

Feasibility Study of Smash Book based Guided Inquiry as Chemistry Learning Media on Buffer Solution Material

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Abstract: Less interesting and less engaging in chemistry learning media makes chemistry learning boring and difficult. Smash book based guided inquiry on buffer solution material is an innovative development of chemistry learning media that facilitates students to studies in an interesting, active and creative way. The aim of this development research is to test the feasibility of smash book based guided inquiry media as chemistry learning media on buffer solutions material. This research uses R & D research design. Instrument in this research is questionnaire of feasibility smash book media on buffer material from validators and students. The data was analyzed using descriptive technique. The result of research and development shows that the smash book based guided inquiry is feasible to be used as chemistry learning media on buffer solutions material.

1 INTRODUCTION

Education is a conscious effort that aims to develop the quality of human beings as an effort to realize the common welfare and the life of the Indonesian nation. Implementation of education is in a continuous process in each type and level of education as well as related in an integral or integrated education system. One way to implement the goals of education is through learning.

Learning is basically an effort to help learners do learning activities. Learning process is also a process of communication between the sender of the message to the recipient of the message. The process of delivering such messages can be made easier by using certain media called learning media.

Learning media is anything that can facilitate teachers to teach and facilitate students learn learning materials. In the process of learning, learning media is a container and channel message from the source message, the teacher to the recipient of the message in this case students (Mahnun, 2012). One of the main functions of learning media is as a teaching tool that also influences climate, condition, and learning environment arranged and created by teacher. Selection and use of learning media must be tailored to the purpose and characteristics of the media itself. In addition, the selection of media must

also consider the conditions and facilities of the fulfillment of the media. The role of instructional media is not only as a tool to convey teacher messages to students. Moreover, the learning media is expected to attract participants to learn more about the content of the material presented by the teacher.

Media learning continues to grow more creative and innovative. The development of learning media aims to create an effective and efficient learning media innovation in helping students learn the material. Learning media developed should pay attention to the purpose of learning, the needs of students and trends. Because, if the learning media developed does not pay attention to these three aspects, then the learning outcomes will not be optimal.

Another important thing to consider in developing instructional media is the educational paradigm. The educational paradigm that is being implemented in Indonesia is constructivism. According to Pali, constructivism is an educational paradigm that considers teaching is not the activity of transferring knowledge from teacher to student, but for the creation of an atmosphere that allows students to build their own knowledge. Teaching means active participation of teachers and students in building knowledge, making meaning, seeking

clarity, being critical and justifying (Iskandar 2011: 14-15).

Learning media that have been developed by researchers in the form of a smash book based guided inquiry on the material buffer solution. Smash book is becoming a growing trend among teenagers. Wilson defines a smash book as a journal book that is decorated and has a specific theme, containing writing and some images or decorations that are intentionally affixed using glue (Wulandari, 2015). Smash book is a medium to write or draw a similar diary but has a more creative and interesting appearance. Basically, a smash book is a personal journal book that someone has to store memories, moments, and musings. Because the display of smash book is unique and interesting, it allows smash book is used as a learning media that is expected to optimize learning outcomes.

Today the term inquiry becomes important, because inkuiri is the main strategy in learning science (Iskandar, 2011: 17). Wenning (2006) in Aprilia (2015) states that inquiry learning strategy is a series of learning activities that train students to learn to seek knowledge or information, or learn a symptom. According to Gormally et al (2011) in Pratiwi et al (2015) the type of inquiry that is suitable for high school level is guided inquiry, since guided inquiry provides more direction for students who are not ready to solve problems with open inquiry because of lack of experience and knowledge or has not reached the level of cognitive development. The use of guided inquiry is also intended to facilitate the management of time and class, as well as to reduce misconceptions that may occur during learning (Cheung, 2007). Here are the advantages of guided inquiry learning: cultivating students' curiosity, open-minded students, increasing students' self-confidence, being aware of science, liking and upholding the values of science, skilled in using logic, critical thinking, integrating skills of science processes, using mathematical operations, communicating (Iskandar, 2011: 44), and solving problems (Fitriyani et al, 2017).

