Internal Factors of Gender Imbalance in the Malaysian Higher Educational Institutions

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Abstract
Statistics have shown that the female-heavy gender imbalance in the higher educational institutions is a global issue, and some educationists have made a specific prediction that it is a continuous trend. This study examined the internal factors of gender imbalance in the higher educational institutions: the gender differences in thinking styles and ability to pay attention. The results indicated that male students are more creative but less able to pay attention to learning stimuli than their female counterparts. The findings implied that attempts should be made to move away from the current rote learning approach towards interactive teaching methods to accommodate the more creative but less attentive males.

Key words: Gender Imbalance, Thinking Styles, Attention Ability

Introduction
Malaysia has a gender ratio of 1.01 male(s)/female. However, statistics have shown that of 40,366 successful Malaysian applicants to all of the local universities, 75% of them are females, and university intakes are dominated by females in many aspects of studies [1]. Statistics have also shown that the female-heavy gender imbalance in the higher educational institutions is a global issue. For instances, female university students in Canada outnumber the males by about 60 to 40 on average nationwide, and the male-female ratio on US campus today is 43 to 57 [2]; the Education for All Global Monitoring Report 2008 shows that ASEAN countries such as Myanmar, Vietnam, the Philippines and Thailand are in a similar gender imbalance position to Malaysia. Besides that, a study showed that Iranian female medical and dentistry students have traditionally outperformed the males. The study suggested that the learning environment may not have been structured to accommodate the males [3].

The evidences hinted that apart from the external factors that influence their performance and marginalise them, as mentioned by Mortazavi & Nejad [3], the Y chromosome group might also be facing internal weaknesses that are driving them away from other fields of study. Hence, the study was undertaken to find out whether males and females have different thinking styles and attention abilities, and to provide an alternative explanation of the academically female-heavy gender imbalance phenomenon in Malaysia.

Literature Review
Several researches and writers have argued that thinking styles (creative and critical thinking) and the ability to pay attention (the ability to focus the mind on learning stimuli) are two factors that determine academic
performance, and they are inter-correlated [4, 5].

Paul wrote that critical thinking is a unique and purposeful form of thinking that is practised systematically and purposefully [5]. Therefore, in order to be critical in thinking, one must have the ability to pay attention to the central point of the problem before imposing standards and criteria on the thinking process, and using them to construct thinking. This contention is in line with the Piaget cognitive development theory [6] that at the formal operation level of cognitive development, human thinking focuses on testing hypothesis, abstract thinking and reasoning development, which are associated with critical thinking.

On the other hand, creative thinking has been defined as a process of becoming sensitive to a problem, gaps in knowledge, missing elements and disharmonies. It has been reported correlate with the ability to pay attention [7].

Although there have been evidences that paying attention to learning stimuli is associated with both creative and critical thinking, and the two kinds of thinking are opposed to one another [8], Baker, Rudd, and Pomeroy suggested that the two constructs are uncorrelated [9]. The researchers emphasised that much more research needs to be conducted to confirm the result of the study.

Meanwhile, although a number of studies have found that there is no difference in critical thinking between male and female [10, 11], and no correlation between creative thinking and gender [12], several studies provided evidences that there is some correlation between critical and creative thinking with gender [13, 14, 15].

Furthermore, a longitudinal study conducted by Ready, LoGerfo, Burkam, and Lee on 16,883 school students (8,701 boys and 8,182 girls) showed that girls outperform boys in literacy learning due to their better attentiveness, task persistence and learning approaches [16]. Besides that, a local study reported that male students often have difficulty accepting and accommodating the teaching styles of their female teachers [17].

Research Questions

The study was conducted to answer the research questions “Are there significant differences between male and female on creative and critical thinking styles?”, “Are there significant difference between male and female on ability of paying attention on learning stimuli?” “Are there significant association among thinking styles and paying attention abilities and gender?” The study was undertaken to provide an alternative answer and explanation of the female-heavy gender imbalance phenomenon in education institutions in Malaysia.

Methods

The subjects consisted of 1,584 students (667 males and 917 females, average age: 19.11 years), randomly selected from 11 local educational institutions in Malaysia. The subjects were selected based on a power analysis [20]. The selection of the sample was based on the power of .80 at the 0.05 level of significance (alpha level). Based on the Sample Size Table [20] (p377), the sample size needed for each institute was 144. As a whole, the sample size for the study was 144 X 11 = 1,584.

The study utilised a quantitative design. Two paper-and-pencil instruments were used to collect data from the subjects of the study. First, the Yanpiaw Creative-Critical Thinking Style Test (YCCTS) [18]. This instrument, consisting of 32 multiple-choice items, was used to collect data concerning creative and critical thinking styles of the subjects (see Figure 1).
A sample item from the YCCTS Test

In a pilot test, with a sample of 32 students, the test yielded high construct validity. The scores of creative thinking style of the test correlated positively with the Torrance Test of Creative Thinking score \( r = .51, p < .01 \). While the scores of critical thinking style of the test correlated positively with the Watson-Glaser Critical Thinking Appraisal’s critical thinking index \( r = .53, p < .01 \) [10]. The results suggested that the test reliably measures certain creative and critical thinking skills of the subjects, similar to those measured by the TTCT and WGCTA.

Second, the Attention Ability Test (AAT) [19] was used to identify the subjects’ ability to pay attention. It consisted of three parts. The first part of the test comprised eight alphabets (X, Y, K, H, A, Z, N and M) which were randomly assigned into rows (see Figure 2).

