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The Effect of Practicum Methods on Geographic Information System Learning Outcomes and Students' Activeness in Senior High School

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Abstract. This research aimed to determine the effect of practicum learning methods on Geographic Information System (GIS) learning outcomes and high school students activities. The subjects of this research were students of class X Senior High School 1 Pare, Kediri Regency, even in the semester 2018/2019 before the Covid-19 pandemic outbreak. The research instrument used essay questions and student activity rubrics. The data are in the form of learning outcomes and student activities. Data collection techniques include a pretest, posttest, and student activity observation. The gain score data were analyzed using parametric inferential statistics with MANOVA. The hypothesis test results showed that the significance value of the practical method on learning outcomes was 0.000, and the practice method to activity was 0.000. The significance value of the two variables is below 0.05. This test shows that the practicum method affects the learning outcomes of GIS and the activity of high school students. Improved learning outcomes from a score of 55.4 to 82.7. Increased activity from 30 inactive categories to 75.8 active categories. This influence is reflected during learning, where practicum provides a deepening that involves many senses, making learning meaningful, collaborative, and student-centered.

1 Introduction

Education is an effort to improve students' abilities in education, attitudes, and skills. Learning outcomes are changes in student behavior after the teaching and learning process in the form of changes in cognitive, affective, and psychomotor aspects. Classification of learning outcomes in Indonesia uses Bloom's theory which divides it into three domains, namely: cognitive, affective, and psychomotor domains [1].

Regulation of the Minister of National Education of the Republic of Indonesia, number 22 of 2006 concerning content standards, explains the objectives of learning geography in schools. The learning objectives based on these regulations, geography learning aims to equip students to understand spatial, environmental, and regional patterns and master essential skills in obtaining data and information so that they can foster caring behavior towards the surrounding environment. Geographical data and information developed with GIS [2]

The domain that is always presented in the learning report by the teacher is knowledge. Learning reports in learning outcomes are abilities obtained by students after the learning process. Proficiency in learning reports shows student success in achieving learning indicators and objectives [3]–[5]. Learning outcomes in Indonesia's realm of knowledge at the high school level are assessed according to teacher assessment standards in the score range of 1-100 [6], [7].

Education and teaching are said to be successful if there is a change in behavior, especially in the realm of knowledge. Learning outcomes must show a change in circumstances for the better, such as increasing knowledge, understanding something that has not been understood before, having a new view of something, and appreciating something more than before. Learning is a process by which behavior is generated or changed through practice or training [8], [9].

The learning outcomes in this paper focus on Geographic Information System (GIS) material. GIS learning outcomes need to be studied because many high school geography teachers cannot operate GIS-based programs and are essential applicable materials [10]–[14]. GIS material for Senior High School 1 Pare teachers also needs to be sharpened. This condition can be seen from the daily test score with an average of 77, the lowest among other materials.

In this study, the ArcGIS 10.4 application practicum was carried out so that students experienced GIS material firsthand. ArcGIS practicum can improve mastery of mapping and GIS materials [15]–[17]. Practicum accelerates students' understanding of the material from a combination of practice and teacher explanations of the material [18], [19].

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GIS learning outcomes can run better if many senses are involved in learning. One of the efforts to improve GIS learning outcomes is using methods involving multiple senses [20], [21]. Dale's cone explains that direct experience is concrete and occupies the highest position in students' memories regarding understanding the material [22], [23].

Practicum has the same meaning as exercise or staying active or busy, which means the same as a response. One of the learning methods that can lead to memorable learning experiences for students is the practicum method [24]. The practicum method aims for students to find various answers or problems they face by conducting their experiments [25].

The practicum method is one method that provides an experience that involves many senses. The practicum method can improve student learning outcomes because they understand more about the material that is practiced directly by students, including GIS [10]. Dale's cone formulates the absorption of direct experience material at 90% and above [26], [27].

