

Research Article

Utilization of Printing Plate Waste As Applied Chemistry Learning Media For Using Engraving and Knocking Techniques

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Abstract.

This study aims to utilize printing plate waste as alternative to making applied chemistry learning media using engraving and knocking techniques. The method includes three stages namely preproduction, production, and postproduction. Activities carried out in preproduction were collecting data through observation, interviews, literature studies, making pattern designs and teaching materials, and preparing tools and materials. The production stage focused on manufacturing the product. The product was hammered using hammer wrapped in paper adhesive and also engraved using CNC laser-cutting machine. The postproduction stage included monitoring and evaluation and improvement of research products. The result was a set of learning media consisting of five media made of plates and one stand where media was placed. This learning media can be used in applied chemistry lectures to make it easier for graphic engineering students at Politeknik Negeri Media Kreatif to understand the lessons taught in class.

Keywords: printing plate waste, applied chemistry media, engraving, knocking techniques

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1. INTRODUCTION

Production and service process activities in the printing industry generally produce printing plate waste which can cause various problems in various industries. This waste requires processing to minimize the impact of environmental pollution. The use of printing plate waste is minimal due to reduced public interest in managing plate waste which is difficult to decompose. Techniques for managing waste with processes to help the world from global warming, steps to increase income, ways to reduce environmental waste and save energy are our ways to help process printing plate waste [1]. The function of the printing plate is to take ink from the ink roller

with a certain layer of ink and transfer it to the rubber canvas.

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The applied chemistry course is a basic course for graphics engineering students at the Creative Media State Polytechnic so that later students are expected to have graduate competencies. What is ready to become a printed materials analyst is closely related to graphic production in the form of ink and printing paper. The process of achieving this competency requires influential learning media to make it easier for students to absorb applied chemistry teaching material. Printing plate waste can be used as a learning tool for applied chemistry courses. The material presented on printing plate waste is basic chemical material to equip students to understand printing materials such as students' understanding of the periodic table of elements, redox reactions, metal corrosion and its prevention, procedures for making ink and printing paper as well as managing waste from the printing industry. The presentation of the applied chemical materials mentioned above is contained in printing plate waste which is formed using tapping and engraving techniques.

A need that cannot be ignored by every educator/teacher is the use of learning facilities in the classroom. Due to considerations in the application of knowledge, students need appropriate and effective learning media to increase their knowledge and insight. One of the means of supporting the learning process is called learning media. According to [2], learning media plays an important role in forming components. Learning today is more focused and organized. Learning media is developed by modeling in forming good attitudes. Aspects of attitude (character) and aspects of skills are the basic guidelines for creating learning facilities. Media learning is useful in helping to foster students' desire to learn to understand the material that will be presented [3]. Learning facilities are some of the most useful ways to enliven the atmosphere of the learning process so that it is more lively and innovative for students so that they are more enthusiastic in learning, the material presented is clear and easy to understand, various learning strategies to create students' mood so that they don't feel bored quickly and don't consuming too much energy, learning media is used as a means of seriousness in learning for students to become more enthusiastic in teaching and learning activities [4]

The engraving technique is the activity of shading over a certain printed design. The engraving process on acrylic uses 5 mm for depth with tool strength reaching 400 mm/s so as to obtain approximately 40% data (Rafsanjani, 2021). Pattern formation is made through working methods that suit each of our wishes, one of which is the inspiration for the moon orchid flower as a design motif, [5]. Characterization of aluminum metal is the initial content displayed as an opening. The size 0.1 mm to 0.3 mm is part of the aluminum foil on the offset machine which is useful in films. The engraving technique

used introduces image and text ornamentation [6]. The appearance of carvings in karambit blades can be done through the working principle of engraving. The materials used to make karambit handles come from synthetic leather rope, wood or resin. The work uses old finishing to make the karambit work appear more antique [7].

The basis and concept of thinking in various aspects of typical Gorontalo bridal fashion design which must be preserved and can be modified by adding a little decoration so that this research can continue, [8]. Plants are an idea for producing works using the tapping technique so that metal can be carved in three dimension as art and used to knocking way, [9]. Steps for knocking work according to [10], include: 1) Using gloves to avoid scratching the metal, causing injuries and injuries. 2) Innovation in making metal works using techniques that require designs made using writing tools and HVS paper as an illustration. 3) Using screwdrivers, hammers, nails and objects that have sharp edges are useful as equipment that will be used to carry out tapping activities. A high level of concentration is needed so that these metal objects do not produce holes or shading on the printing plate when we tap it.

