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Analyzing the Development of Handouts on Strategy and Instructional Design of Biology Subject

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***Abstract*—The material of strategy and instructional design of biology are applicable. Students are required to be able to apply it in the tasks and use it in teaching and learning process in school later. The results of the reflection showed the students get difficulty to apply the concept of material because lecturers don't have their own materials that appropriate with the product of learning. The student and lecturer use learning resources from the printed books only. The development of learning materials in the form of handouts is needed in this subject. The purpose of this research is to analyze of curriculum and learning resources (handout). It will be developed in the course of the strategy and design of learning biology. The method of this research is the development of ADDIE: Analysis, Design, Develop (development), Implementation (implementation) and evaluation. The results obtained the students need learning materials in the form of handouts accompanied mind map to understand topics in instructional design strategy of biology subject.**

Keywords—the analysis, development, handouts

I. INTRODUCTION

Based on the results of the interviews and lecturers reflection on instructional design strategies, it was found some problems; (1) the lack of ability of students in mastering the material because almost materials are applicative. The students get difficulty to apply the concept of material during doing a task. (2) The lecturer does not have learning materials that appropriate with the product of learning (3) in the class, student only utilize learning resources from books.

To overcome the learning problems above, the lecturers need a handout. Handouts are printed materials containing summary or portions of material. According to Steffen and Peter Ballstaedt in [1], the function of a handout are (1) assist the learners in order not to have to take note of, (2) as a companion to the explanation of the educators, (3) reference materials as learners, (4) Motivating learners in order to more enterprising learning, (5) reminder of the fine points of the material taught, (6) give feedback, and (7) assess the results of the study. Granting of student handouts are very helpful to deepen his knowledge and students in the learning process begin directional since it has ingredients in the form of handouts and instructional guidelines the form of the syllabus and lecture contract [2].

Then, some advantages of handout; the students learn as his ability, they can repeat their material based on sequence logically, the combination of text and images improve students understanding material [3].

In arranging handout, there are some stages to do. First, analyze the curriculum. Then decide the title that appropriate with basic competence and achievement. Write the content. After that, evaluate it and use any sources. Handouts were developed along with mind map. Mind map is a method to manage information as a whole. This method was popularized by Tony Buzan [4]. He revealed that the making of the record and the grouping of the mind designed to meet the needs of the entire brain which must include not only the words, numbers, series and also the lines but also with color, images, dimensions, symbols that or mind map mind mapping [5].

The benefits of mind folder are planning, communicating, be creative, save time, solve the problem, the focus, compile and clarify thoughts, given better, learn more quickly and efficiently and see a picture of the whole. The use of mind can save information folder is short term, long term and exercising critical thinking in students [6]. Moreover, it can enhance the knowledge of students because it emphasizes interactive learning and experience [7]. A mind folder is also a relevant, practical and effective way to guide the students ' questions and contribute to the learning objectives [8].

The purpose of this research is to analyze the curriculum on the subject of strategy and instructional design of biology. The results of the analysis will be used to design a handout that will be developed.

II. METHOD

The research was carried out on students and lecturers at STKIP PGRI West Sumatra, on the even semester academic year 2017/2018. Research design uses ADDIE model development. This model consists of 5 steps: analysis, design, development, implementation, and evaluation (Figure 1. Flow Chart of Study).

A. Analysis

This stage aims to analyze the syllabus curriculum, namely the analysis of the standard of competence, basic competence, indicators, and material. Curriculum analysis is conducted to find out and classifying the syllabus developed by the Group of the field of study courses and instructional design strategy of biology, biology courses education STKIP PGRI West Sumatra. Analyzing learning resources to (1) identify the materials and design of strategies of learning biology, (2) identify problems that faced students in understanding learning resource material on courses and instructional design strategy of biology, (3) determining

strategy and design learning materials of biology that will serve as a handout.

To view the analysis of curriculum and learning resources can be in the analysis the analysis by using the analysis sheet is given to students who take courses and instructional design strategy of biology.

1) Design

This stage aims to design the planning of learning materials in the form of handouts of courses biology learning strategies and the design of the curriculum analysis results and analysis of learning resources.

2) Development

The purpose of this stage is to make appropriate handouts for instructional design strategies of biology subject.

