The practice and indicators research based learning for introduction of geographic landscape (a case study in Department of Geography Education)

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Abstract. This study aims to explain the impact of practice and indicators of research-based learning on the introduction of landscapes for geography students. The research method used is qualitative with a case study approach. The subjects in this study were students and lecturers of geography education. Data collection techniques were carried out with written document reviews and in-depth interviews with second semester students and lecturers in geography education study programs. Data analysis techniques are carried out by multi-case analysis review. The results showed that the practice of landscape-based research-based learning had an impact on geography literacy skills, spatial thinking, critical thinking, scientific thinking, research, and mapping of individual students. The ability of observation and analysis is a pedagogic indicator of research-based learning that influences intellectual development, technical progress in learning and research in the field, as well as individual skills in solving problems of geographical phenomena in a practical and theoretical way from students.

1. Introduction

Research is an important component in improving the quality of teaching in higher education. The results of the study can be used for educational and teaching process activities for students both in the classroom and outdoors. Dissemination of research results can be applied with research-based learning to students. Research based learning activities provide opportunities for students to build critical thinking patterns, make predictions, describe the causal factors, and present a constructive arguments [1]. The research-based learning approach in the education process can create an integration of academic study activities and learning innovations to prepare future professional students [18,32].

Research based learning teaching system develop predictive and analytical approaches to students. Its implementation further emphasizes the collaborative and contextual knowledge integration of the research results in the field. The use of research-based learning can make students more active in the learning and completing research projects [8]. The application of theoretical studies and scientific literature provides students’ experience in designing research questions, field investigations, laboratory practicums, and analysis and interpretation of data with evidence to provide answers to research question. Integration of education and research can create an academic environment for multidisciplinary educational activities of science with a student-oriented system [32].

Research based learning that effectively change the way students learn directly in the application. Understanding of new knowledge will become more developed through the activities of asking, researching, analyzing, reporting, and publishing. [29] The findings of
reported that the quality of the research experience could be felt by students through inquiry learning and research-based learning.

Forms of research-based learning consist of two types. The first form of teaching results by using other methods of study. The second form provides instruction to students to build knowledge, create hypotheses, collect data, analyze data, and make conclusions as new information. [10] The explaining of research-based learning contributes to intellectual development and student understanding. The implementation of research-based learning in principle encourages lecturers to improve students’ ability in researching and scientific writing. Practically research-based learning teaching has the advantages over lectures in the traditional way [21]. Research based learning is one of the effective forms of teaching that is favors by lecturers and students [9].

Indicators and practice of implementing research based learning are aimed at: (1) For the application of research-based learning processes to the introduction of geographic landscapes in universities; (2) To review the indicators related to research based learning in terms of geographic landscape at universities; (3) To study the results of research based learning indicators of geographic landscapes at universities; and (4) To develop research-based implementation guideline of geographic landscapes at universities. [27] The practice of implementing problem teaching methods needed special preparation and designed a maximum scenario for students and lecturers.

Student involvement in the practice of research-based learning has different capacities and learning styles when reviewing phenomenographic in Geography studies [3]. Students’ ability greatly affects in understanding content in Geography [34]. Interpretation of geographical phenomenon will build knowledge and student thinking of research activities in the field. The results of study that research learning methods are specifically suited for the study of Geography and Environmental sciences and Earth [20, 30, 37]. The results of the investigation of the research will provide new knowledge to students for the development of geographic studies.

2. Methods
The method used in this study is qualitative with a case study approach. This type of case study research is used to understand the realities that occur during the learning process as educational implementation innovations include potential knowledge, theory, and practice [12,17]. The essence of case studies examines investigations and explores contextual phenomena within the limits of geographic studies both intrinsically, intellectually and collectively [7,36]. The focus of this research is on students at the undergraduate level with the aim to gain an understanding of the teaching process and the practice of research-based learning in the introduction of geographic landscape in the field. The research subjects were students who program the practice of landscape destruction courses in the second semester of 2017 and lecturers in the geography education program at the University of Jember.

