Geography literacy to improve spatial intelligence of high school student

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Abstract. Spatial intelligence is deeply related to success in the STEM disciplines (science, technology, engineering, and math). Spatial intelligence is a transversal capacity which is useful for everyday life but which cannot be characterized in any specific and distinctive way, as are, for example, linguistic or mathematical ability. The ability of geographical literacy relates to spatial intelligence. Test results prove that the ability of high-liter geography of high school students found in students who have a good spatial intelligence score.

1. Introduction
Gardner’s theory of multiple intelligences based on understanding that different parts of brain are connected with those different types of intelligences, is well known. With that theory, Gardner abandoned contemporary theory according to which intelligence is conditioned and unchangeable. According to Howard Gardner’s theory of Multiple intelligence, intelligence is not a homogenous mind skill. Gardner’s model of Multiple intelligence indicates that there are numerous learning styles and cognitions of the world [1].

According to Gardner, spatial intelligence is based upon the ability to transform perceptions, organize information into cognitive maps, and to propose clear and appropriate reproductions. According to Maier, spatial intelligence is the ability to move in space, to orientate oneself, and to be able to think, plan and represent it. Other authors emphasize the cognitive value of spatial intelligence and give less importance to the skills useful in spatial movements. Eliot is convinced that the spatial intelligence “refers to a very broad range of capacities”. Diezmann and Watters claim: “Spatial intelligence may manifest as a particular aptitude for thinking and communicating spatially” [2].

Other research considers spatial intelligence as a transversal capacity which is useful for everyday life but which cannot be characterized in any specific and distinctive way, as are, for example, linguistic or mathematical ability, or as something rather useful for learning the natural sciences [3].

Geographic literacy could be defined as the competence of turning understanding and comprehension of geographical knowledge into a skill because literacy consists of solving problems, reasoning, critical and creative thinking processes. Geographic literacy skills, bring these competences to a conscious level and contribute to students’ geographic literacy skills and processes in their professional lives [4]. In this context, geographic literacy does not only mean geographical knowledge. Literacy is a systematic approach towards events, founding, situations and places which requires...
understanding, comprehension, analytical and synthesis skills. On Earth where we live as a part of the geographical environment, human beings and nature are affected by each other directly or indirectly.[5]

A geographically literate person has the skill to look for solutions which cause the least damage to nature and reduce negative side effects. Additionally, he/she has the skill to understand relationships between different cultures and people. To achieve this, a person should first learn the features of where he/she lives, why he/she lives there, what the surrounding events and discoveries are, and how and when the relationships between these could affect him/her. In order to do this, one should have a good geographical vantage point.[6]

The purpose of this study to analyze the literacy skills of geography to improve Spatial Intelligence of high student school.

2. Methods
This research was conducted with experimental research. This research was conducted on a class XI student of social sciences program at SMAN 18 Surabaya. Students totaling 28 people, 11 women and 17 men. Focus of research is spatial intelligence that is viewed based on the ability to read maps, using media and analytical skills. Instruments used to measure spatial intelligence include tests and observation sheets. Data were analyzed descriptively

3. Results and Discussion
Many people identify thinking and intelligence, even though the relationship between intelligence and thinking is like relationship between car and the driver. Intelligence is the car, and car’s driver will, via thinking, decide which route he will take. Therefore, intelligence is ability that we can use via experiential thinking, or on contrary, it will stay uncultivated. Intelligence, as a badly used tool, can be a barrier for thinking.[2]

Spatial ability is the capacity to understand and remember the spatial relations among objects. This ability can be viewed as a unique type of intelligence distinguishable from other forms of intelligence, such as verbal ability, reasoning ability, and memory skills. Spatial ability is not a monolithic and static trait, but made up of numerous subskills, which are interrelated among each other and develop throughout your life. Spatial skills are of great importance for success in solving many tasks in everyday life. For instance, using a map to guide you through an unfamiliar city, merging into high-speed traffic, and orienting yourself in your environment (as when you are learning your way around a new school building) are all activities that involve spatial ability.[7]

Brown (2015) explain much like any social or physical scientist, the geographer’s goal is to ask and answer questions in order to gain knowledge. Upon asking a question, the geographer will develop a hypothesis and measure variables in order to confirm or deny the hypothesis, just as any scientist would. The geographer is not limited, however, to any one discipline, type of data, or set of tools. He or she is free to use any available information or tools in order to understand how and why things appear as they do in Earth space. That being said, geographers do use a method that requires they have certain skills. These are the skills your students must learn in order to “do geography.”[8]

Geography is an academic discipline which emphasizes the relationship between human space and exploits it with better representations such as graphics and maps, photos, etc. Geographers constantly exploit and highlight the relationship between man and space from different points of view. Literacy ability geography in the study include media literacy, literacy maps, knowledge of geography related to world issues and current events (population, natural resources and weather, health, urbanization, deforestacy, climate change).

