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Developing Pocket Book of Laboratory Safety for Students in SMA Negeri 1 Taman

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Abstract. This works describes a study of developing pocket book of laboratory safety in SMA Negeri 1 Taman. Developing of the pocket book is to increase the awareness of laboratory users (students and teachers) and minimize the work accidents in the laboratory. Based on the observation of the researchers only 38.2% of users in the laboratory have awareness of laboratory safety. The Pocket book was developed using 4-D model that modified to 3-D. The result of the validity is 80,0% which indicates that the pocket book deserves to be used. And the students responses is 87,5% which shows that the students are very enthusiastic.

Keywords: Laboratory safety, Pocket book

INTRODUCTION

Laboratory is a place where students and teachers are doing the experiment. The experiments were performed using a variety of chemicals, equipment and instrumentation special glasses that can cause accidents. Safety in the laboratory is a dream for every researcher, who are aware of the health, safety and comfort of work. Accidents could have been prevented and minimized, because accidents cannot happen by itself. Accidents can be prevented by determining the efforts of supervision over the proper safety effectively and efficiently. The main factors causing accidents is environment and the worker. However, the majority (85%) of the accidents are caused by human factors (Meriati, 1998).

Students of SMAN 1 Taman is very alarming. The awareness of used personal protective equipment (PPE) is very low. Personal protective equipment is the simplest in the school lab coats. But in practical activities and experiments students rarely use. This is due to low awareness of students and teachers as well as the absence of real sanctions for students who are negligent in practical activities. Failure in the laboratory can lead to accidents that not only experienced by the practitioner (the students) but also on laboratory workers. Based on field observations indicate researchers from 34 students in one class that uses a lab coat when practicum course only 13 students (38.2%). While the rest did not use. Based on a questionnaire distributed to teachers researchers users biology and chemistry laboratory showed that only 57% who pay attention to safety in the laboratory by reminding students to use a lab coat. While knowledge on safety hardly any teachers who understand it. This can be realized because of the introduction to the laboratory is included in the basic competence both in biology and chemistry.

The book is one type of print instructional materials. While the pocket book is printed teaching materials are smaller than textbooks. Basically the same pocket books with text books differ only in terms of size and presentation. According to Kamus Besar Bahasa Indonesia (2012) is a book-sized pocket book small portable that can be inserted into a pocket. Generally, safety book exists only in the laboratory and into the inventory of laboratory personnel, and safety warnings only in the form of posters in the laboratory and rarely noticed students. To the researchers will develop a handbook of laboratory safety and applies to the use of biological and chemical laboratories in SMAN 1 Taman.

MATERIALS AND METHODS

This pocket book was develop by modifying the model 4-D to 3-D:

Define

The define stage is to obtain information about the needs that exist in the field to help develop existing instructional media.

Design

The design stage is done to design a prototype product development. The prototype is a preliminary draft which is the basic form of product development.

Develop

The aim of this development stage is to modify the prototype with the evaluation and revision before it becomes effective product.

Data Analysis

The data that obtained in this research is the development of qualitative and quantitative data. The

qualitative data obtained from the study by the teacher. The results are analyzed described and used as a reference in making revisions to the development of a paperback book. Quantitative data obtained from the validation of a questionnaire given to teachers and students.

Data analysis techniques to study the questionnaire responses of teachers and students in this development study quantitatively analyzed descriptively. As a basis for a decision to revise the pocket book, used the criteria of measurement variables adapted from Riduwan (2011) research.

Table 1. Response validation by students.

The average score	Interpretation
0% - 20%	Very Less
21% - 40%	Less
41% - 60%	Enough
61% - 80%	Good
81% - 100%	Very Well

Note: (Riduwan, 2011).

Pocket book can be said to be feasible and effective when the average percentage of validation questionnaire media expert, material expert and student response reached above 61%.

RESULTS AND DISCUSSION

Results Development of laboratory work safety pocket book:

Define

The purpose of this phase is to establish and define the requirements for safety in high school laboratory work by conducting an analysis of the physical conditions of the laboratory and chemicals that are in high school laboratory. Activities in this phase is the front end analysis, analysis of students, and analysis of the concept.