The practicum method in this research is a method that puts the material into practice to strengthen it. The efforts to allow students to test or apply the material that has been obtained. At the university level, a practicum in geography is a must [18], [28]. At the high school level, geography subject practicum is rarely held. Understanding landscape in geography requires practice [29].

The practicum method has advantages in improving learning outcomes. First, it makes students understand the details of the material more directly. Direct practical learning makes learning more meaningful for students [11], [21]. Students can understand the immediate benefits of the teaching they receive [24].

Second, increasing cooperation, honesty, openness, criticalness, and tolerance. The attitude domain can improve students' enthusiasm for achieving maximum learning outcomes [30]. Practices in education give teachers the spirit to innovate and succeed with students [31].

Third, improve objective, realistic, and scientific thinking abilities. This ability is in line with learning outcomes. Practicum enriches students' experience with objective and realistic things and develops scientific thinking attitudes [32], [33]. Quality in creativity, independence, cooperation, solidarity, leadership, empathy, tolerance, and life skills can be achieved through a practicum in the laboratory [34], [35].

In applying the practicum method, students can be trained in scientific thinking. With experiments or practicum, students can find evidence of the truth of a theory being studied related to GIS [21]. Practical activities will familiarize students with learning about objects or materials or a series of activities and problems [11]. They must try to answer questions and solve problems raised by teachers or other students by the increasing knowledge and skills possessed by students. Answers and problem-solving are sought from practical implementation planning and practicum assessments concerned [28].

Fourth, learning outcomes will last a long time because of an internalization process. Students better understand the material because they understand the details through practice. In the practicum, students experience episode knowledge that has high retention so that it can be remembered for a long time and is easier to reuse [36].

The advantages of the practicum method are student-centered. Students become active in explaining the material because they have an understanding. Students are engaged in activities because they are directly involved in practice [27]. Student activity is seen in the intensity of asking, answering, and responding and the quality of the presentation [37].

The activity becomes one of the problems in the classroom because of the teacher-centered approach. Student opportunities are not channeled in the allocation of learning time [38], [39]. Data in the Geography subject of Senior High School 1 Pare Kediri showed an initial activity value of 31.36 or was included in the less active category.

The practical method also has weaknesses. First, it requires facilities in the form of tools or materials or facilities that are not always available in schools. Second, the practicum has the potential to have unexpected technical obstacles that can hinder the practicum. Facing the first weakness in GIS material, schools already have practical facilities in the form of a computer laboratory [27]. Students also have personal laptops to support the number of computers in the school practicum facilities. The second weakness can be overcome by equipping instructors, assistant instructors, and practicum materials [40].

Previous research related to practicum methods in learning, first by [25] about practicum in biology learning at Universities in Jember and Malang Regions, Indonesia. Research with qualitative methods with respondents who received biology lectures with practicum. The data was collected using interviews and analysis of documents. The study's results found that the practical method with cooking recipe-based practice resulted in relatively good achievement of Biology learning outcomes. The practicum is related to the way previous studies and it has several disadvantages.

Second, research [41] investigates the effect of the green chemistry practicum method on the topic of reaction rates on student learning outcomes. Research with a quasi-experimental model of non-equivalent pre-test post-test control group design on senior high school students in the Bali Province, Indonesia. The experiment class was taught by the green chemistry practicum method, while the control class was taught by the conventional method. The results showed that the green chemistry practicum with the practical method was better than conventional methods in improving learning outcomes. The green chemistry practicum is safer for students because not produce chemical waste that is harmful to the environment and cheaper than conventional practicum material.

Third, research [42] on the validation of learning with physical chemistry practicum procedures. The research focuses on practical steps in university learning. The data collecting focuses on the step of practicum in the laboratory while practicum is held. The results showed that the metal model of the n-hexane-methanol binary system could be developed into a learning model and improve students' mental models and understanding.

Fourth, research [8] on platforms that support practicum methods in learning, namely the International Teaching Practicum (ITP). Research with qualitative methods in secondary schools in Indonesia and Brunei Darussalam for Malaysian undergraduate secondary. Data collecting in form of words, images, observations, and documentation. The Data was carried out in eight weeks. The results showed that learning with ITP practicum made it easier for students to understand the context of the material, communication, and science culture.