Some problem formulations that can be explained are 1) Can printing plate waste be used as an applied chemistry learning medium for graphics engineering students at the Makassar PSDKU Creative Media State Polytechnic? 2) How to design and apply engraving and tapping techniques to printing plate waste?

2. METHODOLOGY/ MATERIALS

2.1. Writing Object and Location

Writing Object Includes 1) printing plate waste which has a sharpness and thickness that supports being used as a learning medium and can be applied using engraving and tapping techniques, and 2) Applied chemistry teaching material which includes 5 (five) main chapters in the applied chemistry course taught in class graphic techniques include material on understanding the periodic table of elements, redox reactions, metal corrosion and its prevention, procedures for making ink and printing paper and managing waste from the printing industry. Research sites. Carried out at the Post-Print Laboratory of the PSDKU Makassar Creative Media State Polytechnic. Address on Jl. Pioneers of Independence VI No.50, Tamalanrea Jaya, District. Tamalanrea, Makassar City, South Sulawesi. The postal code for PSDKU Makassar Creative Media State Polytechnic is 90245.

2.2. Data collection technique

Data collection technique. This research was carried out as follows: 1) Field observations with direct observation of printing plate waste at the East Tribun printing press, Makassar. 2) Interviews were conducted with plate waste management staff at the East Tribun printing press, Makassar.

3) Literature study used by the author to take several references from articles and journals related

to the four main topics of this research, namely, the use of printing plate waste, engraving and tapping techniques, and learning media, as well as applied chemistry material. This literature study will be attached in the bibliography list.

2.3. Research Stages

Research stages. Divided into three stages, namely pre-production, production and post- production stages which are described further in Figure 1 below:

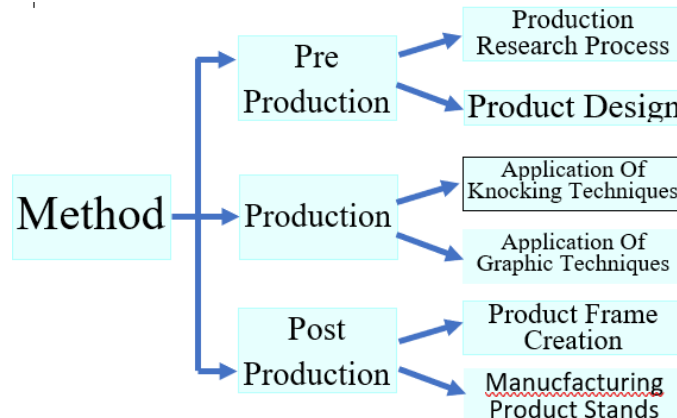


Figure 1: Research Design.

3. RESULTS AND DISCUSSIONS

Pre-Production. At this stage the author carries out activities such as collecting research data and designing patterns starting from letter patterns, numbers 0-9 and TPU frames. The process of forming letter patterns is divided into two, namely uppercase letters A-Z with a diameter of

7.09 cm x 7.06 cm and lowercase letters a-z with a diameter of 5.04 cm x 4.05 cm. The size of the letters is made differently to align the letters with the size of the plate

used, namely 32.42 cm x 81.97 cm so that the writer can align the plate with the letters so that they look more aesthetic and can be read from a distance of several meters. The design used for the TPU frame goes beyond about 10 cm of the plate size.

Production. The next step is material content for learning media by including material about making ink from natural materials based on journal articles as a guide for selecting colors and ink characteristics (Samber et al., 2013; Sulistiawati et al., 2017; Adam, 2015). The author obtained the results of stamp ink from spinach leaf extract referring to the article, (Sulaiman, Faiqoh and Syahrir, 2022), redox reactions and the chemical periodic table. Then do the tapping technique. Initially the author carried out many experiments to obtain results and data to create this learning media starting from the type of tool used for tapping, such as an ordinary metal hammer, making a hole directly into the printing plate. Using nails to tap results in holes and scratches on the printing plate. Using a rubber screwdriver produces a visible pattern but the plate also leaks. The author has

