

Development Of Biology Practicum Guide Based On Guided Inquiry Approach With Vee Map For Grade X SMAN 1 Ranah Pesisir Students

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Abstract – Based on the results of initial investigations conducted by using questionnaires and interviewing teachers, it is known that biology learning activities are not yet available and there is a systematic structured practicum guide. It is known that the practicum guide used by students at school is only a worksheet that contains theory and does not have a practicum activity sheet. In practical activities, students still tend to be passive. Therefore, it can be concluded that students need a practicum guide that is in accordance with their learning needs, easy to understand and able to guide students in understanding the procedures for practicum activities. This study aims to produce a biology practicum guide based on a guided inquiry approach accompanied by a valid, practical, and effective vee map. This research uses the Plomp model which consists of three stages, namely the initial investigation, development and prototyping, and assessment. The research subjects were students of class X MIA SMAN 1 Ranah Pesisir in the first semester of biology subjects for the 2020/2021 academic year. The results showed that the developed biology practicum guide, according to the expert review, had met the didactic, construct, and technical criteria in the very valid category. The results of the practicality assessment by teachers and students obtained a very practical value, because it met the criteria for ease of use. The results of the effectiveness test showed that it was effective on the affective, psychomotor, and cognitive competencies of students. Based on this, it can be concluded that the biology practicum guide based on the guided inquiry approach accompanied with vee map for class X SMA first semester developed is declared valid, practical, and effective.

Keywords – Development, Biology Practicum Guide, Vee Map, Guided Inquiry Approach.

I. INTRODUCTION

Education according to (Anam, 2016) is a learning process where students receive and understand knowledge as part of themselves, and process it for mutual good and progress. An education requires a process, which is not only good but also fun and interesting, for both teachers and students.

The development of the world of education cannot be separated from the development of the curriculum. In Indonesia according to the National Education System Law no. 20 of 2003 concerning the national education system referred to as curriculum is a set of plans and arrangements regarding the objectives, content, and learning materials as well as the methods used as guidelines for the implementation of learning activities to achieve certain educational goals. The current curriculum is the revised 2013 curriculum which is an improvement to the 2013 curriculum.

The 2013 curriculum is a further step from the development of the Competency Based Curriculum (KBK) which was released in 2004 and KTSP in 2006 (Kemendikbud, 2014). In the implementation of the 2013 Curriculum, especially biology learning, it is hoped that it can direct the ability to think scientifically, because biology subjects are essentially products, processes, and scientific attitudes.

One of the important activities in the learning process is practicum activities. Practicum is a form of teaching and learning activity that is intended to strengthen the mastery of applicable material (Mariyam and Afniyanti, 2015). Through practicum activities, students are really involved and are more sure of something that is found, so that students do not only receive knowledge from teachers and books. Practical activities can add experience, develop scientific attitudes, and learning outcomes will last a long time in the memory of students. This is in line with the opinion of Lufri (2007b) that one of the advantages of learning methods in the form of experiments or practicum is that students have direct experience of an activity. Direct experience will strengthen the theory that has been studied, so that students better understand and understand a material.

Biology practicum activities have been formulated in the 4th core competency (KI 4) 2013 curriculum in accordance with the Minister of Education and Culture No. 69 of 2013 concerning the basic framework and structure of the SMA/MA curriculum, so that teachers are required to carry out practical activities in order to achieve the expected learning objectives. The learning process through practicum activities will run according to the expected goals if the supporting factors in these activities are met, one of which is the presence of a practicum guide. A practicum guide is a practicum facility that helps practitioners (students) in carrying out practicals (Kilinc, 2007).

In the implementation of practicum in general, there are still some problems in the field that cause the obstruction of practical activities. This is evidenced by the results of Anggriyani's research (2013) stating the obstacles in practicum activities, namely: incomplete practicum tools, unavailable practicum guidelines, students who have difficulty in concluding practicum results and insufficient practicum time.

Ideally these problems will no longer be found in schools that are already well accredited. However based on the results of an interview in September 2020 that the researcher conducted with the teacher of SMAN 1 Ranah Pesisir, Mrs. Juliawati, M.Pd stated that the school did not yet have a practicum guide that was systematically arranged and did not have an approach in its application. It is known that the practicum guide used by the teacher is in the form of worksheets which only contain theory and there are no activity sheets for practicum. The teacher revealed that the LKS used were sourced from high school biology textbooks and ordinary LKS from one of the publishers. This does not provide opportunities for students to be actively involved in carrying out practical activity procedures and has not been able to improve more scientific work.

