

## Correlation between Brain Supremacy and Verbal Skill Level

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**Introduction:** In the present study Hemisphericity used in functional neurology to describe differences in notice rates between the left and right sides of the brain. The concept of hemisphericity there is hardly a study about its relationship with language proficiency among language studying students. The evolution of life from unpretentious pedigree to the most complex and superior of forms. Therefore the humans is one of the aspect of development on earth but in fact it is the most important since all the innovations that have been made subsequently the advent of times is endorsed to this superior being and specifically outstanding to the far fetched mind clever of doing miracles. Consequent this anecdote here is a meagre effort to clear understand the storehouse of colossal wonders human Mind.

**Keywords:** Hemisphericity, relationship, brain function, Cerebral Dominance, left cerebral hemispheres, right cerebral hemispheres, Students' hemispheric dominance.

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### The Cerebral Hemispheres

It is a general conception that a human being has one brain but anatomically our brain consists of two structures-left and right cerebral hemispheres. These hemispheres have contralateral (opposite) connection with the rest of the body. The corpus callosum connects two distinct cerebral hemispheres separated by a longitudinal fissure or divide. The sides are similar, and the structure of each hemisphere is often mirrored by the other. Despite their striking similarities, each cortical hemisphere has distinct functions. Other channels of communication between these two hemispheres include anterior commissure, the hippocampal commissure, massa commissure, posterior commissure, and optic chiasm. These hemispheres are similar in structure but not similar in functions. Left hemisphere possesses superiority in certain functions over the right hemisphere. This difference in the specialization of function of hemispheres is known as hemispheric specialization or lateralization of function. However, this has not been the case in the past. Earlier, it was believed that our left hemisphere has a dominant role over right hemisphere in controlling and executing all important cognitive processes. As a result of this theory, left hemisphere was often termed as the dominant hemisphere while right hemisphere was called as the minor hemisphere

### Brain Lateralization

The concept that different parts of the brain perform different functions is notorious responsible for managing language, forming memories, and creating movements, for example. More than just arguing for function localization, Paul Broca's report of a "language centre" in his patients. Broca and many other neuropsychologists have since demonstrated that the two cerebral hemispheres appear to play different roles in certain cognitive activities, particularly language.

### Development of the Theory of Cerebral Dominance

One can attribute the development of this theory (cerebral dominance) to two prominent names: Paul Broca and Hugo-Karl Liepmann. In 1864, Paul Broca reported that all his aphasia patients had. This made him conclude that left hemisphere is responsible for language ability. Similarly, Hugo Karl Liepmann in the early 1900s reported that patients of apraxia also had damage.

### Language dominance:

This is the first ability for which cerebral lateralization was discovered by Paul Broca (1864) in his seminal work mentioned the correlation between left hemisphere and aphasia, suggesting a dominance of left hemisphere over right hemisphere in language ability.

### Spatial ability:

Levy (1969) found in her study that spatial abilities, our right hemisphere has superiority over the left hemisphere. Any damage to right hemisphere leads to the disorders of spatial perception such as direction, geometry or distance.

### **Emotional ability:**

Numerous our right hemisphere is better in decoding emotional cues than the left hemisphere. This suggests that people with aphasia are better at detecting a liar because of their damaged left hemisphere, thus, they are free to use right hemisphere and make reliable judgments. (Beeman & Chiarello, 1998).

### **Memory ability**

Studies ensuresuggested that both of our hemisphereshave memory ability. However, the types of memory in which these hemispheres specialize differ from each other. According to the findings of Kelley et al. (2002), our left hemisphere plays a major role in verbal memory hemispheres whereas right hemisphere plays greater role non-verbal memory.

### **Right or left Brain person**

People are termed as being Left brain or right Brain. It means that it is the intrinsic property of the Human species that it uses its either side more than the other. These people are characterized as being highly logical and methodical, who do everything in a mathematical way. Left Brain is more sensitive towards analysing fine details. (Springer & Deutsch, 1998).

