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A Study on Left-Brain Dominance of the Higher Secondary Students

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Abstract: This present study intends to find the left-brain dominance of the higher secondary students in Tirunelveli, Thuthukudi, Kanyakumari, and Virudhunagar districts in Tamilnadu, India. In this survey study, the population consists of 2000 higher secondary students of the above-mentioned districts of Tamilnadu, among this population, based on the result, the population was separated by left, middle or moderate and right brain dominant by the instruction of the scoring key. Here, 743 higher secondary students were coming under the left-brain dominance, 135 were in the right brain and 1122 higher secondary students were in middle or moderate brain dominance. In this study, the investigator examined only the left-brain dominance of the higher secondary students. The alert scale of cognitive style by Loren D. Crane (1989) was used to collect the data for this present study, which consists of 21 optional statements. Necessary instructions were given to every student before they asked to do the questionnaire. The scoring was done according to the scoring scheme and the formulated hypotheses were tested using appropriate statistical technical like percentage analysis, and chi-square. The findings indicate that the left-brain dominance of the higher secondary pupils' level is moderate and there is a substantial association between family income and districts community of the higher secondary students and their left-brain dominance.

Keywords: Left-Brain dominance, Cognitive style, Higher secondary students, Teachers, Curriculum.

Introduction

Human beings like to go to school to cultivate themselves as knowledgeable people in society, but the social circumstance influences them to grow or dropout (Hewes, 1973). Most of the educationalists criticize that everyone cannot be a perfect Learner, even most of the slow learners and dropouts achieve in their life (Concha et. al. 2012; Gazzaniga et. al., 1965). According to the human Physiology and Psychology theories, human growth and development belong to nurture and nature (McGilchrist, 2009). Human Physiology clearly defines that the growth depends on the persons' nurture but in psychology, it depends on the socio environment (Edwards, 2012).

In this regard, our brains were not progressed towards the requirement of contemporary and modern life (Zull, 2002). It is by several, and intricate mixtures of the functional modules, and by complete and myriad of interconnections, our brain can adapt to the functional neural systems, that makes us adjust and cope up with the multifaceted skills and tasks (Harrington, 1987). For so many ages, those processes of multitasking and adaption by the brain the tasks in formal education has been included for both students and teachers.

Lateralization of the brain function is known as Brain dominance, which defines that it is the tendency to carry out the explicit and precise brain activities by either the brain's left or right side (Corballis, 2012). The left and right side of the brain may be similar and alike, but the hemisphere of each side carries out a few specific

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functions over each other (Corballis, 1999; Corballis, 2014). For example, the function of speech is monitored and accomplished by the left hemisphere (It is for a left-handed person by the right hemisphere) (Zhang et. al., 2009). It differs from person to person in each activity regarding the side of the brain. Mostly it differs between the right and left-handed people. The analytical and logical activities are influenced by the left hemisphere (Bauer, 1993). The artistic, creativeness, and intuitiveness are influenced by the right hemisphere. To activate the level of artistic, creativeness, and intuitiveness, a right-hand person uses his left hemisphere by drawing or working on something using his left hand. At the beginning of the '70s, an unavoidable criticism arose that conventional science refused to accept the truth about different hemispheres and it was argued that it is just a story (Meguerditchian et. al. 2010). Even after many experimental and neurological experts' panel discussions, the people were not stopped arguing about the mental function which is lateralized by one or another hemisphere (Sperry, 1982). "Although the simple division of functions posited by popular writers proved to be mistaken, several laterality findings are now well supported: language abilities are strongly lateralized to the left hemisphere, especially in right-handed people, but also in most left-handed people" (Sher Afgahan et. al., 2017).

Need for This Study

UNESCO's strategic aims in education are that the quality of the education has to be improved by modifications of contents and methods, and encouraging research, revolution, invention, and sharing of information (Cantalupo, 2001). The 21st century poses a qualitatively new challenge in the field of education (Hopkins et. al., 2005). Many different professional opportunities exist in education including classroom teaching, administration, and a host of support positions such as counsellors, therapists, social workers, dieticians, and health personnel (Gannon et. al. 1998). So the present education system is to be entirely rehabilitated for the future generation. Only then, the young generation might have the awareness and knowledge about the importance of education especially skill-based education (Lindell, 2013), which is brain-based. Unfortunately, the education system in India focuses only on the memory level and understanding level but not on the reflective level (Wolfe, 2010). This will never help the learners to improve creative thinking. As a result, only a certain percentage of learners will succeed in higher studies and pursue research. The higher secondary students must obtain knowledge through skill-based education which makes them become effective individuals in society.

Title of the study

A study on left-brain dominance of the higher secondary students

Operational Definitions

Brain dominance means "lateralization of brain function, which describes the tendency for either the left or the right side of the brain to carry out specific brain activities."

Higher secondary students mean students who are perusing their higher secondary school education (XI and XII standards).