Fifth, research [43] integrates green chemistry principles with small-scale chemistry practicum for high school student's curriculum. This type of research is developed with a 4D model (Define, Design, Develop, and, Disseminate), which is then practiced in the senior high school curriculum. Data were collected from 34 students of Sanata Dharma University in July 2018 and January 2019 with observation and questionnaire kits. The results showed that integrating green chemistry principles with a small-scale chemistry practicum succeeded in increasing the sustainability goals in chemistry learning by reducing waste, reducing the use of hazardous chemicals, and conducting safe experiments.

Sixth, research [28] applies GIS in learning in Old Tbilisi District, Tbilisi, and Georgina. Research using GIS equipment in learning. The research results on the application of GIS in learning provide an advantage in visualizing data, a clear picture of the educational situations overview, and easy comparison of data with others. The recommended material to be applied throughout education in Georgina, the databases can be combined with query. The GIS Practicum also can solve geographical problems fast, effectively, and correctly. Practicum facilities and implementation policies from the government need to be improved.

Seventh, research [21] using GIS in science class. This qualitative research was conducted in North Carolina, United States of America. Data were collected through an interview that was transcribed and coded. The study results a show that GIS facilitates communication in discovery-based knowledge transfer, increasing problem-solving abilities. Students enjoy using GIS technology in learning and the visualization is real and the concept more simply. Research recommends that GIS is a technology ready to be implemented in the Education curriculum.

This research is different from the seven previous studies. Previous research has not yet conducted a quasi-experimental practicum method with student learning outcomes and activities together. The closest research is quasi-experimental research on practicum methods with learning outcomes only. Other research focuses on the advantages of the practicum method, which is studied qualitatively. This difference shows the research novelty. This research aimed to determine the effect of practicum learning methods on learning outcomes of geographic information systems and students' activities in senior high school.

2 Methodology

This research is a quasi-experimental type. The quasi-experimental research design is a nonequivalent control group design. In the research design, there is an experiment class and a control class that tests the GIS practicum method to the learning outcome and students' activeness. Table 1 shows the quasi-experiment design according to [44].

Table 1. Quasi-experiment Design

Class	Pre-test	Treatment	Post-test
Experiment	O1	X	O2
Control	O1	-	O2

Description:
O1: GIS learning outcome and student activeness before treatment
O2: GIS learning outcome and student activeness after treatment
X: Treatment using the GIS practicum method
-: Treatment using the conventional method (lecture, discussion, question and answer, figure media, and map)

The practicum theme in this research is the basic mapping technique or based map. The base learns how to make maps with basic mapping techniques based on base maps from government agencies such as BAPEDA, and the Geospatial Information Agency, as well as from remote sensing applications such as SAS Planet [2], [45].

The processes practiced are based on georeferencing, digitizing, editing, and labeling [46], [47]. Georeferencing is the process of assigning coordinates in the World Geodetic System to a map. Digitization and editing are the processes of creating and manipulating data in form of vectors in point, polyline, and polygon. Labeling is included in the attribute data from the vector in the shapefile.

The subjects in this research were students of Social Science class X Senior High School 1 Pare, Kediri District, East Java Province, Indonesia. The school was a state under the Education and Culture Department East Java Province, Ministry of Education and Culture of Indonesia. The X class is divided into four classes, from X Social Science 1 to X Social Science 4. The research was conducted in the even semester of the 2018/2019 academic year before the Covid-19 Pandemic outbreaks.

The researcher purposively determined X Social Science 3 as the experimental class and X Social Science 1 as the control class based on equal ability, seen from the average scores of the previous semester's reports on learning outcomes for geography subjects. The average score sequentially from X Social Science 1 to X Social Science 4 are 80.63, 79.94, 80.47, and 81.31. The experimental class received treatment using the GIS practicum method. The control class received treatment using lecture, discussion, question and answer methods, and media images and maps. Quasi-experimental research selects subjects purposively and gives treatment to the experimental and control classes according to design [48].

