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The Analysis of the Brain Dominance and Language Learning Strategy Used by University EFL Learners

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ABSTRACT

This study examined (1) the brain dominance pattern and language learning approaches, (2) the role of brain dominance toward each category of language learning strategies, (3) whether there was a significant difference, and (4) the effect. The participants in this study were 99 students in Universitas Veteran Bangun Nusantara by random sampling. Language Learning and Brain Dominance Questionnaires collected data. The brain dominance score and language learning strategies score were calculated and analyzed by analysis of variance to investigate any difference between brain dominance and learning strategies. The result: (1). The highest mean students' language learning strategies use was cognitive strategies (2) Each language learning strategy category differed significantly between left, whole, and right-brained students. (3) Left-brain and whole-brain effects on student language learning strategies were the same. (4). Students' learning tactics vary by brain type.

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1. INTRODUCTION

When studying English as a second language, students frequently face challenges in learning English [1]–[3]. For example, they may have trouble recalling a word, listening, understanding a text, communicating fear, utilizing or understanding an idiomatic expression, or getting a handle on a subject. The more effective learner deliberately uses language learning strategies to compensate for and mitigate these challenges and shortcomings and facilitate language interaction. These strategies offer a great deal of promise to speed up and improve the acquisition of EFL abilities in 2018 [4]. The research findings also support the hypothesis that students can improve their capacity for expressive language by employing and learning specific strategies to become autonomous learners [5].

The students use strategies to better their language acquisition, motivation in the learning process, sense of responsibility in language acquisition, and confidence in

language acquisition in 2021. These goals can be accomplished using specific methods, procedures, and routines [6]–[8]. Memory methods, cognitive strategies, and compensatory strategies are the three categories that can be used to categorize straightforward procedures. Memory methods focus on how students retain the language, whereas cognitive strategies focus on how students think about their learning and provide students with the ability to compensate for their lack of prior knowledge [9]. According to Oxford [10], there are six categories of language learning strategies, namely, memory strategies mean how the students remember languages, such as vocabulary, the pattern of grammar structure, and act; cognitive strategies mean how the students think in learning English; compensation strategies provide the students with opportunities to compensate for their lack of prior knowledge; metacognitive strategies mean how to manage their learning such as goal, evaluation, designing, and act; affective strategies mean the students' feeling in learning English; social strategies mean the students learn English with other people.

The students' characteristics, as well as their natural, habitual, and preferred ways of absorbing, processing, organizing, and retaining new information and skills, are referred to as their language learning strategies. Learning style has been shown to affect the learners' application of different strategies substantially. Learning style refers to the individual's characteristics [11]–[13]. Left-whole-and right-brain functioning is an example of a concept that can be applied to studying and teaching second and foreign languages as part of the continuum of learning styles [14]. In psychology, brain dominance potentially impacts English teaching and learning [6], [15]. According to Hart [16], there is a relationship between education and brain dominance. Education can be understood as learning and thinking, and the brain may be an organ that processes mental activity.

Numerous psycholinguistic current research that is connected to the teaching and learning of English has made brain dominance a topic of discussion [1], [6], [17]–[21]. Soyoof et al. [17] found that most brain dominance was whole-brained students regarding vocabulary memorization. Vocabulary memorization includes language learning and memory strategies [9]. Mireskandari [1] found that most university students' brain dominance was right-brained students. Nevertheless, there is no significant difference between right-, left-, and whole-brained students toward listening comprehension strategy use. Nazemi et al. [18] stated that learning styles affect students' ability, personality, and cognitive-behavioral inclinations. Ashraf et al. [19] found a correlation between teachers' reflection and brain dominance.

However, there was no significant relationship between teachers' reflection and brain dominance [20]. There is no significant difference between brain dominance and teacher strategy use [21]. There was a significant difference between types of pre-writing strategies and brain dominance. Yang et al. [6] found that reading ability and which side of the brain is more dominant significantly correlated. Karakose et al. [22] found the most significant theme across the three periods. Cross-sectional studies addressing the risk factors or outcomes of addiction among adults and different sexes were prevalent during the first period (1997–2012), while interest moved to the addictive behavior of adolescents and students during the second period (2013–2017).