Methods and Procedures

The present study intends to find the left-brain dominance of the higher secondary students of Tirunelveli, Thuthukudi, Kanyakumari, and Virudhunagar districts in Tamilnadu. The investigator has adopted the survey method which suggests the gathering of data from higher secondary schools in the present study. The population consists of the higher secondary schools of above mentioned four districts. The investigator selected randomly 6,7,7,6 higher secondary schools from Tirunelveli, Thuthukudi, Kanyakumari, and Virudhunagar districts respectively. In this study, the investigator examined only the left-brain dominance of the higher secondary students. The alert scale of cognitive style by Loren D. Crane (1989) was used to collect the data for this present study, which consists of 21 optional statements. Brain dominance refers to the extreme use of the left or right or whole brain. Individuals who are predominantly left side tend to be more verbal, analytical, and problem-solvers, while individuals who are predominantly right-sided tend to be artistic, good at mathematics, and more visual in nature. This inventory contains 21 items, each item having two statements on a scale.

Different methods are used to establish the tool's validity. Content validity and concurrent validity are established by the investigator in this study.

In order to establish content validity, the investigator has given the tool to experts in various colleges. After well checking and scrutinization by the experts the brain dominance inventory has been executed. The suggestions and corrections given by the experts were based on language, suitability, and relevance. The content validity was affirmed by modifying the tool based on the suggestions rendered by the experts. And the establishing concurrent validity, brain dominance inventory was given to a randomly selected sample of sixty students from St. Xavier's higher secondary school, Palayamkottai.

Then the investigator gave the brain dominance scale developed and validated by Vengo Regis and Thomas Alexander (2007) as suggested on the same day to the same students. The students' responses were scored. To establish the concurrent validity, the product-moment correlation coefficient between the two sets of scores was found. It was 0.82. For establishing the brain dominance scale's reliability, the test-retest method was used by the investigator. The tool was administered to a randomly selected sample of sixty students from St. Xavier's higher secondary school, Palayamkottai.

The reliability of the tool was established by noting the time taken to complete the tool and the collected responses were scored. After 15 days, the same respondents with the same tool were administered. Again, the students' response was scored. The correlation coefficient was attained by computation and it was 0.76. Necessary instructions were given to each one before they were asked to fill up the scale. The scoring was done with the key which was prepared by the investigator for the brain dominance scale. In this scale, all the items were objective type with two choices. Each question has 2 statements, Respondents gave one point for each time he/she answered "A" for questions: 1, 2, 3, 7, 8, 9, 13, 14, 15, 19, 20, and 21. Respondents gave one point for each time he/she answered "B" for questions: 4, 5, 6, 10, 11, 12, 16, 17, and 18. Add all points, 0-8 left-brain, 9-13 middle brain, and 14-21 right brain. Whereas no wrong answer is given with zero marks. So an individual may get the lowest score of zero and the possibility of the highest score of 21. The formulated hypotheses were tested using appropriate statistical techniques like percentage analysis and chi-square.

Objectives

1. To find out the level of left-brain dominance of the higher secondary students.
2. To find out the level of left-brain dominance of higher secondary students concerning background variables
3. To find out whether there is any significant association between the community of the higher secondary students and their left-brain dominance.
4. To find out whether there is any significant association between districts of the higher secondary students and their left-brain dominance.
5. To find out whether there is any significant association between the family income of the higher secondary students and their left-brain dominance.

Hypotheses

1. There is no significant association between the community of the higher secondary students and their left-brain dominance.
2. There is no significant association between districts of the higher secondary students and their left-brain dominance.
3. There is no significant association between the family income of the higher secondary students and their left-brain dominance.

Analysis of Data

Objective Testing

To find the level of left-brain dominance of the higher secondary students and to find out the level of the students in their left-brain dominance with regarding gender, community, and family income.

Table 1. Level of brain dominance of the higher secondary students

Left-brain Dominance					
Low		Moderate		High	
Count	%	Count	%	Count	%
72	9.7	671	90.3	-	-

The above table reveals that 9.7% of the higher secondary students have a low level of their left-brain dominance and 90.3% of them have a moderate level in their left-brain dominance.

Table 2. Level of brain dominance of higher secondary students concerning background variables

Background variables	Categories	Low		Moderate		High	
		Count	%	Count	%	Count	%
Gender	Boys	35	10.6	29	89.4	-	-
	Girls	37	9	376	91	-	-
Community	OC	10	23.8	32	76.2	-	-
	BC	29	7.3	367	92.7	-	-
	MBC	23	12.1	167	87.9	-	-
	SC/ST	10	8.7	105	91.3	-	-
Income	Up to 25,000	35	8.4	380	91.6	-	-
	25,001 – 50,000	17	9.7	159	90.3	-	-
	50,001 – 1,00,000	9	11	73	89	-	-
	Above 1,00,000	11	15.9	58	84.1	-	-

The above table reveals that 10.6%, and 89.4 of the higher secondary boys, and 9% and 91% of girls have a low and moderate level of their left-brain dominance. 23.8% and 76.2% of the OC students have a low and moderate level of their left-brain dominance. 7.3% and 92.7% of the BC students have a low and moderate level of their left-brain dominance. 12.1% and 87.9% of the MBC students have a low and moderate level of their left-brain dominance. 8.7% and 91.3% of the SC/ST students have a low and moderate level of their left-brain dominance respectively.