From the results of interviews with teachers, it can be seen that teachers want a practicum guide that is systematically arranged and can support theory in learning. The guide should have an attractive appearance, equipped with pictures, clear working procedures and can develop students' thinking skills. Furthermore, based on filling out a questionnaire with 32 students in September 2020 it was found that 96.87% of students liked biology practicum activities, 100% of students answered that they did not have a biology practicum guide, 100% of students answered the practicum guide in the form of LKS used for the practicum does not have an attractive color combination, 100% of students answered they wanted a practicum guide, it was also revealed that students tend to be passive and do not fully involve themselves in practicum activities. The results of the questionnaire showed that 43.75% of students were active in practicum activities.

Based on the observations and analyzes that have been carried out, it is necessary to seek to solve the problems contained in the implementation of practicum in schools. One of the efforts that can be done is by compiling a systematic practicum guide. Teachers are expected to make learning more innovative which can encourage students to learn more optimally. In this study, researchers developed a biology practicum guide by applying a guided inquiry approach in developing a practicum guide.

The guided inquiry approach allows students to carry out certain experiments designed by themselves to gain an initial understanding of a concept before being taught by the teacher (Cheung, 2011). According to Vandron et. al., (2011) in inquiry based practicum, students are more challenged to think critically about an object and relate the knowledge they already know. Students are more enthusiastic and motivated to learn a principle through an observation. This is in line with the opinion of Fitzgerald (2011) the guided inquiry approach makes it easier for students to find their own concepts through experimentation.

Based on research that has been conducted by Nengsi (2016), a general biology practicum guide based on guided inquiry that has been developed is valid, and after being tested on STKIP Payakumbuh students, general biology practicum guides are obtained practical and effective results in learning, especially practicum activities. Furthermore, research conducted by Kenengsih (2017) revealed that guided inquiry oriented microbiology practicum book that had been tested on STKIP PGRI West Sumatra students showed that the book was valid, practical and effective to use as a supporting facility in practicum activities.

The advantages of guided inquiry are being able to train students independently to design, develop, and carry out experiments and collect experimental data (Wenning, 2005). The guided inquiry approach also has several weaknesses, namely it is difficult to control the activities and success of students, it is not easy to design it because it collides with the habits of students, sometimes implementing it requires the appropriate time and as long as the learning success criteria are determined by the ability of students to master the subject matter, then the approach is this is difficult for teachers to implement (Hamruni, 2009). Therefore, it is necessary to reduce the weaknesses of the guided inquiry approach, one of which is using the vee map. Vee map to assist students in constructing the knowledge they have with the practicum process carried out.

Putardi and Sari (2005) stated that vee map has been developed as a good learning tool for the inquiry process, and the use of vee map can be used as an alternative form of practicum report. This is in line with Roehrig's (2001) opinion that vee map is an alternative to facilitate students in making practicum reports. The opinion of Alvarez and Risko (2007) regarding the effectiveness of using vee maps to help students understand the concept of science, shows that the vee map is a suitable tool for studying the structure of knowledge and the process of forming knowledge. This will make students trained to improve skills and improve learning outcomes both in terms of cognitive, affective, and psychomotor.

Based on the explanation above, it shows the need for developing a practicum guide by integrating approaches in learning. The practicum guide was developed as an effort to equip students to carry out practicum activities well and be able to improve scientific work. From this, researchers have conducted a study entitled "Development of Biology Practicum Guide Based on Guided Inquiry Approach with Vee Map for Grade X SMAN 1 Ranah Pesisir Students".

II. RESEARCH AND METHOD

This research used by Plomp Model. This model consists of three stages, namely the preliminary research phase, the development or prototyping phase, and the assessment phase (Plomp and Nieveen, 2013). This research was conducted at SMAN 1 Ranah Pesisir. The research subjects were 35 students of class X MIA. Collecting data using interview guidelines, questionnaires, and observation sheets. Data analysis was carried out descriptively, qualitatively which included data collection, data analysis, data presentation and drawing conclusions.

