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# Hindrances to Internal Creative Thinking and Thinking Styles of Malaysian Teacher Trainees in the Specialist Teachers' Training Institute

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## Abstract

The aim of this study is to identify hindrances to internal creative thinking and thinking styles of a group of Malaysian teacher trainees from the Specialist Teachers' Training Institute (N = 232). Three psychological tests were used administrated to the subjects. The result indicates that the ability to think creatively for the majority of subjects (87.50%) is hindered seriously by one of the hindrances to internal creative thinking, that is, stimulus fixity. The finding implies that lecturers of this group of teacher trainees should guide them to overcome this internal barrier before trying to encourage them to think creatively.

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*Keywords:* Internal creative thinking, thinking style, teacher trainees, stimulus fixity, functional fixity

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## 1. Background

Human beings react differently to ambiguous situations, situations which cause an individual to experience stress and make him unable to think creatively. Several authors and researchers (Chua, 2010a, Almeida, Prieto, Ferrando, Oliveira, & Ferrándiz, 2008; Carson, Peterson, & Higgins, 2003; Daniels, 1998; Torrance, 1984; Sarnoff & Cole, 1983) are of the opinion that the ability to think freely with an open mind when facing ambiguous situations is an indicator of creative thinking.

Hindrances to creative thinking can be divided into two types: hindrances to external creative thinking and hindrances to internal creative thinking. According to Dacey (1989), two kinds of hindrances to internal creative thinking which prevent people from continuing to think freely and openly when faced with ambiguous situations are stimulus fixity and functional fixity.

Dacey defined stimulus fixity as a condition of an individual who, when faced with a specific stimulus, can only think about the stimulus such that he is unable to open his mind creatively to think about something else other than the stimulus. It is this hindrance that causes an individual to lose his creative thinking ability when faced with ambiguous situations.

In addition, Dacey's 1989 study conducted on a group of secondary school students showed that nearly 75% (n = 900) of them possess rigid thinking and are unable to think creatively because of stimulus fixity. He commented that the students' ability of thinking is limited to the stimuli in front of them until they cannot think creatively about any other thing. Torrance, Ball & Safter (1984) labelled this condition as premature closure, that is, one of the

hindrances where a person cannot open up or free his thinking to think of something else other than the stimulus in front of him.

Functional fixity on the other hand is defined as the condition where a person is unable to open his mind to think beyond the function of a specific object. According to Dacey, life is a process of growing functional fixity – the more a person learns about how things work, the more he tends to accept the patterns of unalterable. Nevertheless, functional fixity interferes with problem solving at all levels of thinking. Only imaginative people could resist being functional fixity, and think freely for functions other than usual purposes. Dacey (1989) reported that the majority of his research subjects (secondary school students) are less creative because of functional fixity.

Several authors and researchers (Koh, 2009; Norrizan, 2000) are of the opinion that the teaching methodology and the Malaysian school curriculum at this point in time place more emphasis on teaching, learning and evaluation methods which are left-brain oriented and which promote rote learning, convergent thinking and submission to the authority of teachers. According to Torrance and Sato (1979), the left and right hemispheres of the human brain function together to process information and both are required for creative problem-solving. William (1983) stated that man have two hemispheres in his brain but sometimes the education system operates such that we are made to use only one hemisphere and this indirectly hinders our ability to think creatively.

Chua (2004) compared creative thinking among students in Asia and the United States and reported that the standard mean score for the creative thinking index of a group of Malaysian secondary school students is lower than the standard mean score for a similar age group in the United States. However, the factor that accounted for the difference was not identified.

In relation to this, this study aims to explore and identify the hindrances to creative thinking and thinking styles of a group of teacher trainees in the teacher training institute in order to provide more information to educators, especially those who are directly involved in creative education.

## **2. Research objectives**

The objectives of this study are to identify: 1) hindrances to internal creative thinking in teacher trainees from the perspectives of stimulus fixity and functional fixity; and 2) thinking styles of a group of teacher trainees.

## **3. Methods**

The data of this descriptive survey was collected using three paper-pencil questionnaires.

### *3.1. Research subjects*

The subjects of this study comprised 232 semester three teacher trainees (Average age: 19.6 years old) of the Specialist Teachers' Training Institute, Kuala Lumpur. The subjects enrolled in a Bachelor of Teaching programme, offered by the Ministry of Education, Malaysia.

### *3.2. Research instruments*

Three instruments were used in this study.

The first instrument was the Story-writing Test (Dacey, 1989). This is a paper-pencil test using a picture of a cat looking at a rectangle. The subjects were asked to write a short story, which is interesting and unusual, a story that no one else would think of. This instrument is used to collect information about a hindrance to internal creative thinking, that is, stimulus fixity.

The second instrument used was the Two-string Test (Dacey, 1989). This instrument is a paper-pencil test showing a picture of a young man. One of his hands is tied with a string to the ceiling of a room (string A) while the other hand is trying to reach for the string which is far from him (Dacey, 1989: 24). Research subjects were asked to help the young man solve his problem using a mouse trap. This instrument is used to gather information about functional fixity, another hindrance to internal creative thinking.

