User research of Ceramics Glaze Database Platform as Instructional Information: Study Case Glazy.org

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Abstract. In ceramics production, the glazing process is the final stage which is quite significant in its existence both to add aesthetics and to maximize the durability of ceramics as disposable objects. For some ceramicists in Indonesia, making ceramic glaze is not an easy step. It requires material understanding, a trial process, and a long evaluation. Glazy.org is a ceramic glaze database website that offers various features to help ceramic enthusiasts. The purpose of this study is to identify the needs of users by analyzing the user journey when making a ceramic glaze using Glazy. This research uses Group Interviews, Expert Interviews, and observation as data collection. The results of identifying user needs can be considered for future design development as an instructional information platform.

Keywords: User needs, Website, Glaze.

1 Introduction

The popularity of internet-based information media in Indonesia has experienced significant development. Based on data reported by datareportal.com, there are 212.9 million internet users in Indonesia with a total population of 276.4 million as of January 2023 [1]. The development of information technology affects various fields including access to information on ceramics glazes. The process of making ceramics does not only rely on technical ability but the need to understand the material [2]. Moreover, in the ceramic glaze compounding process, it is a complex and lengthy process. The availability of information on internet-based glazes makes it easier for novice ceramicists to mix their own glazes. The use of databases encourages openness of ceramic glaze information which not only adds flexibility but also enriches the research and application of ceramic glazes [3]. The urge to have a glaze as an identity of the ceramics studio itself is getting higher along with the many ceramics studios that sprung up in Indonesia. The market expects Ceramicists always to produce original novelties [4]. Public interest in handmade ceramics is based on connections and emotional bonds resulting from the process of making ceramics directly from the hands of the maker [5].

There are several websites about ceramic glazes including Ceramics Art Network and Digitalfire. Apart from these two platforms, Glazy offers a bunch of features for

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ceramicists to gather and shared their glaze recipes. Glazy.org itself was first launched by Derek Philiph Au in 2014 and became a platform for sharing glaze recipes from ceramic activists from various countries [6]. In March 2023, Glazy.org experienced an increase in visits of 44.9% compared to the previous month, and of the total visits, 65.03% were via the mobile web, and 34.97% via desktop [7]. Not only website Glazy also developed on mobile application version. Derek Au a developer of Glazy said the glaze application was created to meet the needs of ceramic workers who have difficulty connecting to the internet so that ceramic glaze recipes can still be accessed without an internet connection. Au also admits that the websites and applications he makes are still far from perfect, so they haven't been able to fulfill the UX properly. Despite all the limitations, Glazy has approximately 40,000 users with a total of 340,000 glaze recipes. [8].

The challenge faced then is no longer a matter of difficult access to information, but how to sort out information according to the availability of materials available in Indonesia, and adjust to the kiln and firing techniques which will be different in each ceramic's studio. Based on the group discussion forum of 7 ceramicists in Jabodetabek, they agreed that ceramic glaze is a stage full of challenges. Making complex ceramic glazes requires good process documentation so that trial processes can be evaluated. An online ceramic glaze platform like Glazy is a potential platform for ceramicists in Indonesia.

Glazy.org has various features such as materials information and substitutions, glaze recipes from various studios, combustion analysis, calculating the cost of each glaze, and many other features offered. Besides the potential use of Glazy to help ceramic enthusiasts, it is necessary to study in detail the process of making glaze in a ceramic's studio. This observation can identify the needs of ceramicists for glaze information media so that it can be used as an evaluation of whether the features in Glazy have answered the needs of ceramic studios, especially in Indonesia.

2 Terms of Ceramics Glaze Database Platform

2.1 Terms of Ceramics Glaze

Glaze is a thin layer of glass that covers the surface of the ceramic body. The presence of glaze is not only a complement to aesthetics but is often identification of the quality of a ceramic. The glaze has the aim of coating the ceramic surface so that it has a smooth surface, does not absorb water, and is hygienic. In an artistic context, glaze functions as an expression for its maker [9]. In other words, the glaze protects the body of the ceramic and serves as a protective and decorative coating [10]. The application is by coating the bisque with liquid glaze which will be absorbed directly on the surface of the bisque. When the liquid glaze is absorbed on the surface that appears is a layer of powder that sticks. This layer will then melt at high temperatures when burning in the kiln [10].

