A STUDY OF ACADEMIC ACHIEVEMENT OF B ED STUDENTS IN RELATION TO THEIR HEMISPHERICITY

Education

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Abstract:

Research has demonstrated that students are capable of mastering new skills if they are taught through instructional methods that complement their hemispheric preference (Boyle & Dunn, 1998). Several studies have found that students taught through methods that matched their hemispheric styles achieved statistically significant higher test scores than when they were taught through other teaching methods (Brennan, 1984; Dunn, Sklar, Beau&y, Bruno, 1990; Jarsonbeck, 1984).

The authors were curious to know if hemisphericity was a correlate of academic achievement of B Ed students. The participants of the study were1037 students were drawn proportionately from14 B Ed colleges. The findings reveal that there is no significant relationship between hemisphericity and academic achievement of participants. The results show the need to focus on brain based learning in teacher education.

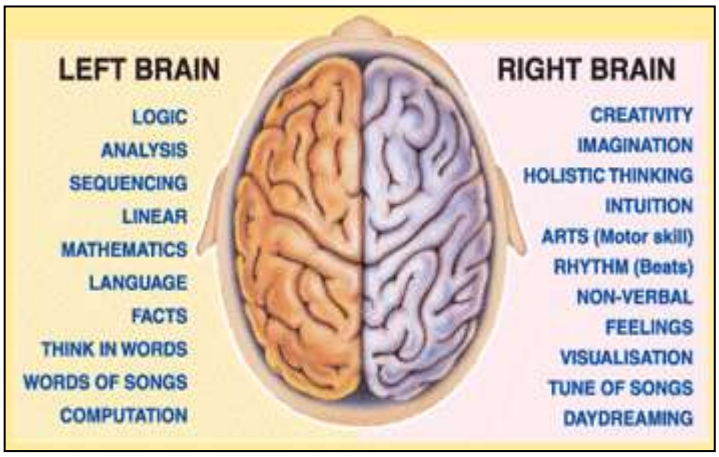
1 Introduction

Brain hemisphericity has been defined in various ways. It is the cerebral dominance of an individual in retaining and processing modes of information on his/her own style of learning and thinking (Raina, 1984). It is the tendency of an individual to process information through the left hemisphere or the right hemisphere or in combination (Bradshaw & Nettleton, 1981; Springer & Deutsch, 1993;McCarthy, 1996) Researches conducted during the last two decades have shown that the human left cerebral hemisphere is specialized for primarily verbal, analytical, abstract, temporal and digital operations and the right cerebral hemisphere is specialized for primarily nonverbal holistic, concrete, creative, analogical and aesthetic functions. (Bogen, 1989; Gazzaniga,1990; Fitzerald & Hattie, 1993). The idea of hemispheric dominance suggests that brain hemisphericity operates on a continuum and is not dichotomous (Saleh & Iran-Nejad, 1995). The individuals have different degrees of dominance, which affect to what degree they exhibit these characteristics.

Research has demonstrated that the left hemisphere operates in a linear, sequential manner with logical, analytical, propositional thought. On the other hand, the right hemisphere operates in a nonlinear, simultaneous fashion and deals with non-verbal information as well as dreams and fantasy (Iaccino, 1993; McCarthy, 1996; Oxford, 1996; Oxford, Ehrman, & Lavine, 1991; Springer & Deutsch, 1993; Torrance, 1988). The left hemisphere appears to be specialized for language, whereas the right hemisphere is specialized for visuo-spatial and appositional thought.

Kinsella (1995), Oxford (1996), and Oxford, Ehrman, and Lavine (1991) maintained that left hemispheric dominants are highly analytic, verbal, linear and logical learners, whereas right-hemispheric dominants are highly global, visual, relational, and intuitive learners. Whole-brain dominants are those who process information through both hemispheres equally and exhibit characteristics of both hemispheres. Those individuals have flexible use of both hemispheres (McCarthy, 1996).

The left hemisphere is the head- quarter for processing information that has to do with one's intellect such as memory, language, logic, computation, classification, writing and analysis. On the other, the right hemisphere is responsible for controlling functions involved in intuition, attitudes and emotions, music, rhythm, physical coordination and activity (Tendero, 2000).



