

## Biology-Based Accelerated Learning in Communication

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### Abstract

*The quality of human resources is an important sector in supporting the achievement of national development goals. National development requires superior quality human resources in the fields of science, technology, arts, sports, noble character, and devotion to God Almighty. Specially gifted children are a resource that can make a meaningful contribution to the progress of the nation and state. The rationale for organizing and continuing to develop educational efforts for gifted children is to provide educational services that suit the potential of gifted children. By preparing potential human resources who will be able to encourage the nation's progress. One form of education for gifted children is the acceleration program, namely the provision of educational services in accordance with the potential intelligence and special talents possessed by students, by giving them the opportunity to complete the regular program in a shorter period of time compared to their peers. her friend.*

**Keywords:** *Learning, Acceleration, Biology, Communication.*

### Abstrak

Kualitas sumber daya manusia merupakan sektor penting dalam menunjang tercapainya tujuan pembangunan nasional. Pembangunan nasional membutuhkan kualitas sumber daya manusia yang unggul baik dalam bidang ilmu pengetahuan, teknologi, seni, olahraga, berbudi pekerti luhur, dan mempunyai ketaqwaan kepada Tuhan Yang Maha Esa. Anak berbakat istimewa merupakan sumber daya yang dapat memberikan sumbangan yang bermakna bagi kemajuan bangsa dan negara. Dasar pemikiran diselerenggarakan dan dikembangkan terus upaya pendidikan bagi anak berbakat adalah bahwa memberikan layanan pendidikan yang sesuai dengan potensi anak berbakat. Dengan menyiapkan sumber daya manusia yang potensial yang akan dapat mendorong kemajuan bangsa. Salah satu bentuk pendidikan bagi anak berbakat adalah program percepatan (acceleration), yaitu pemberian layanan pendidikan yang sesuai dengan potensi kecerdasan dan bakat istimewa yang dimiliki oleh siswa, dengan memberi kesempatan kepada mereka untuk dapat menyelesaikan program regular dalam jangka waktu yang lebih singkat dibanding teman-temannya.

**Kata Kunci:** *Pembelajaran, Akselerasi, Biologi, Komunikasi.*

### INTRODUCTION

Education is basically the same as communication. So, the educational process is actually a communication process. The role of communication biology in educational communication practice is very clear because this role can be seen and felt by the behavior of educators and those being taught. A teacher who is able to package learning messages with the support of moving visual images or animation, even multimedia, means that the teacher is able to condition the configuration and stages of the learning process comfortably. Comfort in learning greatly influences the speed of the brain in receiving information.

A learning designer and implementer should first analyze what needs to be improved if students feel uncomfortable in learning activities. It may be that the discomfort occurs because what the teacher shows cannot be observed; what is heard cannot be heard clearly. To anticipate this problem, the role of communication biology

must be involved, both for educators and students. With the help of communication biology the learning process will be more comfortable. In this case, educators must be able to design the learning messages they will convey. He must package it in visual, audio, audio-visual and multimedia forms so that it can attract students' biological activities when they see, hear, feel and understand the learning message or information. So, it is clear that communication biology is the basis and even a reference for improving the convergence of relationships between educators and students in learning communication.

Special studies on communication related to aspects of receiving, processing, storing information, as well as retrieving and sending messages by individuals have been widely carried out. Many studies have been conducted that attempt to reveal biological, psychological and communication behavior, and the nature of learning based on a neuroscience perspective.

One of them was carried out by Roger W Sperry in 1940 in California (in Deni Darmawan, 2009). In this research, Roger W. Sperry examines the function of the left and right hemispheres of the brain through neurobiology studies. He succeeded in reconstructing mental process maps. His approach was to analyze the abilities of the brain hemispheres through observation. As a result, the left and right hemispheres of the brain both play an important role. This research proves that a scientist is no greater than a painter.