Research during the third period (2018–2022) was driven by smartphone and social media addiction, and resilience as a preventive factor garnered more research interest than previously studied risk factors, which may indicate a perspective change by researchers. Karakose et al. [23] found that Academic self-efficacy, motivation, attitude toward the teaching profession, and classroom management anxiety are four of the most significant factors for teacher training and performance. Their research showed that reading skills are greatly helped by students who use their right brain more. Still, the results showed that brain dominance does not affect how well someone speaks. According to the research, how students use their dominant brain affects how well they remember things. To understand what they are reading, students must take in new information and put it together with what they already know. They used tests and the quantitative method to gather information. They suggested that researchers in the future find out how EFL learners see the role of brain dominance in their learning strategies.

The previous studies' findings show that few researchers are still examining brain dominance toward language learning strategies, especially the classification from [9]. Only two previous studies investigated those variables [1], [20]. Mireskandari [1] emphasized listening comprehension strategy use, and Suzani [20] emphasized teacher strategy. This is in line with the suggestion of Yang and Li [6] to find out how EFL learners see the role of brain dominance in their learning strategies. Therefore, the researcher was interested in investigating the students' brain dominance and language learning strategies used in all English areas. The following research questions are proposed in this study: (1). What are the brain dominance patterns and the language learning strategies of the first-semester students in Universitas Veteran Bangun Nusantara? (2). What is brain dominance's role in each language learning strategy category? (3). Is there any significant difference between left, right, and whole brain dominant EFL learners on their language learning strategies? (4). Is there any effect between left, right, and whole brain dominant EFL learners on their language learning strategies?

2. METHOD

Research Design

The present study employed quantitative research with a non-experimental design which identifies variables and investigates whether or not there are any differences and effects among them statically. However, it does not manipulate the variables or give a special treatment [24]. Therefore, the present study statically identified the brain dominance profile divided into three groups. There were left, whole, and right brains [25], [26]. The study statically identified the language learning strategy use profile was divided into six categories (memory, cognitive, compensatory, metacognitive, affective, and social) [10]. The researchers also investigated whether or not there is any difference and effect between brain dominance and the language learning strategy used by EFL university-level students.

Participants

The participants in this study were 99 students in Universitas Veteran Bangun Nusantara by random sampling. The population was 240 students. They were from the first semester of significant English education. Their gender or age did not need to be provided to participate in this study. The students were divided into three groups according to their brain dominance: right brain, left brain, and whole brain, through the brain dominance questionnaire. Their language strategies use also divided into six categories: memory, cognitive, compensatory, metacognitive, affective, and social the language learning strategies use questionnaires.

Instruments

This study employed two questionnaires for data collection. The questionnaires were close-ended, and their purpose was to explore the students' brain dominance and language learning strategies. These instruments were discussed as follows.

The first questionnaire was the brain dominance questionnaire adapted from Brown [14]. It also had been revised by Faizah [27]. A student's left-brain dominance, right-brain dominance, or whole-brain dominance was determined by completing the questionnaire. The questionnaire consisted of 20 illustrations. There were two opposing illustrations accompanying each illustration. The difference between the two comprised a five-point scale on which the student was to indicate their perception of which statement most accurately characterizes them. Option 1 and option 5 showed that an illustration was very much like; option two and option 4 suggested that one illustration was somewhat more like the other; option 3 indicated that the students have a whole brain.

The second instrument was the language learning strategy use questionnaire. It was constructed by [9]. It has a total of 50 items. The item taxonomy consists of six broad categories, with each category being represented by some specific strategies. The memory strategies were from item 1 until item 9, the cognitive were from item 10 until item 23, the compensatory strategies were from item 24 until item 29, the metacognitive strategies were from item 30 until item 38, the affective strategies were from item 39 until item 44, and the social strategies were from item 45 until item 50. The students were asked to indicate the degree to which each of the 50 statements describes or reflects what they do while learning a second language, while the statements themselves explain what learners usually do while acquiring a second language. The researchers used a scale that ranges from 1 to 5 on the Likert scale to rate the students' responses. The five-point Likert scale from option 1 is "never or rarely true of me," option 2 is "usually not true of me," option 3 is "somewhat true of me," option 4 is "usually true of me," and option 5 is "always or almost always true of me."