Buffer solution is one of the materials on the chemistry subjects studied by high school students. The material often has a low learning mastery. The material has the prerequisite materials of acid-base and stoichiometric solutions. The buffer material has conceptual and mathematical characteristics. The concept of buffer solution related to macroscopic, microscopic and symbolic aspects requires a medium that can solve the problem of chemical representation in the learning activities of buffer solution (Gustiani, 2013). In

addition, the number of mathematical calculations that must be studied in the material buffer solution requires an interesting learning media and encourage learning activities so that students not only memorize the formula to solve mathematical problems

Learning media smash book based guided inquiry learning that has been made is tested its feasibility by 3 experts, that is 2 chemistry lecturer and 1 Chemistry teacher. The media feasibility test includes aspects of content, presentation, language and graphics. In addition, the feasibility of smash book based guided inquiry can also be seen from the responses of a number of students. The feasibility test results are expected to be a consideration for teachers to use smash book base guided inquiry in chemistry learning.

Based on the above explanation, this study aims to:

- 1) Produce smash book based guided inquiry on buffer solution material.
- 2) Knowing the feasibility of smash book based guided inquiry on buffer solution material.

2 METHOD

This research used the Research and Development (R & D) design. The following stages are: 1) potential and problem, 2) data collection, 3) product design, 4) design validation, 5) design revision, 6) product trial, 7) product revision, 8) trial usage, 9) product revision and 10) mass production (Sugiyono, 2011: 298). But due to time and cost constraints, researchers do not perform mass production stage.

In the potential and problem stages, researchers identify problems that arise in the learning of chemistry, such as lack of interest and motivation of students to learn chemistry, low student learning outcomes, learning resources, media and learning activities that tend to monotonous. Researchers judge that the use of learning media can overcome the above problems.

At the data collection stage, researchers began to study the literature on learning media that is a trend among teenagers. Researchers assess that smash book as one of the learning media can be applied to the learning of chemistry because of its unique appearance. In this case, researchers also feel the need to adapt guided inquiry strategy in the development of smash book media so that students' learning activities are not monotonous.

At the design stage of the product, researchers first conduct an assessment of student learning resources such as books and LKS. From these activities it is known that the display of books and chemical LKS tends to be monotonous. After the assessment, the researcher begins to define the objectives and topics of learning, define the problem, develop the hypothesis, find information from various sources related to the buffer solution, and determine the smash book decoration.

In the design validation phase, the researcher asked 3 experts to rate the smash book that has been made. Each expert is required to assess the feasibility of smash book media from the aspect of content, presentation, language, and graphic, so it can be known weaknesses and superiority of products made.

In the design improvement phase, the researcher improves the product that has been made based on input from 3 experts. The revised product can then be tested to a particular group. In the test phase, the product is tested to 10 students of grade XI IPA SMA Muhammadiyah 1 Banjarmasin.

At the product revision stage, researchers refine the smash book based on feedback from the product trial subjects. The revised product is then tested again at the trial stage of usage. At the trial stage of use, the researchers used post-test nonequivalent control group design to assess the success of the product made. In this design, the experimental and control groups were selected without random placement procedures and performed both pretest and posttest. It's just that the control group is not given a particular treatment (creswell, 2009: 160). At the end of this test phase, the researcher asks all students in the experimental group to respond by filling in the shared questionnaire. The student's response to the experimental group will then be used as feedback on the revision phase of the product.

There are 3 Instruments used to collect data in this research are: (1) questionnaire of smash book filled by 3 experts, (2) questionnaire of smash book readiness filled by 10 high school students of class XI, (3) response questionnaire filled by students from the experimental group. The data obtained from the questionnaire is analyzed descriptively quantitatively by calculating the percentage of value provided by the expert and students.

