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2 **Impact of Learning and Thinking styles on Academic achievement among secondary**
3 **school students of Mysuru District**

4

5 **ABSTRACT**

6 Learning and Thinking styles are the ways students take in process and remember information. The
7 present study was undertaken to know the effect of learning and thinking styles on academic achievement of
8 secondary school students. Academic achievement was treated as dependent variable whereas; learning and
9 thinking styles are independent variables. Both the hemisphere of brain and their functions consider
10 knowing the holistic performances of the students. Locality, Gender and Type of school were treated as
11 background variables. A sample of 240 secondary school students was selected through multi-stage random
12 sampling technique. Style of Learning and Thinking (SOLAT) test developed by Venkataraman (2011) was
13 used to measure learning and thinking style of students in terms of their hemisphericity functions of the
14 brain. The obtained data were analyzed using Three Way ANOVA with 2×2×2 factorial design. Levine's
15 Test of Homogeneity of Variance was also applied to test the assumption of homogeneity of variance for
16 ANOVA. Main effects of learning and thinking style, locality and gender on academic achievement of
17 secondary school students were found to be significant. Significant interaction effect of learning & thinking
18 style and locality; learning & thinking style and gender was reported on academic achievement of secondary
19 school students.

20 The findings of the present study have an implication for teachers that they should find out the
21 domain part of their students' brains first and then use the appropriate classroom techniques, methods and
22 tools according to them only then better and greater learning can be accomplished. Results of the study
23 revealed that Active Learning Styles were effective in enhancing the Thinking Styles and Academic
24 Achievement among the secondary school students. The study also showed a positive significant correlation
25 between Thinking Styles and Academic Achievement among Secondary school students.

26 **KEY WORDS: Learning Styles, Thinking Styles, Hemisphere, Academic Achievement.**

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32 INTRODUCTION

33 “By Education I mean all-around development, drawing out of the best in the Child body, mind and
34 spirit.” – Mahatma Gandhi.

35 Education presumes that creative spark may be kept alive throughout life, and moreover that it
36 maybe rekindled in those who are willing to devote a portion of their energies to the process of becoming
37 intelligent. Educational approaches grow high functioning students who are physically, socially emotionally
38 and intellectually engaged. Learner characteristics, items of the interior conditions such as learning style,
39 age, maturity level, interest is essential in designing learning environments process. Many educators are
40 still perplexed about the styles of students in learning and thinking process, what effects these styles have
41 on children’s performance in schools and why attention should be given to children’s performance to assess
42 their levels of ability.

43 According to William James (1895) Learning is the sum total of an individual’s life experience acquitted
44 through socialization process. It exceeds a mere acquisition of factual information or mastering of skills.
45 Thinking is a pattern of behavior in which we make use of internal representations of problem. Thinking is
46 problem solving process in which we use ideas or symbols in place of overt activities. It is essentially a
47 cognitive ability. Most people are somewhat flexible in their use of styles, and to adopt themselves to the
48 stylistic demands according to situations. It is important for the parents and teachers to understand the
49 nature of the student’s mind and its function and their different styles of learning and thinking. Styles
50 depend upon the cerebral dominance of an individual in retaining and processing different modes of
51 information in his own style of learning and thinking. The differences in preference of the two hemispheres
52 for information processing have been referred to as styles of learning and thinking (SOLAT). It indicates a
53 student’s learning strategy and brain hemisphere preference in problem solving. It may be possible to train
54 individuals to modify their information processing procedures to best fit their demands of the cognitive
55 tasks. (Venkataraman 1994).

56 CONCEPT OF LEARNING STYLES

57 David Kolb’s (1971) defines that learning styles is a term generally used to describe an individual’s
58 natural or habitual pattern of acquiring and processing information in learning situations. Proponents for the
59 use of learning styles in education said that teachers should assess the learning styles of their students and
60 adapt their classroom methods to best fit each student’s learning style. By recognizing and understanding our
61 own learning styles, we can use techniques better suited to us. This improves the speed and quality of our
62 learning. Learning style uses the three main sensory receivers: Visual, Auditory, and Kinesthetic
63 (movement) to determine the dominant learning style. It is sometimes known as VAKT (Visual, Auditory,

64 Kinesthetic, & Tactile). It is based on modalities that are channels by which human expression can take
65 place and is composed of a combination of perception and memory. VAKT is derived from the accelerated
66 learning world and seems to be about the most popular model nowadays due to its simplicity.

67 **CONCEPT OF THINKING STYLES**

68 Thinking, Hannah Arendt (2002) once wrote thinking is “the quest for meaning”. But just what is
69 the nature of this quest? John Dewey clarified it a bit by defining thinking as that operation in which present
70 facts suggest other facts (or truth) in such a way as to induce belief in the later upon the ground or warrant
71 of the former. To be even more precise, thinking is the mental manipulation of sensory input and recalled
72 perception of formulate thoughts, reason about or judge. The synonyms assigned to the verb to think suggest
73 the many facts or dimensions of thinking. For instance, we use the word to think to mean to decide, and we
74 use the verb to think to mean to believe. Indeed, the verbs to think is also synonymous with ponder, invent,
75 weigh, imagine, anticipate, predict and form in the mind. Thinking involves and serves a multitude of
76 functions. It is a complex phenomenon.

77 **CONCEPT OF ACADEMIC ACHIEVEMENT**

78 According to Malavika Ganguli, (1978) Achievement is the accomplishment of acquired efficiency
79 in the performance of an individual in a given skill or body of knowledge. It means the knowledge attained
80 or skills developed in the college subjects usually designated by test scorer or by marks assigned by the
81 teacher/university or by both. Since academic achievement is the criterion for selection, promotion or
82 recognition in various walks of life, the attention of educators is being increased on academic achievement.
83 Academic achievement is defined as success in completion with standard of excellence.

84 **NEED AND SIGNIFICANCE OF THE STUDY**

85 This study addresses the need for research into the relationship between achievement, thinking and
86 learning styles. An insight gained from this study enables the learners to improve the existing learning
87 situations as well as develop new, more effective programs for learners. This study gives additional
88 information on the nature of achievement and specific relational qualities necessary for the identification of
89 achievement in individuals. It is foremost important for the teachers to focus their attention on student’s
90 favorite thinking styles before imparting the subject matter. If they fail to do so, the consequences may be
91 serious because the teachers may tend to confuse styles of student’s mind. Since the method of teaching
92 adopted by the teachers often reflects their personal thinking style, the students who the same thinking
93 styles of the teachers are only benefited and rewarded. Any subject can be taught in any way that is
94 compatible with any style; students will seek learning activities that are compatible with their own preferred
95 styles.

96 The important thing to understand is how we learn and process information, so we can help ourselves
97 study in the way most conducive to us. Those individuals in the world who have learned to recognize and
98 understand their own learning styles are the most likely to succeed. Knowing their own learning style also
99 profits the students outside of an academic setting. It provides an indication as to their possible strengths
100 and weaknesses. Though this does not ever serve as an excuse for not paying attention or producing
101 substandard work, it may be able to give assistance in determining what career to pursue or how to go about
102 completing work in their own profession. The study will also analyze the different thinking styles and
103 learning styles of the students. So, the present study is needed.

