

# Location tracking activity to develop spatial concept understanding: case study of grade 9 students in SMPN 1 Lembang

Totok Doyo Pamungkas<sup>1,\*</sup>, Jalu Rafli Ismail<sup>1</sup>, Stefan Primananda<sup>1</sup>, Viola Gustia Fadillah<sup>1</sup>

<sup>1</sup>Geography Education Study Program, Universitas Pendidikan Indonesia, Bandung, Indonesia

**Abstract.** In social science subjects for junior high school students, spatial themes cover a variety of topics, namely spatial interrelation and interdependence, spatial interaction, as well as interspace excellence and limitations. Spatial concept understanding will help students to attain Basic Competences (Kompetensi Dasar/KD), which in general is to understand, analyze, and explain how location and places affect patterns of human activities. The limitation of the lecture method on delivering spatial concepts became the background of this research. In order to improve student activities through scaffolded teaching, the activity of finding information through location tracking is implemented. To analyze the whole process, this research uses a qualitative experimental method. The study shows the increases in student participation during class session, formative test scores, and amount of time reduced in finding answers. The result of this research shows that Location Tracking Activity has increased students' activity during the learning process, as well as motivation of learning. The experiment process resulted in the attainment of basic competencies in students' learning process, as well as 40% increase in students participation during the class; 35% increase in cooperating with their classmates during discussion; and 40% increase in interacting with the teacher.

## 1 Introduction

An effective and meaningful learning process is indicated by the attainment of learning objectives. Under the National Curriculum of The Republic of Indonesia, learning objectives lie in the Basic Competences or *Kompetensi Dasar*, which are generally understood to be in two aspects: knowledge and skill [1]. Each subject has their own unique basic competencies that need to be attained by students through a learning process. Teachers have an important role in ensuring the attainment of learning objectives, which is designing a proper learning strategy. In regards to that, teachers have to select which learning model suits the material, which method needs to be implemented, what technique has to be carried out, what kind of

---

\* Corresponding Author: [totokdp@upi.edu](mailto:totokdp@upi.edu)

Teaching and Learning Material (TLM) have to be produced, as well as preparing media to deliver the material [2]. Designing learning strategies have to consider a wide variety of issues. Successful learning, however, will be successful when students are able to grasp the material delivered proved by assessment results [3]. The assessment is not restricted solely to tests, which refers only to cognitive view [4]. Moreover, it can be the assessment of the learning process in which students seem to be comfortable with, which is a humanistic view; or the changes in behavior through reinforcement given by the teacher [5].

Based on the structure of curriculum in Indonesian schools, subjects of different specific disciplines are not always delivered separately. In the level of primary school, different subjects are learned in a theme-based design, which means that various disciplines are delivered in a single theme [6]. For example, The Theme 1 of Grade 1 in primary school is titled “Myself”, through this theme, students can learn social aspects of their life, biological aspects of human beings, or basic mathematics. In the primary level [7], the aim of learning is still on enhancing basic literacies of reading, counting or numeracy, and science. This aim is upgraded in the secondary level, both lower secondary and upper secondary school. The main difference between the two is in the presentation of knowledge disciplines, which is still confederated or integrated in lower secondary and already separated in upper secondary [8, 13]. Students already know the interdisciplinary basis of knowledge disciplines, such as social science that consist of geography, history, economy, and sociology or natural science that consist of physics, chemistry, and biology. A remarkable distinction lies on time allocation of subject learning, however the learning objectives are already started to be specified with each characteristic of academic disciplines. In geography learning of lower secondary level, which is known as part of single social science taught in school, learning is oriented towards the ability to analyze basic concepts and principles of geography. In the upper secondary level, students were then expected to be able to create products and higher level analysis of geography [9]. Therefore, the readiness of students in learning geography for upper secondary level is determined by the learning process carried in the secondary level. Thus, teachers have to carefully determine what kind of learning strategy supports the attainment of learning outcomes.