3 RESULTS AND DISCUSSION

The result of this research is learning media in the form of smash book. In the smash book there are 8

subtopics of learning, namely: (1) definition of buffer solution; (2) components and means of making acid buffer solution; (3) components and means of making basic buffer solutions; (4) calculation of pH of acid buffer solution; (5) calculation of the pH of the base buffer solution; (6) pH and how acid buffer solution works when added water, acids and bases; (7) pH and the working of an alkaline buffer solution when added water, acids and bases; (8) the function of the buffer solution in the body. The presentation of each subtopic uses guided inquiry strategy, consisting of the stage of problem formulation, hypothesis formulation, hypothesis testing and conclusion drawing. However, the smash book is developed, the stages are not written in Indonesian, but written in English is quite popular among students to look different than other types of print media. The first guided inquiry stage is the formulation of the problem. At this stage students are given a phenomenon, data, or giving examples and non-samples, then students are guided using supervisor questions so that students can understand the problems that have been formulated. Furthermore, in the second stage of the hypothesis formulation, students are asked to write down the alleged or temporary answer to the given problem. In the third stage of hypothesis testing, students are asked to study the literature, analyzing the illustrations of images or data provided. In the fourth stage of drawing conclusions, students are asked to write conclusions in the places that have been provided.

In addition to paying attention to aspects of content and presentation, the development of smash book also pay attention to the decoration aspect. In the developed smash book there are many ornaments such as paper clips, cartoon pictures, origami papers, quote, ice cream sticks, page delimiters and others are deliberately affixed to increase the attractiveness of the resulting learning media. In addition, the developed smash book also provides prerequisite materials that can be completed or completed by each student before studying the material in the core activities. Examples of smash books that have been developed can be seen in Figure 1, 2, 3, 4, 5, and 6 below.

Smash book based guided inquiry that has been made is tested its feasibility by 3 experts, consisting of 2 chemistry lecturers from Lambung Mangkurat University (ULM) and 1 chemistry teacher. The results of the media feasibility test can be seen in Table 1.

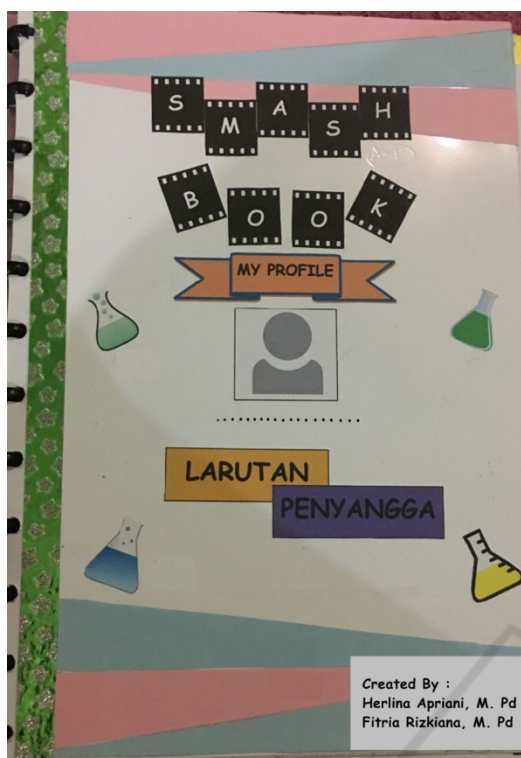


Figure 1: Home page of smash book.

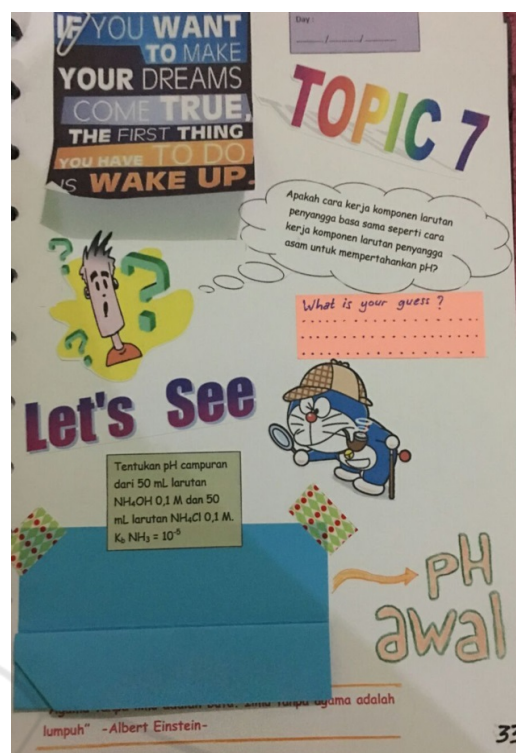


Figure 3: There are inquiry activities in smash book.