104 **REVIEWS OF RELATED LITERATURE**

105 **STUDIES RELATED TO LEARNING STYLES;**

106 **Shetty (2014)** examined on the “meta cognition levels of student teachers and their learning styles”. It was
107 found in the study that “there were higher levels of Meta cognition on the sample collected in the study”.
108 The sample of 172 was considered in the study. As per the research method was concerned the researcher
109 have used the Descriptive Survey Method. While taking into consideration the nature of the data the
110 researcher has used the t-test. The main purpose of using the t-test was that the researcher wanted to
111 compare the mean scores on Meta cognition of student teachers those who have different learning styles. It
112 was found that Extraversion, Sensing, Feeling and judging combination were very high among them.

113 **Singh, Goil and Rani (2015)** examined a study on learning styles preferences among 300 secondary school
114 students. Central tendencies measure and chi- square test were computed through SPSS to analyze the data.
115 The study revealed that visual style of learning was most preferred by students followed by auditory, tactile
116 and kinesthetic learning style. The Learning styles of students were significantly influenced by mother
117 educational level. The study also revealed that gender, place of living, religion and educational level of
118 father not significantly impacted the learning styles of secondary students.

119 **Satyanarayana & Hoovinabhavi (2016)** studied achievement motivation of university students in relation
120 to their learning styles. Out of the total of 100 students 50 males and 50 females were taken as sample from
121 Gulbarga University. Learning Style Inventory (K.S Mishra, 1971) & achievement motivation scale (Deo
122 Mohan, 2002) were used as tools to collect data. Mean and F- ratio were used to analyze the data. The
123 study showed that learning styles and academic motivation not significantly differ among university
124 students. It also showed that significant relationship existed between gender and locality in relation to
125 learning styles and academic motivation.

126 **STUDIES RELATED TO THINKING STYLES**

127 **Bruce Vansledright, Liliana Maggions & Kim Reddy (2011)** study on teachers to teach historical
128 thinking? The interplay between professional development programs and school systems cultures has the
129 objective to compare the results of three nearly identical professional development programs implemented
130 with the support of Teaching American History (TAH) grants. The study focuses on results from these
131 programs efforts to reshape how the History teachers work with think about and teach History to their
132 students. The History teachers in these three TAH program appear to be squeezed in between two
133 counterpoised modes of thinking and operation. The views of the researchers after the study is that the
134 teachers hold some overlapping and shared attitudes, what distinguishes them is the value placed on those
135 attitudes. One champions and stresses one attitude over other while the other inverts that valuation. The
136 belief appears to be that if teachers tell the story. The students will get it and it seems most efficient process.

137 **Nalcaci, Ahmet (2012)** study on the relationship between the individual values and critical thinking skills
138 of prospective social sciences teachers aimed to determine the relationship between them. The sample of the
139 study consists of 298 prospective teachers, who are first year, second year, third year and fourth year
140 students. They were randomly selected and the data of the study have been obtained using a personal value
141 scale and critical thinking scale. The research reveals that a positive significant result has been obtained
142 among the scores for the critical thinking and personal value factor perceived by the prospective teachers.
143 From the study it was also observed that personal values factors collectively predict 42% of the critical
144 thinking score.

145 **Denise Lorraine Trombino (2013)** study on the experiences of secondary social studies teachers with
146 historical thinking skills is a mixed method of study investigated secondary social studies teachers' college
147 course experience with and classroom use of historical thinking skill. Questionnaire prepared by the
148 investigator was distributed to 64 teachers in the mid-Atlantic region of the United States. Observation,
149 interview, and analysis of instructional documents were used to gather data. The result revealed that high
150 school social studies teachers showed a range of experience with and use of historical thinking skill. The
151 teachers also reported more exposure to historical thinking skill in content courses than in method course.
152 The majority of teachers reported limited exposure to and use of explicit instruction. The responses to the
153 open-ended items suggested that teachers used historical thinking skill in college courses to varying degrees,
154 they included sources in their lessons, and they desire specific training related to historical thinking skill and
155 their teaching assignments. During the interview teachers reported more exposure to historical thinking skill
156 in content courses as opposed to method courses. The classroom observations indicated that teachers
157 incorporated diverse sources in to their lessons. Teachers used questioning techniques to involve students in
158 critical analysis of source material.

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162 **STUDIES RELATED TO ACADEMIC ACHIEVEMENT**

163 **Singh, Malik and Singh (2016)** conducted a study to “examine the academic performance of 200 students
164 on the basis of learning facilities, communication skills and proper guidance from parents”. The sample of
165 200 was taken in the study. As for as design of the study was concerned an “ex-post facto research design”
166 was applied while taking into consideration the operation of the variables of the study. Simple random
167 sampling for selection of the sample was used in the study. As per the analysis technique was concerned
168 multiple regression results presented that learning facilities, communication skills and proper guidance from
169 parents were the significant predictors of academic achievement.

170 **Sarkar and Bankim (2017)** explored the academic achievement and adjustment of 120 students (60 boys &
171 60 girls) on the basis of age and gender. For selection of the sample, the researcher has used simple
172 random sampling. As per the method was concerned the researcher have used the descriptive survey
173 method. On the basis of the results regarding the gender there was no significant difference in academic
174 achievement. Furthermore, “a significant relationship was found in academic achievement” and adjustment
175 between students in the adolescent period.

176 **Dooley (2018)** conducted a study on “academic achievement of students on the basis of gender, location of
177 the school and management type”. The researcher took the sample of 210 students. Thus, it was exposed in
178 the study that, significant difference existed in academic achievement while considering the locality of the
179 school and management type of school. Also found that students belonging to urban and government
180 schools had better academic achievement as compared to rural and private schools.

181

182 **STATEMENT OF THE PROBLEM**

183 **“Impact of Learning and Thinking styles on Academic achievement among secondary school students**
184 **of Mysuru district”**

185

186 **OBJECTIVES OF THE STUDY:**

- 187 1. To assess the Levels of Left Hemisphere, Right Hemisphere, and Whole Hemisphere of
188 secondary school students
- 189 2. To assess the Levels of Academic Achievement of secondary school students
- 190 3. To find out the relationship between Left Hemisphere, Right Hemisphere, Whole Hemisphere

191 and Academic Achievement

- 192 4. To find out the association Between Gender and Area with Left Hemisphere, Right
193 Hemisphere, Whole Hemisphere and Academic Achievement.

194
195 **HYPOTHESES OF THE STUDY:**

196 H1: The levels of Left Hemisphere, Right Hemisphere, and Whole Hemisphere are not
197 uniformly distributed among secondary school students

198 H2: The levels of academic achievement are not uniformly distributed among secondary
199 school students

200 H3: There will be relationship between Left Hemisphere, Right Hemisphere, Whole Hemisphere
201 and Academic Achievement

202 H4: There will be significant association Between Gender and Area with Left Hemisphere,
203 Right Hemisphere, Whole Hemisphere and Academic Achievement.

204 **OPERATIONAL DEFINITIONS**

205 **LEARNING STYLE**

206 Learning styles have been widely defined “as the individual preference process to use in learning.
207 Each student has his/her own style frequently used for understanding, analyzing, manipulating, processing,
208 interpreting and assimilating the concept”

209 **THINKING STYLE**

210 Thinking style is defined as a habitual pattern or preference in how individual’s process information,
211 approach problems and make decisions. It reflects cognitive, emotional and behavioral tendencies.

212
213 **VARIABLES OF THE STUDY**

214 **MAIN VARIABLES**

- 215 1. Thinking Style.
216 2. Learning Style.
217 3. Academic Achievement.

