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Author(s)	Jean Lee Say Ying and Yeap Lay Leng
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THE A, P, CPQ AND CLQ PROFILES OF ART ELECTIVE AND NON-ART ELECTIVE STUDENTS

Jean Lee Say Ying
Ministry of Education
Singapore

Yeap Lay Leng
National Institute of Education
Nanyang Technological University
Singapore

Abstract: With the current emphasis on creative thinking and a vision of a Singapore known for 'art, civilization and ideas (Straits Times, 21 Jan 1996), art has gained its much needed attention. This paper examines the cognitive profiles of Secondary Three and Four Art Elective and non-Art Elective students (Express stream). Art education in Singapore schools can be categorized under two major programmes – the Art Elective Programme (AEP) and the non-Art Elective or general art programme. The Cognitive Laterality Battery (CLB)(Gordon, 1986) was administered to 227 students from both programmes. This paper also discusses the implications of the findings on art curriculum in schools.

Introduction

Recent brain research shows that both sides of our brain are used simultaneously in nearly every activity that we engage in although certain tasks and experiences tend to stimulate more activity in one hemisphere than the other. Split-brain research pioneered by Roger Sperry at the California Institute of Technology established that each hemisphere has its own processing style. The left hemisphere deals with stimuli in a sequential, analytical and logical way while the right hemisphere has a more holistic, integrative and intuitive style. Suggestions were made that artists should be right-brained (Edwards, 1979), that is, they rely more on the right hemisphere when processing information. Betty Edwards, in her book, *Drawing on the Right Side of the Brain* (1979, 1992), proposed the cognitive-shift model to facilitate drawing performance. One exercise was by inverting the picture the subject wished to copy so as to make the drawing indecipherable to suppress the 'interference' of the left hemisphere and allow the right brain to use its capability for drawing.

Art in Singapore Schools

A turning point in the history of art education in Singapore was the 1981 report by the 'Ho Kah Leong Committee' which reviewed the teaching of Art and Crafts in Singapore schools. It recommended, among other things, the establishment of Art Elective schools with a special art programme to develop artistic skills as well as critical thinking abilities. Hence, there emerged two art programmes in secondary schools, the general art programme and the art elective programme.

The Art Elective Programme(AEP) is a specialist programme which identifies creative art students through a formal art selection test. It is implemented in schools with a strong academic tradition and so, these Art Elective students can be said to be

also academically able. Admission to the AEP in secondary schools is dependent upon the Primary School Leaving Examination results and formal selection procedures such as drawing tasks, student questionnaires and teacher recommendation.

Unlike the AEP where selected students start their art programme in Secondary One, the non-Art Elective students make an option to offer art for the Cambridge 'O' level examination at the end of Secondary Two where they are then streamed into classes taking art for the 'O' level examination. Art is compulsory for all Secondary One and Two students in all schools. So, one can analyze that, generally, while the students in the Art Elective schools are 'art-focused' and undergoing two years of the Art Elective programme, those in the non-Art Elective programmes have yet to decide whether they want to offer art as an 'O' level subject.

Objectives of the Paper

Educators benefit from knowing how individuals process information and cognitive profiling is able to provide insights into the thinking capabilities of the individual. Cognitive profiling has been defined as "patterns of cognitive functions that are unique to the individual or groups of individuals."(Yeap, Chong, & Low, 1997). Such profiles give a qualitative picture of the individual's strength and weaknesses. Assessing hemisphericity through cognitive profiling enables the researcher to understand the hemispheric capabilities of the subject, enabling art teacher practitioners to understand and strengthen teaching practice, policy makers to tap on creative talent and art educators to personalize learning.

This study seeks answers to the following research questions:

1. What are the cognitive profiles, in terms of left brain functioning tasks (Propositional / P) and right brain functioning tasks (Appositional / A) among the Secondary Three and Four (Express) Art Elective and Non-Art Elective students? Do the two groups' cognitive profiles match?
2. What is the overall performance on the Cognitive Laterality Battery (CLB) as measured by the Cognitive Performance Quotient (CPQ) among the Secondary Three and Four (Express) Art Elective and Non-Art Elective students?
3. What is the cognitive profile as measured by the Cognitive Laterality Quotient (CLQ) in the Cognitive Laterality Battery among the Secondary Three and Four (Express) Art Elective and Non-Art Elective students?
4. What are the implications of the profile characteristics on art curriculum?