Glaze is made of 3 basic components, first alkaline oxide (Silica) which is the main ingredient for forming glass, Acid oxide (Flux) to regulate the melting point of the

glaze, and neutral oxide (alumina) as a counterweight and binder on the ceramic surface [9]. What makes glaze special is that the end result of glaze does not always match what is expected and on the other hand glaze plays an important role in affecting the quality of the resulting ceramic product. So, understanding glazes, formulas, application techniques, and their quality is essential in making ceramics [9].

Making glaze has its challenges. Information about glazes has also been found in many media, both books and internet sites. Generally, books are not able to build in-depth knowledge of how glaze works. To be able to master glaze, ceramicists need a long time to study and gather experience to be able to identify problems that occur in glaze [11]. So, it is understandable when ceramic enthusiasts decide to use prepared glaze because it is more efficient and economical.

2.2 Knowledge and Complexity

In the learning process, there are several gaps that cause learning problems, namely (a) knowledge, (b) skills or abilities, (c) motivation, (d) habits, (e) environment, and (f) communication [12]. According to Dirksen, the success of a learning experience cannot be measured by how much information an individual knows, but by how the individual is able to utilize his knowledge. By understanding the learning problems faced, it will be able to produce appropriate solutions [12].

Instructional design arises from the need of learning problems. The problem of education occurs not only at this time but has also become an important issue that has been discussed and developed centuries ago. The emergence of this branch of science was initiated by Comenius who in the 1600s used the first children's illustrated books in which instructional situations were used. Quoting Smith and Ragan, in the book The Essential of Instructional Design, Instructional design itself can be defined as a systematic and reflective process in translating the learning process into planning such as materials, activities, information, and evaluation [13]. This means instructional design is a way to organize and present a series of information based on the knowledge and abilities of the learner.

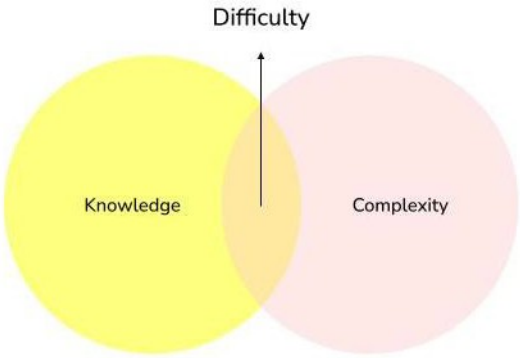

Fig. 1. Learning challenges arise because there is a gap between knowledge and information complexity. [12]

The complexity of information always intersects with one's knowledge. Knowledge and complexity affect the level of difficulty in the learning process. Information complexity is the form of the amount of information that is not in line with the ability to compile this information. Dirksen in his book describes several things that can help a person to be able to process information systematically by using visuals, story approaches, case studies, organizing information, and using relevant metaphors or analogies [12].

Edgar Dale introduced a chart on the progress of the learning experience from the most abstract to a concrete form. This level of experience affects how much information is absorbed [14]. Dale's Cone of Experience is generally divided into 3 types of experience 'tell, show, do'. The highest absorption of information of 70-90% is obtained from real experience. Information that involves direct experience in the process involves analyzing, designing, creating, and evaluating. Information obtained by witnessing a demonstration is only able to absorb 30-50%. Meanwhile, the lowest absorption of information, around 10-20%, is obtained from the process of explaining a topic obtained from reading or listening.

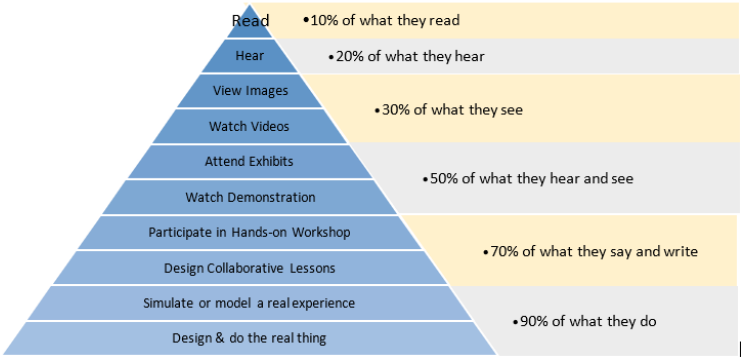

Fig. 2. Dale's Cone of Experience

Inline with Dale's Cone of Experience, in his research Merrill describes the phases for maximizing the effectiveness of media or learning situations which are also known as 'first principles of instruction' These phases are used as a reference for learning stages which can later be applied to the designed learning media. The phases are [15]:

1. Problem-centered Cognitive psychology research shows that the learning process with a problem-solving approach can improve the learning process better. [15]
2. Activation. Activation refers to information and experience that is already owned by an individual. With relevant knowledge and experience, a person will be better prepared to capture new knowledge [15].