The data collection techniques used in practices and indicators of research-based learning for land introduction are:
1) Review of written documents
   Data collection with document review is used to ask the faculty of students and lecturers who follow the practice of research-based learning to introduce geographic landscape. The lecture plan and the field practice module made by the lecturer were also reviewed in this study. Information on academic culture used in the university's university geography education study program.
2) Interview with lecturers who teach courses
   The lecturer who teaches the introduction of geographic landscapes that are facilitators of research-based learning practice activities are interviewed in a semi-structured manner. Lecturer advisors are key informants in the implementation of research-based learning in the field. The key focus was asked regarding planning practices, activities in the field, and process management in the implementation of research-based learning.
3) Observing the learning process and student behavior
Observations of lecturers and students were used to collect information on this case study. The scope of the data collected includes research-based learning methods used by teachers, teacher behavior, student behavior, teaching techniques, practicum modules, contexts and conditions in the field.

4) Conduct discussions with a focus on research-based teaching supervisors.
This case study uses qualitative techniques by conducting group discussions with four lecturers who guide the practice of introducing geographic landscapes. The data collected is an indicator of research-based learning at the university and the practice of guiding the development of research-based learning in the field. Field notes, photo documentation, and recordings were used as validation information in this case study.

Research data were analyzed by reviewing synthesis in multi-case analysis [35]. [7] The qualitative data analysis interprets with a grounded theory approach by focusing on research ideas in reflecting research data. The induction approach is more subjective, inductive and interpretive with the aim of asking about the experience gained by the research subject [24]. The experience of lecturers (S1, S2) and students (S3, S4, S5, S6, S7, S8, S9, S10) is inductively interpreted in practice and indicators of landscape-based research-based learning.

3. Results and Discussions
The practice of research-based learning provides a valuable experience for students in developing and exploring their knowledge. The form of knowledge can be abstract and concrete from geographic phenomena in the field. Knowledge obtained by students is the result of exploration that is used to build the logic of critical and scientific thinking from real-life phenomena. All forms of information and data obtained from the results of the practice of research-based learning in the introduction of landscapes can provide content and knowledge benefits. Both contents are useful for building a specific understanding of geography for the introduction of landscapes.

The practice of research-based learning contains concepts about learning and research. Both concepts challenge students to study geographic phenomena in the field using measurement, observation, and analysis techniques. All approaches are used to solve the problems being examined by students in the practice of introducing landscapes. Indicators of research-based learning applications are oriented to student activity and treatment carried out by lecturers. Synergy between students and lecturers is important in building academic ethics. Its function is so that students can build their geographic knowledge according to the rules of the geography discipline.

Different practices and indicators in research-based learning have an introduction to the landscape. Practice is more focused on application or application in the field in research learning. But more complex research-based learning indicators include preparation, application, reflection, and comprehensive evaluation that includes students and lecturers. The following in table 1 is the result of the response of the research subjects from the practice of introducing landscape learning to research-based learning:
### Table 1. Practice Description and Indicators of Research Based Learning Geography Education Students

| Aspects                                         | Study Description                                                                 | Description                                                                 |
|-------------------------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Research based learning in the classroom        | • The implementation of research-based learning is less effective for students if it only uses the results of lecturer research as learning material. | S1, S2                                                                      |
|                                                 | • The application of research-based learning in the classroom does not provide students with building knowledge, thinking patterns, and knowledge about the application of contextual recognition of landscapes. |                                                                             |
|                                                 | • Students can be controlled regarding the use of time according to the lecture schedule. |                                                                             |
| Research based learning outside the classroom    | • Research based learning activities provide flexibility to students in developing knowledge and thinking, experiments, and application of geography contextually. | S1, S2                                                                      |
|                                                 | • Collaborative learning activities in the implementation of research-based learning take a long time. |                                                                             |
|                                                 | • Research based learning activities give full time to students in research activities. |                                                                             |
| Application of research-based learning landscape introduction | • Natural laboratories have an important role in the application of research-based learning to the introduction of geographic landscapes. | S1, S2                                                                      |
| Guidance on the application of research-based learning to the introduction of landscapes in class and outside the classroom | • Research based learning with contextual problems will provide influence in analytical thinking, critical, and scientific in each student. |                                                                             |
| Proposals and research instruments               | • Preparation of research proposals on the introduction of landscapes became important before research data collection activities in the field. | S3, S4, S4, S5, S6, S7, S8, S9, S10                                         |
|                                                 | • Research instruments for both quantitative and qualitative research need to be prepared by students before the research data collection activities in the field for the study of landscape recognition. |                                                                             |
|                                                 | • Suitability of research instruments must be in accordance with the objectives of |                                                                             |
quantitative landscape recognition research.