### **Statement of the problem**

Each strategy type offered by Oxford (1990) was considered one by one according to the observation of Morris (2005) left brainers, being teachers or learners, are more convenient in the classroom. The reason is that in traditional schooling, emphasis is placed on analyzing different elements of languages, something that left brainers are good at. Revel (as cited in Oflaz, 2011) accentuated that in many language classrooms, left brainers are favored. On the contrary, in these contexts, right brain dominant learners are suffocated by teachers. “Creativity, something that right brainers are said to be good at, is seriously impaired” (Oflaz, 2011, p.1509). Based on the researcher’s observation, like every language learner, students studying in English Preparatory School at Cyprus International University were also using language learning strategies consciously or unconsciously in their language learning process. Without considering how students are learned language, researcher would like to investigate how student’s brain dominance correlates with language proficiency.

### **Significance of the study**

Researchers have begun to do research into neurolinguistics so as to enhance foreign language teaching. The significance of this research study is to reveal and how brain dominance affects language skills of grammar,reading and speaking of learners. It cannot be denied that brain hemisphericity plays a major role in acquiring language skills. As Dülger (2012, p.1) stated, “knowledge of brain functions of language students can help teachers and curriculum designers utilize more effective teaching procedures. Knowledge of the relationship between hemispheric brain preference and language score in language students gives an idea about learning styles of better performing language students. It can also help both students and educators to apply effective teaching-learning methods to improve their performance. It is thought that it might be useful for educational institutes, curriculum designers, teachers, and even for students to realize more effective ways to teach and/or learn a new language. Learning begins when learners become aware of themselves as learners and they should be interested in knowing how they learn to take control of their learning; likewise teachers should also be aware of how their students learn and process information easily and permanently; because, it is very helpful for language instructors to know their students’ neurological strengths and weaknesses to be able to reach the majority of their students and to shape their teaching methodology, techniques and materials accordingly. It is expected to suggest ideas for brain-based instruction programs which have become increasingly popular in today’s education.

This basicreviewreveals the literature regarding brain hemisphericity and language proficiency. It represents, brain and brain lateralization, and its relation to language, and how our brain functions while acquisition of language are reviewed in this chapter. In addition how brain dominance relates to language proficiency in three skills of grammar, writing and speaking and , characteristics of good language learners.

**Kolb and Whishaw (2009)**clear that the belief about human brain that we use only 10% of our brains, and our brains work as a “unified whole”. Studies proved that those beliefs are just a myth since all functions are localized on human brain. Gall’s theory as an “idea that different parts of the brain have different functions.” This theory brought along the studies on the localization of language, as well. Like visual or motor functions, speech also has an area on brain.

**Kolb and Whishaw (2009, p.11)**discussed that “speech is localized in the frontal lobes”. In the further studies, **Paul Broca** “located speech in the third convolution of the frontal lobe on the left side of the brain.” This speech region, which is responsible for the production of language, is named as Broca’s area. As well as

proving that language was localized, Broca also discovered that “functions could be localized to a side of the brain, a property that is referred to as lateralization” (Kolb and Whishaw, 2009, p.12).

**Oflaz (2011, p.1508)** also stated that Sperry’s study emerged the differences between the two hemispheres which are; right hemisphere can recognize the differences among shapes, read faces, copy designs, read and express emotions, understand geometric shapes, process holistically, and comprehend metaphors; on the other hand, left hemisphere is good at language skills, skilled movement, and analytical time sequence processing.

### **On English Language Proficiency**

The term language proficiency is commonly used and understood superficially by ordinary people as one’s facility in the use of a certain language particularly in speaking and writing. However, it is not as simple as many have thought. It has varied complex meanings as viewed differently by language specialists.

**Chomsky (1965)** in his linguistic theory claims that language competence is like an ideal speaker- hearer in a completely homogenous speech community who knows his language perfectly without experiencing any performance variables, such as: memory limitation, distractions, shifts of interest, attention and so on.

**Dell Hymes (1972)** and others proposed a broader scope of competence called communicative competence which includes not only grammatical competence but also contextual or socio-linguistic competence.

Due to deficiency in other aspects of communicative competence (Tabacug, 1990).

The research methodology and procedures covers the aims and objectives the research design, the research locale, the respondents, the instruments, the data gathering procedure and the statistical treatment. The aim of the study was to find correlation between Brain Dominance and Language Proficiency among students. The objectives were, to find brain dominance of language students, to find language proficiency level of language students, to correlate grammar skill and brain dominance, to find correlation between speaking skill and brain dominance, To find gender differentiation on student’s hemispheric Dominance.

