

## Dermatoglyphics Analysis: Uncover Potential Intelligence and Learning Styles of Learners to determine the Appropriate Learning Media

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### Abstract

This study aims to uncover the potential of intelligence and learning styles of learners using dermatoglyphics analysis. This analysis very important to identify learners' characteristics as a basis for selecting a learning media. This research is descriptive qualitative. The subject of this research were learners in grade 7th junior high school in Bandar Lampung. The research instrument was a recorder fingerprint reader tool for the pattern. The results shows, learners have the potential intelligence: visual-spatial (42%), logical-mathematical (31%), naturalist (17%), interpersonal (10%); the learning styles: visual (92%), kinesthetic (2%), and audio (0%). Based on the results and it's associated with characteristics of the concept structure and function of plants concepts, learning media which recommended: learners with visual-spatial potential intelligence and visual learning style (V S+V) should use pictures, posters, flip charts, magazines, modules, and pictorial worksheets; learners type of visual-spatial and kinesthetic (V-S+K) is more appropriate to use original media, torso, image; and learners type of naturalist and kinesthetic (N+K) can be stimulated through direct observation with cruising the nature around approach. In conclusion, dermatoglyphics analysis more accurate and faster than the survey method is often used. Also, by understanding various learners characteristics, teachers can choose the learning media in accordance with learners needs.

**Keywords:** Dermatoglyphics analysis, Learning media, Learning style, Potential intelligence

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## INTRODUCTION

Before teaching, a teacher should have variety skills, such as a skills to design the lesson plan, formulate the subject matter, creating a conducive learning environment, picking and utilizing the learning media, choosing the learning resource, and choose the learning approach that accordance with learners (Situmorang & Rosmawati, 2018). That last part is called stressed that identify the learners characteristics is an important aspect in construct the instructional design. Therefore, an understanding of learners characteristics significantly affect toward the teacher succes in the classroom management, especially in determining an effective learning method, learning experience, the learning media, the learning resource, and evaluation (Khodijah, 2011).

The learners characteristics, both of physiological and psychological aspect, greatly affect the process and results of their learning (Purwanto, 1995). A number of studies have recently found that the success of the students learning is significantly influenced by factors that originate from within the learners such as emotional intelligence and spiritual intelligence (Zulhidha, 2020); motivation (Surya, 2019; Abas, 2019; Hastuti, et al., 2019; Samsudin, 2019); learning styles (Haviz, 2016; Didartita & Irwandi, 2019) and others.

Until now, studies on the students potential intelligence and learning styles are still mostly focus on analysis of the relationship between the two variables (potential intelligence and learning styles) with self-regulation and achievement or students learning outcomes, such as, research by Larasati & Sujarwanta (2020), Chania, et al (2016), Hermawati & Andayani (2020). In addition, studies are still limited to uncover the profile of student learning styles, for example, the research by Soraya, et al. (2020) that identify the learning styles of the learners using David Kolb's theory.

In the context of the measurement of students potential intelligence and learning styles, the researchers generally use non-test based students perception technique, includes the Learning Style Inventory (Dun, et al., in Beck, 2007), Honey and Mumford Learning Style Inventory (Honey & Mumford, 1992), The Grasha-Reichmann Student Learning Style Scales (Grasha, 1982), Felder's Index of Learning Styles (Felder and Silvermann, 1988); Kolb Learning Style Inventory (Kolb, 1984).

Nowadays, many researchers recommend other methods to uncover students potential intelligence and learning styles. One of them is dermatoglyphics analysis, especially fingerprint analysis. Dermatoglyphics is a marker of epigenetic that shows the person's basic physical qualities (Ferrao & Prata, 2014). Similarly, Nodari-Junior (2019) defines dermatoglyphics as markers of biological individuality that used to detect natural talent someone, that the application and its use can be in different contexts, such as sports, education, health and others (Del Vecchio & Goncalves, 2011).

