

II. FRAME OF THEORIES

In relation to the research, there were two major topics which need to be elaborated here. There were review of previous related research and review of related literature which was included (1) concept of reading comprehension, (2) concept of cognitive style in brain hemisphere, (3) the characteristics of left-brain dominance, (4) the characteristics of right-brain dominance, (6) theoretical assumption, (7) hypothesis.

2.1. Review of Previous Related Research

An American neurologist, Sperry, began his research in 1967 about brain hemisphere, known as brain split. As Sperry was able to demonstrate, the *isolated left hemisphere* is concerned with abstract thinking, symbolic relationships and logical analysis of details, particularly temporal relationships. It could speak, write, and make mathematical calculations; in its general function it was analytical and computer-like. It was also the more aggressive, executive, leading hemisphere in control of the nervous system. The *right hemisphere* had lacks of the possibility to communicate with the outside world. It was, as Sperry expresses it, "a passive, silent passenger who leaves the driving of behavior mainly to the left hemisphere". The right hemisphere had so far been completely inaccessible for exper-

imental studies, and also, as a consequence of this, had been considered as being entirely subordinate to the left hemisphere.

Through his investigations, Sperry had revealed that the right hemisphere, contrary to what one previously thought, was clearly superior to the left hemisphere in many respects. This was especially true regarding the capacity for concrete thinking, spatial consciousness, and comprehension of complex relationships. It was also the superior hemisphere when it came to interpreting auditory impressions and in comprehension of music; it could better recognize melodies and better distinguish voices and intonations.

Another researcher, Rosihan, (2006), investigated the association between brain hemisphere, learning styles and confidence in using graphics calculator for mathematics resulted that left-brain learners were “sensing” and “sequential” while right-brain learners were “intuitive” and “global”. However, there was no statistical significant association between brain hemispheres with active-reflective as well as visual-verbal learners. Furthermore, no statistical significant association between brain hemisphere with gender, race, and program of study was reported. He believed that the significance of the study could help enlarge the dimension of research that examined the area of incorporating new technological tool in the teaching and learning of mathematics.

In education, Connell (2000) studied the left brain or right brain as pathways for every learner. Connell assumed that by better understanding students’ neurological strengths and weaknesses of brain hemisphere, teacher could adapt the lessons to reach all of the students. She suggested several techniques for the students who

have left-brain or right brain dominance. Teachers tended to better reach students who share their same neurological strengths. A strong left-brain teacher, for example, would need to make a conscious effort in order to better reach the strong right-brain students in the classroom. By better understanding our own neurological strengths and weaknesses, teacher could adapt the lessons to reach all of their students.

Over the past few years there has been work on the role of the individual (independent) contributions of the left and right cerebral hemispheres in non-neurologically involved individuals to lexical processing, work which fits interestingly with the work on aphasia. For instance, in studies of visual (isolated) word processing, Burgess and Simpson (2000) demonstrated, via a visual hemi retinal priming paradigm that the left hemisphere provides activation of multiple interpretations (primary and secondary meanings) of ambiguous words immediately on viewing the word. In contrast, the right hemisphere appears to initially only have access to the more frequent interpretation of an ambiguous word, and “exhaustive” availability of both meanings of an ambiguous word. Thus, from this visual, isolated word study, it would appear that the left hemisphere is involved in initially accessing all interpretations of lexical entry, and this same hemisphere also has the capacity to select and maintain activation for the most contextually relevant meaning of such words. In contrast, the right hemisphere appears to have the capacity to slowly develop and maintain activation for ancillary semantic information (e.g., secondary meanings) for words.

Based on four studies above, it could be stated that the studies of cognitive style especially in brain hemisphere had been conducted by several observers, including the brain split, the association between brain hemisphere and learning styles, the brain pathway that could be adopted by the students, and also the study of word processing in brain hemispheres. However, it remained only few studies about comparison of brain domination in students reading comprehension achievement.

2.2. Review of Related Literature

The research was about comparative study of students' reading comprehension achievement between left-brain and right brain dominated students. So, in the review of related literature, there were two concepts: reading comprehension and cognitive style in brain hemisphere. Beside that, there were two different characteristics of two hemispheres of left-brain dominance and right brain dominance.

2.2.1. Concept of Reading Comprehension

Mc Whorter (1986:12) states that reading is a way of taking new ideas and identifying information to be learned. It means that when someone is reading a text, he may find new things that he has not known yet and he may also find information that will help him in learning something. In this case, his knowledge will certainly be better than before. Reading is also defined as a construct process of guessing and active process of deriving meaning (Grellet, 1981:1; Goodman, 1976 in Suparman, 2005:1). Moreover, Smith (1983) also defines reading as a process of understanding a certain text in the term of question that formulate concerning with

the text. In this case, the readers should be able to understand the contents of text through question being made.