The research instrument in this study was on learning outcomes using essay questions. Instrument testing was conducted in class XI Social Science 1. The instrument of essay questions was tested for validity with correlated bivariate SPSS 21.0 for Windows [49]. The test results showed that five essay questions had a significance of 0.000 on the total score. These conditions indicate that all questions are valid to be used as research instruments.

The student activity instrument uses a rubric with four aspects of assessment, namely asking, answering, responding, and presenting. Each aspect is given a score between 1 to 4. The activity score is seen from the average aspect score multiplied by 100 divided by 4. The rubric instrument was developed by the researcher and geography teacher in Senior High School 1 Pare based on the Indonesian Curriculum.

In the aspect of asking, answering, and responding based on the quantity of activity. Score 1 if never active, score two if active once, score three if active two times, and score four if active more than two times. Aspects of presentation on the mastery of the material and media use. A score of one if they do not master the material and do not use the media, and a score of two if they do not master the material but use the media. Score three if master but do not use the media, and score four if master the material and use the media.

The sources of data used in this study are primary and secondary data. Primary data were obtained directly by respondents from research subjects, namely the learning outcomes and activity of the experimental and control class geography students. Secondary data in this study is a list of student grades and information about schools.

The data collection technique used in this research was to give a pretest and posttest to the experimental and control classes by the geography teacher of class X Senior High School 1 Pare. The implementation of data collection on learning outcomes for five weeks, from January 15 to February 15, 2019. The activity data collection is carried out by checking the rubric for the active aspect of learning. The initial collection of activities is in five weeks December 14, 2018, to January 14, 2019, and the final collection follows the time for collecting learning outcomes.

The data in the research is a gain score or difference between the final and initial data. Gain score learning outcomes are obtained from the difference between the posttest and the pretest [50]. Student activity gain score is obtained from the difference between the final and initial activity [7].

Data analysis used parametric inferential statistics. The measurement consists of prerequisite analysis and hypothesis testing. The analysis prerequisite test consisted of a normality and homogeneity test.

The normality test using one-sample Kolmogorov Smirnov through the help of SPSS 21.0 for Windows with a significance level of 0.05. The hypothesis for the normality test is H0: the data is normally distributed, and H1: the data is not normally distributed. Decision-making through significance value. If the significance value > 0.05, then H0 is accepted, or the data is normally distributed. If the significance value < 0.05, then H0 is rejected, or the data is not normally distributed.

The homogeneity using Levene's test with the help of SPSS 21.0 for Windows with a significance level of 0.05. The hypothesis for the homogeneity test is H0: homogeneous data/variance and H1: inhomogeneous data. Decision-making through significance value. The significance level > 0.05 means that H0 is accepted or the data is homogeneous, but if the significance level is <0.05, it means that H0 is rejected or the data is not homogeneous.

Test the hypothesis with MANOVA through the help of SPSS 21.0 for Windows. The multivariate from the X variable (practicum method) to the Y1 variable (geographic information system learning outcome) and Y2 variable (student activeness). Hypothesis test decision-making is based on the significant value of each variable, namely X against Y1 and X against Y2. sig value. (2-tailed) > (0.05), then H0 is accepted, meaning that practical learning methods do not affect GIS learning outcomes and student activity. sig value. (2-tailed) < (0.05), then H0 is rejected, meaning that there is an effect of practical learning methods on GIS learning outcomes and student activity.

Presentation of data other than hypothesis testing with descriptive statistics where data trends can be analyzed, such as totals, averages, and percentages. For student activeness, the criteria Aqib (2011) shown in Table 2 below are used.