More in-depth research on neurotransmitters (messengers) was carried out by Ramon Y. Cayal, 1950, in California. In his research, Ramon Y Cayal analyzed the workings of the brain using a chemistry laboratory. In conclusion, the reflection of the soul, namely actions, thoughts and emotions, is the result of the brain's work. Research into how the brain works was also carried out by Joseph L Kirchkink from California. According to Joseph, human brain cells contain magnetic crystals. Research on seven short memories in the brain was discovered through research conducted by John Lisman (1995) from Brandeis University. The approach and analysis uses computer models. In his research he managed to discover that the human brain has seven separate short-term memories at the same time. Short-term memory can be lost in less than 20 seconds. This means that if we try to store certain information, and it is not repeated to be remembered in the brain's memory within 20 seconds, it will be forgotten. For example, remembering telephone numbers.

Innovations in the world of education regarding learning strategies or methods are starting to emerge. As a result, based on several research studies that have been conducted, there are many models, forms and learning approaches that can be used and adopted by the learning community. Some learning models that have emerged include: Integrated Learning, Collaborative Learning, Computer Assisted Instruction, Quantum Learning, Distance Learning, Accelerated Learning.

If the learning models are analyzed, the results obtained will be the same, namely that all learning models operate in the same domain.

This model seeks to pay special attention to and optimize students' abilities through approaches to learning psychology, learning theory, learning communication and engineering results from communication and information technology innovations. The engineering in question is the use of computer software and hardware in the form of learning models. All these efforts lead to measuring the effects, impacts and results and learning processes carried out. However, innovation efforts in an effort to improve the quality of the learning process from the perspective of empowering students are still not widely discovered or carried out.

Based on the conceptual and empirical analysis presented above, this article will specifically examine the acceleration of the development of individual potential as learning participants through studying the biological behavioral model of communication. Sequentially the discussion includes: 1) Biological Concepts of Communication; 2) Behavioral Biology of communication; 3) Accelerated Learning; 4) Acceleration of learning and brain thinking abilities; 5) Communication Biology-based Accelerated Learning Design; 6) Accelerated Learning Model Based on Communication Biology.

## METHOD

The research method used is library research with a qualitative approach. Data was obtained through library and literary studies, then analysis was carried out in a qualitative descriptive manner.

## RESULTS AND DISCUSSION

### 1. Communication Biology Concept

Communication biology, in essence, is a study that studies interactions between humans and their environment with biology as its scientific basis. This scientific paradigm-constructed study for the development of communication biology includes:

#### a. The nature of behavior.

This study of human behavior was carried out from a biological perspective. Biologically, humans must behave in

accordance with their body posture (physical condition). This behavior occurs through the process of mind transformation. This phenomenon is influenced by body shape or posture, normal or not. Communication biology plays a role and contribution, as well as giving color to the development of human behavior. For example, if body posture is not normal, biologically, the behavior that appears tends to be less than ideal. This problem is the study of communication biology.

From an intrapsychic point of view, human behavior can be conditioned according to the aims and objectives of the interaction. The actualization of certain behavior will be heavily influenced and controlled by mental processes, perceptions, motivation, understood values, memories and the personal character of the individual who carries out and experiences it. Based on these aspects that control conditioned behavior, it is possible to carry out aptitude tests on certain individuals based on the behavior they exhibit.

#### **b. Behavioral Approach.**

There are three specific approaches to studying and developing balanced behavior in communication, namely the scientific, naturalist and holistic approaches.

According to the scientific approach, human behavior will truly be in accordance with environmental conditions if it is tested through scientific thinking patterns, namely proposing and testing hypotheses. According to the naturalist approach, the development of biological communication regarding the integrity of human behavior occurs not because of the transformation of the human mind, but because of the process of human interaction (behavior) unconsciously and abnormally as desired by the mind. According to the holistic approach, the biological development of human communication regarding individual behavior is sourced and controlled by biological, mental and social functions. These three elements can be found from memories stored in the brain. This holistic approach prioritizes the study of communication biology from the perspective of human memory analysis. Human memory

gets a contribution from its biological work from its biological functions, namely the workings and perfection of brain tissue. Memory is contributed by biological powers which tend to be related to human mental powers. These factors greatly influence human thought patterns and behavior so that they are in accordance with the values that develop in their environment.