Method

The Cognitive Laterality Battery (CLB) was administered to 115 Art Elective (AEP) and 112 non-Art Elective Secondary Three and Four students (Express stream) from seven schools. The enrolment in the non-Art Elective programme or the general art programme of the four AEP schools is either none or too small to be used. The sample population for the non-Art Elective programme comes from the express streams of non-AEP schools.

The Cognitive Laterality Battery (Gordon, 1986)

The Cognitive Laterality Battery is a performance test which consists of eight sub-tests designed to assess two main cognitive factors: visuo-spatial functions that are associated with the right cerebral hemisphere and the verbosequential functions,

associated with the left cerebral hemisphere. Specialized cognitive functions are assessed through the use of 35mm slides synchronized with pre-recorded audiocassettes. The four visuospatial tests are localization (a test to mark the exact location of *x*), Orientation (a test where individuals select two identical patterns from two similar and one mirror image two-dimensional patterns, presented in different orientations), Touching blocks (a test where, in a stack of 7-10 blocks, individuals report on the number of blocks touching a designated block) and Form completion (a test to identify incomplete silhouette drawings). The four verbosequential tests consist of Serial sounds (a test where one records the sounds in the same sequential order as they are played), Serial numbers (a test to record the numbers in the same order as they are presented), Word production, letters (a test where words that begin with a given letter must be listed in 1 minute) and Word production, categories (same as letters except that words in a category are listed).

Table 1
A, P, CPQ & CLQ of Cognitive Laterality Battery

A	Appositional (Right brain functioning tasks)
P	Propositional (Left brain functioning tasks)
CPQ	Cognitive Performance Quotient (Overall performance in CLB) (A + P) / 2
CLQ	Cognitive Laterality Quotient (A – P) CLQ = 0 = Normal Score +CLQ = better performance on right brain tasks - CLQ = better performance on left brain tasks

Table 1 shows the A, P, CPQ and CLQ of the Cognitive Laterality Battery. Overall performance, known as the CPQ (Cognitive Performance Quotient), is defined as (A+ P) /2. The cognitive profile of an individual is interpreted as the CLQ (Cognitive Laterality Quotient) shown as A-P. A 'normal' score would be CLQ = 0. A positive CLQ reflects a better performance on tests of the right hemispheric function and a negative CLQ reflects a better performance on tests of the left hemispheric function. The CLQ is independent of the overall performance.

Results and Discussion

Research Question 1: What are the cognitive profiles, in terms of left brain functioning tasks (Propositional /P) and right brain functioning tasks (Appositional / A) among the Secondary Three and Four (Express) Art Elective and Non-Art Elective students? Do the two groups' cognitive profiles match?

Finding 1:

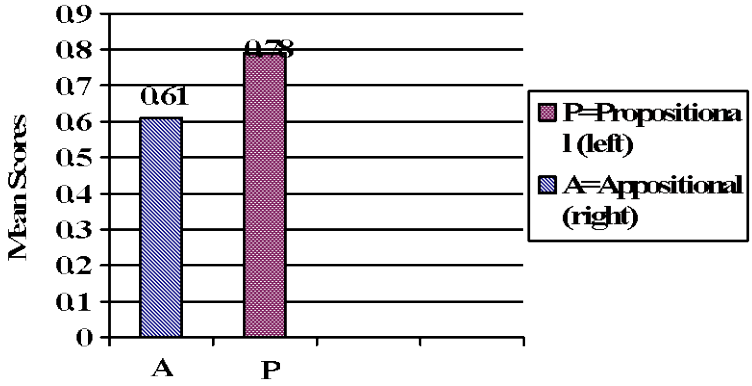

Figure 1: Means of A, P of total sample (n=227)

Students in the sample (n=227) used both hemispheres to process information. They performed relatively well in both hemispheric tasks. However, they had a tendency to perform better in left brain functioning tasks (0.78) as compared to the right brain tasks (0.61) (Fig.1). This was also evident in their performances of individual lateralization tests. The means obtained for the left brain tasks such as serial sounds, serial numbers, and word production, letters, were much higher than the means of the right brain tasks (Fig.2) such as localization, orientation and form completion. Interestingly, in the right brain functioning task of touching blocks, the students obtained a high mean score of 0.96.