- Students as prospective researchers must know the subject and focus of the qualitative research on landscape recognition.

| Field Research | Students collect all primary data about the introduction of landscapes through interviews, trials, and observations. |
|----------------|------------------------------------------------------------------------------------------------------------------|
| Trial and Field documentation | Students conducting land recognition data collection include activities such as: slope measurement, map sketch manufacturing, chemical and physics trials, environmental and regional analyses, and the impact of physical geography on Human activity. |
| Analysis of data on field research results | Analysis of data conducted by students can be quantitative analysis (descriptive, mean, median, and mode), qualitative analysis (a description of words interpreted from the speaker), as well as quantitative and qualitative analysis. |
| Preparation of reports and scientific articles | The preparation of scientific reports is important for students of each application research-based learning related to primary data analysis results. The preparation of scientific research articles required students in training scientific publications for each application of research-based learning the introduction of the landscape of each research group. The quality of research reports and scientific articles is an important essence of research-based learning application for students. |
| Publication of research-based learning results | Publication of scientific articles in the application of research-based learning the introduction of land landscape is important for students in local, national, and international journals. The collaboration of lecturers and students became important in the scientific publication of research on the introduction of landscape land. |
| Assessment of Research proposal and instrument drafting process | Process assessment to students can be seen from conformity between the results of drafting proposals and research instruments for introduction of landscape land. The focus and research studies of students are important elements of research based learning on the introduction of landscape land. |
| Research-based recognition indicators | The assessment is given to students during observation and trial activities in the field in accordance with the research purpose of land introduction. The activation of individual students and group cooperation as assessment instruments during the direct practice of land identification. |
| Assessment of the research process and field trials | The preparation of research reports needs to be examined between the problems and methods of research with the results of landscape introduction research. The results of the research conclusions and suggestions need to be examined between the
| Guidelines for implementing research based learning landscape introduction | The reference module of research-based learning activities is important for students to material indicators, data retrieval, and analysis of landscape introduction research data. |
| --- | --- |
| Field Introduction Guidelines Module | The student's ability to compose scientific articles includes title, abstract, introductory, method, outcome and discussion indicators, conclusions, and bibliography. |
| Proposal drafting guidelines and landscape introduction research instruments | Students’ ability to select an accredited journal level among local, national and international journals as a purpose for scientific publications. |
| Assessment of scientific articles publication of research results | Students’ ability to select an accredited journal level among local, national and international journals as a purpose for scientific publications. |
| Guidelines for drafting a Landscape introduction report | Students need to be given an outline for the formulation of quantitative and qualitative research proposals for implementation of research-based learning of land introduction. |
| | Students should be given an overview of the technique to prepare observation instruments for quantitative research. |
| | Qualitative research instruments in the implementation of research based learning are students. |
| | Students need to be given the reference in drafting a report on the introduction of landscape research, covering the differences in research data analysis and discussion of research results. |
| | Students should be aware of the scientific report drafting guidelines: |
| | 1. Title |
| | 2. Abstract |
| | 3. Table of Contents and tables |
| | 4. Introduction |
| | a. Background |
| | b. Problem |
| | c. Research objectives |
| | d. Benefits of research |
| | 5. Literature Review |
| | 6. Research methods |
| | a. Research approach methods |
| | b. Research location |
| | c. Quantitative/qualitative research samples/subjects |
| | d. Research data collection techniques |

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Research findings and the input given by the students for subsequent research with the study on land introduction.