Hypothesis was formulated on the basis of review of research studies reported in the previous chapter along with some of the important theories relevant to the present study

A. H<sub>0</sub> – There is no correlation between Hemispheric dominance and language proficiency.

H<sub>1</sub> – There is a significant relationship between Brain Dominance and Language proficiency.

B. H<sub>0</sub> - There is no significant relation between brain dominance and grammar skill.

H<sub>1</sub> – There is a significant relation between brain dominance and grammar skill.

C. H<sub>0</sub> - There is writing skill.

H<sub>a</sub> – There is significant relationship between brain dominance and writing skill.

D. H<sub>0</sub> - There is no noteworthy relationship between brain dominance and speaking skill.

H<sub>a</sub> - There is substantial affiliation concerning brain dominance and speaking skill.

E. H<sub>0</sub> – There is no significant relationship between brain dominance and gender differences.

H<sub>a</sub> - There is a significant relationship between brain dominance and gender differences.

This study was deliberate as a quantitative correlational research so as to investigate the correlation between brain dominance and language proficiency of students of English course. According to Salkind (2005, p.191), “correlational research describes the linear relationship between two or more variables without any hint of attributing the effect of one variable on another.” Quantitative research method was employed throughout the study such as for data collection and data analysis procedures.

In this study, convenience sampling technique was used to select participants. At the beginning of the study, it was told students that they would participate in a research study and their names would be kept confidential. They were asked if there were any students who did not want to participate, and then, the questionnaires were distributed to the volunteer participants. In the analysis of data, SPSS, one of the modern statistical software’s, was used for descriptive and inferential statistics analysis.

State institution its tuition and other fees are very much affordable by the majority of the region’s populace and the quality of education it offers is generally good. On account of this background, more and more students from the different places in the region and nearby cities especially those from the low- income families pursue their Master Degree. These students with varied family backgrounds and experiences are expected to possess differing language proficiency individual learning styles.

### **Area of respondents**

The study had a population of fifty – second year science students from the two institutions namely, Tamil and English mostly enrolled during the period of 2020 – 2022. Students studying in institutions vary by

mother tongue, age, ethnic, cultural and educational background. Participants' age vary between 17 and 25. Their English level is ranged from pre-intermediate level to upper-intermediate level. Participants show differences in terms of ethnic and cultural background, and also they have different mother tongues.

### Sampling procedure:

The researcher collected the sample by properly explaining in detail about the nature and the purpose of the present study. Personal information form prepared by the researcher was used to gather information about name, gender, department etc.

Good rapport with the students are established to do the data collection carefully and the purpose of the study was explained to the participants. Before giving the questionnaire, instructions and the procedure for filling the scale used in the study was explained to the students. The respondents were assured of their confidentiality of the responses and that their responses would be used only for the research purposes. The clarification was given as and when required

The data of the research was gathered by two different inventories; because the study aimed at investigating the correlation between two variables. In addition, the questionnaire includes one more part to gather basic information about participants such as their age, gender, and known languages.

The independent variable of the research was the brain dominance of the participants. On the other hand, the dependent variables were language Proficiency used by the participants.

There were two tests in this study. They are

1. Open Hemisphere Brain Dominance Test (OHBDT)
2. Language Proficiency Test.

### Open hemisphere brain dominance test

The open hemispheric brain dominance scale (OHBD) was developed by Eric Jorgenson (2015). He developed it by selecting items based on correlations with five diverse other published scales commonly used to measure the construct: The Alert Scale of Cognitive Style, The Wagner Preference Inventory, Philip Carter's test, Madeline Turgeon's questionnaire and The Polarity Questionnaires. This contains 20 questions. For each question 1-20, the number should be given to rate the item on a scale from 1 to 5 on how much students agree with the statement.