The third instrument was the Thinking Style (YBRAINS, Chua, 2010b) which is used for collecting quantitative information about thinking styles. The test items were built based on research findings about brain hemisphericity. It is a paper-pencil test with 25 items. Each item contains choices related to left-brain, right-brain and whole brain thinking. The items of the YBRAINS instrument were developed based on research evidences of split brain experiments including the blood flow technique (Lassen & Ingvar, 1972), dichotic listening technique (Bethmann, Tempelmann, De Bleser, Scheich, & Brechmann, 2007; Kimura, 1961), and electroencephalogram or electrical brain writing technique (Galín & Ornstein, 1972). Besides that, in building the test, findings regarding the functions of the left brain and right brain from psychological tests such as the literal preference test (Porch & Coren, 1981) and the street gestalt completion test (Bogen, 1975) were also referred to. [*The computer-based YBRAINS test was awarded a gold medal at the 21th International Invention, Innovation & Technology Exhibition, ITEX '10, on 14 - 16 May 2010, Kuala Lumpur Convention Centre*]

A left-brained thinker tends to be more logical and analytical in thinking. He evaluates materials in a rational way, works in a systematic manner, follows rules, processes information sequentially or step by step, is a conforming person, is emotionally inhibited, prefers structured assignments, takes life seriously and is proficient in language and verbal activities. Jobs best suited for this kind of person are those that require systematic, logical thinking and decision-making skills.

Meanwhile, the right brained person is creative, generates good spatial relationships, has a highly adventurous and inventive mind, solves problem intuitively, is a non-confirming person, responds with emotions and feelings, prefers open-ended assignments, has a good sense of humour, faces everyday life with an open mind, responds to music and art and possesses innate musical and artistic talent. The right-brained person is suitable for jobs that require the forming of spatial relationships, creative expressions (such as the aesthetics value of cubism painting of Pablo Picasso) and those that involve idea generation.

To be considered whole brained, a person must have a balanced thinking style, possesses the thinking abilities and other characteristics of left-brained and right-brained thinkers. The whole brained thinker is most suited for jobs that need right-brain and left-brain skills.

Test-retest reliability of the YBRAINS was conducted in a pilot study on a group of 35 students of a teacher training programme at the Kuala Lumpur Specialist Teachers' Training Institute. The same students were retested three months later. The average age of the respondents in the reliability test (average age: 19.4 years old) was similar to the average age of the respondents in the study. The product-moment correlation coefficients were positively significant for the brain styles [left-brain style:  $r = .93$ ,  $p < .05$ ; right-brain style:  $r = .84$ ,  $p < .05$ ; whole-brain style:  $r = .87$ ,  $p < .05$ ].

### 3.3. *Research procedure*

The research subjects individually answered questions from the three research instruments in a classroom setting under the supervision of lecturers who were teaching the classes concerned. The time allocated for the first and second instruments was 8 minutes each, while 30 minutes were allocated for the third instrument.

### 3.4. *Data analysis*

Since this is a descriptive research, data for hindrances to internal creative thinking (stimulus fixity and functional fixity) is tabulated in frequency and percentage. The data is also analysed qualitatively, that is the students' answers are interpreted based on the definitions of stimulus fixity and functional fixity. For thinking styles (left, right and whole brain thinking styles), the data is tabulated in terms of frequency and percentage.

## 4. Results

### 4.1. *Hindrances to internal creative thinking*

The frequency and percentage for hindrances to internal creative thinking of the subjects are shown in Table 1.

Table 1. Frequency and percentage of the hindrances to internal creative thinking ability of the subjects (N = 232)

Test	Hindrances to creative thinking			
	Stimulus fixity		Functional fixity	
	Frequency	Percentage	Frequency	Percentage
The story-writing test	203	87.50	–	–
The two-string test	–	–	34	14.66

The results show that 87.50% (n = 203) of the subjects experience stimulus fixity and 14.66% (n = 34) experience functional fixity. The results indicate that stimulus fixity is the hindrance to creative thinking experienced by the majority of the subjects. Only a small number of the subjects experience the problem of functional fixity.

#### 4.1.1. Stimulus fixity

When the short stories of the subjects were analysed quantitatively, it was found that most of the subjects could only write stories centred on the rectangle in the picture given. The following are some of the extracts from the short stories written by this group of subjects:

“In the box, there was food. A cat smelled the fried fish and tried to go near the box. Unfortunately the cat could not open the box.” (Subject 22)

“The cat ran very fast, looking all around. It saw a box in front. The cat opened the box and saw a rat sleeping in the box.” (Subject 25)

“One day a cat saw a hole in the wall of its master’s house. The cat wanted to see what was in the hole. So it waited in front of the hole and observed. Suddenly a rat jumped out.” (Subject 8)

“A cat wanted to look for its friend who had gone missing for a long time. While it was walking, looking for its missing friend, it saw a very big box. It tried to open it, but could not because the box was too heavy.” (Subject 117)

The research data clearly shows that the ability of the above subjects to think openly and freely when faced with an ambiguous situation is low. This weakness (thinking was restricted by the rectangle in the picture which represents an ambiguous situation) hinders them from thinking creatively and producing unique ideas.