3) Implementation

This stage is tryout. It use of the handouts accompanied mind folder to students who are following the course of the strategy and design of learning biology STKIP PGRI West Sumatra Padang.

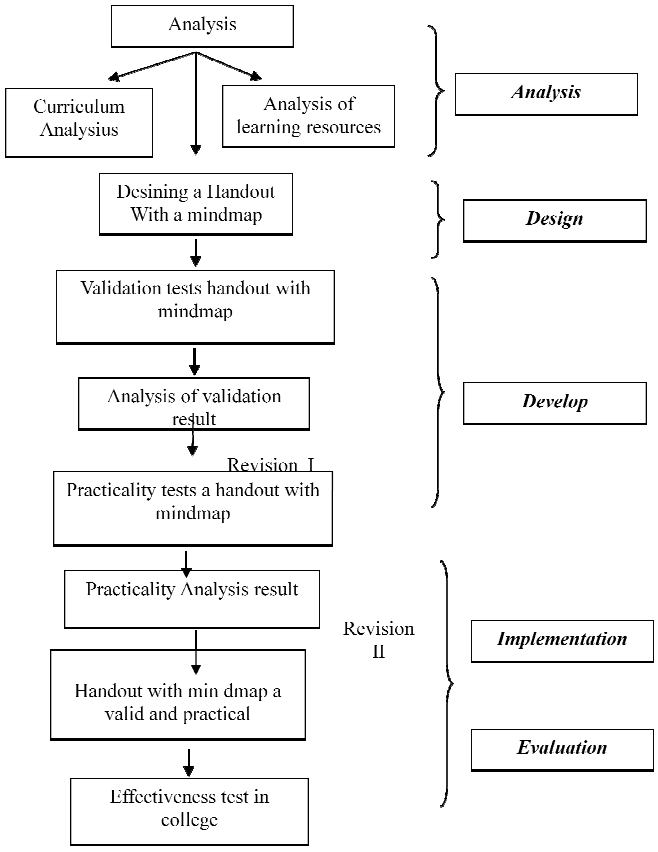

Fig. 1. Flow Chart Research

4) Evaluation

The assessment stage is the stage to revise handouts in accordance with suggestions and criticism, which is done from the process design, define, development and implementation On this research were conducted at the stage of analysis i.e. analysis of the syllabus, the analysis of the sources learn. Analysis syllabus implemented by way of discussion and interviews with professors of courses and instructional design strategy of biology STKIP Biology education courses PGRI West Sumatra.

Analysis of learning resources is done by way of analyzing the needs of college students and an analysis of the literature. The student needs analysis carried out by means of distributing question form to students to find out the needs of the student towards learning materials, while the analysis of the literature was conducted to select the book or source material that can be used in the preparation of material handouts.

III. RESULTS AND DISCUSSIONS

A. Analysis Syllabus

From the results of the analysis of the syllabus, then obtained the result that nothing much learning graduate courses must be owned by the students of Biology education courses after graduating from courses biology instructional design and strategy, namely:

1) Attitudes and values:

After studying the course strategy and design learning biology, students have the attitude and values, as follows:

a. Internalize the values, norms, and academic ethics.
b. Able to be a model for learners as citizens are religious, law-abiding, tolerant, and responsible.
c. Be able to communicate verbally and in writing and have high integrity and discipline.
   Have a spirit of serving and compete healthily as well as having sensitivity and concern for the environment (society, nation, and State).

2) General Skills

After studying the course strategy and design learning biology, the students have the skills, as follows:

a. Able to apply logical thinking, critical, systematic, innovative, and measurable quality in doing work in the field of specific expertise as well as in accordance with the standards of the working field of competence is concerned.
b. Able to demonstrate performance quality, independent and scalable
c. Able to take responsibility for the achievement of the results of the group work and supervision and evaluation of the completion of the work commissioned to a worker under his responsibility.
d. Able to do the process of self-evaluation against the Working Group under its responsibility, are able to manage their learning independently.
   Intelligent sorting and selecting the appropriate evaluation tools and media curriculum he teaches with practicing conservation value and growing character of his protégé participant
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3) Specific Skills

After studying the course strategy and design learning biology, the students have the skills, as follows:

a. Able to communicate the results of problem-solving learning biology in a variety of formal or informal

forum to aid efforts improved quality of learning biology.

b. Able to take the decision quality improvement learning biology in the classroom as well as in schools based on the results of the reflection of learning conducted independently as well as collaboratively
c. Able to take charge of his duties as a teacher as well as a demonstrated work ethic and responsibility, a sense of pride and confidence as a teacher, and communicate effectively, based on the code of ethics teachers, good school, as well as in processed the community.