Comprehension means relating what someone does not know or new information, to what he already knows (Eskey, 1986:15). Readers' knowledge of linguistic and background knowledge of the world will influences their achievement in reading comprehension can be understood that reading is very important skill for students.

Smith (1987:13) states that comprehension may be regarded as related aspect of the world around human being -including what they read- to the knowledge, intentions and expectations already preserved in readers' head. Readers must be able to relate new things to what already know if readers are to comprehend them and relating something new to what they already know.

Based on the quotations above, reading comprehension can be said as way to fulfill the reader's eagerness about topic being read. Before reading a text, reader must have many questions of some problems. Through reading, they can answer their questions by themselves.

Reading comprehension is important because it is a matter of identifying letters in order to recognize words to get the meaning from what is read, involving making connection among words and ideas presented in the text and the readers' own background knowledge about the text they read will have difficulties in comprehending the text (Smith, 1987, p.166). Reading the words of a composition is one thing, but comprehension is the vital point for the reader. Reading the words has

no benefit if the reader does not comprehend what is being read. If the reader can read the words but they do not understand what they read, they are not really reading. Thus, comprehension is fundamentally relating the new to the already known. Reading involves more than recognition, which is without comprehension, no reading take place. Readers use a variety of reading strategies to assist with decoding to translate symbols into sounds or visual representations of speech and comprehension. Readers integrate the words they have read into their existing framework of knowledge or schema in their brain.

Reading comprehension works with four skills: literal comprehension, interpretation, critical thinking/reading, and creative reading (Rubin, 1993, p.195). These comprehension skills are cumulative in that one is built on the other. It is unclear when reading comprehension begins. It could be argued that reading comprehension in its most fundamental form begins when people first make the connection between symbol and concept in their brain. In the brain hemispheres, the information as it enters the right side (which has no language), is transferred to the left side where the word is translated into language, and back to the right side again where it is stored as a concept.

Teaching reading comprehension is an interactive process that goes on between the teacher, the students, and the text, resulting in comprehension. The text presents letters, words, sentences, and paragraphs that encode meaning. The students use knowledge, skills, and strategies to determine what that meaning is.

Students knowledge, skills, and strategies include: (1) Linguistic competence: the ability to recognize the elements of the writing system; knowledge of vocabulary; knowledge of how words are structured into sentences, (2) Discourse competence: knowledge of discourse markers and how they connect parts of the text to one another, (3) Sociolinguistic competence: knowledge about different types of texts and their usual structure and content, (4) Strategic competence: the ability to use top-down strategies, as well as knowledge of the language (a bottom-up strategy).

The purpose(s) for reading and the type of text determine the specific knowledge, skills, and strategies that students need to apply to achieve comprehension. Teaching reading comprehension results when the students know which skills and strategies are appropriate for the type of text, and understands how to apply them to accomplish the reading purpose.

2.2.2. Concept of Cognitive Style in Brain Hemisphere

Left-brain and right-brain dominance of humans are in their brain hemisphere.

Brain hemisphere is related to cognitive style as the way people learn thing in general. Cognitive refers to a stable and internalized dimension related to the way a person thinks or process information. It is a person's typical ways of information processing habits representing the learner's typical mode of perceiving, thinking, problem solving, and remembering (Messick, 1976, p.188). It represents processes or organizes information rather than content. It involves a host of mental processes like attention, memory, rehearsal, forgetting, and retrieval instead of a single integrated theory. It refers to the 'how' rather than the 'what' of behavior.

There are many interpretations to cognitive styles. Some postulate that cognitive style is a bridge between cognition/intelligence measures and personality measures (Sternberg & Grigorenko, 1997; Ridding & Cheema, 1991). Cognitive style is unique in its polar nature, having an “either or” measure, where the absence of one characteristic implies the presence of its extreme. This is in opposition to personality measures that are more multifaceted (Ridding & Cheema, 1991). It can be concluded that cognitive style is a single dimension on a scale from extreme left-brain to extreme right-brain types, depending on which associated behavior dominates in the individual, and by how much.

Cognitive style is very important because it is related to hemisphere or cerebral dominance. Educators are now drawing on psychology and neurobiology to expand their awareness of individual differences. Recent advances in neuroscience and cognitive psychology are providing a clearer understanding of the three pound human brain. The newest element in cognition is hemisphere or cerebral dominance which is another dimension of individual differences. This refers to the tendency of a person to use one side of the brain to perceive and function more than the other (Ornstein, 1972).

Cognitive style works with two brain hemispheres. Brain research shows that the brain has two hemispheres which specialize in different functions or process information in different ways. The two hemispheres extract different aspects of meaning from the same experiences. Individuals have the capacity to engage in

both the left and right hemisphere processing modes, but which mode takes the lead may depend on the individuals' dominance.