- Students’ ability to compose scientific articles includes title, abstract, introductory, method, outcome and discussion indicators, conclusions, and bibliography.
- Quality of articles written by students related to the introduction of landscape land.

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S1, S2
Guidelines for drafting a land introduction article

- Students should be aware of scientific article writing systematics of research learning results that generally include:
  1. Title
  2. Abstract
  3. Introduction
  4. Method
  5. Results and discussion
  6. Conclusion
  7. Bibliography

- Scientific article writing should pay attention to the purpose of publication research result of land introduction.

Source: 2018 Research Result Data
The results of the study of practice and indicators of the implementation of landscape-based learning introduction to the landscape have many aspects of the study. These aspects include research-based learning applications, learning and research preparation indicators, process assessment, and research-based learning implementation guidelines. All of that becomes a unity that must be done by students during the learning process inside and outside the classroom. Research based learning activities provide more freedom for students to explore their knowledge. Learning experiences from observation, trials, and observations in the field will build students' critical thinking skills. The logic of scientific thinking from the results of learning and research will increase learning experience. [19]

The explained of research and publications have an effective impact on teaching and learning physical geography in constructivism. The introduction of landscapes in practice not only examines physical geography, but also human geography. Students in groups and individuals will be responsible for research learning. The motivation of each different individual will pose a big challenge in research learning. Students need to prepare to be able to contribute to learning related to the reasons for work eligibility and combination of projects on going basis [11, 23].

The practice of introducing landscapes provides students with an understanding of geographic phenomena. This learning and research require students to understand aspects of research problems and research methods. Both aspects are needed by students in solving research problems and building an understanding of geography. Each student group needs to prepare for the proposal and research instruments according to the procedures in the landscape-based learning research module. Students' understanding of the preparation of research proposals with the support of literature and scientific journals. The reality that occurred from the results of the study showed that many students did not understand how to write scientific proposals. The impact of the quality of proposals has not been focused because they do not understand the substance of the research problem with the support of relevant research journals.

The preparation and application of research-based learning in the field has an influence on the pedagogic development of students. Knowledge insight and research in the field stimulates students to think scientifically and take reflection actions according to data and facts. [7] The findings of field observations provide in-depth insights and experiences according to student observations themselves. This provides innovation in improving teaching, learning and experience for students. But it is undeniable that the practice of research-based learning is very time consuming and student participation. [25] Academically has a relationship between research, teaching and learning, and observation in the field in the careful and proactive preparation of students to be more flexible and not work methodologically in a short period of time. Students need to pay attention to the practice time of landscape-based research-based learning according to the mapping in the lecture plan.

Research practice on the introduction of landscapes in the field is more focused on students in their application. Collaboration between students is needed in data collection according to the problems in the research proposal that has been prepared. Research data is collected collaboratively by each group in the field. Students have a role in building meaningful knowledge with the support of a collaborative culture with their colleagues [31]. The findings of women have high motivation and perception than men in solving geographic problems [14]. Female students are more challenged in solving research problems as contextual learning experiences from landscape recognition. Real life problems allow students to explore and implement problem solving strategies for active learning [2]. The practice of research-based learning demands more independence and activeness of students in testing theories and building theories according to their research studies. Students collaboratively conduct inquiry in data collection supported by analysis together in groups. Students will be more focused and independent in solving problems related to subject matter with research [14, 16] . The problems solved by students can improve the quality of curriculum content, teaching methods, and evaluation methods for lecturers in the practice of introducing landscapes.