The dermatoglyphics analysis is considered more effective in characterizing the potential of a person as compared to traditional methods. For example, dermatoglyphics can characterize the potential of the athletes through the depiction of patterns of physical strength, the level of coordination, endurance, speed, level of discipline and agility (Chapa-Guadiana et al, 2020). For, the information was useful for the coach to determine the proper treatment to optimize the achievements of the athletes. The fingerprint pattern in the form of a genetic structure in the form of very detailed strokes and forms a sign that is attached to a person is a hidden image containing a person's characteristics (Misbach, 2010).

The structure of fingerprints developed in accordance with the process of growth of brain cells. The difference in the dominance of the brain can affect the levels of cognitive function and also the function of a person's emotions. The dominance of the brain also affect a person's aptitude (Misbach, 2010). Fingerprint patterns are influenced by factors of DNA that are hereditary and genetically inherited from parents. Characterization of fingerprint patterns related with the development of cells in the nervous system of the brain. The results of the research by Montalcini and Cohen about the correlation between NGF (Never Growth Factor) and EGF (Epidermal Growth Factor) prove there is a correlation between the structure of the fingerprint patterns of epidermal skin with the hormone system of the growth of nerve cells in the brain, namely the central nervous (brain) and peripheral nerves (spinal cord) (Misbach, 2010). The structure of fingerprint patterns in humans is unique among one another, but the basic patterns of fingerprints are classified in three types of patterns, namely the basic arch, loop, and whord. (Saparudin & Rasywir, 2012).

On the other hand, a number of studies find that the quality of learning in Indonesia is still relatively low. The low quality of learning is often due to weakness of the learning process itself, for example: selection of a method of learning that is not right, still learning-oriented rote concept; learning dominated the lecture method, the selection of strategy, media, and teaching materials potluck—which holds the learners in the learning space is narrow. It led to the creation of patterns of learning monotone: lectures, exercises, assignments, and daily tests. It's confirms the assumption that teachers often put learners as the object of study, rather than a subject of study. Learners often have to accept anything that is described and directed by teacher, of course with all the advantages and the limitations of the teacher's own, especially the limitations in recognizing the learners characteristics.

The type of subject-object learning is illustrated, for example, in several biology teachers in Bandar Lampung. Apparently, so far teachers have never analyzed the characteristics of learners in a planned and systematic way before carrying out learning. While the selection of learning methods, learning resources, learning media, and evaluation is based on the content of the material in the curriculum that is already available. That is, the delivery of material is only based on the analysis of core competencies and basic competencies; media and learning resources refer to existing books and learning resources without first relating them to the characteristics of learners.

During the learning process, learners gained the same treatment in the classical style, there is no differentiation of treatment on each of the learners who have different characteristics. A lot of teachers who do not yet measure the interest, motivation, potential, learning style, and other characteristics on the learners as the basis for determining the media, strategy, learning resources, and evaluation tools. Teachers teach only in accordance with what is in the textbook. Regardless of the question whether it is done by the teacher has been in accordance with the needs and characteristics of learners, which is clearly the teacher has not yet realized the importance of analyzing the characteristics of the learners before teaching.

Have previously described the importance of choosing learning media well, not solely because of the learning media that is considered effective and is often used other people. Heinch,

et al a model ASSURE as a way to choose the learning media, covering the six steps of the principal, which is the first: analyze the characteristics of the learners (Arsyad (2016). When learning media is selected based on the characteristics of the learners, then they wouldn't be difficulties associated with the media.

Identify the characteristics of learners can help teachers in selecting learning media in a flexible and appropriate personal condition of each student. This allows teacher create learning environments based on personal characteristics of learners, where in one class there are various characteristics of learners, the teacher can provide learning that is fair (El-Bishouty et al 2015), because the teacher can provide learning media in accordance with their needs (Eastham, 2011).

Therefore, this research is important to uncover the potential of intelligence and learning styles of learners. The profile of potential intelligence and learning styles can be used as a basis to determine the learning media in accordance with the personal characteristics of learners and the characteristics of the learning material, so that can improve the quality of learning.