Data Analysis

Excel calculated the result of the brain dominance questionnaire based on the score total of item 1 until item 20. A scoring star of less than 57 is considered left-brain dominating. If the score result is between 57 and 66, it implies that the student has a whole brain. If the student gets a score of 66 or higher, it indicates that the student's right brain is

more dominant [27]. The result of the language learning strategies used questionnaire was calculated by excel based on each learning strategy category to determine the student's language learning strategies profile of each category. The score total of item 1 until item 50 was also calculated in excel. The brain dominance score and language learning strategies score were calculated and analyzed by ANOVA through SPSS 16 to investigate any difference between brain dominance and learning strategies. The score total of left, whole, and proper brain scores regarding language learning strategies score was calculated and analyzed post hoc with LSD through SPSS 16 to find out the effect of brain dominance on language learning strategies

Procedures

The students were required to answer the brain dominance questionnaire and the learning strategies used questionnaire through google form for 90 minutes. The WhatsApp group distributed the link to Google Forms. After that, the researchers downloaded the result of the students' responses through a google form. The researchers calculated the score through excel to determine the types of students' brain dominance and language learning strategies profile, and the researchers calculated the mean and Standard Deviation (SD) in descriptive statistics through SPSS 16. The researchers then analyzed differences between the students' brain dominance and language learning strategies using ANOVA through SPSS 16 [28]. The researchers then analyzed the effect of brain dominance on language learning strategies using post hoc LSD through SPSS 16 and interpreted the result [1].

3. RESULTS AND DISCUSSION

3.1. Results

The first research question to be answered was revealing the students' brain dominance and language learning strategies used in all English areas. The information was gathered through two different questionnaires, both of which were submitted using Google Forms. The student's scores on the brain dominance questionnaire determined whether they tended to use more of their left, whole, or right brains. This was accomplished through the use of excel. The students' brain dominance findings were presented as shown in Table 1.

Table 1. The Descriptive Statistics for the Students' Brain Dominance

Brain Dominance	Frequency	Percentage	Mean	SD
Left Brain	52	52.52%	43.19	5.753
Right Brain	41	41.41%	78.02	6.471
Whole Brain	6	6.06%	63.17	3.251

Table 1 showed that the most first-semester students' brain dominance in Universitas Veteran Bangun Nusantara was left-brained students with a mean of 43.19 and SD 5.753. Fifty-two students tended to use the left brain. The right-brained students and whole-brained students followed it. The right-brained students were 41, with a mean of 78.02 and an SD of 6.471. The less frequent brain dominance was five whole-brained students with a mean of 63.17 and an SD of 3.251.

The questionnaire was used to collect data on the student's language learning strategies use, and this data was then analyzed in Excel to produce a description of the student's language learning strategies use of each category. The student's language learning strategies' findings were presented as shown in Table 2.

Table 2. The Descriptive Statistics for the Students' Language Learning Strategies use

Category of Strategies	Mean	SD
Memory	29.40	7.670
Cognitive	51.17	4.792
Compensatory	20.70	4.322
Metacognitive	32.04	5.364
Affective	16.34	5.691
Social	20.63	2.999

Table 2 showed that the highest mean students' language learning strategies use was cognitive strategies, with a mean of 51.17 and SD 4.792. It was followed by metacognitive, memory, compensatory, social, and affective strategies. The mean of metacognitive strategies was 32.04, with SD 5.364. The mean of memory strategies was 29.40, with SD 7.670. the mean of compensatory strategies was 20.70 with SD 4.322. the mean social strategies were 20.63, with SD 2.999. The lowest mean of the student's language learning strategies was effective strategies, with a mean of 16.34 and an SD of 5.691.

The second research question investigates brain dominance's role in each language learning strategy category. It can be presented as shown in Table 3.

Table 3. The Descriptive Statistics for the students' Category of Language Learning Strategies Use with Different Brain Dominance orientations

Category Strategy	Brain Dominance					
	Left Brain		Whole Brain		Right Brain	
Memory	23.04	3.150	28.00	3.033	37.68	2.669
Cognitive	53.46	4.217	46.00	4.336	49.02	3.959
Compensatory	17.71	3.025	19.50	2.881	24.66	2.276
Metacognitive	36.13	3.278	30.00	3.688	27.15	2.851
Affective	11.71	3.189	17.17	2.994	22.10	1.828
Social	20.00	3.131	21.33	2.422	21.32	2.779

Table 3 showed that the highest mean of language learning strategies used by left-brained students were cognitive strategies, with a mean of 53.46 and SD 4.217. It was followed by metacognitive, memory, social, compensatory, and affective strategies. The mean of metacognitive strategies was 36.13, with SD 3.278. The mean of memory strategies was 23.04, with SD 3.150. The mean of social strategies was 20.00 with SD 3.131. The mean of compensatory strategies was 17.71, with SD 3.025. The lowest mean of the student language learning strategies used by left-brained students was affective strategies, with a mean of 11.71 and an SD of 3.189.