This research studies the learning process in the subject of social science for the 9th grade, focusing on its geography materials. The selected material to be studied is “Spatial Interdependence and its Influence on Social Welfare”, basic competence needs to be attained is presenting analysis of spatial interdependence viewed from economic concepts of production, distribution, consumption, price, and market, then how it affects migration, transportation, social institutions, as well as economy, livelihood, education, and social welfare. Current common practices on teaching such material is self-literacy, where students are instructed to utilize internet sources in order to gain information on the topic [10]. Teacher will create a worksheet that contains questions, incomplete tables of facts or definitive statements, analyzing graphs and diagrams, or asking opinions. The model of worksheet mentioned above is however ideal in terms of attaining this level of literacy skill. However, this will have to deal with students' motivation and learning activity. In conducting this learning process, teachers will likely instruct students to group themselves. Consequently, this raises questions whether basic competencies attained by each individual or a small portion of students; does a filled worksheet indicate student comprehension of concepts and ability to analyze?, considering the practice of plagiarism that most likely occurred.

Developing reading literacy skills for students deals with students' motivation of learning. There are various learning models introduced by numerous scholars on how this skill can be developed in a more fun, student-centered, and scaffolded way. [11] formulated a problem based learning specified in character-based literacy learning and life career skills; [12] proposes a literacy based on MID (Multi-literacy, Integrated, and Differentiated) concept in order to develop a literacy learning; [14] designed an intersession model for year-round

schools that produced impressive gain in reading achievement. The collaboration of various models in developing literacy skill is found in the works of Suherdi (2019) that proposes a Synergetic Multilayered English Language Teaching in the Industry 4.0 and Disruption Era or SMELT I 4.0 DE. The study itself is based on english teaching and learning, yet it brought interesting models to nurture reading skills that includes ICTC (Information, Communication, and Technology Cultivation); SRLI (Self Regulated Learning Inculcation; TVCD (Transversal Competence Development), and CSM (Curriculum Subject Matter). All four SMELT I 4.0 DE layers involve the use of IT platforms, enhance thinking skills, ability to analyze, and collaborative learning.

The implementation of the selected model is later mixed with spatial concepts and spatial skills learning. Spatial thinking is a process that integrates knowledge, skill, and habit of thinking that use spatial concepts, devices that display spatial information, and spatial reasoning. Therefore, being able to think spatially means being able to utilize spatial information through the use of spatial devices, such as *Global Positioning System* or GPS, map, or Geographic Information System (GIS). This research proposes a method called *Location Tracking Activity*, that asks students to search information through reading literacy, analytical thinking, and collaborating with other sources. The searched information is tagged on the selected location shown on the map. Through this process, each student is expected to be able to have an individual participation that will determine the success of their group and present the analysis result through presentation mode.

## 2 Methods

This research studies spatial concept understanding of junior high school students. This research is approached in qualitative methodology and qualitative experimental method. Variables of research consist of spatial concept understanding and location tracking activity. The Subjects of research are 20 students of State Junior High School 1 of Lembang. Data collection process was carried through non-participant observation and interviews and analyzed through qualitative descriptive techniques to explain and interpret each aspect of study. Location Tracking Activity is a predictor to spatial concept understanding. Assessment of the process was done through an observation of this following criterias:

**Table 1.** Criteria of Location Tracking Activity Process

Criteria	Students Group Number				
	1	2	3	4	5
Able to determine plot location					
Able to write coordinate position properly					
Able to determine distance of plots					
Able to use <i>apps</i> like <i>Google Maps</i> to determine position and distance					
Able to explain the content of texts					
Able to express opinion					
Able to give recommendation to fellow friends					

Able to fill the question in the worksheet					
Able to present their work result					

### 3 Results and discussions

Developing reading literacy skills and using maps as the medium for spatial thinking is carried through Location Tracking Activity. This activity is done in an outdoor setting and aimed to enhance spatial literacy and map interpretation for junior high school students. Students are asked to find the QR Code that has been distributed in the school area, by looking for the area on the map that has been marked. Then students are asked to calculate the distance from QR Code 1 to QR Code 2, and look for the coordinates of the QR Code using the map application. Activities that aim to improve geospatial capabilities require a *google maps* or *google earth* application, relevant articles and question sheets.

