Student Analysis of Handout Development based on Guided Discovery Method in Process Evaluation and Learning Outcomes of Biology

S Nerita*, A Maizeli and A Afza

1Program Studi Pendidikan Biologi, Sekolah Tinggi Keguruan dan Ilmu Pendidikan Persatuan Guru Republik Indonesia Sumatera Barat, Jl. Gunung Pangilun, Padang 25173, Indonesia

Abstract. Process Evaluation and Learning Outcomes of Biology subjects discusses the evaluation process in learning and application of designed and processed learning outcomes. Some problems found during this subject was the student difficult to understand the subject and the subject unavailability of learning resources that can guide and make students independent study. So, it necessary to develop a learning resource that can make active students to think and to make decisions with the guidance of the lecturer. The purpose of this study is to produce handout based on guided discovery method that match the needs of students. The research was done by using 4-D models and limited to define phase that is student requirement analysis. Data obtained from the questionnaire and analyzed descriptively. The results showed that the average requirement of students was 91.43%. Can be concluded that students need a handout based on guided discovery method in the learning process.

1. Introduction

Process Evaluation and Learning Outcomes of Biology subjects are one of the compulsory subjects in Biology Education of Sekolah Tinggi Keguruan dan Ilmu Pendidikan Persatuan Guru Republik Indonesia Padang. This subject discusses the evaluation process in learning and application of designed and processed learning outcomes. Students as prospective educator should be able to master this subject, So they can analyze and evaluate their student’s learning outcomes appropriately.

Some problems found during the evaluation of the learning process, the student to understand material and the subject unavailability of learning resources that can guide and make students independent study. One of them is in the design of knowledge scoring instruments. In addition to the design of the instrument required an understanding of biological materials. For example on the organizational structure of life. Before designing questions, students must understand the content of the material, such as cells, tissues, organs, organ systems and organisms. After that, then students design the question based on the cognitive level of Bloom’s Taxonomy from C1 level to C6 level. This also applies to other biological materials. To design questions, students need help in concept discovery. The solution to solve the problem is to apply guided discovery methods.

Learning with guided discovery method hoping the students are really active learners to find their own materials to learn [1]. Learning based guided discovery method is one of the innovative learning models that can provide active learning conditions to students. This lesson emphasizes the process of
solving problems faced scientifically. Students not only just take notes and memorize the material, but students are actively thinking and can finally make conclusions with the guidance of lecturers [2]. Students learn better when they are led through activities that allow them to discover concepts for themselves (guided discovery) than from the presentation of concepts by an instructor [3].

Learning with guided discovery method can be converted into the handout based on guided discovery method. So required student analysis in developing handout based on guided discovery method. Needs analysis is an important step in terms of developing curriculum and syllabus for different courses. It is necessary to become familiar with students’ objectives, attitudes, learning habits and expectations of the course in order to have an appropriate and suitable syllabus and course design [4]. Needs analysis should be carried out as frequently as possible [5] Teachers have to promote meaningful learning with different tools to respond to student need [6]. The purpose of this study is to produce handout based on guided discovery method that suitable for the students.

2. Experimental Method
This research used 4-D development model [7]. 4-D consists of 4 phase, define, design, develop, and disseminate. This research has done until define stage, that was student analysed. Data collection used questionnaires of student needs analysis. The subjects of this researched were 20 students of Biology Education Sekolah Tinggi Keguruan dan Ilmu Pendidikan Persatuan Guru Republik Indonesia Sumatera Barat. They are 20 until 21 years old which have taken Evaluation Process and Learning Outcomes of Biology subject. Data was taken on 12 January 2017.

3. Result and Discussion
The results of student needs analysis can be seen in Table 1 below.

| No | Question | Choice of Student Answers | Percentage % |
|----|----------|---------------------------|--------------|
| 1  | Do you like learning by using teaching materials? | Yes | 100 |
| 2  | Why are you using teaching materials? | Because the teaching materials help to study independently | 90.48 |
| 3  | Do you have difficulty in learning process without teaching materials? | Yes | 100 |
| 4  | What kinds of teaching materials (print) do you know? | Handout | 95.24 |
| 5  | Do you like the handout as a learning resource in process evaluation and learning outcomes of biology? | Yes | 100 |
| 6  | How is the presentation of the material you expect from a handout? | Guided (directed) to find concepts | 71.43 |
| 7  | What style of language do you like about a handout? | Standard, but not rigid | 85.71 |
| 8  | Do you think it needs to develop handouts for learning process? | Need | 100 |
| 9  | Do you know about guided discovery method? | Yes | 71.43 |
| 10 | Do you think it should be developed | Yes | 100 |
handout based on guided discovery method
in Process Evaluation and Learning
Outcomes of Biology?

Table 1 showed that 100% students like learning to use teaching materials. 90.48% students stated that teaching materials can help self-study. 100% students stated that they have difficulty in lectures without using teaching materials. 95.24% students know that handout is one type of teaching materials. 100% students like handouts as learning resources in Process Evaluation and Learning Outcomes of Biology. 71.43% students stated that they like the presentation of handouts in evaluation lectures by being guided (directed) to find concepts. 85.71% students knew that handouts were one type of teaching materials. 100% students like handouts as learning resources in Process Evaluation and Learning Outcomes of Biology. 71.43% students know about guided discovery methods. 100% students stated should be developed handout based on guided discovery method in process evaluation and learning outcomes of biology.