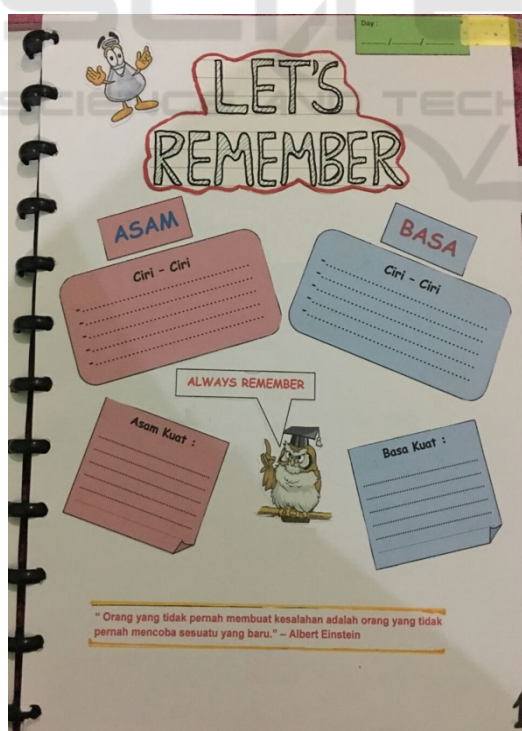


Figure 2: There are quotes, cartoon pictures and prerequisite materials in smash book.

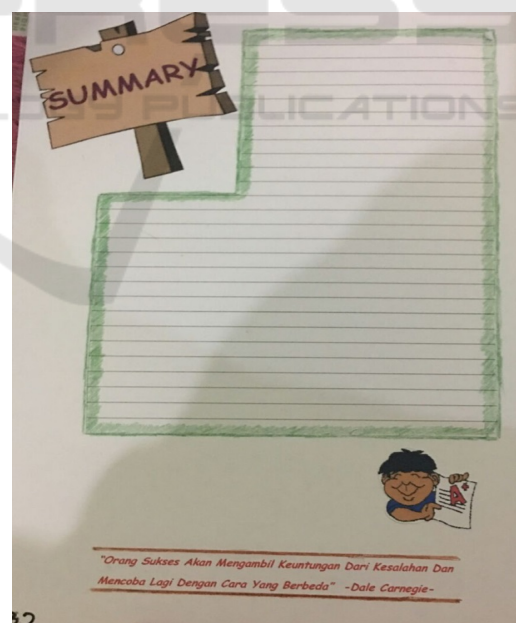


Figure 4: there are place to write conclusions

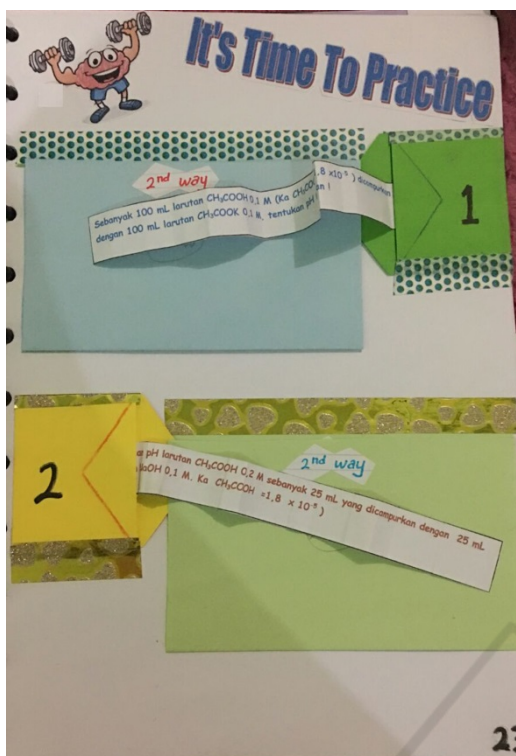


Figure 5: There are practices.