#### **c. Science Study of Behavior.**

This study provides a scientific basis for thinking about communication biology in studying human behavior for efforts to develop and discover characteristics or something new in human behavior in accordance with scientific logic. Research and development of secondary and primary behavioral approaches by the discipline of communication biology is really needed by individuals when they are in certain conditions. This research and study is science-based. Through this study it can be seen that human behavior arises based on the freedom and stimulus factors given to him to elicit a response. The response that appears shows a biological phenomenon like a black box that must be researched and analyzed. On that basis, immediately carry out experimental steps. The result is that human behavior emerges based on stimulus control. This control looks more controlled and is definitely in accordance with the goals and values of personal needs and the environment.

#### **d. Psycho-biological Study of Brain Structure as a Source of Emergence Behavior.**

Biologically, the study of the brain contributes to a deeper analysis of the biology of communication. Neurologists agree that the source of control of human behavior, both physically and mentally, is the structure and tissue of the brain.

Communication biology can be called internal biology because this scientific discipline studies the origins of human behavior based on the study and understanding of the source of behavior control, namely the brain. Biological studies of internal communication include the following things. First, biologically, human

behavior is influenced by the level of consciousness. This study will explore neurons as elements that form the skin of the human brain. Second, the fast information pathway in the brain will study the process of delivering stimuli from outside the individual. This study explores sensory and motor abilities. Third, automatic response control, namely studying the respiratory and digestive processes that influence human behavior, especially muscle movements during interaction. This study has a lot to do with brain fasting. Fourth, the relationship between biology and intelligence thinking communication. Communication intelligence is one of the parts studied by communication psychology. Communication psychology has so far studied the stimulus response process which produces intelligent thinking behavior, good thinking or behavior, good and organized writing skills. This study studies the big brain more.

#### Medical Technological Approaches To Analyzing Human Behavior.

This approach bridges the development of communication psychology studies, especially those related to the results of the adoption and diffusion of engineering technology innovations. This approach also has the potential to give rise to the biology of engineering communication. If we analyze it more deeply, the visualization of individual responses or behavior shown in certain environmental conditions turns out to be different from behavior in other environmental conditions. One of the results of the adoption of this technology (communication technology) is the emergence of tools to detect the process of message flow from one brain nerve to another brain nerve. This detection uses an EEG (electronic encephalo graph) tool. This tool is able to detect responses in the form of electrical waves that are transmitted to the layer so that, visually, a person's behavior can be distinguished from other behavior.

With this tool, a new, broader phenomenon emerges regarding the field of communication biology when it is combined with communication technology. This new phenomenon is closely related to the regulation of human behavior since the working process of the brain. The adoption of

this technology provides new opportunities for further development of behavioral approaches to communication biology. This approach can be developed based on visualization control of detection tools so that recognition is more accurate. In scientific practice, it shows that the biology of communication influences the development of communication technology when studying communication behavior both internally and externally.

## 2. Behavioral Biology of Communication and Learning Phenomena

The cerebrum (cerebral cortex) consists of two hemispheres (hemispheres). These two hemispheres are separate, but interconnected. In most people, the left brain controls logic and language, while the right brain is concerned with intuition. Discrepancies between behavior and conscience often occur as we have experienced. This is one of the unique biological behaviors of communication which is controlled by the left and right brain, as well as the conscience. For example, when someone feels hungry and wants to eat, social, biological and psychological reactions automatically come out. The brain immediately creates traffic routes to send messages, whether visual, audio, or perceiving something. All the movement of sending messages is controlled by a very specific part of the brain.

Pain and health will look clearly different. This difference in reaction is related to a person's socio-cultural conditions when facing an event. Automatically, the visible behavior will be different. Human behavior cannot be separated from his personal and social life. Deni Darmawan (2009) explains the understanding of biologically based behavioral processes, in a frame of thinking about biological studies which is the basis for biological communication behavior.

## 3. Accelerated Learning

For the first time, this accelerated learning model was proposed by Collin Rose & Malcolm J. Nicholl (1993). This learning model has three objectives: (1) actively involve the emotional brain thereby making things more memorable; (2) synchronize left and right brain activity; (3) mobilize all eight intelligences so that learning is accessible to everyone and the resources of the whole mind are used. This accelerated learning



model pays special attention to the process of developing mental attitudes.