Finding 2:

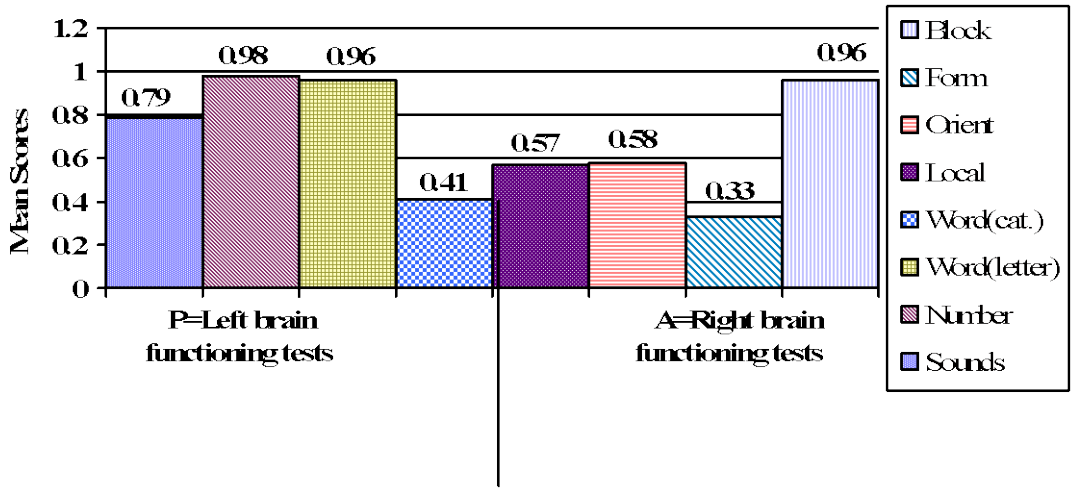

Figure 2: Performance of individual tests of sample (n=227)

Note: Block = Touching blocks; Form = Form completion; Orient = Orientation; Local = Localization; Word (Cat.) = Word production, categories; Word (letter) = Word production, letters; Number = Serial numbers; Sound = Serial sounds

The Art Elective Programme (AEP) group performed better in both the left (P) and right (A) brain functioning tasks (Fig.3). Both the AEP and the non-AEP groups process information with both hemispheres with a tendency towards left brain functioning. The AEP students have a high mean score of 0.97 for P (Propositional, verbosequential) and 0.81 for A (Appositional, visuo-spatial). It scored a high 0.97 in

its performance on verbal, left brain functioning tasks(P) with its highest score at 1.20 for Word and its lowest score at 0.78 for Word Category. Both tasks were involved in vocabulary building. The group also obtained an equally high 0.81 in its performances on A (right brain functioning). Its highest scores in these four sub-tests of right brain functioning tasks was 1.23 for the 'touching blocks' tasks, a spatial test, and its lowest score was Form, a pattern formation test, at 0.42.

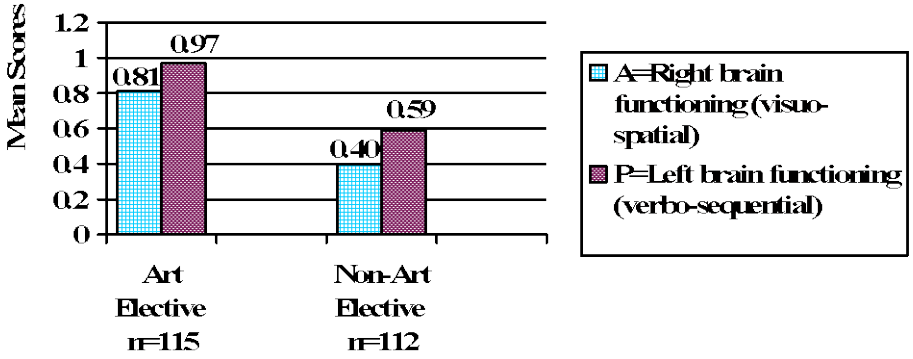

Figure 3: Means of A, P by Art Elective and Non-Art Elective Programmes

The non-AEP group, on the other hand, obtained relatively lower mean scores for both the right and left brain functioning tasks. They obtained an average 0.59 in their performance on P (left brain functioning) with the highest score at 0.87 for Number, a sequential test, and the lowest at a very low 0.02 for Word Category, a vocabulary test. For right brain functioning tasks, the group obtained a low 0.40 with its highest score at 0.68 for Block and its lowest at 0.24 for form. However, both groups performed better on left brain functioning tasks with the AEP students obtaining a higher score than the non-AEP students.