Lecturer directives need to be considered by students in research-based learning outside the classroom. Completion of research projects is the main target of learning, so students need to pay attention to the indicators of implementation of research-based learning in accordance with the practicum module specifically and lecture planning. The following are the concepts of practice and indicators research-based learning introduction of landscapes in University of Jember's geography education study program which is described as follows:
Figure 1. Research Based Learning Scheme for Introduction to Landscape

The research-based learning scheme is more focused on student participation and activity. The stages carried out by students are very clear starting preparation, implementation of field practice, and evaluation of activities. The target of preparing reports, scientific articles, and publications is the main one in research-based learning applications. The process of developing students' critical thinking related to the situation, submitting questions, gathering information, communicating findings, and providing recommendations about situations [26] The practice of research-based learning has a relationship that cannot be separated between the disciplines of the study of science, learning methods, and skills. All three are indicators in the implementation of research-based learning for geographic disciplines. The relationship between learning activities and research can be illustrated as follows:

Figure 2. Illustration of the Relationship of Geographical Pedagogical Skills, Active Learning, Research Based Learning, Geographic Phenomena
Student pedagogical skills can be formed from research practices in the field. This activity includes active learning that requires the domain of cognitive, affective, psychomotor. The practice of learning and research will provide pedagogical knowledge to lifelong students. The findings of research-based learning has the potential to reconfigure students as intellectual producers through involvement and active participation in research culture in the departments and geographic disciplines [22].

Student pedagogic development became the focus when the application of research-based learning to the introduction of landscapes. The aim is for students to design a framework for providing analysis and criticism in geography research. The practice of research-based learning in this research is carried out by students in groups. Each group numbered 5 students as discussion and research partners. Group collaboration in scientific thinking is important in learning landscape recognition research. Lecturers need to develop critical thinking and pedagogical attitudes of students which include practicality in designing, implementing, and applying in groups as the focus of research [4].

The practice of research-based learning provides valuable experience not only to students, but also to lecturers. Gender and intellectual differences are the main reflections for lecturers. However, the lecturer in the application is limited to be a mentor or facilitator. The relationship between students and lecturers greatly influences the completion of this research project. The development of academic has a special role in informing institutional policies about the integration of research and interpretation of academic ethics as the value and implications of teaching and learning for students [5].

Changes in scientific student behavior are important in building emotions and intellectuals. Student learning outcomes can be seen from emotional and intellectual development in understanding phenomena in geographic disciplines. Student participation in research-based learning influences emotions and intellectual responses [15]. The experience of students from field practice will shape scientific intellectual development in studying and analyzing research problems. The results of student experience differ between one individual and another, even in one research group. This shows that the practice of research-based learning needs to consider the pedagogical abilities of students before, during implementation, and the end of the study. Indicators of pedagogical skills of students in the practice of research-based learning on the introduction of landscapes include: (1) The ability to observe empirical geographic phenomena; (2) Descriptive skills in explaining and detailing the phenomenon of geosphere; (3) Classification skills in analyzing geosphere phenomena; (4) Mapping skills in the form of basic cartography; and (5) Skills to connect natural and human phenomena in the study of rational geosphere phenomena. These four skills result from the application of learning and research in the field.

Pedagogical elements provide benefits in geographic education to students on an inclusive basis. The contextual and active learning environment provides experience to students, thus contributing to building geography skills. A real environment provides opportunities for students to study, research and collaborate [39]. Learning in the field provides mediation to students, lecturers, and student-environment interactions that involve repetitive, discursive, adaptive, interactive and reflexive processes [13,38]. The activity provides enough openness to students in the learning process according to their own wishes in solving geography problems.

4. Conclusion

The practice of research-based learning introducing landscapes provides a complex experience for students. Form of experience in the form of geography literacy skills, spatial thinking, critical thinking, scientific thinking, researching, and mapping in research learning. Students can develop their abilities independently and in groups in analyzing and interpreting geographic phenomena. The implementation of research-based learning practices provides active learning and more space for students to explore their knowledge in the field. Learning and research experiences provide stimulation with patterns of direct observation, connection, and adaptation of human relationships with the environment. The impact results in greater knowledge retention [28]. The amount of experience is the impact of the practice of research-based learning that brings students to direct contact with the object under investigation [33]. Students can learn two aspects of learning and research for the field of geography.
The skills of observation and analysis in the practice of landscape-based research-based learning have an impact on the pedagogical skills of each student. Indicators of successful implementation include: (1) Intellectual development (student understanding of geographic disciplines); (2) Development of technical learning and research (student progress related to research methods and techniques in the field); (3) Development of individual skills and collaboration in groups. The three successes are part of the effectiveness of pedagogical practices in research-based learning on landscape recognition. Thus, students are able to integrate the theoretical and practical concepts of landscape recognition through research learning.