## **METHOD**

This research is a descriptive qualitative. Researchers analyze the fingerprint the student to recognize the potential of intelligence and learning style. Mapping of the potential of intelligence and learning style was later used as the basis for determining the learning media that can be used on the material of the structure and function of plants.

Subject of the study consisted of 27 learners of grade 7<sup>th</sup> junior high school in Bandar Lampung. Sampling technique using purposive sampling with the criteria of the selected subject did not experience disabilities in fingerprint patterns. The process of taking fingerprints using the recorder fingerprint with good specifications. Then, the recording fingerprints were analyzed using the method of division of the area of the structure of the brain based on the study of neuroscience and pattern recognition methods based on the science of dermatoglyphics.

Data collection techniques using literature review, observation, documentation and analysis of fingerprints. Data analysis techniques include data reduction: summarizes the important things that are in accordance with the theme and

patterns and throw away everything that is not important which is adjusted with the goal of what is desirable (Sugiyono, 2011); display/presentation of data in the form of diagrams and tables and the last conclusion.

To ensure the validity of the data, then do the triangulation in the form of triangulation theory by combining several theories for the basis of research that is comprehensive; the triangulation of sources by collecting information from multiple sources so that the data obtained are more accurate, and the use of recording devices fingerprint patterns are standardized.

## RESULT AND DISCUSSION

The results of the fingerprint analysis on the learners who are selected as research samples obtained at least four of the potential of the eight types of multiple intelligences proposed by Gardner, and two diverse learning styles of learners. The profile of potential intelligence and learning styles of learners is shown in the diagram 1 and 2.

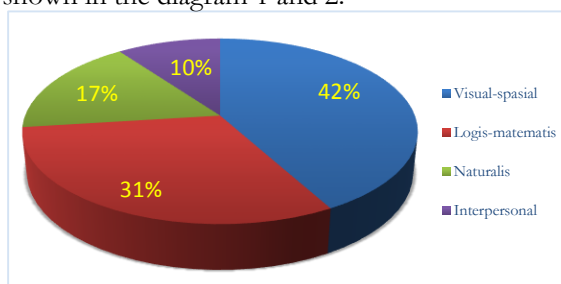


Diagram 1. The Profile of Potential Intelligence

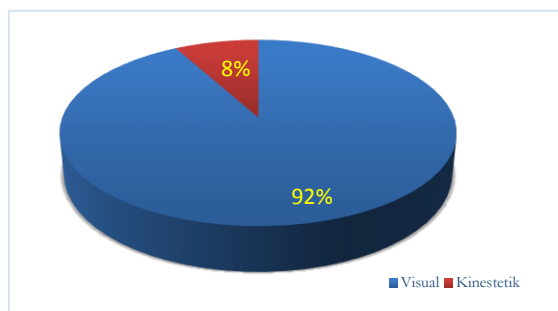


Diagram 2. The Profile of Learning Style

Refer to diagram 1, the potential intelligence of learners the majority of the visual-spasial. It's in tune with the profile of their learning styles (diagram 2) the dominant visual. Next order: logical-mathematical, naturalist, and interpersonal "coloring" of the potential intelligence of learners. Other potentials such as intrapersonal, body-kinesthetic, linguistic, and musical is not dominant. In a small percentage,

kinesthetic learning style appear on the learners. However, the learning styles of others such as audio-visual, audio, global, and analytic does not appear. Here's an example of the results of recording the fingerprints of learners.