The second part consisted of numeric numbers (1 to 9) which were randomly assigned into rows. The third part of the test was made up of a mixture of numeric numbers and alphabets (8, B, 7, T, 9, G, 3, S, 5 and C) which were randomly assigned into rows. In each part, the subjects were asked to pay attention to the numbers and alphabets, to find and circle any alphabet that was located two alphabets after alphabet a particular number or alphabet, or other arrangements. Any subject making more than 25 mistakes was labelled as having a low attention span; the subject with 18 to 25 mistakes was classified as having an average ability to pay attention, while those with less than 18 mistakes were considered to have a high level of attention ability. Its test-retest reliability in a range of three months was .87.

The subjects of the study answered the two tests individually in a classroom setting under the invigilation of the researcher. The time allocated for each of the instruments was 25 minutes.

Results

The data in Table 1 show that there is a significant difference among the three groups in creative thinking style \( F(2, 1581) = 539.34, p < .05 \). It shows that subjects high in creative thinking ability possess low attention ability. On the other hand, subjects low in creative thinking ability tend to have high attention ability (the creative thinking style scores are as follows: high attention ability group, \( M = 22.38 \), average attention ability group, \( M = 24.36 \); low attention ability group, \( M = 33.71 \)). The results indicated that the two variables are negatively correlated.

Similarly, the results in Table 1 indicated that there are significant differences \( F(2, 1581) = 4,138.79, p < .05 \) among the three attention ability groups in critical thinking style.
style (critical thinking style scores are as follows: high attention ability group, \( M = 33.22 \); average attention ability group, \( M = 23.93 \); low attention ability group, \( M = 16.18 \)). The results indicated that the high attention ability group possesses the highest critical thinking style scores, followed by the average and low attention ability groups. This means that critical thinking style is positively correlated with the ability to pay attention. The Post Hoc Tukey’s HSD Multiple Comparisons results detailed the significant differences in critical and creative thinking styles among the three attention ability groups.

<table>
<thead>
<tr>
<th>Thinking style</th>
<th>Attention ability</th>
<th>M</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creative</td>
<td>Low</td>
<td>33.71</td>
<td>539.34</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>24.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>22.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Critical</td>
<td>Low</td>
<td>16.18</td>
<td>4,138.79</td>
<td>.00</td>
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<tr>
<td></td>
<td>Average</td>
<td>23.93</td>
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The results presented above clearly show that relatively, subjects with creative thinking style are less attentive to learning stimuli while subjects with critical thinking style are more attentive to learning stimuli. The data in Table 2 indicate that there are significant gender differences in thinking styles. The male subjects outperformed their female counterparts in creative thinking [Male: \( M = 29.21 \); female: \( M = 23.48 \); F(1, 1,582) = 342.25, p< .05] (see Figure 3 for the profile plot). On the other hand, the female subjects outperformed their male counterparts in critical thinking [Male: \( M = 18.86 \); female: \( M = 29.10 \); F(1, 1,582) = 2,230.01, p< .05].

The data in Table 3 show that there is a significant gender difference in the number of attention mistakes made [the number of attention mistakes made is as follows: Male, \( M = 25.02 \); female, \( M = 19.24 \); F(1, 1,582) = 1,234.56, p< .05]. It indicated that relatively and significantly, the male subjects made more mistakes in the Attention Ability Test and hence they were less able to devote attention to learning stimuli compared to the female subjects (see Figure 3).

6. Discussion and Conclusion
The main findings of this study is: thinking styles, the ability to pay attention and gender
are significantly inter-correlated; Male subjects exhibit a creative thinking style and they are less able to pay attention to learning stimuli, while female subjects demonstrate a critical thinking style and they show better paying attention ability. It supports the works of Michalko [4]; Ready, LoGerfo, Burkam & Lee [16]. The findings indicate that the male and female subjects demonstrate different and inverse thinking styles and the abilities of devote attention to learning stimuli. Looking at the fact that the current Malaysian’s education system is currently still heavily exam-oriented, and employs structured teaching and learning techniques [21], the learning environment tends to directly or indirectly favour the females and neglects the creative and low attention ability males. It provides an explanation for the phenomena of gender imbalanced in higher educational institutions and why the females are dominating most of the academic studies. The findings of this study suggest too much attention on rote learning and a strong emphasis on academic achievement will demoralise and marginalise the relatively less academic males who also exhibit lower critical thinking skills, while on the other hand neglect the chances of the female students to foster their creative thinking. For the sake of male students, create a fun learning environment in schools so that the creative males can survive, participate and thrive in the world of education.

This study also shows that internal factors such as thinking style and the ability of paying attention should be taking into account in resolving the problem of gender imbalance in the Malaysian higher educational institutions. The findings of this study provide an evidence for the Brain Hemisphericity Theory and theories of Sex and Lateralization [22], that there are associations between gender and brain functions (creative, critical thinking and the ability to pay attention to learning stimuli). It contributes to the body of knowledge especially in the fields of gender study and thinking style. It suggests that educators should recognize gender differences in learning and provide flexible teaching and learning techniques that could suit the needs of both the male and female students in higher educational institutions.

Since paying attention is a learnable skill, future research could be conducted to identify ways of overcoming learning and attention barriers, and ways of improving the male students’ critical thinking abilities. This might help defer the decline to extinction of males in the higher educational institutions as well as other fields of excellence.

References