As this is the only such local study on brain functioning and art, comparison can only be made with local studies on academic and mathematics achievement. In Yeap's (1987) *Learning Styles of Singapore Secondary Two Students*, it was found that the higher the students' achievement level, the better were their A, P performances in the CLB. Both the mean scores of P and A among the high achievers were higher than those of the low achievers. More balance between the performances of the two hemispheres of the brain was seen with the increasing achievement levels of the students. The AEP students were from four premier schools ranked in the top 20 of 100 Singapore schools in the ST100 guide (Straits Times, Aug 1997). Though the AEP students obtained higher scores for P, left brain functioning, they also had right brain functioning high scores. Mean difference between the two (A and P) was only 0.16. This was in agreement with Dorethy and Reeves'(1978) findings, where art education majors studied showed nearly equal usage of both brain hemispheres. The findings of this study also concurred with La Pierre's study (1992) that artists display not only a spatial and holistic thinking style attributed to right brain dominance but also the sequential and logical thinking style of left brain dominance, hence, supporting the neuropsychological evidence of whole brain functioning.

Research Question 2: What is the overall performance on the Cognitive Laterality Battery (CLB) as measured by the Cognitive Performance Quotient (CPQ) among the Secondary Three and Four (Express) Art Elective and Non-Art Elective students?

Another value that can distinguish the cognitive profile of the AEP and non-AEP students is the Cognitive Performance Quotient (CPQ), that is, the overall performance on the CLB.

Finding 1:
The overall sample (n=227) scored high in their Cognitive Performance Quotient (CPQ) (Table 2). Both groups processed information using both the hemispheres. But, there was tendency towards left brain functioning, P (0.79). Their performance on the right brain functioning tasks, A, (0.61) was lower than the scores obtained in P, but it was relatively good. The mean difference between P and A was only 0.18. As a whole, the sample performed relatively well in CLB as measured by the CPQ value (0.72).

Finding 2:
The overall performance (CPQ) on the CLB was different between the AEP and non-AEP groups (Table 2). AEP students performed much better in both A, P, and CPQ than the non-AEP students. The AEP students scored high in their overall performance of the CLB, 0.92. High CPQ scores were associated with high achievers and high A and P (Yeap, 1987; Yeap, Chong, & Low, 1997, 1998). This can be expected as AEP students are high achievers, selected for the programme based on both their creativity and artistic inclination, as well as academic capability.

Table 2
Means of A, P, CPQ by Art Elective and Non-Art Elective Programmes

CLB Values / ***Art Programme***	**A** Right Brain Functioning	**P** Left Brain Functioning	**CPQ** Cognitive Performance Quotient
Art Elective n=115	0.81	0.97	0.92
Non-Art Elective n=112	0.40	0.59	0.51
Total sample n=227	0.61	0.79	0.72

The non-AEP students, on the other hand, opted to offer Art at their GCE 'O' level examination. There were no formal selection tests to undergo. The non-AEP students had a lower mean score for CPQ (0.51) (Table2). Hence, there was significant difference (α 0.05, pr = 0.000) in the overall performance (CPQ) on the Cognitive Laterality Battery among the Secondary Three and Four Art Elective and non-Art Elective students.

Research Question 3: What is the cognitive profile as measured by the Cognitive Laterality Quotient (CLQ) in the Cognitive Laterality Battery among the Secondary Three and Four (Express) Art Elective and Non-Art Elective students?

Finding 1:
The overall sample (n=227) was cognitively left (-0.18) as shown by a negative Cognitive Laterality Quotient (CLQ) (Fig. 5). This reflected a better performance on left brain functioning tasks. A 'normal' score would be CLQ = 0. A positive CLQ reflects a better performance on tests of the right hemispheric function and a negative CLQ reflects a better performance on tests of the left hemispheric function.

Finding 2:
The AEP group performed better on left hemispheric tests with a negative CLQ score of -0.16, reflecting a left cognitive profile (Fig.5).Though they were cognitively left (-0.16), the score showed movement towards zero and an integrated hemispheric functioning. This is concluded from the high scores of A and P. This is an interesting observation because AEP students though academically capable (as the programme was implemented for bright students), were not as dominantly left as the mathematics and academic high achievers found in local studies (Yeap, 1992; Yeap, Chong & Low, 1997, 1998) and international studies in Nigeria (Gwany, 1985), Korea (Koh, 1982) and the U.S. (Gordon, 1983). The AEP students were integrated in their hemispheric functioning.