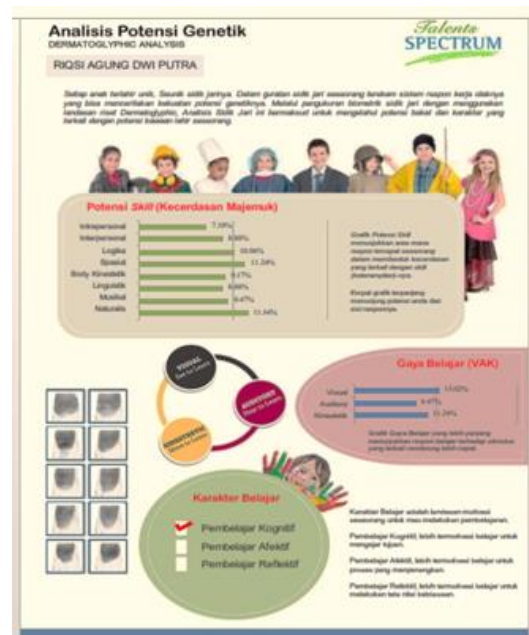


Figure 1. The Output of the Fingerprints Analysis

Further, the profile of potential intelligence and learning styles of learners used to explore the possibilities of the learning media that can be selected to teach the material the structure and function of plants. Referring to the results of the data reduction and analysis of the material characteristics of the structure and function of plant, set out two types of potential intelligence: visual-spasial and naturalist. Related to the style of learning, two types of learning styles that appear combined with the potential for intelligence. The determination of the types of learning media which is suitable to refer the model ASSURE and procedures for the selection of instructional media according to Anderson. Following the recommendations of learning media based on potential intelligence and learning styles of learners.

### 1. Types of Visual-Spatial + Visual (V-S+V)

Learners V-S+V's have the ability to observe, analyze and has the sharpness of the optic that is able to capture the object either in the form of pictures and the real object and the three-dimensional model, coupled with the style of learning which is indeed a visual strengthen the sharpness of the. Then, the kinds of learning



media should be objects that can stimulate the senses of vision, can be a media colored, black and white, or a combination of both.

Based on the analysis of the characteristics of the material of the structure and function of plant that concrete and abstract form of facts, concepts or principles, educators can choose media groups II & III (black and white) if it does not require interaction with the object. While if the need of interaction with the object in order to build the conditions of learning which is more fun, educators can use the learning media group VIII+I, X+II, V+II. Type of media from this group, based on tables Anderson and some of the relevant journal, includes diagrams, charts, graphs, posters, pictures, flip charts, text books, magazines, module, LKPD, journal, learning video, sound film, animation, real objects, and a power point presentation (Sanjaya, 2008).

Learners with potential intelligence visual-spatial tend to be easy to catch the stimulus through the five senses, observe and learn to use the pictures and observe the object is a way of learning that allows the child with the potential for intelligence and learning styles of this type (Kurniawan, 2017). The material of the structure and function of plant with learning that is the fact, such as the morphology of the stem, roots, leaves; anatomy of root, stem, leaf, can use media such as picture shown through learning videos, real objects. While the material is concepts and principles can use media such as module, worksheet, journals, and images (mind maps and concept maps). Through these media teachers can explore the capabilities of the learners with the potential intelligence visual-spatial and visual learning style to understand the morphology and anatomy of plants and explain functions optimally.