4) Knowledge

The student has the knowledge, as follows:

a. Master the concepts, principles, and procedures of the basic biology of the scientific work through a minimum in accordance with the depth and breadth for learning biology in schools.
b. Master the theory and principles of a profound education so that they can apply them in accordance with the latest education in biological materials,
c. Master the curriculum and its implementation strategy,
d. Master the methods, models, approaches, media and evaluation/assessment service learning in the field of Biology education in all schools to implement medium.

To realize the close-close the learning process of learning done face-to-face meeting 16 times (1 semester). In RPS, a form of learning that is used already vary, i.e. methods lectures, q & a discussion of classical, awarding the task group and the granting of independent tasks.

Lecture activities need a guide/handout/module that is able to steer students in finding information independently to realize there is nothing analytical study Of the results of the needs analysis curriculum above can be known, that for close to the learning courses embody the strategy and design of learning biology, it takes handouts that have nothing much to learn that are in accordance with the RPS and must be able to lead students to master concepts, then the learning materials that it deems fit with nothing much learning is a handout.

B. The analysis of the literature

Telaahan literatur bagi suatu penelitian atau terhadap penulisan karya ilmiah, bagian ini dalam penelitian diungkapkan sebagai jembatan berkonsep (*conceptual bridge*) untuk mengungkapkan beberapa hal yang sangat penting dalam pengajuan penelitian [9]. Dalam menghasilkan suatu telaahan literatur, 4 (empat) langkah berikut menjadi panduan bagi para peneliti/penulis:

Cari literatur yang sesuai dan pindai secara efisien literatur dari sumber informasi.

Nilai literatur melalui sejumlah kriteria.

Periksa dan analisis isi literatur secara sistematis.

Sintesis isi literatur [10].

Literature analysis activity is an activity that is conducted to collect materials related to design a handout. The material used is textbook about learning strategies, the development of learning materials, as well as learning devices from multiple authors and publishers, comply with the material and associated strategies and the design of learning biology.

A textbook used is print version and the online version. For example, models of learning material used from Slavin book. This book discusses several models that can be used as an alternative in the process of learning by teachers. This book is also one of the book's sourcebook with a category the main sources in the preparation of handouts on learning models.

Books published by the Ministry of national education of the learning model is also used, this book is obtainable for free dr Web. This book described the material models of learning tailored to the learning model is recommended in the curriculum that is currently in effect. For example model inquiry, discovery learning and others that correspond to the process of learning in the curriculum of 2013. It is becoming a reference in the creation of handouts because the prevailing education curriculum is a curriculum of 2013.

Not all of school apply curriculum 2013, some of them school apply In addition to the curriculum of 2013, there is still a valid curriculum at every level of the school curriculum and KTSP curriculum i.e. 2013 revised edition. Changes to the curriculum were made a foundation in development handouts in terms of the depth of the material. The material is presented in the form of a model of learning, and the learning device clearly discussed on the basis of the curriculum.

Textbooks do not constitute the only one used in the preparation of handouts. The journal is also used as a reference in the preparation of material on handouts. This is because of so much of the results of research conducted by the researcher. The results of this research provide benefits in the development of science and complete expected to be a concern in education.

Textbooks are not the only source used in preparing handouts. The journal is also used as a reference in the preparation of material on the handout. This is because so many results of research conducted by researchers. The results of this study provide benefits in the development of science and are expected to solve problems in education. the journal gets online. Online, as it is easier, using a search engine, such as Google Scholar (https://www.google.co.id/), certain headlines can easily classify several scientific works from the most referenced to the slightest similarity in the canopy [11].