For the whole-brained students using learning strategies, the highest mean of language learning strategies was cognitive strategies, with a mean of 46.00 and SD of

4.336. It was followed by metacognitive, memory, social, compensatory, and affective strategies. The mean of metacognitive strategies was 30.00, with SD 3.688. The mean of memory strategies was 28.00, with SD 3.033. The mean of social strategies was 21.33, with SD 2.422. The mean of compensatory strategies was 19.50, with SD 2.881. The lowest mean of the student language learning strategies used by whole-brained students was affective strategies, with a mean of 17.17 with SD 2.994.

For the right-brained students using learning strategies, the highest mean of language learning strategies was cognitive strategies, with a mean of 49.02 and an SD of 3.959. It was followed by memory, metacognitive, compensatory, affective, and social strategies. The mean of memory strategies was 37.68, with SD 2.669. The mean of metacognitive strategies was 27.15, with SD 2.851. The mean of compensatory strategies was 24.66, with SD 2.276. The mean of affective strategies was 22.10 with SD 1.828. The lowest mean of the student language learning strategies used by right-brained students was social strategies, with a mean of 21.32 with SD 2.779.

The data shows that most of the language learning strategies used by the students' left, whole, and proper brains were cognitive. The loss of language learning strategies used by the students' left and whole brains were cognitive strategies, while the right brain was social strategies.

The third research question investigated whether there was any significant difference between left-, right-, and whole-brain dominant EFL learners in their language learning strategies. It can be presented as shown in Table 3.

Table 4. The One-Way ANOVA to Compare the Students' Language Learning Strategies Use and Brain Dominance

	Sum of Squares	Df	Mean Square	F	Sig.
Between Group	9488.473	2	4744.237	59.167	.000
Whitin' Group	7697.607	96	80.183		
Total	17186.081	98			

The findings of the statistics obtained from a one-way ANOVA, which are presented in Table 4, demonstrated that there was a significant difference between the students who have left brain dominance, students who have whole brain dominance, and students who have right brain dominance regarding the language learning strategies that they use. The P value was found to be less than 0.05 with the sig. is 0.000.

The fourth research question study was finding out the effect of brain dominance on language learning strategies in post hoc with LSD, as shown in Table 5.

Table 5. The Multiple Comparisons between the Students' left, whole, and the right brain toward Language Learning Strategies Use and Brain Dominance

(I) Brain Dominance	(J) Brain Dominance	Main Difference (I-J)	Sig.
Left Brain	Whole Brain	0.58	0.988
	Right Brain	-19.869	0.000

Table 5 showed no significant difference between the left and whole brains on the student's language learning strategies with sig. 0.988. Thus, the effect of the left brain on student language learning strategies was the same as the effect of the whole brain on students' language learning strategies. There was a significant difference between the left and the right brain toward the language learning strategy with sig. 0.000. The P value was found to be less than 0.05. Thus, the effect of the left brain was not the same as the effect of the right brain on the student's language learning strategies.

3.2. Discussion

The present study found that most first-semester students of Major English education in Universitas Veteran Bangun Nusantara regarding brain dominance were left-brained students. It was in line with [13] and [29] that students and teachers in EFL classrooms most liked the left brain due to the emphasis on evaluating various language aspects. This finding was in line with those of [6]. They found that most left-brain students have competence in doing the reading task. Students with a dominant left hemisphere typically analyze verbal and mathematical information in a deductive or logical manner. This demonstrates that the left brain dissects information by examining and differentiating a portion of the entire [14], [30], [31]. Thus, students process information sequentially, sequentially, and systematically. In addition to analyzing and compiling information, students collect some data. As Brown [32] stated, Left-brain dominant EFL learners are competent in word formation, gathering linguistic features, performing function cycles, and employing conceptualization, categorizing, naming, and restructuring. For instance, students can identify specific information in a text and assess the text's contents critically.