### Scoring Procedure

- Take the values for the test form and move them into the two equations below.

$$A = \_ + \_ + \_ + \_ + \_ + \_ + \_ + \_ + \_ + \_ + \_ = \_ \\ (Q1) (Q2) (Q3) (Q5) (Q8) (Q10) (Q11) (Q12) (Q14) (Q18) (Q20)$$

$$B = \_ + \_ + \_ + \_ + \_ + \_ + \_ + \_ + \_ = \_ \\ (Q4) (Q6) (Q7) (Q9) (Q13) (Q15) (Q16) (Q17) (Q19)$$

- Compute the values for A and B then put them into the equation below.

$$X = 66 - \frac{\_}{(A)} + \frac{\_}{(B)} =$$

- X is the final score. It should be between 20 and 100. Higher scores indicate more right-brained thinking. Lower scores indicate left-brained thinking.

### Range Results

20-55 - Left-brained

56-64 - No clear preference

65-100 - Right-brained

### Tamil Proficiency test

Tamil Proficiency test contains 25 questions which constitute grammar, writing and speaking. In this, grammar part has 20 questions, writing part has 2 questions in which write about given topic, and speaking part has 2 questions in which students has been asked to talk about this topic. This test was prepared under the guidance of proficient Tamil teachers.

### English Proficiency Test

English Proficiency test was used to this study. The level of test is between intermediate to Intermediate to Advance to assess proficiencies in English grammar, reading, writing, and conversation.

**Statistics**

- Simple percentage frequency, mean and SD will be presented for all the variables.
- The association between subject variables using Karl Pearson Coefficient of Correlation.
- The significant mean difference between two groups (male and female) the independent sample t-test will be used.

**Findings and interpretation**

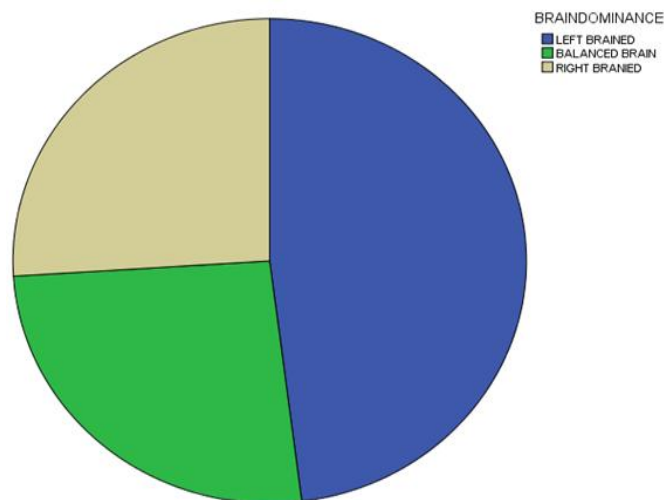
This study presents the data gathered from the students by the use of English proficiency tests in the three skills of grammar, speaking, and writing; and were analysed by the use of descriptive statistics and the Pearson Product-Moment Correlation Coefficient (Pearson r). The presentation and analysis of the said data are done in the following order:

- 1.) Students hemispheric dominance;
- 2.) Students' English proficiency scores in the three skills and global level by hemispheric dominance and gender which were qualitatively interpreted.
- 3.) Correlation between were categorized according to gender.

Descriptive statistics on Brain Dominance

	Frequency	percentage
Left brained	24	48%
Right brained	13	26%
Balanced brain	13	26%

Shows Student’s Hemispheric Dominance



The study presents the distribution of students in terms of hemispheric dominance - i.e. the left-brain dominance, the right-brain dominance and the whole-brain dominance. The study clear that 48 % were left-brain dominance, 26 % belonged to the right-brain dominance and 26% to the whole-brain dominance category. These findings provide a strong indication that left-brained individuals and few were right-brained and whole-brained.

**Student’s language proficiency scores in three language skills and global level**

This result indicates that regardless of hemisphericity, the students' proficiency level in the three skills was generally low although the students showed a bit better performance in the grammar and Speaking Skill Test.