3. Demonstration. Merril said that the learning process which was accompanied by demonstrations as an example had a good impact on the quality of learning. [15]
4. Application. This application phase is related to the activities carried out in the learning process. seeing examples and then practicing them will improve the quality of understanding. [15]
5. Integration. This phase means a person transfers or applies what he has learned into his daily life. A person begins to adapt to new knowledge and abilities [15].

3 Methods and Materials

To have a clear point of view for identifying users needs and what challenges they facing while making ceramic Glaze, this research using qualitative methods such as Group interview, expert interview, and observation towards features that provided on Glazy.org.

3.1 Related Platform

In this study, Glazy was selected as a study case. Glazy is one of many digital platforms that offer information about glazes. What distinguishes Glazy from similar platforms is that users from Glazy can learn and share the results of glaze trials that have been carried out so that they can be tested by other users and result in recipe verification and development. Glazy is a new form of ceramic information and recipe-sharing tool. This website itself was built on various inputs from a number of users, in this case, ceramicists.

Glazy was created by Deek Au in 2014, as a free and open digital library. This website is aimed at ceramic enthusiasts, of any background and skill level, with the aim that users can exchange knowledge and eventually form a community. In his interview, Au said that Glazy still has many limitations including the limitations of the Glazy feature in the application which can only view recipes that have been previously stored on the Glazy website page and can view them without an internet connection.

The features offered on the Glazy website including:

1. Community

a. Activity. On this page, users can make posts containing the results of the glaze experiments that were carried out. In this post, other users can discuss by writing their opinions in the comments sections.

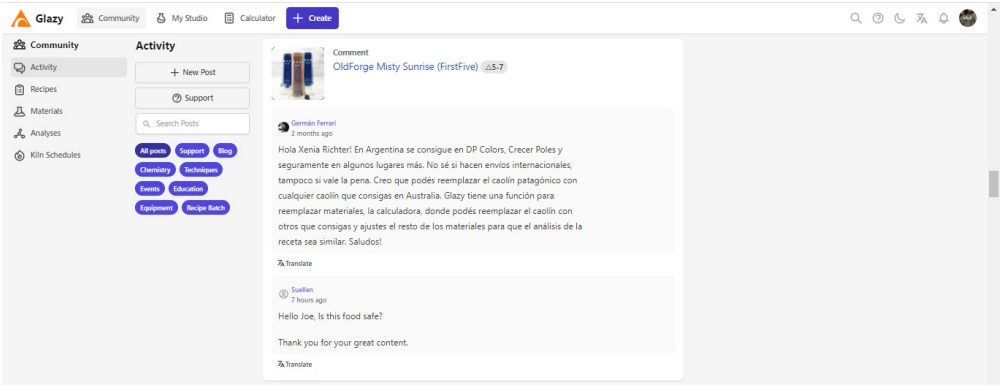

Fig. 3. Activity Page in Glazy.org

b. Recipes. In this section, users can see various types of glazes, clay body, slip & engobe, overglaze, underglaze, and refractory recipes. To make it easier to find the desired recipe, this page is equipped with an option/filter folder based on the type of recipe, temperature, atmosphere, color, surface, transparency, country, material, and oxide content, to sort recipes with photos or not. Apart from that, on this page, users can also choose more than 1 recipe to save or print at once.