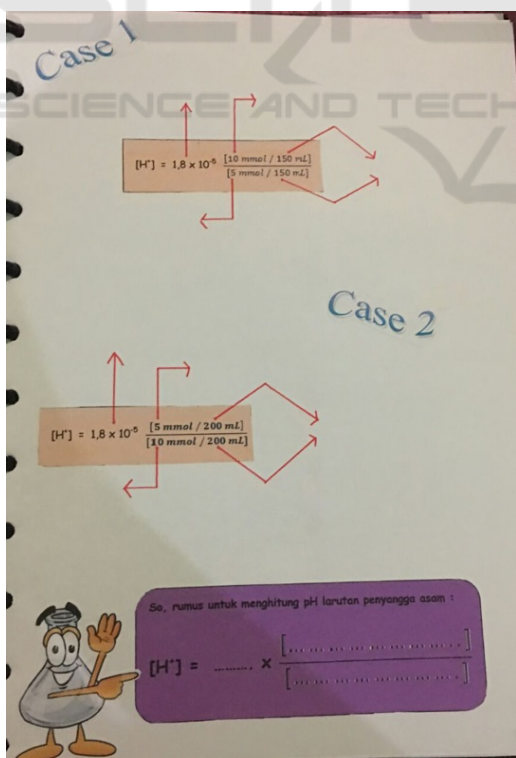


Figure 6: sheet of discovery activity.

Table 1: The result of feasibility test smash book based guided inquiry.

Aspect	Expert 1 (%)	Expert 2 (%)	Expert 3 (%)
Content	100	100	85.71
Presentation	100	100	100
Language	87.50	100	100
Graphic	100	83.33	100

Based on data in Table 1, the average percentage of feasibility on every aspect of the test can be seen in Figure 7.

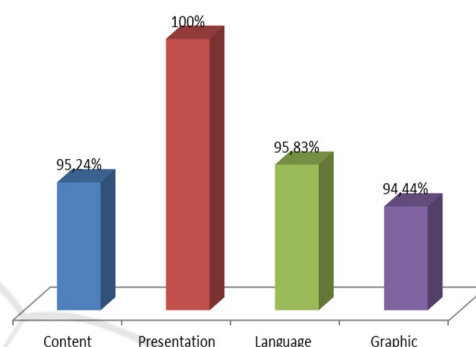


Figure 7: Average percentage of feasibility on every aspect.

Table 1 and Figure 7 show that every aspect of the feasibility test get high scores from all experts. The content aspect consists of seven statements about the purpose of learning, the correctness of concepts, the order of the material, the completeness of the information and the exercise question. The aspect of the presentation consists of eight statements relating to guided inquiry activities, guidance, encouragement of learning activities, learning motivation and practice questions. The language aspect consists of three statements relating to the ease of the language used. The graphic aspect consists of six statements relating to the type and size of letters, illustrations, color combinations and layout.

Based on the data in Figure 7, the feasibility of smash book on aspects of content, presentation, language and graphic into the category very well. Therefore, when calculated total score of 24 statements (questionnaire) filled out by three experts, the average percentage of the feasibility of the overall media smash book amounted to 95.83%, and included in the category of very decent.

There are two suggestions from the three experts to smash book developed, namely (1) the representation of the components forming the buffer solution should be adjusted to the shape of the

molecule that is the truth, (2) guide the activities in the smash book less, the absence of instructions for students to observe illustration regarding buffer solution components. These suggestions are subject to revisions for product improvements before proceeding to the pilot phase.

The revised smash book was then trialed to ten high school students of Class XI IPA. In the experiment, the researcher distributed a questionnaire containing 10 statements. The result of the percentage obtained from the questionnaire can be seen in Figure 8.

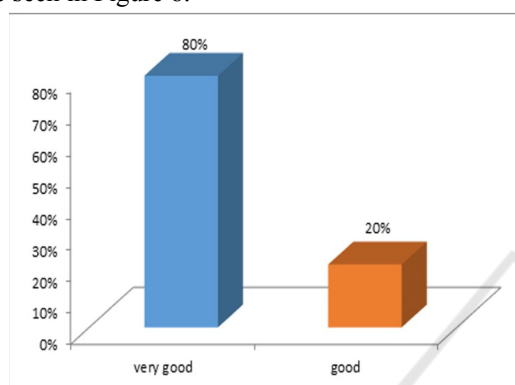


Figure 8: Percentage of smashbook's feasibility from student.