Finding 3:
The non-AEP group also performed better on left hemispheric tests as their CLQ score was a -0.19. The non-AEP students are of mixed ability and do not have to sit for any aptitude tests. They offer the subject based on a number of possible reasons, be it whether they need to meet their quota of subjects for the GCE 'O' level examination or that they like Art or are good at Art. It is, therefore, interesting to note that their CLQ scores (-0.19) were not significantly different from the scores of the AEP group (-0.16) (Fig.5). The two figures of -0.19 and -0.16 are not statistically different. However, embedded in the two figures, -0.19 and
-0.16, lay a difference in the AEP and non-AEP cognitive profiles. Both groups had small mean scores for CLQ because their A (right brain functioning) and P (left brain functioning) mean scores were close (CLQ = A - P). However, the AEP group's high A and P scores and the small CLQ mean score implied a whole brain functioning because of the movement towards zero. Though the small CLQ mean score of the non-AEP group also indicated a movement towards zero, it cannot be read as such because of the low A (right brain functioning) and P (left brain functioning) mean scores (Fig. 5). The non-AEP figures cannot be interpreted as whole brain functioning but rather, as a movement towards right brain functioning.

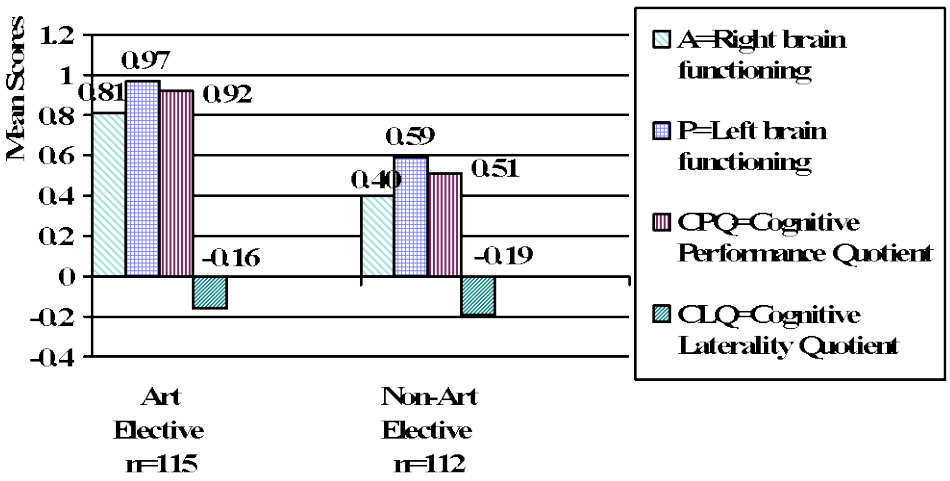

Figure 5: Means of A, P, CPQ, CLQ by Art Elective and Non-Art Elective Programmes

Studies on Mathematics and academic high achievers showed high mean scores in A and P with a tendency towards left brain functioning and were cognitively left (Yeap, Chong & Low, 1997, 1998). However, the AEP group, though high achievers, have also a factor different from the Mathematics and academic high achievers. They have been identified as artistic and creative. Therefore, their performance in right brain functioning tasks was better. Their mean difference between A (right brain functioning) and P (left brain functioning) was small because of their better performance in right brain functioning as compared to the mathematics and academic high achievers who did not perform as well in the right brain functioning tasks and so, the CLQ (A - P) mean score for these mathematics and academic high achievers was bigger and, hence, more cognitively left.

Though ability in art especially in drawing is not indicative of a creative person, it is common for such a person to be perceived as creative. Being artistic is often seen as being creative. In fact, in applying lateralization construct to giftedness the hypotheses put forward generally view the right cerebral dominance as being associated with high levels of creativity, artistic and aesthetic appreciation (Eysenck, H.J & Barrett, P. T., 1993) and the AEP students were selected for the programme based on their creativity. This creative element is perhaps the factor that accounts for their close to zero and moving towards a positive CLQ mean score (-0.16). However, the determination of artistic talent is not simple as there exists no reliable measures to judge either art production or appreciation. In the visual arts, it is accepted that the basic executive skill occurs in drawing which is taken to be the foundation of artistic development. Educators like Stalker (1980) argued that cognitive complexity, a construct which encompasses both convergent and divergent thinking abilities, is the intelligence required for artistic performance.

Table 3 below summarizes the findings of the study.