Shows Descriptive statistics on Language Proficiency Skills

	N	HPS	Mean	Std. Deviation
Global level	50	68	43.8200	12.23693
Grammar Skill	50	38	23.8600	8.51172
Writing Skill	50	10	6.3400	2.21875
Speaking Skill	50	20	14.0200	4.77019

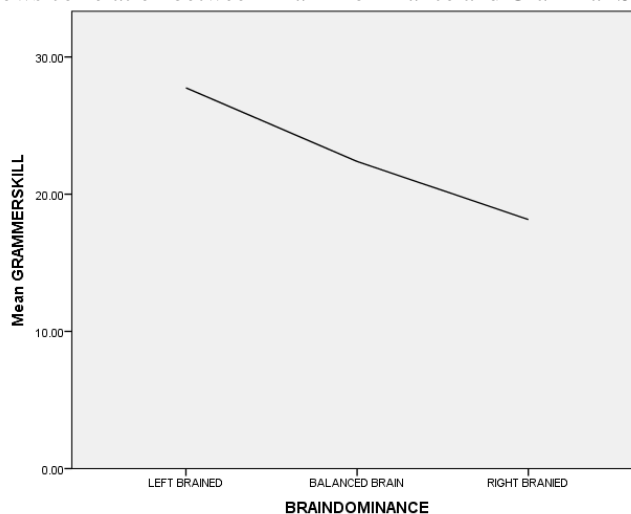
Correlation results between Hemispheric Dominance and Language Proficiency Skill

Language Proficiency skills	N	Computed value of r	Significance value at 0.05 level(p)	Interpretation
Grammar	50	- 0.478	0.000	Significant
Speaking	50	- 0.213	0.138	Not Significant
Writing	50	- 0.364	0.009	Significant

**Hemispheric Dominance and Grammar Skill**

Pearson r correlation analysis reveals that students' hemispheric dominance was negatively correlated with their grammar skill as shown by their computed value of r of - 0.478 and the degree of correlation was statistically significant at 0.05 level of significance. Hence the Null hypothesis is rejected. The result implies that if a student has a left or balanced brain dominance, it is more likely that he will obtain higher score in a test measuring his grammar skill; whereas, if a student has a right-brain, there is a greater tendency that he will get lower score in the same test.

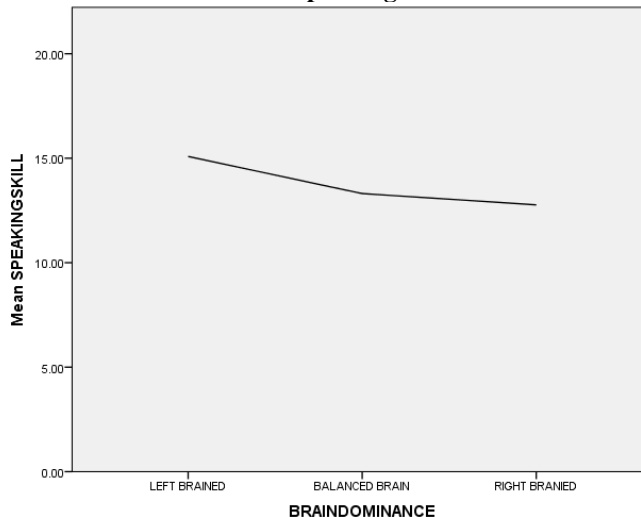
Shows correlation between Brain Dominance and Grammar Skill



**Hemispheric Dominance and Speaking Skill**

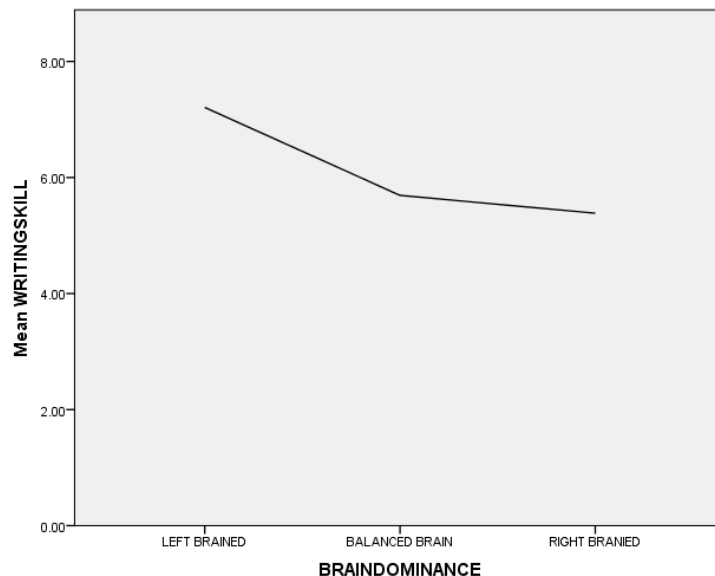
Between hemispheric dominance and speaking skill, the study reveal that students' hemispheric dominance was negatively but not significantly correlated with their speaking skill test result as evidenced by the computed value of r of - 0.213 against the 0.05 level of significance. So the null hypothesis is proved. This finding means that if a student is left-or balanced brained, he tends to get higher score in the speaking skill test; if he is right-brained, he tends to get lower score in the same test.