These statements are related to the display, the order of presentation, the illustrations, the sheets provided for writing the answers, the language used, the ability to generate learning motivation and the opportunity to discover the concept itself or the formula, and the suitability of the smash book as a chemical learning media.

Based on the data in Figure 8 can be seen that the percentage of feasibility smash book by 80% categorized as excellent and 20% good category. This indicates that the smash book based guided inquiry can be easily used by students as learning media. There are 2 suggestions from the experimental results, (1) the space provided for writing the answer is not very broad, (2) the colors used to decorate the smash book should use neutral colors. The suggestion that has been obtained is used as the material of the smash book revision before it is used in the trial phase of usage.

The revised smash book is then tested to the user, in this case is the grade XI student of SMA KORPRI Banjarmasin. Trial usage is done in four meetings. In learning using smash book based guided inquiry, the teacher invites students to find their own concept or formula in a creative and interesting way. Students are guided to build their own knowledge through

data, images, examples and non-examples or instructions contained in the smash book. Before building their knowledge, students are invited to recall the previous lesson material that became the basis for studying the material of buffer solution. In this way, in addition to the teacher can check the mastery of students to a previous concept, teachers can also help students connect the previous concept with the concept to be studied. Such learning will be easier for students to remember.

Learning media smash book based guided inquiry not only presents learning facilities to students in interesting forms and ways, but also trains students in developing curiosity and enhances learning activities. This is done by giving students a number of topics in the form of questions relating to the material of the buffer solution. Students are welcome to guess the answer and then invited to prove the truth of the answer. The curiosity that arises will increase students' enthusiasm in learning the material given, so that students will become active during the learning. The more students are invited to validate answers to the topics presented, the more accustomed students will become to think critically.

Trial use of learning media smash book based guided inquiry is done in four meetings. After the use trial is done, the researcher distributes a response questionnaire to the students. The questionnaire is intended to find out the students' responses to chemistry learning using smash book based guided inquiry on buffer solution material. Questionnaire responses consist of twelve positive statements to be filled by students by giving score 1 if the student does not agree with revelation and score 2 if the student agrees with the statement. Statements on related questionnaires on the following points: (1) ease of students in studying buffer material using learning media smash book based guided inquiry, (2) learning motivation developed through the use of learning media smash book based guided inquiry, (3) learning motivation developed through the use of learning media smash book based guided inquiry, (4) the learning generated through the use of learning media smash book based guided inquiry, (5) the opportunity to interact with other students during the learning process, (6) the opportunity to find their own concepts or formulas (7) examples of problems and exercises on smash book media in helping the mastery of buffer material, (8) the opportunity to ask during the learning process, (9) Instruction on learning media smash book based guided inquiry in facilitating the solving of the problem, (10) more interesting learning using learning media smash book based guided inquiry, (11) design of smash book

based guided inquiry and (12) feasibility of smash book based guided inquiry as a learning media of buffer material. The result of the trial of the use of smash book based on inquiry is guided by the material of buffer solution through student response questionnaire can be seen in Table 2.

Table 2: The percentage of students' responses to the learning media smash book based guided inquiry.

Percentage (%)	Category
68.2	Very good
22.7	Good
9.1	Enough

Data in Table 2 shows that the distribution of student response data is divided into three categories that is very good, good and enough. Based on the responses submitted by the students in the trial class of product usage, some of them at the beginning of the meeting are still not accustomed to learning by way of inductive because so far the ordinary teachers invite students to learn in a deductive way. But all students stated that the inbuilt based smash book media is worthy to be used as a learning medium for chemical buffer material. Overall, the average student response to the learning of buffer solution material using smash book based guided inquiry as learning media is good.

4 CONCLUSIONS

Based on the results of the analysis and discussion, it can be concluded that smash book based guided inquiry on buffer material has been feasible to be used as a learning media in terms of content, presentation, language, and graphic.

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