218 **BACKGROUND VARIABLES**

- 219 1. Gender (Boys & Girls)
220 2. Locality (Rural & Urban)
221 2. Type of School (Govt. Aided & Unaided/Private)

223 **RESEARCH METHODOLOGY**

224 The researcher has selected the survey research method of descriptive type. In this study, researcher has
225 selected samples of 240 respondents from the different schools of Mysuru district, population and
226 administered the tools of the study that is SOLAT inventory. Academic Achievement Scores were
227 collected through examination results for data information.

228 **DESIGN OF THE STUDY**

229 The study is of survey in nature where in the mention variables like learning and thinking styles,
230 achievement of students is surveyed and relationship between these variables is studied.

231 **SAMPLE AND SAMPLING PROCEDURE**

232 For this study, samples of 240 students from different schools were taken. The sample comprised of
233 Boys & Girls studying in 8 & 9 standards in Government, Aided & Unaided Schools of Urban & Rural
234 background. Simple Random Sampling technique was used. The questionnaire (SOLAT) which consisted of
235 50 items were given and achievement test which was based on common state syllabus.
236

Sampling Procedure											
Total 240											
Urban 120						Rural 120					
Govt. 40		Aided 40		Unaided 40		Govt. 40		Aided 40		Unaided 40	
M	F	M	F	M	F	M	F	M	F	M	F
20	20	20	20	20	20	20	20	20	20	20	20

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238 **DEVELOPMENT AND VALIDATION OF INSTRUMENTS FOR THE STUDY**

239 To study the major objectives, the tests developed were,

- 240 1. SOLAT tool.
241 2. Achievement test.

242 **SOLAT TOOL**

243 SOLAT (Styles of learning and thinking) tool developed by Venkataraman (1994) is used in the
244 present study. It is a modified version of the tool developed by Torrance. It is identified hemisphere
245 dominance by way of studying the hemisphere functions and indicates the learning and thinking styles and
246 brain hemisphere preference. It is the analysis and synthesis of learning for retention and thinking is
247 cognitive ability with a problem-solving behavior to achieve some purpose with symbolic activity. Style
248 indicates hemisphere function of the brain and learning strategy.

249

250 **ACHIEVEMENT TEST**

251 In order to study the achievement of students, the units taught in the class were considered for
252 constructing achievement test. Objective type questions were constructed along with short answer type and
253 essay type questions. While constructing the test items the behavioral objectives were kept in mind.

254

255

256 **ADMINISTRATION AND SCORING OF THE INSTRUMENTS**

257 Two tests were conducted and administered to 240 students of the schools. The achievement
258 duration was 60 mins, SOLAT tool of 30 mins. Clear instructions and directions were given to the students
259 before the test and how to precede each of them.

260 Academic achievement refers to the level of schooling successfully completed and the ability to attain
261 success in students' studies. Academic achievement (or academic performance) is the outcome of education
262 the extent to which a student, teacher or institution has achieved their educational goals. The question
263 paper consisted of objective short and essay type questions. The students were expected to answer
264 accordingly. Key scores were prepared before the scoring and marks were allotted accordingly. The final
265 score was calculated by summing up.

266

267 **STATISTICAL TECHNIQUES**

268 The data analyzed by appropriate statistical techniques manually and by using SPSS software.
269 Descriptive statistics: Mean, Standard Deviation and Percentile Analysis Inferential statistics t-test, One-way
270 ANOVA. Pearson's correlation coefficient.

271

272 **ANALYSIS OF RESULTS**

273 **SECTION I: DEMOGRAPHY AND DESCRIPTIVE STATISTICS FOR THE SELECTED SAMPLE**

274 Table 4.1: Distribution of the selected sample of secondary school students by various demographic factors

Variable	Sub variable	Frequency	Percent
Total sample		240	100.0
Class	8th std	80	33.3
	9th std	160	66.7
Age	14	80	33.3
	15	160	66.7

Area	Urban	120	50.0	275
	Rural	120	50.0	
School Type	Govt.	82	34.2	
	Aided	80	33.3	
	Unaided	78	32.5	
Gender	Male	128	25.0	
	Female	112	54.2	

276

277 **Class:** The sample consists of 240 secondary school students, with 80 students (33.3%) in the 8th standard
278 and 160 students (66.7%) in the 9th standard.

279 **Age:** In terms of age, the sample is evenly split. There are 80 students (33.3%) who are 14 years old and
280 160 students (66.7%) who are 15 years old.

281 **Area:** The sample includes 120 students (50.0%) from urban areas and an equal number of 120 students
282 (50.0%) from rural areas.

283 **School Type:** Among the students, 82 (34.2%) attend government schools, 80 (33.3%) attend aided
284 schools, and 78 (32.5%) attend unaided schools.

285 **Gender:** The sample consists of 128 male students (45.8%) and 112 female students (54.2%).
286

287 SECTION II:

288 LEVELS OF LEFT HEMISPHERE, RIGHT HEMISPHERE, WHOLE HEMISPHERE AND 289 ACADEMIC ACHIEVEMENT

290 Levels of Left Hemisphere, Right Hemisphere, Whole Hemisphere

291 Table 4.2. Distribution of the selected sample of secondary school students by various levels of Left Hemisphere, Right Hemisphere,
292 Whole Hemisphere and Academic Achievement.

Variable	Levels	Frequency	Percent	Test statistics
Left Hemisphere	Low	6	2.5	$X^2=450.475$; $P=.001$
	Average	156	65.0	
	High	78	32.5	
Right Hemisphere	Low	2	8	$X^2=140.700$; $P=.001$
	Average	235	97.9	
	High	3	1.3	
Whole Hemisphere	Low	0	0	$X^2=228.150$; $P=.001$
	Average	237	98.8	