## **2. Type of Visual-Spatial+Kinesthetic (V-S+K)**

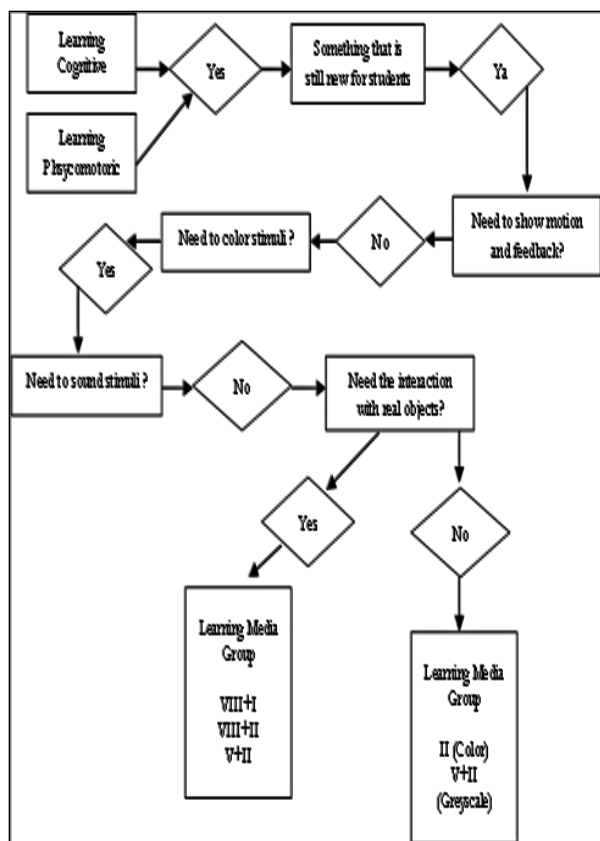
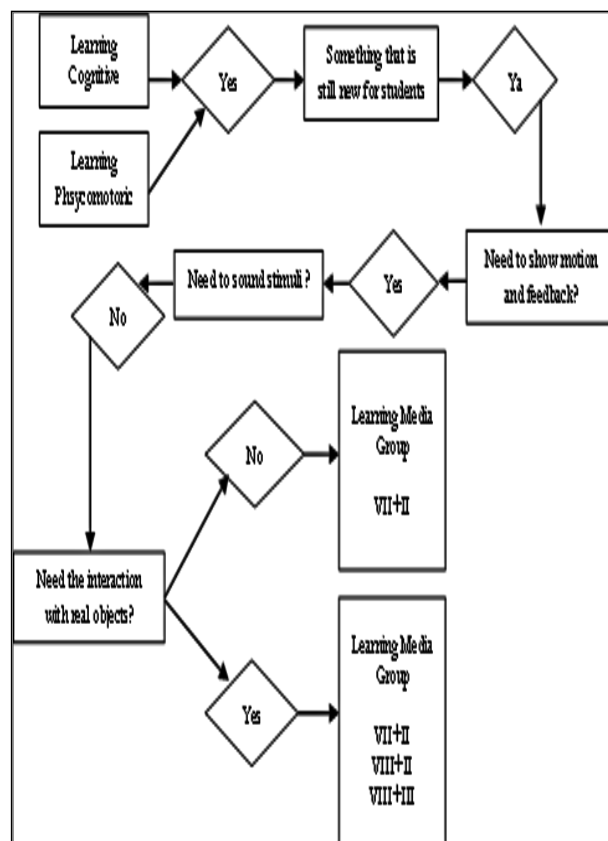
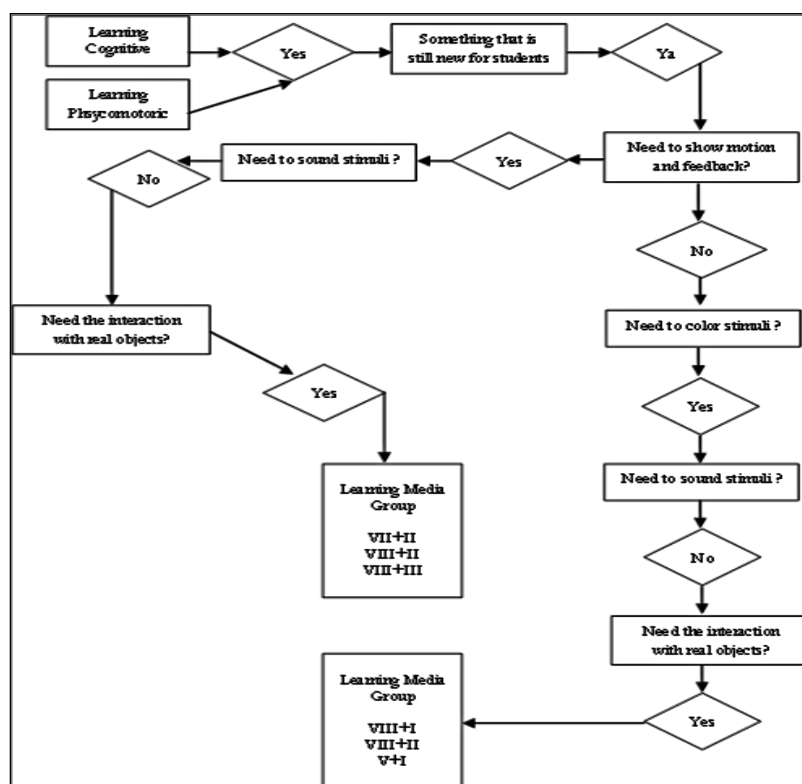
Students with kinesthetic learning style and potential intelligence visual-spatial don't just have the sharpness and sensitivity on the senses of vision, but also skilled in physical exercise. Students with kinesthetic learning style is more like physical activities that involve all members of his body move to acquire and looking for information. They tend to be easily associated with all things related to the activities that touch