Most students' language learning strategies were cognitive strategies. It indicated that in the first semester of Major English education, students summarized more often when they listened to material and read texts in English. The students improve their speaking skills by watching an English film or TV program. Students look for unknown vocabulary in online or offline dictionaries. Students practice directly using new vocabulary both orally and in writing. These statements were inferred from the students' language learning strategies questionnaire responses. This is supported by strategic cognitive classifications such as practice, memorizing, monitoring, grouping, recording, summarizing, and listening [4], [10]. This finding was in line with those of [1]. They found most cognitive strategies with a mean of 3.3662 supporting listening comprehension strategy use.

On the other hand, the fewer students' language learning strategies were affective. It indicated that in the first semester of Major English education, students manage their feelings, anxiety, moods, emotions, appreciation for improving English skills, and students' motivation in learning languages [10]. It can be seen in the students' response to language learning strategies that they often give rewards such as taking a trip for themselves when they get a good grade in language. This can increase their emotions toward learning English. Another example is anxiety, the students are afraid to speak, but they still encourage them to dare to speak English to improve their speaking skills [8]. This finding

was in line with those of Mireskandari [1]. They found less affective strategies with a mean of 2.8803 supporting listening comprehension strategy use.

The role of brain dominance in each language learning strategy use category, most language learning strategies used by the students' left, whole, and proper brain were cognitive strategies. The loss of language learning strategies used by the students' left and whole brains were cognitive strategies, while the right brain was social strategies. The findings were in contrast with those of Mireskandari [1]. They found that most language learning strategies used in listening comprehension were metacognitive strategies according to the students' left, whole, and right brains. The fewer language learning strategies used in listening comprehension according to the students' left, whole, and proper brain were affective strategies. The case was different regarding category strategy; however, it was the same as with left, right, and whole brain dominance. It might be because of the different English skills. Mireskandari [1] investigated listening skills, while the present study investigated all English skills. Furthermore, Kök [15] revealed no significant difference between listening and brain dominance.

There was a significant difference between the students with left brain dominance, students with whole brain dominance, and students with right brain dominance regarding the language learning strategies they use. The finding aligned with Mireskandari [1] and Nadimi [21]. They also found a significant difference between the left, right, and whole brain students regarding listening strategy use, speaking strategies, and pre-writing strategies. The finding was, however, in contrast with Suzani [20]. She found no significant difference regarding teachers' strategies between the left, right, and whole-brain students. The effect of the left brain on student language learning strategies was the same as the effect of the whole brain on student learning strategies. At the same time, the effect of the left brain was not the same as the effect of the right brain on the student's language learning strategies. The finding was in line with Mireskandari [1]. They found that the effect of the left, whole and proper brain differed in the students' learning strategies. In the end, the researchers can conclude that for students to learn more efficiently, they need to understand better and appreciate their differences and how those differences can affect the learning process according to the dominant hemisphere of their brains and the strategies they use to learn languages.

4. CONCLUSION

The present study analyzed the role of brain dominance and language learning strategies of EFL learners in Universitas Veteran Bangun Nusantara. Most first-year students of primary English education regarding brain dominance were left-brained. The right-brained students and whole-brained students followed it. The highest mean students' language learning strategies used were cognitive strategies. It was followed by metacognitive, memory, compensatory, social, and affective strategies. Most language learning strategies used by the students' left, whole, and proper brains were cognitive. The loss of language learning strategies used by the students' left and whole brains were cognitive strategies, while the right brain was social strategies. There was a significant difference between the students with left brain dominance, students with whole brain

dominance, and students with right brain dominance regarding the language learning strategies they use. The effect of the left brain on student language learning strategies was the same as the effect of the whole brain on student learning strategies. The effect of the left brain was not the same as that of the right brain on the students' learning strategies. In the end, the researchers can conclude that for students to learn more efficiently, they need to understand better and appreciate their differences and how those differences can affect the learning process according to the dominant hemisphere of their brains and the strategies they use to learn languages.

5. RECOMMENDATION

Teachers and students must consider different types of strategies and brain dominance in supporting the learning process. Teachers and students must combine different language learning strategies and brain dominance to support their English learning. As stated by [19], by combining strategies according to students' brain mastery, students can use class assignments as exercises to support the learning process, and teachers can achieve teaching and learning goals. For example, the teacher could give the assignment to practice speaking as a native speaker from a film. This is related to right-brained students and cognitive strategies. The researchers provide suggestions for future researchers to explore other types of strategies in qualitative designs.

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