The idea is to coat a rubber screwdriver with insulation for the tapping stage and this method produces a visible, legible and textured pattern. After the problem with the tool to be used is found, the author goes into the tapping technique. In this tapping technique, the author goes through three stages first before getting a technique that is suitable for this tapping technique, namely first the author performs tapping with the position of the tapping tool 90 degrees from the printing plate, but this stage makes the plate is shaded and etched. Next, enter the screwdriver position, tilt it 60 degrees, but tap it from the middle, making the side of the printing plate bent, with a hole and not fitting the frame. Therefore, the author found a good technique for tapping, namely the position of the screwdriver coated with insulation, tilted 60 degrees and the tapping starting from the edge of the letter pattern which has been given insulation so that the pattern for the frame does not move when tapped and the tapping technique must also not use force because it can make the plate leak so high concentration is needed in this tapping stage. Next, clean the plate first to avoid dirt sticking to the plate and make it easier to apply color. Giving color to the printing plate that has been cleaned is useful for attracting the appearance of the product. The color used by the author is orange red number 14. The author chose this color because it shows a display character that depicts brightness, uplifting enthusiasm and happiness. This color displays the color side of polymedia. Coloring is done on the box. The boxes in the table are colored so that the appearance of the letters in the table is more visible and textured from the tapping results. Look at Figure 2 below which shows the production section.

The engraving technique starts from designing material content using the Corel Draw application. The design results were then transferred to a laser cutting machine using a TAN type 1309A CNC laser cutting machine. This CNC laser cutting machine is useful for cutting certain materials such as aluminum, metal, wood, steel, stainless steel and so on. Meanwhile, the cutting step is non-metallic materials such as acrylic, rubber, plastic, marble, synthetic leather using a laser beam [11]. The advantage of this machine is that it is neater when cutting and also making engravings. The working steps of the TAN type 1309A brand CNC laser cutting machine are capable of making scratches and engravings based on a certain depth that is adjusted to the existing image pattern [12]. Part plat for engravings on printing plate waste, namely writing that

helps the learning process, element names and atomic numbers. During the engraving process, the operator presses the plate more with the aim of influencing the plate pressure because the plate placed into the machine is already wavy and no longer flat as a result of the tapping. This printing process takes around 90 minutes to make 118 elements, one type of element name takes 1 minute and making information on each printing plate takes around 2 hours of processing time. The author has carried out a trial phase using a manual engraving tool but the results from manual engraving are not possible to use.

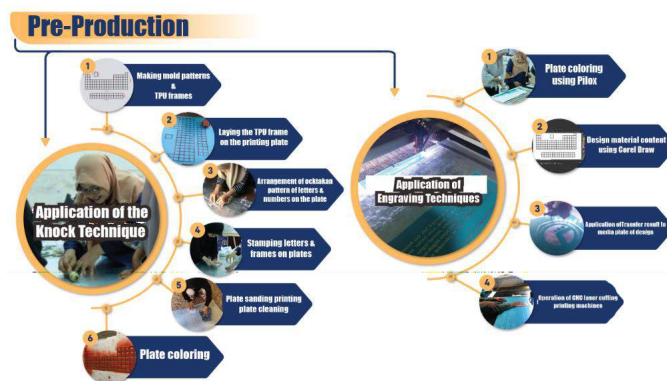


Figure 2: Production.

Post Production. The next activity is monitoring and final product results. The final product result is the creation of legs and a stand for the plate to function as a place to store plates containing learning media so that they are easier to see and display as teaching materials for students in the learning process later. The stand used is triangular in shape and made of light wood, similar to stands often used by painters or artists, with a height of 110 cm and a width of 50 cm. Creation of product frames for each learning media material. This frame functions as a protective edge on the plate. The edge of the plate is sharp so to avoid accidents or problems later the author provides a

frame. The purpose of this frame is also to beautify the appearance of the plate so that it looks attractive and pleasing to the eye as a learning medium. Then the next stage is to complete the product validation test by relevant experts regarding whether or not this learning media product is suitable. Look at Figure 3 below which shows the post-production part.



Figure 3: Post Production Department.

The finding of this study indirectly enriches some of the previous research findings. The previous studies focused on comparing homogeneous and heterogeneous groups. This study involved randomized, homogeneous, and heterogeneous groups and showed that the randomized groups performed the highest.



Figure 4: Post-production results.

4. CONCLUSION AND RECOMMENDATION

Printing plate waste can be used as an applied chemistry learning medium for graphics engineering students at the Creative Media State Polytechnic by applying engraving and tapping techniques. The resulting media is a set of learning media consisting of 6 plates with 5 Applied Chemistry content materials and a stand where the media is

placed. Applied chemistry teaching material presented on printing plate media includes the Periodic Table of Elements, redox reactions, corrosion processes, characteristics of stamp ink from red spinach leaves and liquid waste processing for printing activities.

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