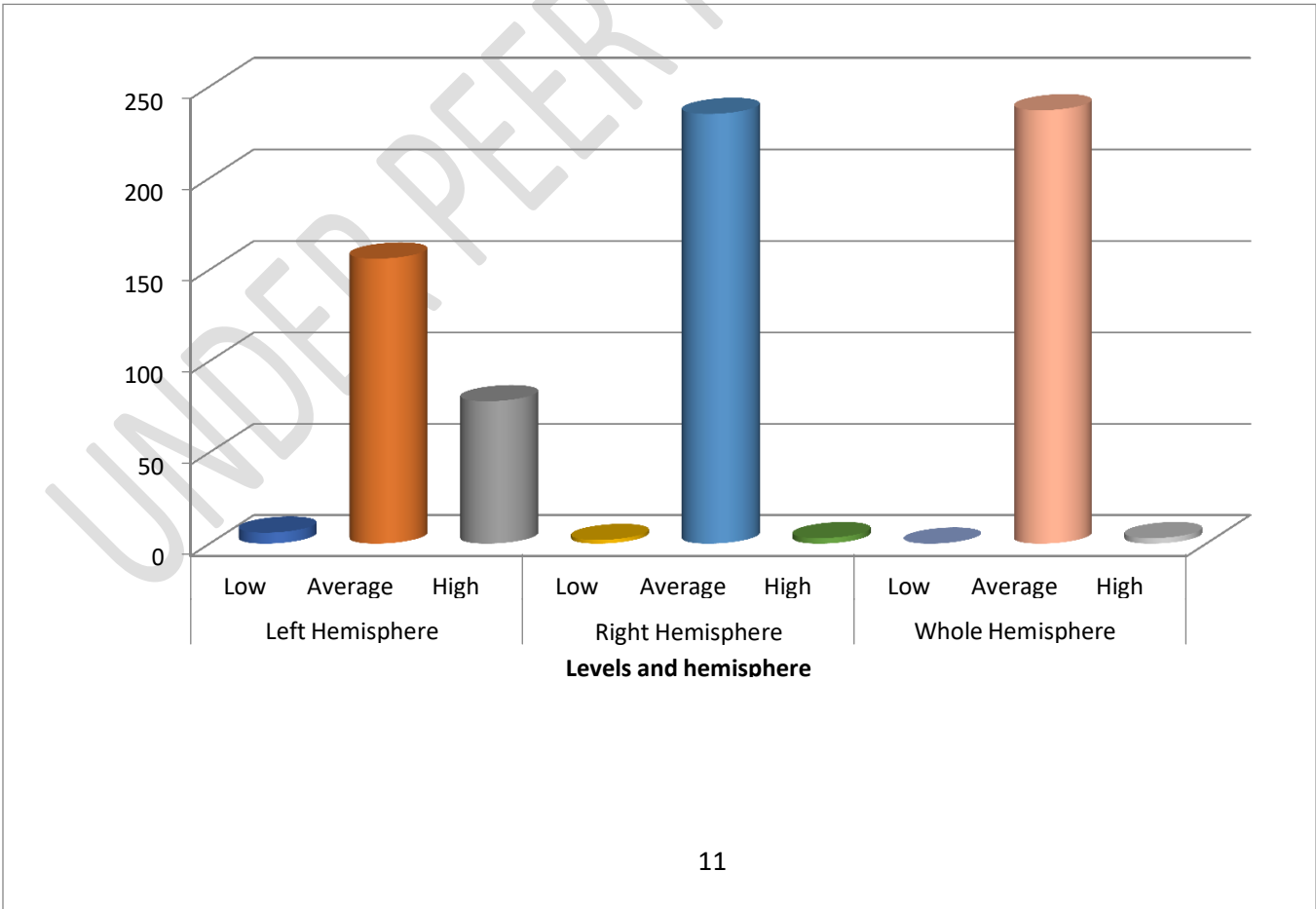
	High	3	1.3
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293 **Left Hemisphere:** The distribution of students in terms of Left Hemisphere functioning reveals that 6
 294 students (2.5%) fall into the "Low" category, 156 students (65.0%) are in the "Average" category, and 78
 295 students (32.5%) belong to the "High" category. The chi-square test ($X^2=450.475$, $p=0.001$) demonstrates
 296 a highly significant difference between frequencies of Left Hemisphere levels and the students, indicating
 297 that majority of them average level of Left Hemisphere functioning.

298 **Right Hemisphere:** The distribution based on Right Hemisphere functioning indicates that 2 students
 299 (0.8%) are in the "Low" category, 235 students (97.9%) are classified as "Average," and 3 students (1.3%)
 300 are in the "High" category. The chi-square test ($X^2=140.700$, $p=0.001$) shows a highly significant
 301 difference between frequencies of Right Hemisphere levels, indicating that majority of them had average
 302 level of right Hemisphere functioning.

303 **Whole Hemisphere:** In the case of Whole Hemisphere functioning, there are no students in the "Low"
 304 category, 237 students (98.8%) are classified as "Average," and 3 students (1.3%) fall into the "High"
 305 category. The chi-square test ($X^2=228.150$, $p=0.001$) indicates a highly significant difference between
 306 frequencies of Whole Hemisphere levels indicating that a large majority of them average level of Left
 307 Hemisphere functioning.

308 Graph 4.1: Distribution of the selected sample of secondary school students by various levels of Left Hemisphere, Right Hemisphere and Whole Hemisphere.



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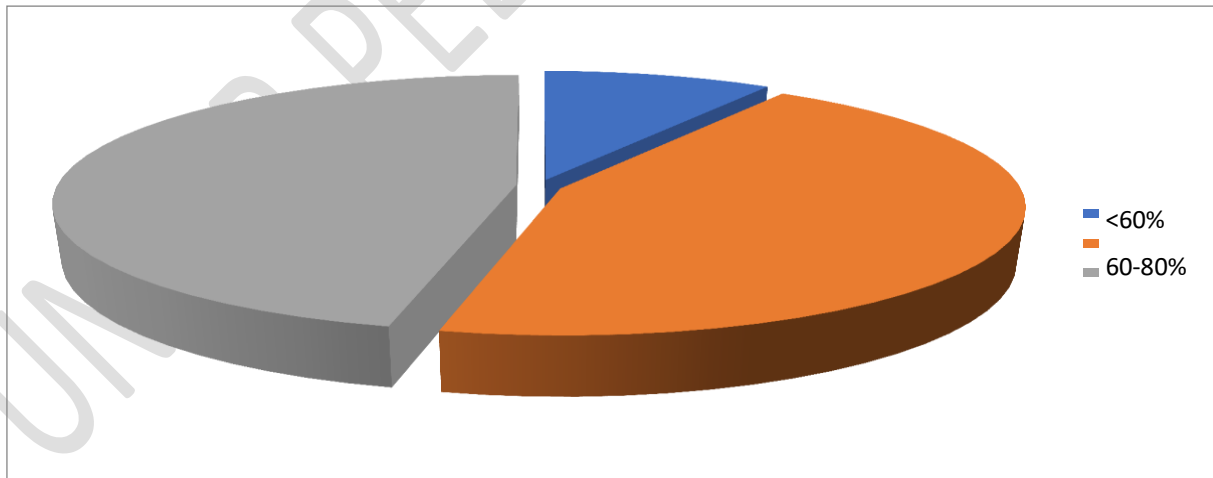
LEVELS OF ACADEMIC ACHIEVEMENT

325
326 Table 4.2: Distribution of the selected sample of secondary school students by various levels of Academic Achievement.

Variable	Levels	Frequency	Percent	Test statistics
Academic Achievement	<60%	22	9.2	$X^2=63.175$; $P=.001$
	60-80%	107	44.6	
	>80%	111	46.3	

327
328 **Academic Achievement:** The distribution of students based on academic achievement levels is as follows:
329 22 students (9.2%) achieved less than 60%, 107 students (44.6%) scored between 60-
330 80%, and 111 students (46.3%) achieved more than 80%. The chi-square test ($X^2=63.175$, $p=0.001$)
331 demonstrates a highly significant difference was observed between academic achievement levels and the
332 students, indicating that majority of the students had their academic achievement in the range of >80% and
333 60-80%.

334 Graph 4.2
335 Distribution of the selected sample of secondary school students by various levels of Academic
336 Achievement



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339 **SECTION III: CORRELATION BETWEEN LEFT HEMISPHERE, RIGHT HEMISPHERE,**
340 **WHOLEHEMISPHERE AND ACADEMIC ACHIEVEMENT**
341 Table 4.3 Results of Pearson's correlation coefficient between Left Hemisphere, Right Hemisphere, WholeHemisphere and Academic Achievement.

Variables		Academic Achievement
Right	Correlation	-.050
	P value	.439
Left	Correlation	-.063
	P value	.330
Whole	Correlation	.147*
	P value	.022

342

343 **Academic Achievement and Right Hemisphere:** The correlation between Academic Achievement and
 344 Right Hemisphere is not statistically significant with a Correlation of $-.050$ ($p=0.439$), suggesting that there
 345 is no significant relationship between academic achievement and the Right Hemisphere.

346 **Academic Achievement and left Hemisphere:** The correlation between Academic Achievement and left
 347 Hemisphere is statistically non-significant with a Correlation of $-.063$ ($p=0.330$), indicating that the scores
 348 on left hemisphere and academic achievement are independent of each other.