The type of data in this study is primary data because the data is obtained directly through the provision of questionnaires for testing validity tests, practicality tests, and effectiveness tests on research subjects. The first data is obtained from the results of the validation of the practicum guide by the validator. The second data was obtained from the implementation of the practicum guide trials consisting of practicality and effectiveness test data.

III. RESULTS AND DISCUSSION

The value of the validity results of the biology practicum by the validator includes:

Didactic Aspects

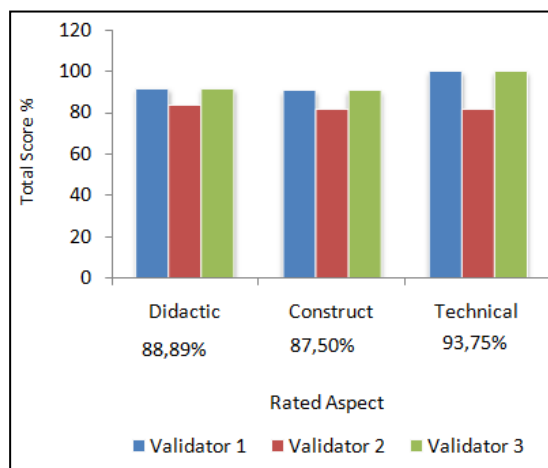
In the didactic aspect, a biology practicum guide based on a guided inquiry approach with vee map was declared valid by the validator with a validity value of 88.89 with very valid criteria. Based on the criteria on the didactic aspect, it is known that the guide developed practicum is in accordance with the curriculum used.

Construct Aspects

In the construct aspect, the practicum guide based on the guided inquiry approach with vee map is declared valid by the validator with a validity value of 87.50 with very valid criteria. Based on the criteria in the construct aspect, it can be stated that the biology practicum guide based on the guided inquiry approach along with the vee map is equipped with a clear identity and is systematically structured. The use of language, the developed biology practicum guide is in accordance with the rules of Indonesian that are good and correct and the terms used in the practicum guide are correct.

Technical Aspects

On the technical aspect, a biology practicum guide based on a guided inquiry approach with vee map was declared valid by the validator with a validity value of 93.75 with very valid criteria. Terms or criteria for technical aspects related to writing, images, and appearance in the manufacture of a product (Trianto, 2012). In the technical aspect criteria, it is stated that the practicum guide developed uses a type and size of letters that can be read clearly, and the use of punctuation marks is correct. The presentation of the image in the practicum guide has a size and explanation that can be read clearly. In addition, a biology practicum guide based on the guided inquiry approach with vee map has also been compiled with an attractive color combination display.



Picture 1. Percentage Validation Results

The value of practicality results is related to the ease of using the practicum guide by teachers and students in practicum activities. The practical assessment of the biology practicum guide based on the guided inquiry approach with vee map is carried out in stages starting from small group assessments, large group or field tests assessments, and assessments by biology teachers. The practicality of this biology practicum guide is seen from the aspect of ease of use, aspects of presentation, and the time it takes.

Table 1. Small Group evaluation Percentage Results

No	Aspect	Percentage (%)	Category
1	Using	90,48	very practical
2	Presentation	95,83	very practical
3	Time	83,33	very practical
Means		89,88	very practical

The results of the practicality of the small group evaluation got an average score of 89.88 in the very practical category. Furthermore, the practicality assessment by teachers and students with an average practicality value of 89.58 by the teacher and 90.13 by students with the very practical category. Based on the results of field tests and assessments by teachers of biology

practicum guides based on the guided inquiry approach with vee map that was developed, it shows that, with a practicum guide as a guide to conducting practicum, it can make it easier for teachers to guide students in carrying out practicum activities.

Table 2. Teacher Practical Results

No	Aspect	Percentage (%)	Category
1	Using	91,67	very practical
2	Presentation	89,58	very practical
3	Time	87,50	very practical
Means		89,58	very practical

Table 3. Students Practical Results

No	Aspect	Percentage (%)	Category
1	Using	90,20	very practical
2	Presentation	90,89	very practical
3	Time	89,29	very practical
Means		90,13	very practical

The value of the effectiveness of a biology practicum guide based on a guided inquiry approach with vee map can improve the cognitive, affective, and psychomotor abilities of students with a very effective category.