Table 2. Student's Activeness Criteria

Activeness Average Score	Criteria
80-100	Very Active
60-79	Active
40-59	Average
20-39	Less Active
0-20	Passive

3 Result and Discussions

The pretest and posttest data on students' geography learning outcomes in the material of geographic information systems obtained a difference or gain score. Gain score analysis prerequisite tests, including normality and homogeneity tests [12]. The normality test results with the Kolmogorov Smirnov test through the help of SPSS 21.0 for Windows showed a significance value of 0.234, a significance value above 0.05, which indicates a normal gain score.

The gain score tested the second analysis prerequisite, in this case, is the homogeneity test. The results of the homogeneity test with Levene's test through the help of SPSS 21.0 for Windows showed a significance value of 0.974. The significance value is above 0.05, and this indicates homogeneous gain score data. Gain score learning outcomes meet the requirements of parametric statistical tests because they are normal and homogeneous.

Data on students' geography's initial and final activeness in the material of geographic information systems obtained a difference or gain score. Gain score analysis prerequisite tests, including normality and homogeneity tests. The normality test results with the

Kolmogorov Smirnov test through the help of SPSS 21.0 for Windows showed a significance value of 0.260, a significance value above 0.05, which indicates a normal gain score data.

The gain score tested the second analysis prerequisite, which is the homogeneity test. The results of the homogeneity test with Levene's test through the help of SPSS 21.0 for Windows showed a significance value of 0.681. The significance value is above 0.05, indicating homogeneous gain score data. The student's activity gain score fulfills the requirements of the parametric statistical test because it is a normal and homogeneous trough test of normality and homogeneity.

Test the research hypothesis by testing the gain score of learning outcomes and student activity with MANOVA. The results of hypothesis testing using MANOVA showed that the significance value of the practical method to learning outcomes is 0.000, and the practical method to activity is 0.000. The significance value of the two variables is below 0.05. It can be concluded that the practicum method affects high school geography students' learning outcomes and activities.

The learning outcomes of the GIS experimental class and control class are as follows.

Table 3. GIS Learning Outcome Data

GIS Learning Outcome	Average Score					Sum of Score
	Quest. One	Quest. Two	Ques. Three	Quest.Four	Quest. Five	
Pretest Experimen	11.51	11.457	11.371	10.8	10.257	55.4
Pretest Control	10.647	11.617	11.676	11	10.823	55.764
Posttest Experimen	16.857	16.4	16.457	16.2	16.857	82.771
Posttest Control	12.764	13.705	13.470	13.235	13.323	66.5

With the practical method with map-based material, students can understand the GIS subsystem well. Students' understanding is based on material involving subsystems that are not only taught and memorized but practiced. This is shown by the highest increase in pretest and posttest in the experimental class on item number 1. The control class gets taught without being practiced. This is reflected in question number 1, which also experienced the lowest increase in the post-test. Teacher-dominated is learning a one-way learning process and makes understanding the material not optimal [27], [52].

The increase in scores on each item for the experimental class experienced 5-6 scores, while the control class had 2-3 scores. This shows that with practice, understanding related to GIS subsystems, spatial data, attribute data, raster data, vector data, and GIS work systems can be mastered well by students. GIS practice ensures a better understanding of mapping material [11], [21].

The results of the activity of the experimental class and control class are as follows.

Table 4. Activeness GIS Study

Activeness	ẍ Quest.	ẍ Ans.	ẍ Res.	ẍ Present.	Activeness Score	Criteria
Experiment Early Activeness	1.314	1.285	1.085	1.114	30	Less Active
Control Early Activeness	1.382	1.441	1.235	1.176	32.720	Less Active
Experiment Final Activeness	3.028	2.828	2.942	3.342	75.892	Active
Control Final Activeness	2.264	2.294	1.971	2.264	54.963	Average

The activity of the experimental and control classes in the initial data collection were both in the less active category. The final data collection showed an increase in the experimental class from less active to active and the control class from less active to average. The increase in the experimental class makes students at least have material for participation twice in the activity aspect, asking, answering, responding, mastering the material, and utilizing the practicum results as a presentation medium. Practice gives students an understanding that can be discussed and explained to others [10], [23], [53].