Based on the test data is written and performance tests conducted by 28 students at SMAN 18 Surabaya low average. This is evident in the average literacy 64.11 geography. Low literacy skills, especially in the ability to use a map to show the location, describe the characteristics of an existing location in the map that the average 36.35. Students' ability to use the media to explain the phenomena, the symptoms and the process is already well geography (79.18)
Table 1. Literacy ability Geography student of SMAN 18 Surabaya

| Geography Literacy Component | Average Value | Score Spatial intelligence |
|------------------------------|---------------|----------------------------|
| Media Literacy              | 79.18         | High                       |
| Literacy map                | 36.35         | Low                        |
| Knowledge of geography      | 76.79         | High                       |
|------------------------------|---------------|----------------------------|
| Average Literacy geography  | 64.11         | Medium                     |

Students' skills in analyzing and studying the phenomena of the geosphere are also good (76.79). Students with literacy skills in analyzing the phenomena of good geosphere turned out to have the literacy skills and media literacy skills using a good map.

Score average of Geography skill are 70.39. When linked between geography and literacy skills to read a map, showing the location and assess the characteristics of the region on the map, the geography of low skills due to low literacy skills to read a map. Geography skills students grades on average 70.39. Geography skills are not supported by the literacy skills using a map as a tool for navigation skills and the identification of the place. Score of map literacy students are 36.35. Geography skills are well supported by media literacy skills and knowledge of geography. And location is the first of four concepts which Gershmel identifies as the core constituents of geography: 1) location, i.e. knowing where things are; 2) place, i.e., understanding the unique character and differences of places; 3) links, i.e., knowing connections between different locations; 4) regions, i.e., comprehending spatial patterns, both formal and functional, at a larger scale.[9]

Geographic literacy could be defined as the competence of turning understanding and comprehension of geographical knowledge into a skill because literacy consists of solving problems, reasoning, critical and creative thinking processes. Today, in order to impart literacy skills to individuals, teachers should first have these skills. It is important that teacher candidates should attain these skills before graduation. When these conditions are established, it will be easier for teacher candidates to be aware of their geographic literacy skills, bring these competences to a conscious level and contribute to students' geographic literacy skills and processes in their professional lives.[5]

Pellegrino describe the specific skills deemed to be “21st century skills” may be defined, categorized, and determined differently from person to person, place to place, or school to school, the term does reflect a general-if somewhat loose and shifting-consensus. An illustrative overview of the knowledge, skills, work habits, and character traits commonly associated with 21st century skills. One of them is Information and communication technology (ICT) literacy, media and internet literacy, data interpretation and analysis, computer programming.[10]

The convergence of media and technology in a global culture is changing the way we learn about the world and challenging the very foundations of education. No longer is it enough to be able to read the printed word; children, youth, and adults, too, need the ability to both critically interpret the powerful images of a multimedia culture and express themselves in multiple media forms. Media literacy education provides a framework and pedagogy for the new literacy needed for living, working and citizenship in the 21st century. Moreover it paves the way to mastering the skills required for lifelong learning in a constantly changing world

4. Conclusion
21st century skills require that students have the literacy skills of science is no exception geography literacy. In general science literacy of students is still low. Low literacy is still low competence related science student learning. Geography literacy knowledge and skills related to geography. Literacy geography visits of media literacy, literacy maps and geographic knowledge. The results showed geography literacy skills supported by good knowledge of geography. It is important to note that the
skills that make up spatial ability are the results of long learning and training processes (beyond developmental gains and other factors). The level of spatial performance someone is capable of may change over time. You are likely to gain in performance through practice, training, and learning, but you may also lose in standing relative to others if they acquire more experience that supports their performance or make more progress in their intellectual development. So, if you are interested in getting a long-time perspective on your spatial skills, it is advisable to have the testing repeated from time to time. This, of course, applies the more the younger you are when you take a spatial test. What needs to be studied further is the low literacy map high school students. This affects the low literacy geography

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