When people read something, the left-brain hemisphere works with analyzing the information they get from reading with analytical order. It is related to reading ability whether they can comprehend the text or not. Vision in people left brain is specialized for reading. The left brain learns to see arrangements of lines in alphabet letters. The brain learns to perceive arrangements of lines as letters, for example “n-a-m-e” and then the brain will perceive arrangements of letters as words, for example “name”. Reading is merely a visual gimmick tacked onto oral vocabulary and grammar. It is common to have people who can speak but not read; it is impossible to have a person who can read but not understand the same language when spoken.

There is a need to cultivate both hemispheric modes so that an individual can develop the ability to use both hemispheres in a complementary fashion. Research showed that verbal, logical, convergent, and analytic functions can be ascribed to the left hemisphere. Intuitive, divergent, visual, spatial, and gestalt functions can be ascribed to the right hemisphere of the brain. Psychologists began to redefine and reconceptualize the hemispheric differences in terms of the processing of information from reading rather than in terms of the types of tasks. All of them interpret cognition in terms of hemisphere from the brain theory: that the two hemispheres of the brain specialize in different functions or process information in different ways.

2.2.3. The Characteristics of Left-Brain Dominance

The left brain is said to be the logical brain. It is the left brain that people use it to solve mathematical problems and to think logically. Left brain begins to work by searching files for information. If it finds the files, it begins relating what to do step by step. Left brain dominance people tend to relate with intrapersonal aspect. They like doing things alone rather than together. They are not really good in social relationship. Left brained people use analyzing to solve problems. Most of them are very strong in basic math. Processing numbers, mathematical models and notation are easy for these people. They have the giftedness to memorize words and formulae, in a much easier fashion than the right-brained people.

Verbal thinking is common among people, who have a strong left-brain. They can remember names easily. They emphasize to quantity of things and being realistic in thinking. The left side of brain can process information bits in a linear manner and capture the idea explicitly. In other words, the information is processed from tiny parts and to whole of it.

They are also organized people. When a person has left centric brain, it collects and collates tiny bits of information, aligns them in a linear manner and organizes all the bits into a logical sequence in segmental ways. Persons, who are string in scheduling and planning, have a strong left sided brain. People who have strong left sided brain are cautious because they probably create lists before doing something and working on those lists. So, they are depended by timing. The left-brain endowed people have strong focus. They tend to speak to the point of idea. The

left-brained person takes little pieces, lines them up, arranges them in logical order, and arrives at a convergent conclusion.

2.2.4. The Characteristics of Right-Brain Dominance

Right-brained people use a sense of intuition to solve problems. They may not know how to solve a problem, but they usually get the right answer by using the sense of intuition. They may have the gut feeling to choose the right type of solutions for a given problem. Right brain dominance people tend to relate with interpersonal aspect. They like doing things in group rather than alone. They are good in social relationship. The right brain is often called the creative brain. It has the function of thinking creatively. This includes all the artistic functions, including art and music appreciation.

Visual thinking is common among people, who have a strong right-brain. They can recognize face easily. They emphasize to quality of things and being imaginative in thinking. When people come across a new situation in their life, the right brain gives ideas implicitly on how to tackle it. The right brain does not accept information in bits and pieces in lateral manner. It always treats the information as a whole and it starts processing from top to bottom. It watches and treats the scene as a whole and it does not look at the finer details that hide inside the picture. If people are endowed with a right brain, they may not have the ability to summarize different bits of information into one. To do it, they must look at the set of information from all angles.

The right-brained people process given information in a random fashion, so they are unorganized people. In other words, they are very poor in scheduling and indexing. People who have strong right sided brain are impulsive. Following directions or lists are also quite difficult for them. As the effect, they are independent in timing. The left-brain endowed people have diffuse way in talking with others. They tend to use more explanation to express the idea. The person with a dominant right hemisphere starts with the answer, a total concept, or perceives the whole pattern and discovers a divergent conclusion.

2.2.5. Theoretical Assumption

People have different ways of thinking when they are reading. The differences were influenced by human cognitive style. Cognitive refers to a stable and internalized dimension related to the way a person thinks or process information. There are many types of cognitive style and the researcher focused on left-brain and right-brain dominance. People with each type of dominance processed the information they got from reading in different way. The left brain was said to be the logical brain. It is the left brain that people use it to think logically. Meanwhile, the right brain was often called the creative brain. It had the function of thinking creatively. The dominance of each brain hemisphere could make people have different process of reading. The students of left-brain and right-brain dominance could have significant difference of their reading comprehension achievement.

2.2.6. Hypothesis

Based on the theoretical assumption above, the researcher made hypothesis as followed:

“There is a significant difference of reading comprehension achievement between left-brain dominated and right-brained dominated students at second year of SMAN 2 Bandar Lampung.”