The control class has increased, but the increase is limited to one-time participation without practical work as material for the activity aspect. Many media materials do not provide, along with the mastery of presentation material is still average. Conventional learning is characterized by passive students [54], [55].

The practicum part of teaching aims to allow students to obtain material from theory and practical lessons. The practicum method presents lessons to students to conduct experiments by experiencing and proving something learned [27]. The practicum method is a way of learning with students actively experiencing and proving the material for themselves [8].

The types of practicum are guided practicum and free practicum. In the guided practicum, students conduct experiments and find the results, and the experimental process is designed by the teacher [56]. The teacher has determined the experimental steps, equipment, and objects observed. Free practicum students think independently in assembling experimental tools, conducting experiments, and solving problems; the teacher only determines the objects that must be observed [18], [57]. In the practical implementation of learning, generally, students are divided into small groups to adjust the tools and materials. This research uses a guided practicum with the teacher's role as a facilitator and designer of the GIS practicum.

Practicum in geography is rarely done in high school but is a must at the college level. Practicum, especially the ArcGIS mapping application, can make it easier for students to understand GIS material [11], [21]. In practical learning, students experience, process, observe objects, analyze, prove, and draw conclusions about objects [27].

Practical steps in the learning process need to be done to achieve the learning objectives. The practicum steps consist of preparatory, implementation, and follow-up practicum methods. Practicum must be followed up to overcome weaknesses during implementation [25].

Preparatory steps aim to reduce weaknesses that can arise. Activities in the preparatory step include: setting the title, and practicum objectives, preparing the necessary tools and materials, preparing the practicum place, considering the number of students with the number of available tools and the capacity of the practicum place, preparing rules and discipline during the practicum, and making instructions and practical steps. The preparation step is essential, one of which is planning the objectives, tools, materials, places, and other equipment [56].

In the practical implementation step, students carry out practical activities according to the instructions and steps that have been made at the preparation stage. The steps are made according to the material. Student activities in practicum are observing experiments, recording data, analyzing data, answering questions, concluding practicum results, and communicating practicum results. The teacher's role in implementing the practicum is to supervise the practicum process that is being carried out by students individually and in groups [27].

The follow-up steps are cleaning and storing the equipment used and discussing the problems found during the practicum. They were making a report on the practicum results and presenting the report results that had been obtained. The teacher determines a follow-up plan based on the reflection formula (looking for factors strongly suspected of causing the unsuccessful learning improvement), which is essential in the practicum method [8], [56].

The results showed that the practicum method affected the learning outcomes of high school students' geographic information systems. This result is because the practicum method provides hands-on experience that involves many senses [26]. This makes students' memory in remembering and understanding of the material better and richness, reaching 90% and above [27], [53], [58]. Learning activities that involve all the senses can improve understanding and memory, including changes in attitudes [23]. Knowledge is increasing in the practicum method because students can perceive the material with all their senses.

Learning outcomes are abilities obtained by individuals after the learning process that provides behavior changes in knowledge, attitudes, and skills. This change means that students are better than before. Learning outcomes are one indicator of the learning process. One indicator of whether or not the learning process is achieved is by looking at the learning outcomes. Learning outcomes can be said to be successful if they have achieved educational goals; one of the indicators is the cognitive aspect consisting of C1-C6 [1].

The practicum method is a direct practice of the material. Students learn more meaningfully because they immediately understand the benefits of learning in everyday life. This method helps students quickly master the material from the practical experience of GIS. Students' material gives more meaning to their daily lives [32], [59]. Meaningful learning can affect student learning outcomes [27].

Practicum gives students much hands-on experience. Students can also do their experiments with particular objects. First-hand experiences make student learning easier than learning through books or other methods that involve limited senses [23]. Based on Bruner's theory, students learning with an inactive pattern through action (learning by doing) can transfer their knowledge in various situations [25], [26]

The practicum method increases cooperation, honesty, openness, criticism, and tolerance. The domain of attitudes affects students' enthusiasm for achieving maximum learning outcomes [60]. In group practicums, it fosters an attitude of Cooperation [32], [40]. Practicum can hone attitudes that lead to better learning outcomes [20].