(Source: http://ucmas.ca/our-programs/whole-brain-development/left-brain-vs-right-brain/)

The left hemisphere is associated with logical, analytical thought, with mathematical and linear processing of information. The right hemisphere perceives and remembers visual, tactile and auditory images. It is more efficient in processing holistic, integrative and emotional information (Brown, 1994).

Some of the features of the left and right brain dominant learners are given below (Brown (2007) :

Left-brain dominant learners: Intellectual; remember names; respond to verbal instruction and explanations; experiment systematically and with control; make objective judgments; planned and structured; prefer established certain information; analytic readers; reliance on language in thinking and remembering; prefer writing and talking; prefer multiple choice tests; control feelings; not good at interpreting body language; rarely use metaphors; favour logical problem solving.

Right-brain dominant learners: Intuitive; remember faces; respond to demonstrated illustrated or symbolic instructions; experiment randomly and with less restraint; make subjective judgments; fluid and spontaneous; prefer elusive uncertain information; synthesizing readers; reliance on images in thinking and remembering; prefer drawing and manipulating objects; prefer open-ended questions; more free with feelings; good at interpreting body language; frequently use metaphors; favour intuitive problem solving

Hemisphericity and Academic Achievement

Brain hemisphericity is found to be associated with academic majors (Kolb, 1979; McCarthy, 1996). Academic subjects such as arts, the humanities, and architecture are believed by several researchers to require a more global, synthetic, and spatial orientation which make them more suitable for right-brain dominant students, whereas other subjects such as science, engineering, and language emphasize logic and verbal analysis, which make them a better fit for left-brain dominant students (Herrman, 1982; Katz, 1983; Coulson & Strickland, 1986). Humanities students seem to show preference for the right-hemispheric dominance, natural science students a left-hemispheric mode, while social science major students for left-hemispheric dominance (Lavach, 1991).

Research has demonstrated that students are capable of mastering new skills if they are taught through instructional methods that complement their hemispheric preference (Boyle & Dunn, 1998). Several studies have found that students taught through methods that matched their hemispheric styles achieved statistically significant higher test scores than when they were taught through other teaching methods (Brennan, 1984; Dunn, Sklar, Beau&y, Bruno, 1990; Jarsonbeck, 1984).

The researcher was curious to know if hemisphericity was a correlate of academic achievement of B Ed students as they are supposed to know the concept of hemisphericity and the instructional methods that complement them.

2. Need and Significance of the Study

Teachers are to be the masters of the subject of their specialization, they are to possess not only analytical and problem solving skills bout also the right attitude and values to model desirable behaviour and prepare good citizens for the country. They have to focus on cognitive, affective and psychomotor domains of child's development. All this requires the right and left brain to be functioning optimally; studies on hemisphericity of the brain reveal that most of us who are conditioned to think verbally and who are exposed to only verbal, text or lectures have our left brain active rather than the right. I have seen from so many years of teacher training that not much of creativity or innovativeness emerges out of teacher education institutions and not much effort goes into developing the right emotions, attitudes and values among students. The focus is theory, assignments, tests, examinations, marks, marks and marks. Therefore, there is a dire need to look at the hemisphericity of the teachers and sensitize them to the benefits of training in the areas they lack.

The study will highlight the relation between the student-teachers' Academic Achievement and Hemisphericity among B Ed students. This will sensitize teacher-educators to the functions of the right and the left hemispheres of the brain and the dominance of hemisphericity among students and its implications to teaching and learning. Teacher educators would be made aware of the need to focus on strategies to train and foster right brain functions. The study is also expected to make policy level changes in the curriculum of teacher education regarding the inclusion of brain based learning strategies.

3. Objectives of the Study

- To ascertain the relationship of Academic Achievement of B.Ed. students with their Hemisphericity;
- To compare the hemisphericity of B Ed students on the basis of their gender, type of institution and subject of specialization

4. Research Questions

RQ1. What is the level of academic achievement of B Ed students on the basis of their gender, type of institution and subject of specialization?

RQ2. What is the hemisphericity of B Ed students on the basis of their gender, type of institution and subject of specialization**?**

5. Hypotheses

$H_0$1. There is no significant relationship of Academic Achievement of B.Ed. students with their Hemisphericity.

$H_0$2. There is no significant main effect and the interaction effect of Hemisphericity and gender on Academic Achievement of B Ed students.