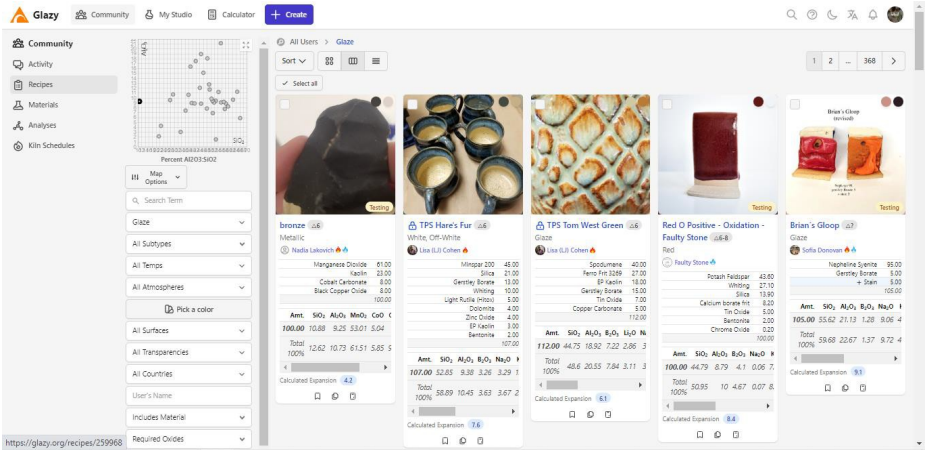

Fig. 4. Recipes Page in Glazy.org

c. Materials. This section displays material information along with the mineral content in it. Almost the same as the recipes page, this page also has an

option/filter map. Users can search for materials based on material type, country, user name, and oxide content.

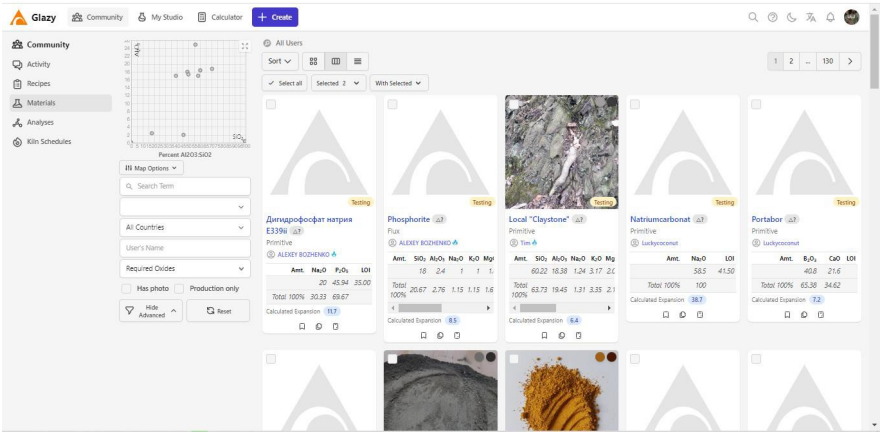

Fig. 5. Materials Page in Glazy.org

d. This page contains the results of an analysis of tests conducted by users based on formulas, percentages, and Unity Molecular Formula (UMF).

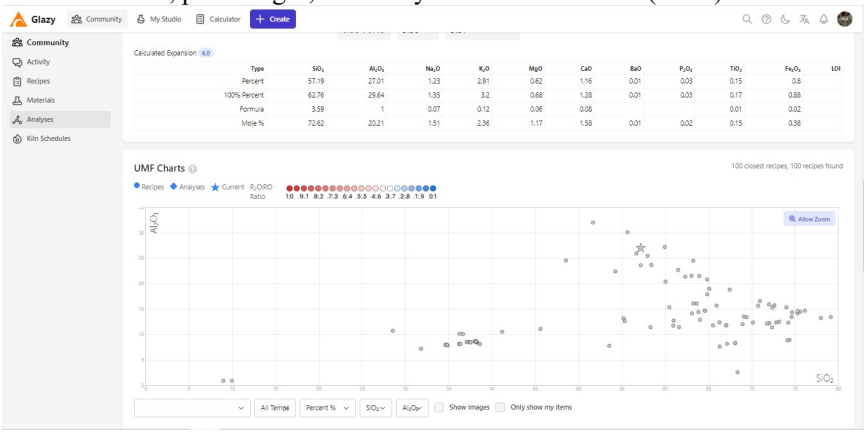

Fig. 6. Analyses Page in Glazy.org

e. This feature helps users monitors the temperature movements during the combustion process. Users can enter the target temperature they want to achieve per hour.