Shows correlation between Brain Dominance and Speaking Skill



**Hemispheric Dominance and Writing Skill**

The study reveals that the student’s hemispheric dominance was negatively correlated with their writing skill as evidenced by the computed value of r of -0.364. So Alternative hypothesis is proved. This implies balanced brained students tended to get higher score in the writing skill test; whereas, the right-brained students tended to get lower score in the same test although the result was not statistically significant at 0.05 level of significance.

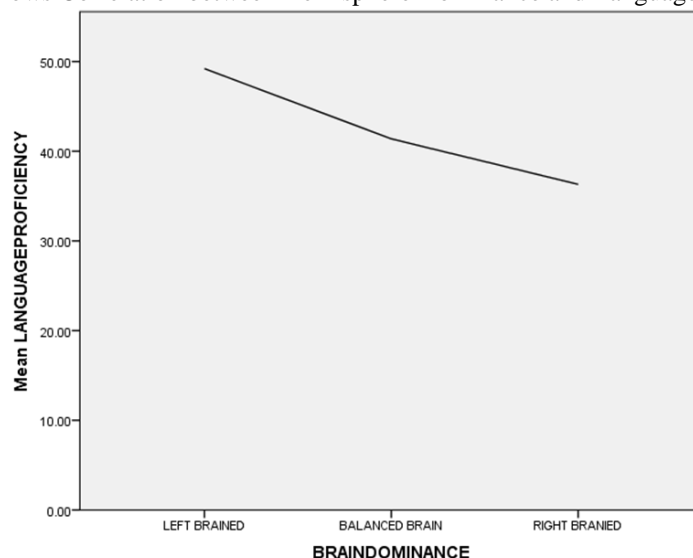


Correlation results Between Brian Dominance and Global Language Proficiency

English Proficiency	N	Computed Value of r	Significance value at 0.05 level(p)	Interpretation
Global	50	-0.451	0.001	Significant

The global language proficiency, discloses that students' hemispheric dominance was negatively correlated with their global English proficiency. The degree of correlation was statistically significant at 0.05 level of significance, the result implies that if a student is left-or balanced brained, it is more likely that he will get higher scores in the global test ; if a student is right-brained, it is more likely that he will get lower scores in the global test . This can be supported by their mean scores wherein the left and balanced-brained obtained a mean score of 50 and 43 in the global test while the right-brained, got a mean score of 32 in the same test.

The study shows Correlation between Hemisphere Dominance and Language Proficiency



This finding about the left-brained students' tending to excel in the global test of language proficiency speaks of a reality about the present educational system in the classroom level. Research has revealed that many of today's teaching methods, materials and tests are highly analytic. Hence, they are biased against the right-brained (global) learners. No wonder that the right-brained tend to get lower scores in the overall language proficiency test because these learners find difficulty in learning analytically (Hermosa, 1996).

### On hemispheric dominance and global language proficiency by gender

When the hemispheric dominance scores correlated with their global language proficiency scores, the results revealed significant negative relationships between hemispheric dominance score of male and proficiency level and insignificant correlation with brain dominance scores of female and global level proficiency.

Correlation results between Gender and Hemispheric Dominance

Gender	N	Computed value of r	Significant value at 0.05 level	Interpretation
Male	22	-0.656	0.000	significant
Female	28	-0.251	0.099	Not significant

The computed value of r for males was -0.656 and for females, was -0.251 at 0.05 level of significance. The results imply that the left-brained males and females were likely to get higher scores in the global test of language proficiency; whereas right-brained or whole-brained were likely to get lower scores in the same test, although female shows statistically insignificant.