Every researcher through his knowledge in methodology research needs to examine and analyze the contents of the literature systematically. First, the feasibility of a document to be used as literature is examined in accordance with the requirements in the literature review and its importance in research / writing. Each literature contributes to the literature review for a study / writing, but the literature must be categorized according to its importance [10].

C. Analysis of college students

According to the results of research that 53% of the students learning style is visually. Students who visually have the following characteristics: regular, pay attention to everything, maintain appearance, remember images, prefer to read rather than read and need a comprehensive picture and purpose [12].

Characteristics of learning for students of visual are namely:

1. the lecturer stands calm when presenting the information segment, and moves slowly between the segments;
2. encourage students to describe information, by making diagrams, symbols and color images in Visual student notes;
3. Tables and Graphs will deepen the understanding of Visual students, especially in mathematics, engineering, or science;
4. the creation of mind maps / concept maps will be very helpful Visual students in providing an "overall picture" of a concept;
5. use visual symbol languages in lecturer presentations that represent key concepts;
6. familiarize students to record material / information again using interesting colors / images;
7. pay attention to lighting or lighting the room when learning / learning takes place.
8. use learning media in the form of Books, magazines, Posters, Computers/LCD, Collages, Flow charts, Highlighting, keywords displayed around the class, writing with attractive colors [13].

To analyze the needs of the student towards learning materials can be seen in table 1.

TABLE I. THE RESULTS OF THE ANALYSIS OF THE NEEDS OF THE STUDENTS AGAINST THE HANDOUT

No.	Component	The total number of	%
1.	In the course of the strategy and design of learning biology, Whether lecturers use learning materials (*Powerpoint* learning and textbook) in doing the learning process	48	100
2.	What is the need for the development of learning materials on the subjects of strategy and design learning biology in the form of handouts, so that learning brothers better understand the material in lectures	48	100
3.	Do you agree, if course handouts and instructional design strategies that will be developed biological accompanied mindmap	47	98
4.	Apakah saudara tertarik dengan handout pembelajaran pada mata kuliah strategi dan desain pembelajaran biologi disertai mindmap	48	100
5.	Whether the brothers agree if handout learning strategy and learning biology consist of design, cover, editorial page, preface, table of contents, mindmap, learning material, evaluation, and bibliography.	48	100
6.	Do you agree if the handout learning strategies and the design of learning biology contains a mindmap to help so college student better understand the topics studied	47	98
7.	Do you agree if there's a mindmap on the colored learning handout so that it looks more interesting	48	98
8.	If you have handouts on learning strategy and design courses of learning biology, whether emo agree with using Times New Roman on handouts?	46	96

From table 1 it can be known, that in lectures and instructional design strategy of biologists, professors already using power point in the media convey a point-point material. In addition, the relevant textbooks are already used in the process and associated costs to improve students ' understanding of the need of the development of learning materials in the form of handouts that are equipped with mindmap.

Handouts that are developed are presented with several components namely, cover, editorial page, preface, table of contents, mindmap, learning materials, and evaluation bibliography. Mindmap is created with variations in color and comes with an image that suits the material and associated costs. Conclusion on analysis of student needs, namely the students very much agree with the handouts on courses biology instructional design strategies and accompanied by a mind map.

IV. CONCLUSIONS

Based on the results of the analysis, the curriculum can be used, namely to realize the learning strategies and design courses of biology learning, which are needed for those who have learning abilities that are in accordance with RPS, and must be able to learn concepts, then the materials that match learning outcomes are handouts.

The results of the literature analysis state that the materials used in the design of handouts are textbooks about learning strategies, development of teaching materials, and learning tools from several authors and publishers in accordance with the lecture material on strategies and biology learning design. Compiled handouts are based on textbooks from both the printed and digital versions. This book is the main source book in designing handouts. Apart from textbooks, the material on the handout was designed based on the results of the research from the journal. Journals are a supporting source for compiling handouts. Each chapter in the handout is equipped with mindmap. Making mindmap aims to describe the contents of the material in the chapter, making it easier for students to understand the concepts that must be mastered.

Mind maps supported with color and images in describing the material. The handout folder also comes with cover, editorial page, preface, table of contents, learning material, evaluation, and bibliography. The kind of writing on the handout is times new roman type.

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