$H_0$3. There is no significant main effect and the interaction effect of Hemisphericity and subjects of specialization (Arts, Science and Commerce) on Academic Achievement of B Ed students.

6. Operational Definitions of Key Terms

Academic Achievement: It is defined as the final total score of students-teachers in B.Ed. course (both the semesters put together). It encompasses marks secured by the B.Ed students in theory (10 papers) as well as practicum (internal assessment marks of all the practicum activities such as micro teaching, practice teaching, internship, book review, computer assisted presentations and research based project as well as marks on content test, assignments and tests.

Hemisphericity: It is a tendency of an individual to rely more on one than the other cerebral hemisphere for information processing. In the study, it is represented by the highest score obtained by the B Ed students on HDT test by Venkataraman (1996) which enabled the researcher to group students' hemisphericity under right, left and integrated hemisphere.

7. Scope of the study

1 The study was conducted within the geographical region of Greater Mumbai.
2 The study involved only those B. Ed colleges in Greater Mumbai that are affiliated to the Mumbai University in the region of Greater Mumbai.
3 The study focused on student-teachers' Academic Achievement in relation to their Hemisphericity, Self Esteem, Study Habits and Learning Styles.
4 The study employed the quantitative paradigm of research design..

8. Delimitations of the study

1. The study was delimited to

- only English medium B Ed students;
- teacher education institutions located in Greater Mumbai;

2. The tools for data collection are delimited to inventories which expect written responses from the students.

9. Research Design

The present study is a descriptive survey involving corelational and causal comparative methods. The correlational part of the study sought to determine whether, and to what degree, a statistical relationship exists between academic achievement and hemisphericity of B Ed students..

10. Participants

In the present study, the researcher made use of ***stratified random sampling technique*** to select the sample for the study. For the purpose of the present study, a two-stage sampling technique was used as follows:

At the first stage of sampling, the B Ed colleges were stratified on the basis of their location in Mumbai Metropolis as follows:

- South Mumbai (from Colaba to Dadar) and South East Mumbai (from Chembur, Govandi, Mankhurd and Trombay)
- North Mumbai (from Dadar to Dahisar)
- Central Mumbai (from Chatrapathi Shivaji Terminus (CST) to Ulhasnagar)

At the second stage of sampling, the aided and unaided colleges were selected from these locations using stratified random sampling technique. In all, 14 B Ed colleges were selected of which 7 were aided and seven unaided. 1037 students were drawn proportionately from them of whom 929 were women and 108 were men; 506 from aided colleges and 531 from unaided colleges.

11. Tools for Data Collection

Personal Data Sheet

The researcher prepared the Personal Data Sheet which gave information on the Personal details of the students such as their name, name of the college, gender, type of the college (Aided / Unaided), Subject of specialisation (Art/ Commerce/ Science), qualification, and percentage of graduation, Total marks in Semester I, category (Open/Reserved) and place of residence (Urban/Rural).

Hemisphericity Dominance Test

Hemisphericity Dominance Test is standardised tool prepared by Venkataraman (1996). The tool consists of 50 items. There are two statements for each item. The student has to put a tick mark either in one of these statements or both. A tick mark against the first statement shows the dominance of right hemisphere. A tick mark against the second statement shows the dominance of left hemisphere. A tick mark against both statements shows the use of both the hemispheres or integrated hemisphericity. The internal consistency reliability of the tool is as follows:

Hemisphere	Reliability
Right hemisphere	0.89
Left hemisphere	0.71
Integrated hemisphere	0.65

Scoring of the Tool: The number of ticks were counted separately for right hemisphericity and left hemisphericity. Depending on the higher score, the subject was categorized as right hemisphere dominant (R), left hemisphere dominant (L); if the scores were almost equal in both, the subject was labelled as having integrated hemisphericity (I).

The academic achievement scores of participants - The final total score of students-teachers in B.Ed. course (both the semesters put together) in theory (10 papers) as well as practicum (internal assessment marks of all the practicum activities such as micro teaching, practice teaching, internship, book review, computer assisted presentations and research based project as well as marks on content test, assignments and tests) was collected from the respective B Ed colleges.

12. The answering of the research questions

RQ1. What is the level of academic achievement of B Ed students on the basis of their gender, type of institution and subject of specialization?