### Findings

English proficiency in the three skills of the college students. Its findings, and conclusions are presented in the sequence as follows: Out of 50 respondents of the study, 48% (or 24) were left-brained, 26% (or 12) were right-brained and 26% (or 12) were whole-brained. **Grammar Skill** - In the proficiency skill test Grammar, out of the 38-item grammar Test, the students' mean score was 23.8600 which was qualitatively interpreted as - fair. **Speaking**- In the Speaking Skill Test of 20 points, the respondents, obtained a mean score of 14.5 with a grade of which meant - good, **Writing**- In the Writing Skill Test of 10 points, they obtained a mean score of 6.3400 which was considered - fair. Out of the 68 global Language proficiency score, the students got a mean score of 43.8200 qualitatively interpreted as —Good. Correlation results English proficiency in the four macro skills at 0.05 level of significance revealed that hemispheric dominance grammar ( $r = -0.478$ ) and speaking ( $r = 0.213$ ) and writing ( $r = 0.364$ ) skills.

There was a negative and significant correlation between the respondents' hemispheric dominance and global Language proficiency score ( $r = -0.656$ ). Among the —males, hemispheric dominance was negatively and significantly related with global Language proficiency ( $r = -0.0238$ ); among the —females, hemispheric dominance had a negative but not significant correlation with their global English proficiency ( $r = -0.251$ ).

### Conclusion

Based on the institution enrolled in the department of Tamil and English are left-brained. Only few of them are right-brained and whole-brained. The students are qualitatively —fair in their Grammar and writing skills—fair in their speaking ability—good in their reading proficiency. The students' global English proficiency score is good. The students' hemisphericity shows significant relationship on their three skills of grammar, and writing and does not on their speaking skill. The student's hemispheric dominance has significant influence their global language proficiency. For the male, their hemispheric dominance does have any influence on their global language proficiency. For the female, their hemispheric dominance does have any influence on their global language proficiency.

### Implications

The result on students' hemisphericity from institution is analytic learners. They learn faster better if programmes are presented and explained in a step-by-step linear manner from the specifics to the general (or following inductive method). It further implies that the present educational system has unconsciously succeeded to develop the student's left-brain but failed to develop their right brain which is the global and simultaneous processor of information.

Students' generally low proficiency level in the English language both in the three proficiency skills and global, it implies too alarming a sign of deterioration that it demands a dire need of strengthening the basic education. In addition, the result implies that the left-brained and balanced students tend to perform better in



grammar, speaking, writing and global English proficiency while the right brained doesn't show any significant relationship between those skills.

The study implies further that hemispheric dominance student's English proficiency when they are categorized in terms of their gender. Every study requires regulating itself within specific constraints. The concern brain dominance analysis. Mehrdad and Ahggar (2011) suggest that using evidence-based approaches such as FMRI is better for determining brain dominance. However, it was not economically feasible and practical for this research study due to the lack of necessary devices. As a consequence, brain dominance inventory learners' brain hemisphericity instead of using FMRI.

The English proficiency level of students which also adversely affected in the study. As it is known, preparatory students are the ones who fail English proficiency exams given by the educational institution proficient enough in English. For this reason, participants could find it difficult to understand the language used in the questionnaires. To minimize this, the students whose language proficiency level was pre-intermediate and above since the difficulty level of the language used in the English versions of the data collection instruments was not appropriate for lower levels: therefore, it would have needed to be simplified for them, or the lower learners would have needed more than a class hour to be instructed to respond questionnaires which was not feasible in terms of time provided for data collection.

The study clear that the 24 leftbrains, 12 right brain, and 12 whole brain were dominant participants. The total number of participants in each group is imbalanced. The reason of this mismatch is that none of the participants were eliminated from the study to make the total number of participants equal in each group after brain dominance analysis. The present research study the learners might cause different level of language processing, then, it would be correct to say that more research on identifying the factors influencing brain dominance could bring to how less dominant side of brain could be activated and strengthened. Furthermore, learner's achievement in language learning, cognitive style, and learning style could be analysed to investigate the learning strategies contribute majorly can be studied.

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