Based on observations of researchers to guide students to use class X students of both biology, physics and chemistry can be concluded that, most books do not discuss special secaa concerning safety in the laboratory. So it is understandable that the student skills and understanding of the safety in the laboratory SMAN 1 Taman is very low or even none at all.

The high school students are range between 15-18 years. At this age, students' ability to understand symbols, images and excellent exposure.

Design

To produce the initial product pocket book, there are several steps, the first of which is the process of preparing a handbook. The preparation of a handbook consisting of: 1) a cover that contains the logo SMAN 1 Taman, the title of a paperback book Handbook: Work Meticulously Job Congratulations, author's name and institution that houses the author, 2) Preface, 3) a list of the contents of a paperback book, 4) section there is a description of the contents of safety in the laboratory, 5) contains a bibliography of the literature used in the preparation of a paperback book, and 6) the back cover pocket book.

Pocket book is then processed by a computer, including the process of typing a paperback book, design, lay out, and finishing or pocket book making final arrangements. The results of this booklet subsequently printed results of this booklet in the form of draft 1 which will be refined at a later stage, the stage of development.

Develop

Before applied or tested this booklet through the stages of validation by the teacher. The validation results are showed below:

Table 2. Results validation.

Aim	Aspect	Scores of teachers			Average	Percentage (%)
		Biology	Chemistry	Art		
Legibility	Simplicity	4	5	4	4.33	86.67
	Accuracy of Language	5	4	4	4.33	86.67
	Size and Fonts	4	4	4	4.00	80.00
	the attractiveness	5	4	5	4.67	93.33
	Room	4	4	4	4.00	80.00
Use	Ease of Use	4	4	4	4.00	80.00
Display Quality	display Media	3	4	5	4.00	80.00
Quality Content	Accuracy of Content	4	4	3	3.67	73.33
	material interests	4	3	3	3.33	66.67
	completeness material	4	4	3	3.67	73.33
Average					**4.00**	**80.00**

This stage is to validation the pocketbooks. Through this stage pocket book will get a revision depends on the judgment of teachers. The qualitative data in the development of a paperback book in the form of study (criticism and suggestions / feedback) in general about the pocket book.

To study the pocket book done by a biology teacher Mrs. Nanik Mudjiastuti, M.Pd, chemistry teacher Mrs. Maisaroh, M.Pd and art teacher Mrs. Kristanti Handayani, S, Pd. The results of the study of teachers' pocketbooks are:

1. Material Safety is more focused on the tools and materials that exist in schools.
2. The book is too thick.
3. Too many posts, the use of images and symbols are preferred.
4. Examples of events are made as close as possible to that experienced by students in the school laboratory.

From the table 2 shows the results of the revised booklet created by the researchers showed that a handbook has been fit for use by the average percentage of validation of teachers is 80%, which means Eligible. Pocket book will be tested on a limited basis.

Implementation of the trials carried out in class X MIPA 3 with 32 students who have not done at all lab activities, both in the laboratory of Biology and Physics and Chemistry. So that the students' knowledge of laboratory work safety is still lacking. The provision of this booklet performed 2 days before students doing practical observation of microscopic fungi. In addition to providing a paperback book, the researchers also shared student questionnaire responses to the pocketbook and analyze it.The trial questionnaire results can be seen in the table below:

Table 3 Results trial limited.

Aim	Rated aspect	Percentage(%)
Attractiveness	Cover Display Pictures	87.50
	Attractive pocket book title	93.75
	Letters are used readability	84.38
	The design and content of the book interesting	93.75
Matter	The material content of the book is easy to understand	78.13
Average		**87.50**

From the results of limited testing conducted showed that the average score of 87.50%, this can be interpreted that this booklet is very appropriate to be applied in learning activities in the science lab SMAN 1 Taman.

Figure 1 The pocket book.

CONCLUSIONS

The conclusions that can be drawn from this study are as follows:

1. The process of developing a handbook performed using 4D has been simplified into 3D, That Define, Design, and Develop.
2. The results demonstrate the validity of the teachers score 80.0% which indicates that the pocket book deserves to be used.
3. From the student questionnaire responses indicate a score of 87.50% which shows that the students are very enthusiastic and can receive the pocket book as a book of safety in the laboratory SMAN 1 Taman.

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