Academic Achievement scores of female student-teachers is more than that of male student-teachers; Academic Achievement scores of student-teachers studying in unaided institutions is more than that of the aided institutions ;Academic Achievement scores of student-teachers with Science as the subject of specialization is more than that of those with Arts and Commerce as subjects of specialization.

Descriptive Analysis of Academic Achievement Scores of the Participants

	N	Mean	Median	Mode	SD	Percent Mean
Male	108	542.16	550.00	565.00	89.42	54.22
Female	929	554.15	558.00	550.00	83.81	55.42
Aided	506	548.09	544.50	447.00	87.07	54.81
Unaided	531	557.49	562.00	550.00	81.69	55.75
Arts	434	547.39	549.5	550.00	82.16	54.95
Commerce	270	551.04	559.50	600.00	85.11	55.10
Science	333	561.61	570.00	680.00	86.38	56.16

RQ2: What is the hemisphericity of B Ed students on the basis of their gender, type of institution and subject of specialization**?**

Left Hemisphericity Dominance*:* Male students have higher Left Hemisphericity Dominance as compared to females; students in aided colleges are found to have higher Left Hemisphericity Dominance as compared to those in unaided colleges; B Ed students with Arts and Science as subjects of specialisation have lower Left Hemisphericity Dominance as compared to Commerce students.

Right Hemisphericity Dominance: B Ed students have almost equal Right Hemisphericity Dominance irrespective of their gender, type of institutions and subjects of specialisation.

Integrated Hemisphericity Dominance: Male students have higher Integrated Hemisphericity Dominance as compared to females; students in aided colleges are found to have higher Integrated Hemisphericity Dominance as compared to those in unaided colleges; students with Arts and Science as subjects of specialisation have higher Integrated Hemisphericity Dominance as compared to Commerce students.

Descriptive Analysis of Hemisphericity Scores of the Participants

		N	Mean	Median	Mode	SD
LHDS (Left Hemisphericity Dominance Scores)	Male	17	26.06	27.00	27.00	4.38
	Female	185	24.73	24.00	23.00	4.52
	Aided	99	25.02	24.00	23.00	5.29
	Unaided	103	24.67	25.00	26.00	3.65
	Arts	79	24.89	25.00	26.00	4.71
	Commerce	63	25.03	24.00	23.00	4.69
	Science	60	24.58	24.50	25.00	4.12
RHDS (Right Hemisphericity Dominance Scores)	Male	69	26.64	26.00	26.00	4.42
	Female	652	26.37	26.00	23.00	4.68
	Aided	330	26.05	25.00	21.00	5.10
	Unaided	391	26.69	27.00	26.00	4.23
	Arts	299	26.39	26.00	26.00	4.85
	Commerce	187	26.58	27.00	28.00	4.32
	Science	235	26.26	26.00	25.00	4.68
IHS (Integrated Hemisphericity Scores)	Male	22	22.82	23.00	30.00	12.43
	Female	92	20.14	21.00	19.00	8.45
	Aided	77	22.31	22.00	19.00	9.21

	Unaided	37	17.22	21.00	21.00	8.78
	Arts	56	21.18	21.00	19.00	9.90
	Commerce	20	17.7	21.5	22.00	8.47
	Science	38	21.45	21.00	21.00	8.88

13. Verification of the Hypotheses

13.1 Verification of the Hypothesis $H_0$1

The hypotheses reads*: There is no significant relationship of Academic Achievement of B.Ed. students with their Hemisphericity*.

The technique used to test this hypothesis is Pearson's co-efficient of co-relation (r). The table shows the relevant statistics.

Significance of the Correlation of Academic Achievement Scores and Hemisphericity Scores of the Participants

Sr. No	Variables	N	df*	r	LOS**
i	AAS and RHDS	1037	1035	-0.046	NS
ii	AAS and LHDS	1037	1035	0.003	NS
iii	AAS and IHS	1037	1035	0.046	NS

df: degrees of freedom; LOS**-Level of Significance; NS: Not Significant.*

Academic Achievement and Hemisphericity

From the Table, it could be observed that the obtained value of ***r*** is less than the table value at 0.05 level (0.062). Therefore, the null hypothesis is accepted.

Interpretation:

There is negligible and no significant relationship between Academic Achievement and Hemisphericity among the participants with left hemisphericity dominance, right hemisphericity dominance and integrated hemisphericity.