349 **Academic Achievement and Whole Hemisphere:** The correlation between Academic Achievement and
 350 Left Hemisphere is statistically significant with a Correlation of $.147^*$ ($p=.022$), suggesting a weak positive
 351 relationship between Academic Achievement and the Left Hemisphere. This means that as the functioning
 352 in the Left Hemisphere increases, there is a increase in the academic achievement.

353 **SECTION IV: ASSOCIATION BETWEEN GENDER AND AREA WITH LEFT HEMISPHERE,**
 354 **RIGHT HEMISPHERE, WHOLE HEMISPHERE AND ACADEMIC ACHIEVEMENT**

355 Gender and Hemisphere

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Table 4.4: Association of Right Hemisphere by gender and results of Chi-square test

Right Hemisphere		Gender		Total
		Male	Female	
Low	Frequency	5	1	6
	Percent	3.9%	0.9%	2.5%
Moderate	Frequency	84	72	156
	Percent	65.6%	64.3%	65.0%

High	Frequency	39	39	78
	Percent	30.5%	34.8%	32.5%
Total	Frequency	128	112	240
	Percent	100.0%	100.0%	100.0%
Test statistics		Chi-square test=2.534; P= .282		

357

358 The table 4.4. provides the frequency distribution of right hemisphere levels (categorized as Low,
359 Moderate, and High) among secondary school students, with data separated by gender.

360 Among male students, 5 (3.9%) fall into the Low category, 84 (65.6%) are in the Moderate category, and
361 39 (30.5%) are in the High category. For female students, 1 (0.9%) is in the Low category, 72 (64.3%) are
362 in the Moderate category, and 39 (34.8%) are in the High category. The total sample size is 240 students,
363 with 6 (2.5%) in the Low category, 156 (65.0%) in the Moderate category, and 78 (32.5%) in the High
364 category.

365 The Chi-square test results ($\chi^2 = 2.534$, $p = 0.282$) indicate that there is no statistically significant
366 association between students' gender and their right hemisphere levels. This suggests that there is statistical
367 similarity in the proportions of male and female students with Low, Moderate, or High right hemisphere
368 levels among the secondary school students in the sample.

369 Gender and left hemisphere

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Table 4.5: Association of Left Hemisphere by gender and results of Chi-square test

Left Hemisphere		Gender		Total
		Male	Female	
Low	Frequency	0	2	2
	Percent	0.0%	1.8%	0.8%
Moderate	Frequency	126	109	235
	Percent	98.4%	97.3%	97.9%
High	Frequency	2	1	3
	Percent	1.6%	0.9%	1.2%
Total	Frequency	128	112	240
	Percent	100.0%	100.0%	100.0%
Test statistics		Chi-square test=2.508; P= .285		

371

372 The table 4.5 presents the frequency distribution of left hemisphere levels (categorized as Low, Moderate,
373 and High) among secondary school students, with data separated by gender.

374 Among male students, there are no students (0.0%) in the Low category, 126 (98.4%) in the Moderate
375 category, and 2 (1.6%) in the High category. For female students, 2 (1.8%) are in the Low category, 109
376 (97.3%) are in the Moderate category, and 1 (0.9%) is in the High category. The total sample size is 240
377 students, with 2 (0.8%) in the Low category, 235 (97.9%) in the Moderate category, and 3 (1.2%) in the
378 High category.

379 The Chi-square test results ($\chi^2 = 2.508$, $p = 0.285$) indicate that there is no statistically significant
380 association between students' gender and their left hemisphere levels. This suggests that the proportions of
381 male and female students with Low, Moderate, or High left hemisphere levels among the secondary school
382 students in the sample are the same statistically.

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387 **Gender and whole hemisphere**

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Table 4.6: Association of Whole Hemisphere by gender and results of Chi-square test

Whole Hemisphere		Gender		Total
		Male	Female	
Low	Frequency	-	-	-
	Percent	-	-	-
Moderate	Frequency	125	112	237
	Percent	97.7%	100.0%	98.8%
High	Frequency	3	0	3
	Percent	2.3%	0.0%	1.2%
Total	Frequency	128	112	240
	Percent	100.0%	100.0%	100.0%
Test statistics		Chi-square test=2.658; P= .103		

389 The table 4.6 presents the frequency distribution of whole hemisphere levels (categorized as Low,
390 Moderate, and High) among secondary school students, with data separated by gender.

391 Among male students, there are no students (0.0%) in the Low category, 125 (97.7%) in the Moderate

392 category, and 3 (2.3%) in the High category. For female students, there are no students (0.0%) in the Low
 393 category, 112 (100.0%) in the Moderate category, and 0 (0.0%) in the High category. The total sample size
 394 is 240 students, with no students (0.0%) in the Low category, 237 (98.8%) in the Moderate category, and 3
 395 (1.2%) in the High category.

396 The Chi-square test results ($\chi^2 = 2.658$, $p = 0.103$) indicate that there is no statistically significant
 397 association between students' gender and their whole hemisphere levels. suggesting that there is no
 398 significant difference in the proportions of male and female students with Low, Moderate, or High whole
 399 hemisphere levels among the secondary school students in the sample.

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409 **Gender and academic achievement**

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Table 4.7: Association of Academic Achievement by gender and results of Chi-square test

Academic Achievement		Gender		Total
		Male	Female	
<60%	Frequency	13	9	22
	Percent	10.2%	8.0%	9.2%
60-80%	Frequency	55	52	107
	Percent	43.0%	46.4%	44.6%
>80%	Frequency	60	51	111
	Percent	46.9%	45.5%	46.2%
Total	Frequency	128	112	240
	Percent	100.0%	100.0%	100.0%
Test statistics		Chi-square test =.477 ^a ;P=.788		

411

412 The table 4.7 provides the frequency distribution of academic achievement levels (categorized as <60%, 60-
 413 80%, and >80%) among secondary school students, with data separated by gender. For male students, there are
 414 13 (10.2%) in the <60% category, 55 (43.0%) in the 60-80% category, and 60 (46.9%) in the >80% category.
 415 Among female students, there are 9 (8.0%) in the <60% category, 52 (46.4%) in the 60-80% category, and 51
 416 (45.5%) in the >80% category. The total sample size is 240 students, with 22 (9.2%) in the <60% category,
 417 107 (44.6%) in the 60-80% category, and 111 (46.2%) in the >80% category.

418 The Chi-square test results ($\chi^2 = 0.477$, $p = 0.788$) indicate that there is non-significant association between
 419 students' gender and their academic achievement levels indicating varying proportions of male and female
 420 students achieving <60%, 60-80%, or >80% academic achievement levels among the secondary school
 421 students in the sample.

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429 **Area with Left Hemisphere, Right Hemisphere, Whole Hemisphere and**
 430 **Academic Achievement**

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432 **Area and right hemisphere**

433 Table 4.8 Association of Right Hemisphere by area and results of Chi-square test

Right Hemisphere		Area		Total
		Urban	Rural	
Low	Frequency	6	0	6
	Percent	5.0%	0.0%	2.5%
Average	Frequency	88	68	156
	Percent	73.3%	56.7%	65.0%
High	Frequency	26	52	78
	Percent	21.7%	43.3%	32.5%

Total	Frequency	120	120	240
	Percent	100.0%	100.0%	100.0%
Test statistics		Chi-square test =5.004;P=.082		

434

435 The table 4.8 displays the frequency distribution of right hemisphere levels (categorized as Low, Average,
 436 and High) among secondary school students, with data separated by the area of residence (Urban and
 437 Rural).