8.4% and 91.6% of the students come under up to Rs/.25, 000 of their parents' income have a low and moderate level of their left-brain dominance. 9.7% and 90.3% of the students come under up to Rs/.25, 001 – 50,000 of their parents' income have a low and moderate level of their left-brain dominance. 11% and 89% of the students come under up to Rs/.50, 001-1, 00,000 of their parents' income have a low and moderate level of their left-brain dominance. 15.9% and 84.1% of the students come under up to Rs/.25, 000 of their parents' income have a low and moderate level of their left-brain dominance respectively.

Hypothesis Testing

H_{01}

There is no significant association between the community of the higher secondary students and their left-brain dominance.

Table 3. Association between the community of the higher secondary students and their left-brain dominance

Left-brain Dominance	Calculated χ^2 value	Remarks
	13.49	S

(at 5% level of significance, for 6 df, the table value of χ^2 12.92)

It is inferred from the above table that there is a significant association between the community of the higher secondary students and their left-brain dominance. The calculated χ^2 value (13.49) is higher than the table value (12.92) at a 5% level of significance. Therefore, the null hypothesis is rejected and it is concluded that there is a significant association between the community of the higher secondary students and their left-brain dominance.

H_{02}

There is no significant association between Tirunelveli, Thuthukudi, Kanyakumari, and Virudhunagar district higher secondary students and their left-brain dominance.

Table 4. Association between Tirunelveli, Thuthukudi, Kanyakumari and Virudhunagar district higher secondary students and their left-brain dominance

Left-brain Dominance	Calculated χ^2 value	Remarks
	23.33	S

(at 5% level of significance, for 6 df, the table value of χ^2 12.92)

It is inferred from the above table that there is a significant association between Tirunelveli, Thuthukudi, Kanyakumari, and Virudhunagar district higher secondary students and their left-brain dominance. The calculated χ^2 value (23.33) is higher than the table value (12.92) at a 5% level of significance. Therefore, the null hypothesis is rejected and it is concluded that there is a significant association between districts of the higher secondary students and their left-brain dominance.

H_03

There is no significant association between the family income of the higher secondary students and their left-brain dominance.

Table 5. Association between the family income of the higher secondary students and their left-brain dominance

Left-brain Dominance	Calculated χ^2 value	Remarks
	3.98	NS

(At 5% level of significance, for 6 df, the table value of χ^2 12.92)

It is inferred from the above table that there is no significant association between the family income of the higher secondary students and their left-brain dominance.

Findings and Discussion

The findings indicate a general impression that the level of left-brain dominance of the higher secondary students is moderate. The result shows that there is a significant association between community, districts of the higher secondary students, and their brain dominance. The community of the students is influencing the brain dominance of the students. This may be because based on their origin, culture, and lifestyles of the students' communities have separated the cut-off percentage in those their education and career. Based on the opportunities from their community are being unique and significant. But, these are all testing by the cognitive strength of the individual that is, through the competitive examinations and interview method of examination candidates selected. This also induced and urges the students from all the community to prove their cognitive strength by open. Hence, the community is influencing the left-brain dominance of the students.

The result shows that there is a significant association between districts of the higher secondary students and their left-brain dominance. Students from the mentioned districts are influencing the left-brain dominance of the students. This may be because each district is being unique but long ago, all the mentioned districts were in the single and same geographical realm. So in all districts may have the common phenomena at any of the characteristic features, coastal districts like Kanyakumari and Thuthukudi may have the large exposures of teenagers; Because cultural and industrial openings are being rich in these two districts more than that job opportunity like small scale and large scale industries play a significant role.

Tirunelveli and Thuthukudi are being the places on the riverbank of Thamirabarani. Tirunelveli is called the oxford of south India, because more number of higher education institutions like law college, engineering colleges, arts and science colleges, colleges of education, polytechnic colleges, and an enormous number of higher secondary schools, high schools, and elementary schools are making this districts and also the students more efficient and Virudhunagar district a well known for industrialization, here more number of fireworks business being done everyday basis. Without have enough knowledge of logic and technical mind people cannot do this kind of work successfully. People who are in this field must have unique in their mind and body then only it succeeded. Students from this family may also have the same things in their cognitive behavior. Hence, districts are influencing the left-brain dominance of the students.

Conclusion

Knowledge over the functions and jobs of the human brain is better, but understanding and holding a perception of the learners' brain functions is the best (Ehret, 1987). During this contemporary era, a catastrophe occurs that students lose their individuality, creativity, productivity, and independent thinking. This study may help the teachers to know about the students in their classroom. During the children's growth, it depends on their activities that make the activeness of the brain's side (left or right), that ultimately have an overlook on their choices of higher studies in the degree level (MacNeilage, 2013). Students who choose science and engineering show their high left-brain activity (Rogers et al., 2013). Understanding the preferences of the learners' brains is vital because it determines certain skills and weaknesses, likes, and dislikes. As a teacher one who must know how to make the learners brain based on their preferences (Ellamil et. al., 2012). If the curriculum has been made by the brain preferences of the learners then it will be a great opening of the human resources in all the fields.

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Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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