The practicum method can improve objective, realistic, and scientific thinking abilities. This ability is in line with learning outcomes. Scientific attitudes can be formed from practicum because it is structured and solve the problem [61], [62].

Learning outcomes last long in applying practical learning methods because of the internalization and habituation process. Students better understand the material because it has been practiced. Practicum can be done repeatedly until students understand [63].

Learning activities are physical and mental activities. In learning activities, the two are interrelated. Learning activities are carried out by students in learning activities [64]. Learning needs activity because, without activity, the learning process is impossible to take place properly. The process of learning activities must involve all aspects of students, both physically and spiritually, so that changes in behavior can change quickly, precisely, efficiently, and correctly, related to cognitive, affective, and psychomotor aspects [65].

Student activity is student involvement in the form of attitudes, thoughts, attention, and activities in learning activities to support the success of the teaching and learning process and obtain benefits from these activities. Student activity during the teaching and learning process is one indicator of the desire or motivation of students to learn [21]. Students are said to have activeness if behavioral characteristics are found, such as: often asking the teacher or other students, being willing to do the assignments given by the teacher, being able to answer questions, and being happy to be given learning assignments [56].

Activities are all carried out either physically or spiritually with the intention that student activities during the learning process indicate the student's desire to learn. Learning activities are a series of learning activities carried out by students during the learning process. Students doing various activities in learning activities are expected to be able to build knowledge [8].

The results showed that the practicum method affected the GIS discussion class activeness for high school students. The practicum method makes students equipped to ask, answer, and respond. Aspects of asking, answering, and responding arise because the learning process is student-centered [30], [31], [66]. Discussion material becomes rich, obtained during practice, and is associated with GIS material [11]. The following figure 1 shows the activity of the experimental class students when recording the results of the practicum and guided by the teacher asking questions.

Fig. 1. Students' Activeness in Experiment Class while Group Work

The control class needs more effort to be active in class because the GIS material discussed is applicable. Control class students understand the material abstractly without direct practice. In general conditions, material abstraction is also important in gaining knowledge [32]. The following figure 2 shows the atmosphere of activity in the control class.

Fig. 2. Student's Activeness in Control Class while Learning

The material mastered by students from the practicum results is explained well during the presentation session. The media from the practicum results are in the form of photo screenshots, practical videos, or directly practicing in front of the class, as in the [56], [61] study, which used photos from the practice. Students practices with learning materials are interrelated [55], [67]. The mastery of the material was different in the control class, which did not do the practicum, which was in the average category, and some did not prepare the media.

The application of the practical method has several weaknesses. First, it requires special facilities in schools. Disadvantages can be overcome by utilizing existing facilities in schools. Computer laboratory facilities are limited in terms of geographic information systems, so some students who have laptops are welcome to bring their own. Limited school facilities can affect the success of GIS practicum, but simple facilities can also be practicum [21], [40]. Figure 3 shows student laptops used to complete GIS practicum facilities.

Fig. 3. Students' Laptops as Practicum Facilities

4 Conclusion

The research finding showed that the practicum method affected GIS learning outcomes and high school students' activeness. It is improving learning outcomes, especially on questions about the GIS subsystem. The overall increase in the experimental class was 27.3 points and in the control class 10.8 points. Increased activity in the experimental class is from the inactive category with a score of 30 to the active with a score of 75.8. The control class activity is still in the average category with a score of 54.9 from the inactive category with a score of 32.7. The effect of the practicum method on GIS learning outcomes is reflected in learning, where the practicum provides a deepening that involves many senses, makes learning meaningful, collaborates, raises scientific attitudes, and internalizes material. The effect of the practicum method on student activeness is reflected in the learning process where the practicum is student-centered and has the nuances of learning media that involve many senses. The recommendation in this research is to apply the GIS practicum method in the Indonesia Curriculum in Senior High School.

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