the real object. On the material that is abstrak and need to be memorized, they often memorize the material with a walk and look around the area.

Based on this, the media that is suitable for learners of type V-S+K on a material that is both concrete and abstract good the facts, concepts and principles are the media of the group VII+II, VIII+II, VIII+III. The Media of this group can be in the form of media such as real objects, the imitate model, a microscope, and laboratory. Through a variety of media, the real objects will explain the learning that is the fact for learners with characteristics like this. As for the material that is concepts and principles can be used in media such as the model of a clone (herbarium or preservation), and laboratories.

## **3. Tipe of Naturalis + Kinesthetic (N+K)**

The learners with the potential intelligence of the naturalist basically tend to love things associated with nature. They are more easily associated with the exploration of nature, flora and fauna, taxonomy of living things and will be more sensitive to the conditions or natural phenomena. Experts suggested the same thing, learners d the potential intelligence of the naturalist is a person who is caring and sensitive to the environment as well as manyukai activities carried out in the outside environment such as field studies (Ismiati, 2017) thus, they will be more easily learn the material of the structure and function of plant with the media of the group VIII+I, X+II, V+II, VII+II. Type of media from this group include real objects (noiseless), real objects (silent), audio-visual (film and video), the model of imitations, worksheet, journal, and pocket book. The material is concepts and principles can be explained to the learners with the potential intelligence of the naturalist, using media that contains the description of the concept or principle that is referred to as worksheet, the image is accompanied by an explanation, or journals that are relevant. The material is the fact can also be used media images accompanied by explanations, real objects, learn direct in nature and also the models of imitation. Groove selection of learning media based on the potential intelligence is described as in figure 2 until 4.


Figure 2. Groove for type **V-S+V**

Figure 3. Groove for type **V-S+K**

Figure 4. Groove for type **N+K**

As a result, choosing the right learning media involves a complicated process and dynamic. Teachers need to pay attention to various aspects, the base, as well as the factors that affect the effectiveness of the use of learning media. Choose the media of learning is not only based on forecasts of educators that a medium is considered suitable, but must pass through the stages of the selection of media in a systematic way.

Of a number of stages in the planning of learning, the first step that most need attention is to analyze the characteristics of learners (Sadiman, dkk., 2014). Therefore, the information contained in the material actually addressed to the learners. Then, the educator must ensure that the conditions of the learners compatible with the media used to convey information.

This study revealed the potential of intelligence and the range of learning styles of learners through fingerprint analysis or the study of biometrics. Data about the characteristics of the learners are then used as a basis for selecting a media of learning. Review of biometric is a computerized system that is oriented at ease-ease and accuracy in uncovering patterns of fingerprints. Although biometric systems is often used only for the purposes presence, but biometric systems in this analysis is very different. Review of biometric is done by identifying the patterns of scars fingerprints and translate the structure of the pattern (Galar, et al, 2015).

Review of biometric using recording equipment with special specifications, resolution, and high sensitivity. This tool can also record all the areas on the structure of the fingerprint patterns. Sub-methods of biometric systems is focused start of scanning of the fingerprint patterns to the process of extraction in fingerprint patterns, this system is the initial stage of the process of fingerprint analysis, which are grouped based on the structure of each.