Based on the data, it can be seen that students like learning by using teaching materials. The teaching materials are all materials are arranged systematically which displays the complete figure of competence that will be mastered by learners and used in the learning process with the purpose of planning and review of the implementation of learning [8]. Teaching materials are preferred by students because it is easier to understand the material. With the teaching materials, lecturers do not have to speak in class, but as facilitators for students. The lecturer's task is not to provide the knowledge that students should memorize, but to prepare a learning environment that enables students to actively build their knowledge. Presence teaching materials can facilitate students to learn independently [9].

The questionnaire analysis also showed that students know and like handout as teaching materials. Handout is written materials prepared by a teacher to enrich the knowledge of learners [10]. With provided handouts, students do not need to write fast without focus on the concepts. Therefore they have more time to listen and focus on the educational content [11]. Students like handouts because the grammar is simpler so it is easy to understand. Furthermore, the preparation of handouts is also in accordance with face-to-face meetings in the semester learning plan, so students are not confused about the depth and breadth of the material and practical in its use.

Questionnaires that have been disseminated also indicate that the student knows about guided discovery methods and needs to be handout development based guided discovery method. Guided discovery method is a method that can guide and direct students to learn independently and find their own knowledge. In this lesson, students are encouraged to learn largely through active engagement with concepts and principles, and teachers encourage students to have experience and experiment that allows them to find principles for themselves. Therefore, it is hoped that with this guided discovery method can improve the learning outcomes of students [12]. Learning using guided discovery methods can improve student learning outcomes [13]. Guided discovery method was more effective than the conventional method in promoting chemistry students' achievement in chemistry [14].

Using active learning approaches like guided discovery learning compared to the traditional methods is more effective for the improvement of problem-solving, decision making, critical thinking, creative thinking and interpersonal skills [15]. Higher order thinking skill can not be developed directly and instantly [16]. This indicates that the guided discovery method influences the students' critical thinking skills.

This guided discovery method can be converted into teaching materials, that is handout based on guided discovery method. In accordance with the results of the questionnaire analysis, that students agreed to do handout development based on guided discovery method. Based on this, it can be seen that the students need the material in the form of handouts based on guided discovery method.

4. Conclusion
The conclusion of this study is that students need a handout based on guided discovery method in the learning process.
Acknowledgments
Our thanks to Kementerian Riset, Teknologi dan Pendidikan Tinggi who have funded this research.

References
[1] Suherman E 2003 Common TextBook Contemporary Learning Math Strategy (Bandung: JICA Universitas Pendidikan Indonesia) p 212
[2] Widdihartono R 2004 Model-model Pembelajaran Matematika SMP (Departemen Pendidikan Nasional) p 5
[3] Achera L J, R R Belecina and M D Garvida 2015 The Effect of Group Guided Discovery Approach on the performance of Students in Geometry International Journal of Multidisciplinary Research and Modern Education (IJMRME) p 339
[4] Moiinvaziri M 2014 Students’ Voice: A Needs Analysis of University General English Course in Iran Journal of Language Studies p 57
[5] Todea L and R Demarcsek 2016 Needs Analysis for Language Course Design. A Case Study for Engineering and Bussines Students IOP Conf. Series: Materials Science and Engineering 200 (2017) 012064 p 9
[6] Herold J F 2014 A Cognitive Analysis of Students’ Activity : An Example in Mathematics Australian Journal of Teacher Education p 151
[7] Thiagarajan S, Dorothy S S, and Melvyn I S 1974 Instructional Development for Training Teacher of Exceptional Children (Indiana: Indiana University) p 6-9
[8] Prastowo A 2012 Panduan Kreatif Membuat Bahan Ajar Inovatif: Menciptakan Metode Pembelajaran yang Menarik dan Menyenangkan (Jogjakarta: Diva Press) p 180
[9] Dimas A, Cari, Suparmi, Sarwanto, J Handhika 2016 Profil Analisis Kebutuhan Bahan Ajar Mahasiswa Materi Dinamika Gerak pada Mata Kuliah Fisika Dasar Prosiding Seminar Nasional Fisika p 42
[10] Majid A 2008 Perencanaan Pembelajaran Mengembangkan Standar Kompetensi Guru (Bandung: Remaja Rosdakarya) p 172
[11] Avval F Z, I. Jarahi, K Ghavzini and M Youssefi Distribution of Handouts in Undergraduate Class to Create More Effective Educational Environment International Journal of Education and Research p 5
[12] Nurhari 2004 Pembelajaran Kontekstual dan implementasinya pada KBK (Malang: UM Press) p 122
[13] Juwendi, Sumadjii, T C Wulandari 2016 Penerapan Metode Penemuan Terbimbing untuk Meningkatkan Hasil Belajar Siswa Prosiding Seminar Nasional Matematika 2016 Universitas Kanjuruhan Malang p 177
[14] Akani O 2007 Effect of Guided Discovery Method of Instruction And Students’ Achievement in Chemistry at the Secondary School Level in Nigeria p 6226
[15] Makoolati N, M Amini, H Raisi, Sh. Yazdani, AV. Razeghi The Effectiveness of Guided Discovery Learning on the Learning and Satisfaction of Nursing Students Hormozgan Medical Journal p 494
[16] Fianti, F L Najwa, S Linuwih 2016 Development of Open Ended Problems for Measuring The Higher-Order-Thinking-Skills of High School Students on Global Warming Phenomenon IOP Conf. Series: Journal of Physics: Conf. Series 824 (2017) 012008 p1