Table 3

A summarized description of hemisphericity of Art Elective and non-Art Elective Express students as measured by the Cognitive Laterality Battery

CLB values	*Art Elective n=115*	*Non-Art Elective n=112*	*Total n=227*
Right brain lateralization tests (A)	High mean standard scores (0.81)	Low mean standard scores (0.40)	Average mean standard scores (0.61)
Left brain lateralization tests (P)	High mean standard scores (0.97)	Average mean standard scores (0.59)	High mean standard scores (0.79)
Cognitive Performance Quotient (CPQ)	High overall performance (0.92)	Average overall performance (0.51)	High overall performance (0.72)
Cognitive Laterality Quotient (CLQ)	Left cognitive profile (-0.16)	Left cognitive profile (-0.19)	Left Cognitive Profile (-0.18)

Note: High = 0.71 and above; Average = 0.51 to 0.70; Low = 0.50 and below

Implication of the Profile Characteristics on the Art Curriculum

In art today, computers and digital cameras are as much the tools of the artist as the brush is. There is more to teach and learn as new works are being created daily. Art educators like Koroscik (1996) speak of the cognitive demands of art today. It is no longer sufficient for students to merely develop an awareness and appreciation of art. Students need to think critically about art and acquire higher order insights and expertise. Art education's role is one that fosters reflective thinking, removing the misconception of art as skill-oriented, non-cognitive and verbal and fit only for the talented.

A Discipline-based Approach (DBAE) to Art Education in Singapore

In the field of art education, the creativity paradigm dominated the scene for the last half century. Lowenfeld (1947) and a generation of art educators saw art education as a means of encouraging children to express ideas, emotions, and feelings in a constructive manner. Art education today has moved from an expressionist viewpoint to a more cognitive and conceptual approach known as Discipline-Based Art Education (DBAE). Four parent disciplines such as aesthetics, studio art, art history and art criticism are taught. The adoption of DBAE in art education here will provide students with a deeper understanding of art that will enhance the current programme. In DBAE, activities and skills are presented in sequences that lead to a developed understanding of art. This ordering of activities seeks an evolution from a naïve to a sophisticated understanding of the subject of art. As the concepts and skills from these four disciplines are taught concurrently, they interrelate to reinforce one another. Hence, there is continued focus on an integrated understanding of art. Not only is there attention to systematic instruction, a discipline-based art education teaches both the skills of attending to art and the skills of expression. With the disciplines of aesthetics and art criticism, the art student can make and defend judgements about works of art. With developed critical abilities, the art student can also present reasons for choices and decisions about the value of works. So, the right brain's visuo-spatial, holistic and creative functions are not sufficient. There is also a need for the sequential, analytical and verbal processing functions of the left brain. The approach

to art is a whole brain approach. The process of art making and appreciation includes description, analysis, synthesis, interpretation and evaluation. At present, art is often seen as a soft option and has a low status in schools and the community as our educational system emphasizes academic disciplines like the sciences and humanities. Furthermore, the non-Art Elective or general art programme, has been criticized as being geared towards the passing of examinations as the predominant style is 'examination art' (Chia, 1993). Hence, the adoption of a discipline-based approach with adaptations to the local situation, will enhance art education in Singapore.

As this study found that AEP students are balanced in their cognitive profile, such an approach will only enhance their capability and creativity. The non-AEP students, on the other hand, with their lower mean scores for left and right brain functioning, will definitely benefit from the integrated approach of DBAE. The fact that the AEP students obtained better scores in their cognitive profiles than the non-AEP students can be attributed to a number of factors such as the specialized art programme, the specialist teachers, the facilities and academic capability. AEP students' comprehensive exposure to art has resulted in cognitive profiles that are whole brain functioning. It is envisaged that the non-AEP group may be able to attain the level of achievement given the same infrastructure.

Conclusion

Both groups performed better in left brain tasks, hence, appearing to contradict the notion that artistic people rely more on the right hemisphere to process information. A factor to consider is that the school art style that sets the art of schools apart from the world of art has, among its art components, art design and the study of art, both needing a more conceptual approach. The design process calls on left brain skills such as analysis and logical sequence in its definition and evaluation of the design problem. Hence, attention to whole brain learning should be the guiding factor in art education. Recent brain research has called for changes to existing paradigms in education. Powerful learning concepts emerge based on current research in neuroscience which suggests how our brains learn best. Cognitive profiles are one source of information towards this end. Further research linking recent brain research to art will benefit art education which lends itself naturally to creating an environment that is optimal for learning.

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