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References
[1] Al-Maktoumi, Ali, Al-Ismaily, Saif & Kacimov, Anvar. 2016. Research Based Learning for Undergraduate Students in Students Soil and Water Sciences: a case Study of Hydropedology in an Arid Zone Environment, Journal of Geography in Higher Education, Vol.40, 1-19.
[2] Barret, T.2013. Learning about the Problem in Problem Based Learning (PBL) by Listening to Students’ talk in Tutorials: A Critical Discourse Analysis Study, Journal of Further and Higher Education, 37 (4), 519-535.
[3] Bradbeer, J.m Healey, M., & Kneale, P.2004. Undergraduate Geographer’s Understandings of Geography, Learning and Teaching: a phenomenographic study, Journal of Geography in Higher Education, 28 (1), 17-34.
[4] Breen, R.L.2006. A Practical Guide to Focus Group Research, Journal of Geography in Higher Education, 30(3), 463-475.
[5] Brew, Angela. & Jewell, Evan.2012. Enhancing Quality Learning Through Experiences of Research Based Learning: Implications for Academic Development, International Journal for Academic Development, 17(1), 47-58.
[6] Cotton, Debby R.E, Stokes, Alison, & Cotton, Peter A. 2010. Using Observation Methods to Research the Student Experience, Journal of Geography in Higher Education, 34(3), 463-473.
[7] Cousin, Glynis. 2005. Case Study Research, Journal of Geography in Higher Education, Vol 29 (3), 421-427.
[8] Elton, L.2001. Research and teaching: What are the real relationships?, Teaching in Higher Education, 6(1), 43-56.
[9] Field, D.J., Koppi, A.J., Jarrett, L.E., Abbott, L.K., Cattle, S.R., Grant, C.D., & Weatherley, A.J. 2011. Soil Science Teaching Principles, Geoderma, 167, 9-14.
[10] Fuller, I.C., Brook, M.S., & Holt, K.A.2010. Linking Teaching and Research in Undergraduate Physical Geography Papers: The role of Fieldwork, New Zealand Geographer, 66, 196-202.
[11] Geday, S. & Chalkley, B.2006. Employability within Geography, Earth, and Environmental Sciences. The Higher Education Academy, Geography, Earth, and Environmental Sciences Learning and Teaching Guide, HEA GESS Subject Centre, University of Plymouth.
[12] Ghensquiere, Pol, Maes, Bea, & Vandenberghe.2004. The Usefulness of Qualitative Case Studies in Research on Special Needs Education, International Journal of Disability, Development and Education, Vol 51 (2), 171-184.
[13] Green, S.K. & Gredler, M.E.2002. A Review and Analysis of Constructivism for School-Based Practice, School Psychology Revie, 31(1), 53-70.
[14] Golightly, A., & Muniz, O.A. 2013. Are South African Geography Education Students Ready for Problem Based Learning?, Journal of Geography in Higher Education, 37(3), 432-455.
[15] Guinness, Patrick.2012. Research Based Learning: Teaching Development Through Fieldschools, Journal of Geography in Higher Education, 36(3), 329-339.
[16] Hallinger, P.2013. Learner Centered Higher Education in East Asia: Assessing the Effects on Student Engagement, International Journal of Educational Management, 27 (6), 594-612.
[17] Harland, Tony. 2014. Learning about Case Study Methodology to Research Higher Education, Journal Higher Education Research & Development, 1-10.
[18] Haverhals, B. 2007. The Normative Foundations of Research Based Education: Philosophical Notes the Transformation of the Modern University Idea, *Studies Philosophy and Education*, 26(5), 419-432.