Based on the psychology of learning approach, the accelerated learning model is also an attempt to combine psychological processes and language acquisition. According to Harley, psycholinguists is the name given to the study of psychological processes involved in language. We are concerned with listening, reading, speaking, writing and memory for language. Regarding memory for language, Rose and Nicholl, commented: "The core idea in The Accelerated Learning language course is that to learn a language you must build a mental model of how it is structured and then be exposed to numerous natural situations so you abstain the vocabulary" The accelerated learning model also contains models of multiple intelligence, the magic of music, and mental development processes. From a communication biology perspective, this accelerated learning model is a bridge medium (wasilah) to accelerate human sensory sensitivity in responding, storing, transforming and producing messages.

The accelerated learning model is a new breakthrough that seeks to find the best way of teaching. There are six steps that highlight the role of the brain as a weapon for learning exact and social sciences. The six-step principle is abbreviated as MASTER: Motivating, Acquiring, Searching out the Meaning, Triggering the memory, Exhibiting what you know, and Reflecting on how you've learned. If we visualize this paradigm, it is as follows:

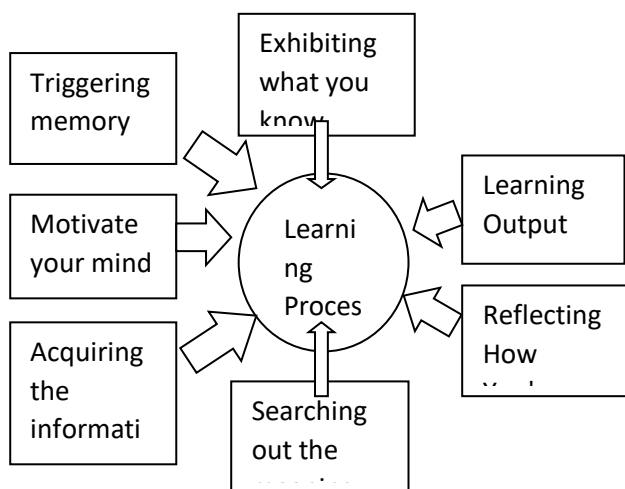


Figure 1. Accelerated Learning Model

In this context, George B Shaw, stated that "one man who has a mind and knows it can always beat ten men who haven't and don't." The

accelerated learning model aims to awaken students' learning abilities, creating learning activities as activities that fun and satisfying, and contributes to the creation of happiness, intelligence, competence and success of learners. The accelerated learning model focuses on the results or achievements achieved, not the method. Therefore, the accelerated learning model must be linked to results or achievements, not methods. Any learning method that aims to speed up and improve the learning process is part of the accelerated learning method.

The accelerated learning includes a large number of techniques that are continually being developed. The accelerated learning is a philosophy of learning and life that continues to strive for demechanization. This model takes steps to humanize for humans in the learning process. With this model, the whole body, mind and person are seen to be active in learning. In other words, the whole body must experience the same learning experience. Therefore, accelerated learning seeks to reshape most of the beliefs and practices that have been limited and inherited from the past.

The accelerated learning model is part of a more fundamental and broader movement. Accelerating learning is not only used in education, but also in agriculture, medicine, community life and other areas of life. In essence, accelerated learning is an action program to rediscover something real. This movement seeks to readjust human life to everything that is natural, to humanize the organism. That is why, this movement is far from things that are inauthentic, mechanistic and contrived. This movement also seeks to nurture human intelligence at all levels so that the learning process becomes more effective.

### 1. Acceleration of Learning and Brain Thinking Ability

Lawrence C. Katz & Manning Rubin in Deni Darmawan (2009; 196) argue that most learning and memory rely heavily on the brain's abilities. It is the memory in the brain that forms and searches for associations in a similar way to what it has learned. In interaction, the brain needs media and tools to package thought patterns into more interesting ones that don't feel heavy. Communication-based learning that suits the brain's needs.

Students' learning abilities with the help of information and communication technology-based learning models as well as analysis-synthesis ability questions produce very striking differences in results. This learning model is used to see the acceleration of student learning, while the use of analysis-synthesis questions is aimed at seeing left (analysis) and right (synthesis) brain abilities.