438 For students residing in Urban areas, there are 6 (5.0%) in the Low category, 88 (73.3%) in the Average
 439 category, and 26 (21.7%) in the High category. Among students residing in Rural areas, there are no
 440 students in the Low category, 68 (56.7%) in the Average category, and 52 (43.3%) in the High category.
 441 The total sample size is 240 students, with 6 (2.5%) in the Low category, 156 (65.0%) in the Average
 442 category, and 78 (32.5%) in the High category.

443 Additionally, Chi-square test results ($\chi^2 = 5.004$, $p = 0.082$) indicate that there is no statistically significant
 444 association between the area of residence (Urban or Rural) and right hemisphere levels among the
 445 secondary school students. This suggests that there is a statically similarity in the proportions of students
 446 from Urban or Rural areas with Low, Average, or High right hemisphere levels in the sample.

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448 **Area and left hemisphere**

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Table 4.9: Association of Left Hemisphere by area and results of Chi-square test

Left Hemisphere		Area		Total
		Urban	Rural	
Low	Frequency	6	0	6
	Percent	5.0%	0.0%	2.5%
Average	Frequency	88	68	156
	Percent	73.3%	56.7%	65.0%
High	Frequency	26	52	78
	Percent	21.7%	43.3%	32.5%
Total	Frequency	120	120	240
	Percent	100.0%	100.0%	100.0%
Test statistics		Chi-square test =5.004 ^a ;P=.082		

450

451 The table 4.9 illustrates the distribution of left hemisphere levels (categorized as Low, Average, and High)
 452 among secondary school students, with data separated by their area of residence (Urban and Rural).

453 Among students residing in Urban areas, there are 6 (5.0%) in the Low category, 88 (73.3%) in the
 454 Average category, and 26 (21.7%) in the High category. In contrast, for students living in Rural areas,
 455 there are no students in the Low category, 68 (56.7%) in the Average category, and 52 (43.3%) in the
 456 High category. The total sample size consists of 240 students, with 6 (2.5%) in the Low category, 156
 457 (65.0%) in the Average category, and 78 (32.5%) in the High category.

458 The Chi-square test results ($\chi^2 = 5.004$, $p = 0.082$) indicate that there is no statistically significant
 459 association between the area of residence (Urban or Rural) and left hemisphere levels among the secondary
 460 school students, indicating that the proportions of students from Urban or Rural areas with Low, Average,
 461 or High left hemisphere levels in the sample are statistically the same.

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469 **Area and whole hemisphere**

470 Table 4.10: Association of Whole Hemisphere by area and results of Chi-square test

Whole Hemisphere		Area		Total
		Urban	Rural	
Low	Frequency	6	0	6
	Percent	5.0%	0.0%	2.5%
Average	Frequency	88	68	156
	Percent	73.3%	56.7%	65.0%
High	Frequency	26	52	78
	Percent	21.7%	43.3%	32.5%
Total	Frequency	120	120	240
	Percent	100.0%	100.0%	100.0%

Test statistics	Chi-square test =5.004 ^a ;P=.082
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471

472 The table 4.10 displays the distribution of whole hemisphere levels (categorized as Low, Average, and
473 High) among secondary school students, with data separated by their area of residence (Urban and Rural).

474 For students residing in Urban areas, there are 6 (5.0%) in the Low category, 88 (73.3%) in the Average
475 category, and 26 (21.7%) in the High category. Conversely, students living in Rural areas do not fall into
476 the Low category, with 68 (56.7%) in the Average category and 52 (43.3%) in the High category. The total
477 sample size includes 240 students, with 6 (2.5%) in the Low category, 156 (65.0%) in the Average
478 category, and 78 (32.5%) in the High category.

479 Furthermore, the Chi-square test results ($\chi^2 = 5.004$, $p = 0.082$) suggest that there is non- significant
480 association between the area of residence (Urban or Rural) and whole hemisphere levels among the
481 secondary school students, implying that there is no statistically significant difference in the proportions of
482 students from Urban or Rural areas exhibiting Low, Average, or High whole hemisphere levels in the
483 sample.

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490 4.6.3: Area and academic achievement

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Table 4.11: Association of Academic Achievement by area and results of Chi-square test

Academic Achievement		Area		Total
		Urban	Rural	
<60%	Frequency	4	18	22
	Percent	3.3%	15.0%	9.2%
60-80%	Frequency	46	61	107
	Percent	38.3%	50.8%	44.6%
>80%	Frequency	70	41	111
	Percent	58.3%	34.2%	46.2%

Total	Frequency	120	120	240
	Percent	100.0%	100.0%	100.0%
Test statistics		Chi-square test = 18.588 ^a ;P=.001		

492

493 The table 4.11 illustrates the distribution of academic achievement levels (categorized as <60%, 60-80%,
 494 and >80%) among secondary school students, segregated by their area of residence (Urban and Rural).

495 For students living in Urban areas, there are 4 (3.3%) in the <60% category, 46 (38.3%) in the 60- 80%
 496 category, and 70 (58.3%) in the >80% category. Conversely, students in Rural areas consist of 18 (15.0%)
 497 in the <60% category, 61 (50.8%) in the 60-80% category, and 41 (34.2%) in the >80% category. The
 498 overall sample includes 240 students, with 22 (9.2%) in the <60% category, 107 (44.6%) in the 60-80%
 499 category, and 111 (46.2%) in the >80% category. Moreover, the Chi-square test results ($\chi^2 = 18.588$, $p =$
 500 0.001) indicate a statistically significant association between the area of residence (Urban or Rural) and
 501 academic achievement levels among secondary school students. This implies that there is a significant
 502 association in the proportions of students from Urban and Rural areas achieving varying levels of academic
 503 performance in the sample. Urban students had significantly higher levels of academic achievement than
 504 rural students.

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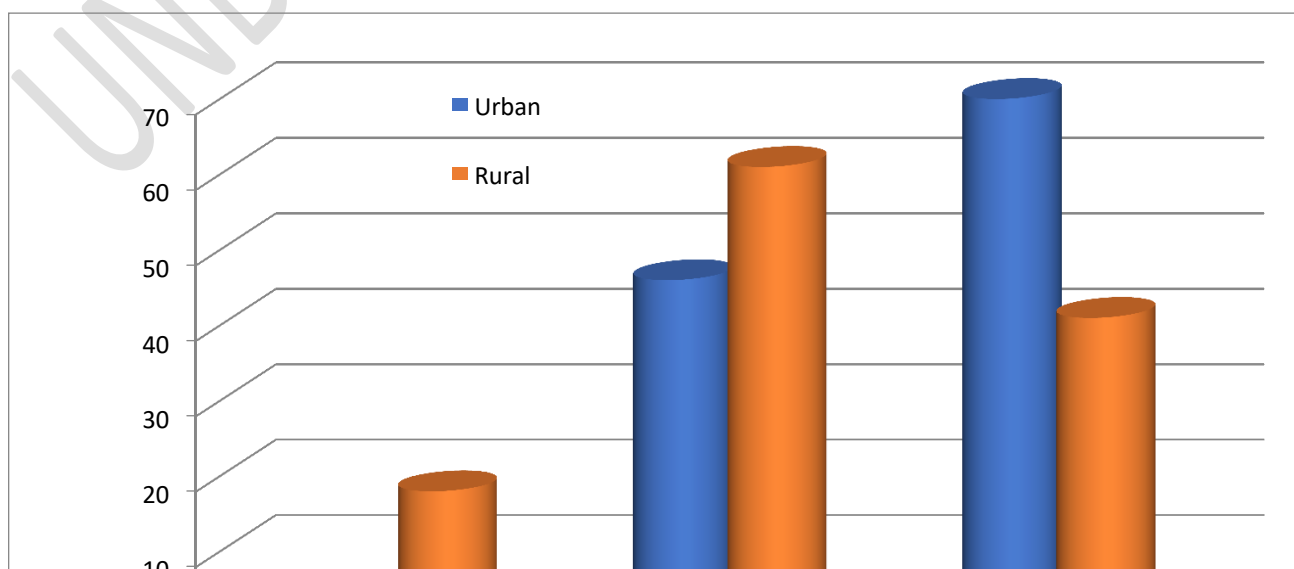
Graph 4.3: Distribution of the selected sample by area and levels of academic achievement