Extracts from the short stories written by the second group of subjects, who are free from stimulus fixity, are as follows:

“One quiet night, I felt tired and slept on the bed. I had a strange dream. In my dream, there was a hungry cat with yellow fur. It was looking for food all around its master’s house and finally saw a fish on the table. When the cat was going to eat the fish, it saw another cat which was sick and hungry. It remembered its mother who was kind and always helped other cats who needed help.” (Subject 34)

“Kamal is an artist. One day Kamal drew a pretty picture (picture of a cat, like in the picture above). He coloured it using pretty colours. He wanted to sell his picture to the owner of a restaurant, but the restaurant owner did not want to buy the picture because he could not understand it. Kamal explained that the picture would bring luck to the restaurant owner because the cat in the picture represented the customers who were very interested in the restaurant’s food, and if the picture were hung on the wall of the restaurant, the business would increase.” (Subject 77)

The difference between the two types of stories above is that the first group composed the stories as if they were instructed to focus their stories on the rectangle in the picture. In this situation their thinking was restricted and they were unable to compose unique and unusual stories. Their stories were almost always constrained by the lines that surround the picture. However the stories of the second group were not restricted by the rectangle in the picture; they used the whole picture or elements in the picture as the basis to develop stories which were freer and unique. Their thinking was not hindered by stimulus fixity.

#### 4.1.2. Functional fixity

The research data in Table 1 clearly shows that only a small group (n = 34; 14.66%) of teacher trainees could not solve the problem (when faced with an ambiguous situation) creatively because they could not imagine how the

mouse trap could be used for purposes other than its original one. Some of the teacher trainees suggested that the mouse trap be used to catch a mouse and the mouse be used to help the young man reach for the two strings. However, the majority of the subjects could think logically and rationally, and suggested using the concept of gravitational pull (weight of the mouse trap) to swing the trap which was tied to string B to reach string A.

#### 4.2. Thinking style

The frequency and percentage of each thinking style of the students are shown in Table 2. It was found that most of the students tend to use the left brain to think (left brain 66.81%, right brain 27.16% and whole brain 6.03%).

Table 2. Thinking styles of the subjects (N = 232)

Thinking style	Frequency	Percentage
Left	155	66.81
Right	63	27.16
Whole brain	14	6.03

### 5. Discussion

The study results show that most ( $n = 203$ ; 87.50%) of the teacher trainees experience the problem of stimulus fixity. They tend to focus their attention on the stimulus alone when faced with ambiguous situations. These teacher trainees are stimulus-bound; they follow rules religiously and are unable to bend the rules to suit their needs. They assume that rules exist when the situation is ambiguous (Slahova, Savvina, Cacka, & Volonte, 2007; Getzels & Taylor, 1975; Torrance, 1979). They are likely to assume non-existent directions in order to alleviate the fear of being wrong, and the fear is undoubtedly one of the most effective inhibitors of creative thinking. This behaviour served as a hindrance to internal creative thinking.

A creative personality dares to engage in uncertain and ambiguous situations, find new aspects in something that is congenial and familiar and create new experiences, always eagerly searching for new styles and manners and proceeding with various stages of the creative process (Slahova, Savvina, Cacka, & Volonte, 2007, Chua, 2009). Obviously, from the results of the study, this creative personality is lacking in the teacher trainees. This may be due to the school education system which directly or indirectly stresses thinking which is “systematic, logical and structured” in order to achieve high score in examinations (some subjects in the curriculum do emphasise the significance of enhancing thinking skills in students).

This is however, due to the tough competition among schools for academic achievement and “excellent school” and “cluster school” status). Students are taught to follow instructions step by step and to think logically as soon as they enter school (Hart, 1983). This emphasis indirectly will train them to centre and view each stimulus from only one perspective. Such a focus only increases the ability to think logically while weakening the ability to think creatively.

The findings of this study are supported by the research data about functional fixity, where the majority of teacher trainees could think logically, as illustrated by their use of the gravity concept to solve the problem in the Two-string Test. They could see the mouse trap functioning as a weight, but other unusual functions were not immediately obvious to them. The research results are also supported by the data in Table 2 which shows that most of the teacher trainees tend to use their left brain, which is oriented towards logical, systematic and rational thinking.

However, the results about functional fixity are not in line with the findings of Dacey (1989). The contradictions in the two research findings may be explained by the results of Chua’s research (2002), which showed that the standard mean score index for creative thinking in Malaysian students is lower when compared to the mean score index for American students of the same age. Nevertheless, to compare data of two studies which were conducted 10 years apart does not make sense. More bilateral or multilateral studies should be conducted to clarify this result.

## 6. Implications and suggestions

The results imply that the teacher trainees in this research experience problems in stimulus fixity when they are faced with ambiguous situations. To free them from this hindrance to creative thinking, it is suggested that lecturers help their students to become aware of this problem and explain to them the natural process of creative thinking while at the same time prepare an environment which will allow them to think creatively. This will awaken them to their innate powers of mind and enable them to reclaim their ability to think creatively.

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