The results of the research show that the learning speed of elementary school students when studying social sciences is around 4.25 minutes compared to information and communication technology-based learning models. That means, the results obtained by information and communication technology-based learning models are faster than ordinary learning models. For exact lessons, the difference is around 4.08 minutes faster. The use of synthetic learning (right brain ability) shows significantly different results. In this case, students' synthesis abilities after learning with information and communication technology-based learning models are much better.

At the junior secondary level, research results show that the learning speed of students when studying social sciences, the time difference is around 3.08 minutes. This information and communication technology-based learning model can be faster than ordinary learning. For exact learning, the difference is around 2.52 minutes faster. The difference in scores obtained by students when working on analytical questions using information and communication technology-based learning models in the social science subject group, the difference in average results is very significant. The test given is a one sample t-test. Synthesis learning shows significantly different results. In this case, students have better synthesis abilities after implementing information and communication technology-based learning models.

The test results obtained at the elementary and middle school levels also apply at the high school level. The average learning speed of secondary level students studying social subjects without using information and communication technology-based learning is 47.5 minutes, whereas with information and communication technology-based learning the average learning time is 45.3 minutes.

Information and communication technology-based learning can be around 2.16 minutes faster than regular learning. With a learning model based on information and communication technology, the average is 52.1 minutes. So there is a time difference of 2.8 minutes. This means that learning based on information and communication technology is faster.

## 2. Communication Biology-Based Accelerated Learning Design

There are several aspects that must be considered in learning design, especially in the context of Communication Biology, namely:

### a. Visual

This design greatly influences the abilities of specific occipital (vision) parts of the left and right brain. Research shows that visual learning retains learning information in memory longer. Jansen explained that our eyes are acceptable of registering 36,000 visual messages per hour. Between 80-90 percent of all information that is absorbed by our brain is visual. (The eyes have the ability to receive around 36,000 visual messages every hour. About 80-90% of the information processed by the brain is visual). Therefore, learning design based on information and communication technology using computer based instructional (CBI) tools must pay attention to visual design and visual readability (visual image). That way, 36,000 or 80-90% of learning messages are easily processed by specific parts of the left and right brain during learning.

### b. Color

The specific part of the brain that receives messages from the visual nerve regulates and understands the essence of color differences. Vuontela's research results prove that "in testing memory for verbs and memory for color, learners better recalled color. And when the object was tested against color, once again, color memory was stronger"

### c. Picture

*Image* also has an impact on understanding the biological phenomena of communication. Image or object design aims to provide illustrations to emphasize understanding of learning information. In CBI, the presentation of images must be

able to create a real (natural) impression. Real objects or images should be presented through photos or image designs that are similar to the real object or object. Experimental results prove that it is easier for students to capture the space and movement of the model displayed, stimulating specific parts of the brain to interact quickly and in fun.

Learning design in CBI must pay attention to illustrations whose reference is the ability of a specific part of the occipital (vision). On that basis, the design must approach the concreteness of the object so that students find it easy to analyze and synthesize the teaching material to understand the image or illustration.

#### d. Light

Specific parts of the occipital, parietal, and frontal brain prove that they help better thought processes to process visual stimulus messages. All three also require analysis of the use of color from the lighting effects design. The soft colors that appear further lighten the vision of the eye nerves. For example, natural colors. This color effect is closely related to the lighting effect. Light that enhances the color density of an object affects the brain. The brain feels light, and does not get tired easily to capture the content of visual messages. This visual message is controlled by the occipital, and reaches the frontal. However, the visual message is processed first by the parietal. According to Jansen, "many learners may be underperforming simply because the lighting is difficult on their eyes or hard on their nervous system. Soft, natural lighting is best for learning.

#### e. Audio/Music

*Accelerated learning* has convinced many people that the effect of music in learning is very helpful in increasing the speed and calm of learning. Background music can develop students' learning creativity. Music and narration in CBI can activate specific temporal and parietal regions. So the biological phenomenon of communication in a specific part of the brain really supports the processing of information from the senses, especially hearing which is controlled by a specific part of the temporal brain.