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525 **Verification of Hypothesis:**

526 **H1: The levels of Left Hemisphere, Right Hemisphere, and Whole Hemisphere are not uniformly distributed**
527 **among secondary school students**

528 The left hemisphere is specialized for language and analytical, logical, and linear thinking, while the right
529 hemisphere is specialized for visual-spatial thought and deals with non-verbal information (Yeliz Yazgan,
530 2018). Mathematically gifted individuals tend to have better cooperation between the left and right
531 hemispheres of the brain (Harnam Singh, 2004) .Studies have found varying levels of left-brain dominance
532 among students, with some studies indicating a moderate level of left-brain dominance
533 (VedalaveniChowdappa Suresh, 2020), (Khanal L,2023).

534 One study found no significant relationship between hemispheric preference scores and academic
535 performance among preclinical medical students. Another study found no significant difference in
536 cumulative grade point average between students with left-brain dominance and those with right-brain
537 dominance (Donald M. Hurwitz, 2005). Overall, the search results suggest that the levels of left and right
538 hemisphere dominance are not uniformly distributed among students, and that there may be a relationship
539 between hemispheric dominance and academic achievement, although the results are not consistent across
540 studies. Further research is needed to confirm these findings and to better understand the relationship
541 between hemispheric dominance and academic achievement.

542

543 **H2: The levels of academic achievement are not uniformly distributed among secondary school**
544 **students**

545 A study conducted on undergraduate medical students in Thailand found that there is a significant
546 association between learning styles and high academic achievement (Jiraporncharoen W, 2015). The study
547 found that students with the assimilating learning style had the highest academic achievement, while
548 students with the diverging learning style had the lowest academic achievement. Another study conducted

549 at a technical college in Georgia found that learning style is associated with student performance. The
550 study found that students with the converge learning style had higher grades than students with other
551 learning styles. A study conducted on nursing students found a significant relationship between learning
552 styles and academic achievement (Shirazi, F., & Heidari, S., 2019). A study conducted on high school
553 students found that students who were aware of their learning style had improved academic performance.
554 The study found that college students who were tested on their learning style and were given appropriate
555 education according to their learning style profile achieved higher academic performance than other
556 students.

557 A study conducted on secondary school students in Turkey found that there is no significant relationship
558 between learning styles and academic performance (Nursen İlçin, 2018). The study found that students
559 with the visual learning style had the highest academic performance, while students with the kinesthetic
560 learning style had the lowest academic performance. Overall, the studies suggest that there is a relationship
561 between learning styles and academic achievement among secondary school students, although the results
562 are not consistent across studies. Some studies found that students with certain learning styles had higher
563 academic achievement, while others found no significant relationship between learning styles and
564 academic performance. It is important to note that these studies have limitations, such as small sample sizes
565 and different methods of measuring learning styles and academic achievement. Therefore, further research
566 is needed to confirm these findings and to better understand the relationship between learning styles and
567 academic achievement among secondary school students.

568 **H3: There will be relationship between Left Hemisphere, Right Hemisphere, Whole Hemisphere and** 569 **Academic Achievement**

570 A study conducted on preclinical medical students studying medicine and dentistry found no statistically
571 significant relationship between academic achievement and hemispheric preference scores (Essmat A
572 Mansour, 2017) (Khanal L, et.al, 2.23). The study compared the right and left hemisphere preferences for
573 processing information with academic performance of medical students in both theory and practical exams.
574 The mean hemispheric scores for the right hemisphere, left hemisphere, and whole brain were 26.51, 14.5,
575 and 6.76, respectively. High achievers in theory exam and practical exam received a higher left-
576 hemispheric score and whole- brain score than low achievers; however, the difference in the mean value of
577 hemispheric score was statistically not significant. Another study conducted on nursing students found a
578 significant positive correlation between academic achievement and left hemisphere dominance (Khanal L,
579 Shah S, 2023)

580 The study aimed to investigate the relationship between hemispherical brain dominance and academic
581 achievement among nursing students. The results showed that the left hemisphere dominance was

582 significantly associated with academic achievement. A cross-sectional study conducted on medical
583 students found a significant positive correlation between academic achievement and left hemisphere
584 dominance (VedalaveniChowdappa Suresh, 2020)

585 The study aimed to assess brain dominance and its correlation with academic achievement among medical
586 students. The results showed that the left hemisphere dominance was significantly associated with
587 academic achievement. A study conducted on business and accounting students found a significant positive
588 correlation between academic achievement and left hemisphere dominance (Tan Keat, 2016). The study
589 investigated the relationships between learning styles and academic achievement and brain hemispheric
590 dominance and academic performance in business and accounting courses. The results showed that the left
591 hemisphere dominance was significantly associated with academic achievement. A study conducted on
592 learners' brain hemisphericity found that the left hemisphere dominant learners had a higher degree of
593 vocabulary retention than the right hemisphere dominant learners (Ali Soyooof, 2014). The study
594 investigated the effects of learners' brain hemisphericity on their degree of vocabulary retention. The
595 results showed that the left hemisphere dominant learners had a higher degree of vocabulary retention than
596 the right hemisphere dominant learners. Overall, the studies suggest that there is a weak positive
597 relationship between academic achievement and left hemisphere dominance. However, some studies found
598 no statistically significant relationship between academic achievement and hemispheric preference scores.
599 It is important to note that these studies have limitations, such as small sample sizes and different methods
600 of measuring academic achievement and hemispheric dominance. Therefore, further research is needed to
601 confirm these findings.

602 **H4: There will be significant association Between Gender and Area with Left Hemisphere, Right**
603 **Hemisphere, Whole Hemisphere and Academic Achievement.**

604 A study conducted on medical students found no significant difference in hemispheric dominance between
605 male and female students (Suresh, 2020). The study found that left hemisphere dominance was
606 significantly associated with academic achievement. Another study found that inter-hemispheric
607 connectivity was stronger in women, while intra-hemispheric connectivity was stronger in men (Andrea
608 Scheuringer, 2020). The study did not investigate the relationship between hemispheric dominance and
609 academic achievement. A study conducted on high school students found that there was no significant
610 relationship between brain dominance and cumulative grade point average (Donald M. Hurwitz, 2001). The
611 study aimed to determine if the brain dominance of high school students is a determining factor for their
612 cumulative grade point average. The results showed that there was no significant difference in the
613 cumulative grade point average between male and female students with left-brain dominance and those

614 with right-brain dominance. the studies suggest that there is no significant difference in hemispheric
615 dominance between male and female students, and that there may be a relationship between hemispheric
616 dominance and academic achievement, although the results are not consistent across studies. Further
617 research is needed to confirm these findings and to better understand the relationship between gender,
618 hemispheric dominance, and academic achievement among secondary school students.