Fingerprint analysis can uncover information through the interconnections between the neurons cross the line-line epidermal identified on the structure fingerprint patterns. The structure of the fingerprint pattern this has a sensitivity to the power response in the brain regarding the function of the thalamus, hypothalamus, hippocampus, amygdala, and corpus callosum. This method also takes into

account the structure of the fingerprint patterns such as ridges, island or dot, delta or triraridi, core, minutie point, bifurcatio which is then taken into account using the pattern area (Harlod Cummins, cited Misbach, 2010).

The steps in the analysis of the biometric process begins with the recording of fingerprints to find the fingerprint patterns. Patterns-patterns of a fingerprint can be in the form of Ridge lines, Ridge ending, Bifurcation, Crossover, Island, Pore, Delta, and Core. Fingerprint patterns found certainly cannot be directly used to see how the brain works, because the early stages of interpreting the pattern area in order to obtain accurate data (Misbach, 2010). Furthermore, the classification of the area of the structure of the brain based on the science of neuroscience. Neuroscience is referred to by experts as “the jungle brain” that illustrate how complex the relationship between the structure of the triune brain (right brain) and the brain hemisphere (left brain) as well as the functions of the parts of the brain in the cerebral lobes (Paul D. Mc. Lean, Roger W. Soerry in Misbach, 2010).

The process of classification of fingerprints can indicate the specifications in the area of the cerebral with a description of: (a) the fingerprint part of the thumb is connected on the area of the lobe of the pre-frontal; (b) the index finger is associated with the area of the frontal lobe; (c) the middle finger is connected on the area of the parietal lobe; (d) the ring finger is connected on the area of the temporal lobe; (e) the pinky finger is connected on the area of the lobe occipital (Misbach, 2010). The particulars of the relationship between the introduction of the characteristics of learners with the selection of instructional media, it should be underlined that the groove is the selection of learning media effective to have to rely on the achievement of learning objectives (Heimich, et al. cited Sumiharsono & Hasanah., 2017).

Heinich et al recommend the model ASSURE, “analyze learner characteristics, state objectives, select or modify the media, utilize, require learner response, and evaluate”. Of these stages, the analysis of the characteristics of the learners aims to determine the learner needs. The analysis of learner characteristics do with uncovering the general characteristics in accordance with the level of education such as socio-economic background, as well as the

special characteristics such as knowledge, learning styles, skills, and attitudes of early-owned (Arsyad, 2016; Sumiharsono & Hasanah, 2017).

Criteria for selection of learning media based on the assumption that the media is part of the system instructional. Although the rules in the selection of learning media not sure, based on some theory that there are at least three models of media selection effective learning: a model flowchart (diagram alir), the model matrix and model check (consider all the criteria).

In the context of choosing media based instructional purposes, Anderson recommends flowchart model. This model puts the media as an integral part of the instructional purpose. The procedure of selection of media, starting with the essential questions for example, "What is the message to be conveyed? Whether that message is informative? or Did the media that contains the message of the lesson plan?". When a message is in the form of a book lesson plan, "Whether it will serve as a means of learning (the media) or a means of teaching (props)?" Answers of basic questions that can then be useful to determine the learning experiences that are relevant from the aspect of affective, cognitive and psychomotor (Sanjaya, 2008).

## CONCLUSION

Based on the analysis of the results of this study, it was concluded that: 1) the learners have the potential intelligence and learning styles vary, the most dominant potential of visual-spatial (42%), logical-mathematical (31%), naturalist (17%), interpersonal (10%); the learning style of the learners are the most dominant visual (92%), kinesthetic (2%), audio (0%); 2) Learning for the learners with the type of visual-spatial and visual learning style (V-S+V) can use media images, posters, flip charts, magazines, module, LKPD pictorial; 3) Learning for students with the type of visual-spatial and kinesthetic (V-S+K) is recommended to use the original media (preparation), a model of a clone, image; 4) Learning for students with the type of naturalist and kinesthetic (N+K) should make observations with roaming nature around guided by the guidebook practicum or module.

This study certainly still has a lot of limitations. Therefore, it is necessary more studies to unravel the other characteristics on learners complete. Further research can also be directed at the development of learning-based personal characteristics of learners.

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