Communication biology from an educational perspective views this as

something very important. That is why, this perspective recognizes that music can sharpen creativity and influence how the brain works when learning. Research by Bever and Chiarello (in Deni 2009) found that the brain responds differently to the music it hears. Both of them also found that music can influence the depth of analysis of something.

On that basis, the educational perspective emphasizes that the biology of left-brain and right-brain communication must be of special concern, especially in the CBI pattern. The speed of the left brain can be balanced with background music. Education experts believe that music can help accelerate the functioning of the right brain. According to Shahib, with music, the work of the right brain improves in processing information in the form of music.

#### f. Interactive Rate

Student learning phenomena must also be supported by interactive learning models. Interactive learning models greatly influence the activity of specific parts of the brain. The speed, variety of obtaining and processing stimuli from various presentation techniques is also aimed at creating interactions that involve all the working functions of specific parts of the brain. Interactive models can also increase psychological activities to support student learning success. Cognitive, affective and psychomotor activities are largely determined by brain activity. So design is very effective in stimulating or bridging all learning activities. Howard Gardner, stated that there are many types of intelligence called multiple intelligences. Multiple intelligences include linguistic, logical-mathematical, visual-spatial, physical-kinetic, musical, interpersonal and intrapersonal. In this case, interactive design is used to build multiple intelligences through optimizing physical or kinesthetic intelligence.

### 4. Communication Biology-Based Accelerated Learning Model

Acceleration of student learning is related to the modality they have. The basic modalities in question are visual, audio and synthetic or tactile. A student will certainly

be successful in participating in accelerated learning if he has a visual modality that is fully supported by a healthy biological condition. So where specific parts of the brain influence how language, memory and emotions work.

Based on the assumptions above, the form or model for implementing accelerated learning based on communication biology can be mapped at each level of education from elementary school to high school, as follows.

#### **a. Based Accelerated Learning Model Communication Biology in Elementary School**

The success of learning in schools, including at the elementary school (SD) level, is the creativity of students. The learning model that will support the development of elementary school children's thinking and creativity is a learning model that develops children's creativity. Learning models in the form of drills, tutorials, guidance, simulations and games (role playing) significantly help the development of creativity. Empowering children's creativity can be done by training and developing all aspects of learning: IQ, EQ, and ES. (Cognitive, affective, psychomotor).

Creativity can be developed through a model that suits the intelligence level of students whose intelligence level is between 90-110 (normal children). So, creativity is closely related to and supported by the level of intelligence. In this case, the application of a biological communication (ICT) based learning model could be an alternative. Communication biology (ICT)-based learning models do not have to emphasize aspects of the sophistication of technological applications. Learning designers and developers must explore psychological aspects developed from the biology of left and right brain communication. According to John R. Hayes in Deni (2009:331), creativity in learning must be raised because "creative people are generally above average in intelligence, and of two creative people, the more creative one is likely also to be the more intelligent one".

In the biological communication (ICT) based learning model, visual intelligence is an absolute necessity. It is called absolute because visualization in the drill model approach, tutorials, simulations and games is very closely related to aspects of color, speed of movement and other interesting presentations. This means that visualization is the most important thing in the biology of left and right brain communication. The importance of visual intelligence was put forward by Eric Jensen by terming visual intelligence the concept of brain dominance in visual learning. According to Eric Jensen, "over 90% of all information that comes to our brain is visual".

So, learning models at elementary school (SD) level should emphasize creativity aspects through simulation models. In other words, a learning model based on communication biology (ICT) must be the main support for training balanced abilities in the working processes of the left and right hemispheres of the brain. Shahib (2003:39) states that left brain intelligence which relies on logic is very important in human life, but without being accompanied by right brain intelligence, a person will never be innovative and creative to solve life's problems because creativity and creativity are only "created" by the right brain.

This learning model through drills, tutorials, simulations and games is expected to develop students' creativity. Their brains are "challenged" to decode complex codes in life. In this way, students experience the process of forming individual character which occurs normally and naturally.