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620 **MAJOR FINDINGS OF THE STUDY**

- 621 • The distribution of students in terms of Left Hemisphere functioning reveals that highly significant
622 difference between frequencies of Left Hemisphere levels and the students, indicating that majority of
623 them average level of Left Hemisphere functioning.
- 624 • The distribution based on Right Hemisphere functioning shows a highly significant difference between
625 frequencies of Right Hemisphere levels, indicating that majority of them had average level of right
626 Hemisphere functioning.
- 627 • In the case of Whole Hemisphere functioning, a highly significant difference between frequencies of
628 Whole Hemisphere levels indicating that a large majority of them average level of Left Hemisphere
629 functioning.
- 630 • The distribution of students based on academic achievement levels is demonstrates a highly significant
631 difference was observed between academic achievement levels and the students, indicating that
632 majority of the students had their academic achievement in the range of >80% and 60-80%.
- 633 • The correlation between Academic Achievement and Right Hemisphere is not statistically significant
634 with a Correlation of $-.050$ ($p=0.439$), suggesting that there is no significant relationship between
635 academic achievement and the Right Hemisphere. The correlation between Academic Achievement and
636 left Hemisphere is statistically non- significant with a Correlation of $-.063$ ($p=0.330$), indicating that the
637 scores on left hemisphere and academic achievement are independent of each other.
- 638 • The correlation between Academic Achievement and Left Hemisphere is statistically significant with a
639 Correlation of $.147^*$ ($p=.022$), suggesting a weak positive relationship between Academic Achievement
640 and Left Hemisphere. This means that as the functioning in the Left Hemisphere increases, there is an
641 increase in the academic achievement.

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645 **EDUCATIONAL IMPLICATIONS**

- 646 1. Teachers can benefit from this study to know the learning and thinking styles of students and they can

647 develop effective teaching strategies.

- 648 2. Helps to understand about individual differences among school children.
- 649 3. Result of present study will help the parents and teachers to perceive their children and their natural
650 tendencies of how they think, act and learn in different situations.
- 651 4. Present study reveals that school children depends upon right and left cerebral hemispheric dominance
652 so teacher should adopt those teaching strategies that improve functioning of right and left hemisphere
653 as it is possible to modify a children's preferred style of learning and thinking.
- 654 5. Teachers being self-reflective and explicit about the role of learning and thinking styles can make
655 teaching more effective and enhance students learning outcomes.
- 656 6. Different teaching techniques and strategies can be adapted to activities and influence the brain
657 hemisphere functions of the brain.

658

659 **CONCLUSION**

660 Learning styles students in this study have more dominant in Hemispherecity. There are also
661 various kinds of thinking styles in the present study made an influence on learning outcomes. It is also
662 proven that there are significant differences in learning and academic achievement due to the learning and
663 Thinking styles. The findings of the present study have an implication for teachers that they should find
664 out the dominant part of their students' brains first and then use the appropriate classroom techniques,
665 methods and tools. Results of the study revealed that Active Learning Styles were effective in enhancing
666 the Thinking Styles and Academic Achievement among the secondary school students.

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675 **BIBLIOGRAPHY**

676 Arizin, R., Mahmood, Z. & Royalized, R. (2008). Students learning style and academic performance. 22nd Annual
677 SAS Malaysian Forum, Kuala Lumpur convention centre, 15th July.

678 Bawana, A.K., Md. Zain, A.N. & Saleh, S. (2010). The relationship between 10th grade Jordanian students' thinking
679 styles based on the Hermann whole brain model and their track choice for the secondary school level. *European*
680 *Journal of Social Sciences*, 14(4), 567-580.

681 Cano Garcia, F., & Hughes, E.H. (2000). Learning and thinking styles: An analysis of their interrelationship and
682 influence on academic achievement. *Educational Psychology*, 20(4), 413- 430.

683 Davies, Peter, Janet Conneely, Rhys Davies, and Derek Lynch (2000). *Imaginative Ideas for Teaching and Learning*.
684 In Alan Booth and Paul Hyland (Ed.), *The Practice of University History Teaching*, (pp. 112-24). Manchester, U.K.:
685 Manchester University Press.

686 Elizabeth, M., Maria, C.A. Glena, C.M., & Gemma, M.P. (2009). Learning styles of high and low academic
687 achieving freshman teacher education students: An application of the Dunn and Dunn's learning style model.
688 *University of the Cordilleras Research Journal*, 1(4), 58-71.

689 Furnham, Adrian (1994), *Young People Understands of Politics and Economics*. In Mario Carretero and James F.
690 Voss (Ed.) *Cognitive and Instructional Processes in History and the Social Sciences*, (pp.17-47). Hillsdale, N.J.:
691 Lawrence Erlbaum Associates.

692 Graf, S. & Kenshu, (2008). Interactions between students learning styles, achievement and behaviour in mismatched
693 courses. *International conference on cognition and exploratory learning in digital age*. China, 223-228.

694 A Study on Relationship between Scientific Attitude and Achievement in Science among Secondary School Students in
695 Mysore City- Karnataka, *IJNRD - International journal of novel research and development* (www.IJNRD.org),
696 ISSN:2456-4184, Vol.7, Issue 5, page no.344-378, May-2022, Available :<https://ijnrd.org/papers/IJNRD2205037.pdf>

697 Grigorenko, E.L. & Sternberg, R.J. (1997). Styles of thinking, abilities and academic performance. *Exceptional*
698 *Children*, 63(3), 295-312.

699 Heffner, B. (2001). Individual Learning style and the learning style inventory, *Educational Studies*, 27(3), 307-316.

700 Holmes, R.M., Liden, S. & Shin, L. (2013). Children's thinking styles, play, and academic performance. *American*
701 *Journal of Play*, 5(2), 219-238.

702 Kolb D A (1984) *Experiential Learning: experience as the source of learning and development*, Upper Saddle River,
703 NJ: Prentice Hall.

704 Neagh, M.R., Ghashghaeizadeh, N. & Houshmand, M. (2013). The study of the relationship between learning styles
705 and thinking styles with academic self-efficacy in English lesson among the students of Islamic Azad University of
706 Bhabhan. *Journal of Life Sciences and Biomedicine*, 3(1), 75-82.

707 Soila, Y.M. & Accouple, B. (2002). The effect of learning styles on achievement in different learning environments.
708 *The Turkish Online Journal of Educational Technology*, 8(4), 43-50.

709 Sternberg, R.J. & Grigorenko, E.L. (1995). Styles of thinking in the school. *European Journal for High Ability*, 6(2),
710 201-219.

711 Torney-Purta, Judith (1994), *Dimensions of Adolescents' Reasoning about Political and Historical Issues:*
712 *Ontological Switches, Developmental Processes, and Situated Learning*. In Mario Carretero and James F. Voss
713 (Ed.), *Cognitive and Instructional Processes in History and the Social Sciences*, (pp.103-22). Hillsdale, NJ:
714 Lawrence Erlbaum Associates.

715 Venugopal, K. & Mridula, K. (2007). Styles of learning and thinking. *Journal of the Indian Academy of Applied*
716 *Psychology*, 33(1), 111-118

717 Wineburg, Samuel S (1993), *The Psychology of Learning and Teaching History*. In D. C. Berliner and R. Calfee
718 (Ed.), *Handbook of Educational Psychology*, New York: Macmillan.

719 Zhang, L.F. & Huang, J. (2001). Thinking styles and the five-factor model of personality. *European Journal of*
720 *Personality*, 15(6), 465-476.