55	59	50	28	35	17
Level of self-confidence of student	41	**29**	**58**	**21**	18	25
Motivation of student for studying	**86**	94	75	**24**	18	33
Extent of social network of student	**21**	18	25	**62**	59	67

Table 1

factor that affects student learning, the extent of social network of students (21%), was generally believed to be different between genders (62%).

In addition, when the data was disaggregated by gender, male and female respondents appeared to disagree on many issues. One significant finding was that more women than men (58% vs. 29%) regarded the level of self-confidence as an important factor in influencing student learning. Overall, this factor was still not considered as differing between genders (21%).

So the question remained: what do the respondents believe is the most important factor for student learning and differs between gender? An open-ended question included in the questionnaire led to the identification of several other factors including the cultural background of students, social expectations and obligations and the conception of success. In addition, it was interesting that only female respondents mentioned age as an important factor.

From the descriptive statistics of the survey, two factors appeared to be influential. These relate to the interaction *between* students and interaction *with* teacher. Interestingly, interaction with teachers was deemed more important for male than female respondents (76% vs. 58%). This seems to contradict the earlier finding that majority of male respondents believed that the two genders have similar learning patterns! If there were indeed contradictory beliefs among males on the issue of different learning styles between genders, I would like to suggest that it might be appropriate to undertake further research focusing solely on the lecturer's beliefs[*].

To conclude, since the majority of respondents consider the interaction with teachers as a key issue that influences learning and varies between genders, a clearer picture would emerge either by increasing the sample size of the survey, or constructing another survey questionnaire focusing on the dynamics influencing these interactions. In fact, a bestseller by John Gray, *Men Are from Mars, Women Are from Venus: A Practical Guide for Improving Communication and Getting What You Want in Your Relationships*[3], claimed to reveal in detail the dynamics involved in the interaction between genders. As a down-to-earth person, I never read the book. However, in my attempt to understand the long-ranging results of this short survey, I may well have an academic purpose for reading Dr Gray's work.

Endnotes

1. The sample was self-selecting and the response rate was about 50%, with 12 male and 16 female respondents.

2. Based on a t-test of independent samples, the p-value was 0.025.

3. Gray, John (1992). *Men Are from Mars, Women Are from Venus: A Practical Guide for Improving Communication and Getting What You Want in Your Relationships*. New York: HarperCollins. ∎

* *Anyone interested in pursuing a similar type of research is welcome to contact me (mppbc@nus.edu.sg) for the questionnaire or the data file.*