Communication biology-based learning designs for the social and social subject groups are basically the same, both in terms of procedures and background. Communication biology (ICT)-based learning models in elementary schools do not yet emphasize aspects of breadth and complexity of material. The main idea is in the aspect of adaptation and being fun.

#### **b. Biology-Based Accelerated Learning Model for Communication in Middle Schools**



The speed and development of student learning during the lesson really depends on the way the teacher packages the lesson material. The model that can be used for this is the LCBT (Lateral Computer Based Tutorial) model. This model basically uses the principles of practice and tutorials through the application of lateral thinking or leaps of thinking supported by visual abilities to understand learning information. This learning model is oriented towards increasing motivation, creativity and speed of understanding the material. In the process, this learning model is required to be able to develop students' speed (accelerated). This speed is shown in the activities of observing, understanding, determining and constructing formulas to their application in solving problems.

According to Munir (2004), a technology and information-based learning model that is able to optimize the role of the left and right brain in junior high school (SMP) is a model that pays attention to freedom of thought flow (cognitive-flexibility). This model provides free opportunities for students, especially students who already have branching, network thinking. Of course, the presentation of the model is adjusted to the student's level of intellectual development. This network of thinking is based on the biological dimensions of communication, psychology and the learning process. These three dimensions should be known and applied by teachers when carrying out their duties, both for teaching, guiding, directing and creating formal and non-formal environments.

#### **b. Based Accelerated Learning Model Communication Biology in High School**

For Senior High School (SMA) level, the learning model is adapted to the student's level of thinking. The learning model in high school must be able to optimize creativity and emotional power. These two aspects are closely related to the level of thinking of high school students who are at the abstract thinking level. The learning model that is suitable for high school students is an interactive model. Through an interactive

model, the presentation of learning messages must invite students to solve their own problems. In this case, a more appropriate model is the Simulation-Based Tutorial and Games Model. The content of the material is designed in the form of a game with the support of attractive illustrations in the form of simulations to find problem solving and problem solving. With this learning model, interactive learning activities will occur.

For social studies, problem solving presented must condition students to be actively involved in individual learning activities. One of the simulation-based game tutorial learning models is interactive multimedia (MMI). With this model, high school students are invited to participate in optimizing their senses of sight, hearing and kinesthetics in the search for problem solving. This model is very representative because it can represent all students' creative thinking paths, both social and exact groups.

The interactive model (MMI) combines various memory development patterns to awaken students' creativity. The steps taken are to empower the ability to imagine and think abstractly (right brain), while the left brain (logical-rational) is the controller. According to Shahib (Daslam Deni Darmawan; 2009:343), the way a person organizes and processes information is very dependent on his or her habits of thinking. For someone who usually thinks logically-rationally, the easiest way to absorb information is presented in the form of something logical-rational. It's different with someone whose right brain is more dominant. They prefer to start an action from the global first, and usually visualization accompanied by imagination is very impressive for those whose right brain is dominant.

The Interactive Multimedia Model applies a combined learning pattern, namely explanation of instructions, practice questions, branching presentation flow, and is supported by video-simulation-animation-text-image illustrations so that the method of presenting the learning process is carried out as a whole. Through this model, student

learning acceleration can be improved better. This model can also overcome students who have problems with their thinking patterns.

## CONCLUSION

Behavioral Biology Communication provides a very important meaning for a more detailed explanation of the biological phenomena behind psychological behavior, especially in accelerating learning activities when students observe, feel, understand and act. The study was carried out using brain stimulants in the form of messages based on information and communication technology. In this case, there are four practical suggestions in efforts to accelerate smart, brain-based learning: (1) start by studying the mechanisms of the brain and adapt the child's way of learning to the brain; (2) eat healthy foods that brighten the brain; (3) learn by moving a lot; (4) learn something new, solve new problems, and live in a new and innovative-conducive learning environment.

To help the working system of the left brain which is logical-rational in nature and the right brain which is holistic, random and creative, information technology-based communication biology makes a huge contribution to the development of the brain's working system, especially learning models which are drill, simulation, tutorials. This learning model is very suitable, especially its branching nature. Communication biology behavior really supports efforts to develop and approach student learning acceleration, especially in learning communication for elementary, middle and high school students.

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