[19] Jenkins, EW. 2000. Research in Science Education: Time for Health Check?, *Studies in Science Education* 35(1), 1-25.

[20] King, H. 2001. Editorial: Case Studies in Problem Based Learning from Geography, Earth and Environmental Science, *Planet, Special Issue* 2, 3-4.

[21] Krakowka, A.R. 2012. Field Trips as Valuable Learning Experiences in Geography Courses. *Journal of Geography*, 111, 236-244.

[22] Lambert, Cath. 2009. Pedagogies of Participation in Higher Education: a Case for Research Based Learning, *Journal Pedagogy, Culture & Society*, 17(3), 295-309.

[23] Lidstone, J. & Stoltman, J.P. 2008. Global Environmental Change: What is the Role of Geography and Environmental Education?, *International Research in Geographical and Environmental Education*, 17(2), 89-92.

[24] Liu, Lisha. 2016. Using Generic Inductive Approach in Qualitative Educational Research: A Case Study Analysis, *Journal of Education and Learning*, Vol 5(2), 129-135.

[25] Morrissey, John, Clavin, Alma, & Reilly, Kathy. 2013. Fieldbased Learning: the Challenge of Practising Participatory Knowledge, *Journal of Geography in Higher Education*, 37(4), 619-627.

[26] Paul, R. & Elder, L. 2008. The Miniature Guide to Critical Thinking: Concepts and Tools (Dillon Beach, CA: The Foundation for Critical Thinking).

[27] Pawson, Eric, Fournier, Eric, Haigh, Martin, Muniz, Osvaldo, Trafford, Julie, & Vajoczki, Susan. 2006. Problem Based Learning in Geography: Towards a Critical Assessment of its Purpose, Benefits and Risks, *Journal of Geography in Higher Education*, 30(1), 103-116.

[28] Robson, E. 2002. An Unbelievable Academic and Personal Experience: Issue Around Teaching Undergraduate Field Courses in Africa, *Journal of Geography in Higher Education*, 26(3), 327-344.

[29] Sproken-Smith, R., & Hilton, M. 2009. Recapturing Quality Field Experiences and Strengthening Teaching Research Links, *New Zealand Geographer*, 65, 139-146.

[30] Sproken-Smith, R. 2005. Implementing a Problem Based Learning Approach for Teaching Research Methods in Geography, *Journal of Geography in Higher Education*, 29(2), 203-221.

[31] Stefanou, C., Stolk, J.D., Prince, M., Chen, J.C., & Lord, S.M. 2013. Self-regulation and Autonomy in Problem and Project Based Learning Environments, *Active Learning in Higher Education*, 14(2), 109-122.

[32] Tranter, E.A. 2007. Integration of Research and Education in a Multi-Institutional Centre, *International Conference on Engineering Education-ICEE 2007, Coimbra, Portugal*.

[33] Tueth, M.W. & Wikle, T.A. 2000. The Utility and Organization of a College Field Course: Examining National Park Management, *Journal of Geography*, 99, 57-66.

[34] Wu, C.V & Fournier, E.J. 2000. Coping with Course Content Demands in a Problem Based Learning Environment, *Journal of the Alabama Academy of Science*, 71(3), 110-119.

[35] Yin, R.K. 2003. *Case Study Research: Design and Methods* (3rd ed.). Thousand Oaks, Ca: Sage.

[36] Zainal, Zainal. 2007. Case Study as a Research Method, *Humanitarian Journal*, 9, 1-5.

[37] Harianto, E., Nursalam, L., Ikhsan, F., Zakaria, Z., Damhuri, D., & Sejati, A. 2019 The Compatibility of Outdoor Study Application of Environmental Subject Using Psychological Theories of Intelligence and Meaningful Learning in Senior High School. *Geosfera Indonesia*, 8(3), pp.398-406.