The experiment activity consists of the preparation stage, the implementation of learning strategy, and result analysis. In the preparation stage, the tools and materials are prepared for location tracking activity. The needed tools are QR-Codes, articles and question sheets which are then distributed according to a predetermined plot in the school area. Students have to obey the rules set by the teacher and agreed before the process starts. In the implementation stage, learning activities started with orientation, apperception, and motivation. Then the teacher explained the material about mapping and the explanation of rules for implementing location tracking activity. Students are divided into five groups of four each. After students are conditioned according to their groups, a school map is provided as a reference for determining the plot that students will go through. Each group went to three predetermined plots, which differed from one group to another. Arriving at the plot, students must scan the QR-Code found. The QR-Code contains articles that are used as references in filling out questions. Questions are distributed through the WhatsApp group. Students must also determine the coordinates and distances between plots by using *gmaps/google earth*. After completing the geotrack, students discuss with their groups to solve problems and then prepare for presentations. The items presented were an explanation of the answers from the question sheet and an explanation of the location of the coordinates and the distance between plots. Students give each other rebuttal and input and express their thoughts. The activity was closed by reflecting and concluding the results of the activity and ended with a prayer.

**Table 2.** Performance of Students Based on Experiment Criterias

Criteria	Students Group Number				
	1	2	3	4	5
Able to determine plot location	-	-	v	v	-
Able to write coordinate position properly	-	-	-	-	-
Able to determine distance of plots	v	v	v	v	v
Able to use <i>apps</i> like <i>Google Maps</i> to determine position and distance	-	v	v	-	-

Able to explain the content of texts	v	v	v	v	v
Able to express opinion	v	v	-	-	-
Able to give recommendation to fellow friends	-	-	v	v	v
Able to fill the question in the worksheet	v	v	-	v	v
Able to present their work result	v	-	v	v	v

(Data Analysis, 2021)

Location Tracking Activity is a learning activity about spatial dependence. Learning outcomes after doing this learning activity are students are able to analyze through text literacy, students are able to interpret the contents of a discourse and express their opinions. Students are also able to criticize the content of the discourse with the current reality. Then students are able to use digital sources such as using a QR-Code to scan articles and through these articles, students can complete the worksheets that have been presented. In addition and most importantly, students are also able to use geographic information that was previously rarely used by students. Through this geotracking activity, students are able to use google earth and GPS applications as digital media to determine coordinates and distances between locations, then students are also able to use the map as a reference for the plot. The following figures are the documentation of the learning activity process.



**Figure 1.** Process of of Location Tracking and Discussion among Students



**Figure 2.** Presentation of Students Group and Reinforcement through Rewards

The whole learning process carried through location tracking is proven to be more effective in terms of achieving learning outcomes and efficient in terms of time spent. This

is indicated by aspects, such as: students participating in the whole process, students' courage to express their views, and ability to respond to teacher questions and instructions. The information regarding these statements is found through an interview process taken both from students and teachers. From students' perspective, learning with this method is considered to be more fun and enjoyable. Numbers of students stated that they have less pressure while carrying tasks in the worksheet, pointing to the previous activities of searching and reading information in the classroom with small amounts of activities, which they thought to be less interesting and they choose to either copy the works of their classmates or from internet sources. While participating in this location tracking activity, they engage in the physical activity that reduces their pressure and boredom. From teachers' perspective, participation of students on working with their classmates and responding to the questions is increased throughout the experiment process. This process is summarized in the table below.

Table 3. Effectiveness of the Learning Process for Students

Comparison Aspects	Percentage Students Activity (n=20 students)	
	Prior to Experiment	After the Experiment
Participation in class (giving opinions, and asking questions)	30%	70%
Willingness to work with classmates	45%	80%
Interaction with teachers (answering to randomly asked questions)	20%	60%

(Data Analysis, 2021)

Spatial concept understanding is measured through the ability to analyze implied information from the texts. This was done through answering questions in the worksheets in which students need to read ten texts about different locations surrounding their school, the locations are those that have tourism potential. Based on the information presented in the text, students should be able to analyze what kind of tourism activities that can be developed from each location as well as analyzing how it would affect economic activities and social welfare of the region. The study shows that from all ten questions answered by students, there are different ideas presented in the filled worksheet. Compared to previous filled worksheets, the answers tend to be similar between students denoting they merely copy what they found on the text. But through the experiment process, students are able to formulate their own opinion and analysis as well as having the courage and confidence to present before the class.