IV. CONCLUSION

From the data analysis that has been carried out, it is concluded that the biology practicum guide based on a guided inquiry approach with vee map is categorized as very valid by the validator, very practical by teachers and students, and very effective for students to use in biology learning because it can improve cognitive, affective, and psychomotor.

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REFERENCE

- [1] Alvarez, M. C. & Risko, V. J. 2007. *The Use of Vee Diagrams with Third Graders As a Metacognitive Tool for Learning Science Concepts*. Nashville: Tennessee State University.

- [2] Anam. 2016. *Pembelajaran Berbasis Inkuiri Metode dan Aplikasi*. Yogyakarta: Pustaka Pelajar.
- [3] Anggriyani, R., Lufri, L., dan Zulyusri, Z. 2013. Analisis Kegiatan Praktikum Biologi Kelas X dan XI SMAN 10 Padang Tahun Pelajaran 2012/2013. *Kolaboratif*, 1 (1).
- [4] Fitzgerald, Lee. 2011. *The Twin Purpose of Guided Inquiry: Guided Inquiry Student and Evidence Based Practise*. Sydney: Loreto Kirribilli.
- [5] Hamruni. 2009. *Strategi dan Model-Model Pembelajaran Aktif Menyenangkan*. Yogyakarta: UIN Sunan Kalijaga.
- [6] Kenengsih, Sri. 2017. Pengembangan Penuntun Praktikum Mikrobiologi Berorientasi Inkuiri Terbimbing untuk Mahasiswa STKIP PGRI Sumatera Barat. *Jurnal Saintifik@*. 1 (2).
- [7] Kemendikbud. 2014. Materi Guru Implementasi Kurikulum 2013 Tahun Ajaran 2014/2015 Mata Pelajaran IPA SMP/MTs. Jakarta: Badan Pengembangan Sumber Daya Manusia dan Kebudayaan dan Penjamin Mutu Pendidikan.
- [8] Kilinc, Ahmet. 2007. "The Opinion of Turkish High School Pupils on Inquiry Based Laboratory Activities". *The Turkish Online Journal of Educational Technology*. 16 (4).
- [9] Lufri. 2007. *Strategi Pembelajaran*. Padang: UNP.
- [10] Mariyam, S., Lestari, R., dan Afriyani, E. 2015. Analisis Pelaksanaan Praktikum Pada Pembelajaran Biologi Siswa Kelas VII SMPN 3 Kuto darussalam Tahun Pembelajaran 2014/2015. *Jurnal Ilmiah Mahasiswa FKIP Prodi Biologi*, 1 (1).
- [11] Nengsi, Sari. 2016. Pengembangan Penuntun Praktikum Biologi Umum Berbasis Inkuiri Terbimbing untuk Mahasiswa STKIP Payakumbuh. *Jurnal Ipteks Terapan. Research of Applied Science and Education* 10 (1), 47-55.
- [12] Plomp, T., & Nieveen, N. 2013. *Educational Design Research: An Introduction*. Enschede: SLO. Netrherlands Institute for Curriculum Development.
- [13] Permendikbud Tahun 2013 No. 69. Tentang Kerangka Dasar dan Struktur Kurikulum Sekolah Menengah Atas/Madrasah Aliyah.
- [14] Purtardi, S., & Sari, P. L. 2005. Diagram V (V) Sebagai Alternatif Bentuk Praktis Laporan Praktikum. *Prosiding Semnas Penelitian, Pendidikan dan Penerapan*. Yogyakarta: FMIPA UNY.
- [15] Roehrig, G., Luft, A. J., Edward, M. 2001. "An Alternative To The Traditional Laboratory Report. *The Science Teacher*, 68 (1), 28-31.
- [16] Trianto. 2012. *Mendesain Model Pembelajaran Inovatif-Progresif: Konsep, Landasan, Dan Implementasinya Pada Kurikulum Tingkat Satuan Pendidikan (KTSP)*. Jakarta: Kencana Prenada Media Group.
- [17] Vandon, Ravali, T. M., Small, Margaret. M., Hillery, Barbara & Andreescu, Silvana. 2011. A ersatile , Inquiry-based Laboratory for a High School or College Science Course. *Journal of Chemical Education*, 88. 1119-1122.
- [18] Wenning, C. J. 2005. Levels of inquiry: Hierarchies of pedagogical practices and inquiry processes. *Journal of Physics Teacher Education Online*, 2 (3).