Finding: There is no significant relationship of Academic Achievement of B.Ed. students with their Hemisphericity.

13.2 Verification of the Hypothesis $H_0$2

The hypotheses reads: There is no significant main effect and the interaction effect of Hemisphericity and gender on Academic Achievement of B Ed students.

The statistical technique used to test this hypothesis is Two Way ANOVA. The table shows the relevant statistics.

Main Effect and Interaction Effects of the Hemisphericity and gender on Academic Achievement of participants

Sources	Sum of Squares	df*	Mean Square	F-ratio	LOS**
SS between Hemisphericity Dominance Scores	62919.62	2	31459.81	4.45	NS
SS between Gender scores	13924.24	1	13924.24	1.97	NS
Interaction	17574.06	2	8787.03	1.24	NS
Residual Error	7293425.63	1031	7074.13		
Corrected Total	7387843.55	1036			

df: degrees of freedom; LOS**-Level of Significance; NS: Not Significant.*

Interpretation:

1. The calculated F=4.45 (SS between Hemisphericity Dominance Scores) is not significant at 0.05 level and therefore, the null hypothesis is accepted. Thus, there is no significant main effect of Hemisphericity on the Academic Achievement B Ed students.
2. The calculated F = 1.97 (SS between gender scores) is not significant at 0.05 level and therefore the null hypothesis is accepted: there is no significant main effect of Gender on the Academic Achievement B Ed students.
3. The calculated F = 1.24 (Interaction) is not significant at 0.05 level and therefore, the null hypothesis accepted. There is no significant interaction effect of Hemisphericity and Gender on Academic Achievement of B Ed students.

Finding: There is no significant main effect and the interaction effect of Hemisphericity and gender on Academic Achievement of B Ed students.

13.3 Verification of the Hypothesis $H_0$3

The hypotheses reads: There is no significant main effect and the interaction effect of Hemisphericity and subjects of specialization (Arts, Science and Commerce) on Academic Achievement of B Ed students.

The statistical technique used to test this hypothesis is Two Way ANOVA. The table shows the relevant statistics.

Main Effect and Interaction Effects of the Hemisphericity and subjects of specialization on the Academic Achievement of participants

Sources	Sum of Squares	df*	Mean Square	F-ratio	LOS**
SS between Hemisphericity Dominance Scores	62919.62	2	31460	4.47	NS

SS between subjects of specialization scores (Arts, Science and Commerce)	39359.26	2	19680	2.8	NS
Interaction	57644.44	4	14411	2.05	NS
Residual Error	7227920.23	1028	7031		
Corrected Total	7387843.55	1036			

df-degrees of freedom; LOS**-Level of Significance; NS: Not Significant.*

Interpretation:

1. The calculated F= 4.47 (SS between Hemisphericity Dominance Scores) is not significant at 0.05 level and therefore, the null hypothesis is accepted. There is no significant main effect of Hemisphericity on the Academic Achievement B Ed students at 0.05 level.
2. The calculated F = 2.8 (SS between subjects of specialization scores) is not significant at 0.05 level and therefore the null hypothesis is accepted. There is no significant main effect of subjects of specialization on the Academic Achievement B Ed students.
3. The calculated F = 2.05 (Interaction) is not significant at 0.05 level and therefore, the null hypothesis accepted. There is no significant interaction effect of Hemisphericity and subjects of specialization on Academic Achievement of B Ed students.

Finding: There is no significant main effect and the interaction effect of Hemisphericity and subjects of specialization (Arts, Science and Commerce) on the Academic Achievement of B Ed students.

Conclusion: The results suggest that there is no correlation between hemisphericity of B Ed students and their academic achievement. There is no main effect or interaction effect of gender or subjects of specialization on the Academic Achievement of B Ed students.

Suggestions for developing Hemisphericity of Student teachers

In order to develop left-hemisphere functions, B Ed colleges should focus on training students in information-processing skills such as note taking, inductive and deductive reasoning and problem solving, helping learners construct meaning by organizing, elaborating, and representing knowledge in their own way. To develop right-hemisphere functions, integrate art, music, physical education and activities related to multiple intelligences into the teaching-learning process; train the students in lateral thinking and divergent thinking.

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