## 4 Conclusion

Location Tracking Activity is a formulated learning method in which students search the location of information through the use of maps and other geospatial devices. The use of this method is aimed to develop students' spatial concept understanding, especially for geography topics in social science subjects for junior high school. The experiment of this method was carried out in State Junior High School 1 of Lembang, Indonesia. From all 20 students observed, the experiment saw significant increases in terms of students activity and motivation of learning, this was showed through a comparison prior to experiment and after the experiment was conducted, which is 40% increase in students participation during the

class; 35% increase in cooperating with their classmates during discussion; and 40% increase in interacting with the teacher. Location Tracking Activity method can be applied in topics that require students to attain reading literacy skills. Pressure and boredom of students can be managed through a learning process that enhances students' activity, which also increases students' learning motivation.

## References

1. J.W. Leksono, Pendekatan Saintifik pada Kurikulum 2013 untuk Meningkatkan Keterampilan Berpikir Kritis Siswa, *Proceedingfptk*, **437** (2015)
2. P. Watson, The role and integration of learning outcomes into the educational process. *Active learning in higher education*, **3**(3), 205-219 (2002)
3. H.L. Friedman and D.A. MacDonald, Humanistic testing and assessment. *Journal of Humanistic Psychology*, **46**(4), 510-529 (2006)
4. P. King and P. Witt, Teacher immediacy, confidence testing, and the measurement of cognitive learning. *Communication Education*, **58**(1), 110-123 (2009)
5. L. Fernsten and J. Fernsten, Portfolio assessment and reflection: Enhancing learning through effective practice. *Reflective Practice*, **6**(2), 303-309 (2005)
6. N. Hidayah, Pembelajaran tematik integratif di Sekolah Dasar. *Terampil: Jurnal Pendidikan dan Pembelajaran Dasar*, **2**(1), 34-49 (2015)
7. N.K.E. Muliastri, New Literacy Sebagai Upaya Peningkatan Mutu Pendidikan Sekolah Dasar di Abad 21. *PENDASI: Jurnal Pendidikan Dasar Indonesia*, **4**(1) (2020)
8. B. Hidayat, Tinjauan Historis Pendidikan IPS di Indonesia. *Jurnal Pendidikan IPS Indonesia*, **4**(2), 147-154 (2020)
9. D. Sugandi, Pembelajaran Geografi sebagai Salah Satu Dasar Pembentukan Karakter Bangsa. *SOSIOHUMANIKA*, **8**(2) (2015)
10. M. Csikszentmihalyi, Literacy and intrinsic motivation. *Daedalus*, 115-140 (1990)
11. M. Nurtanto, M. Fawaid, H. Sofyan, Problem Based Learning (PBL) in Industry 4.0: Improving Learning Quality through Character-Based Literacy Learning and Life Career Skill (LL-LCS). In *Journal of Physics: Conference Series* (**Vol. 1573**, No. 1, p. 012006) (2020)
12. Y. Abidin, Developing literacy learning model based on multi literacy, integrated, and differentiated concept at primary school. *Jurnal Cakrawala Pendidikan*, **36**(2), 156-166 (2017)
13. C. Jacobsen, M. Bonds, K. Medders, C. Saenz, K. Stasch, J. Sullivan, An intersession model for accelerated literacy learning. *Reading & Writing Quarterly*, **18**(2), 151-173 (2002)
14. Departemen Pendidikan Nasional. *Naskah Akademik Kajian Kebijakan Kurikulum Mata Pelajaran Ilmu Pengetahuan Sosial (IPS)*. Jakarta: Badan Penelitian Dan Pengembangan Pusat Kurikulum (2007)