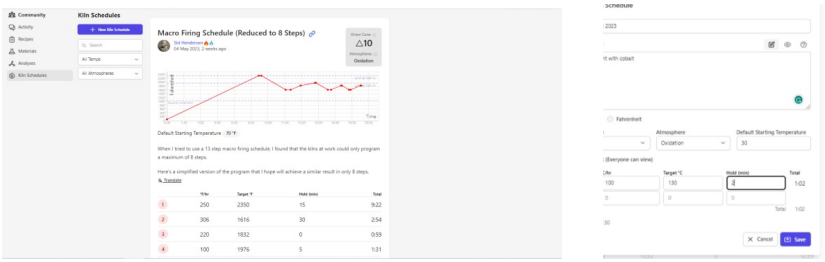

Fig. 7. Kiln Schedule Page in Glazy.org

2. MyStudio. In the My Studio menu, users can view various recipes that have been made or saved, enter materials they have, make analyzes, create inventories, store photo documentation, provide reviews, view comments that have been given, and previously made Kiln Schedules. In general, My Studio displays data or documentation from the user's ceramic studio.
3. Calculator. In this section, the user can arrange recipes and calculate the percentage of materials used.

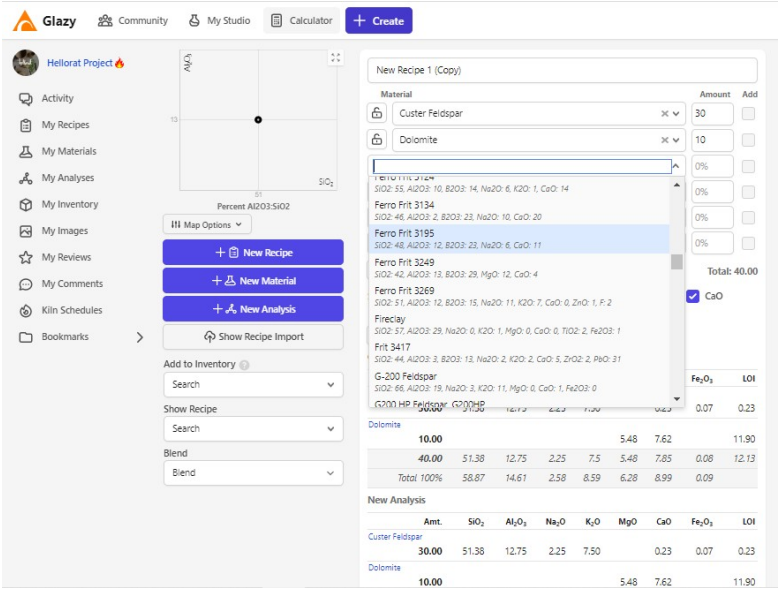

Fig. 8. Calculator Page in Glazy.org

With so many features provided, according to Au, the feature most frequently used is the recipe search feature. Au admits that the Glazy website is still not well designed, and has difficulties in providing a good user experience. However, currently Glazy has approximately 40,000 registered users with around 340,000 recipes. This is enough to indicate that Glazy is quite reliable by many ceramic activists around the world.

3.2 User Study and Data Collection

User Study

The Glazy site has quite a segmented target audience because it targets users who work in the ceramics sector and have a need to make the glaze. Although in making this site Derek Au did not target specific demographics, in Indonesia, ceramics studios are not a job that many people are involved in. Glazy is intended for ceramicists with various skill levels. Using website analytics in March 2023, Glazy users are dominated by ages between 25-34 years with an even composition of men and women. Based on these demographics, this study conducted group interviews by gathering 6 studio-scale ceramic industry players in the Jabodetabek area to discuss the glaze production process in their respective studios.

a. Demographics
   - ∞ Age: 25-34 years
   - ∞ Gender: Male and Female
   - ∞ Occupation: Student, teacher and practitioner in the field of ceramics
b. Geography
   - ∞ Indonesia
   - ∞ Greater Jakarta
c. Psychographics
   - ∞ Explorative
   - ∞ Tech Savvy

Through group interviews it was found that of all stages of making ceramics, glaze is one of the most difficult stages. So, 4 out of 6 studios prefer to use ‘prepared glaze'. ‘Prepared glaze’ here refers to ready-to-use glaze sold by local suppliers in Indonesia with a more stable firing result. The problem is that while glaze can become a studio's identity, the finished glaze cannot fulfill the uniqueness of each studio.

The process of learning to make glaze requires an effort to find information independently. Besides books and the internet, participants often rely on discussions with other ceramicists, as well as suppliers. According to a formal educational institution majoring in ceramics, it was enough to help the participants. Based on the experience of Ignasius Tommy, the learning process during lectures is more directed toward understanding glaze-forming materials and presenting study cases of glazes. So that this can encourage students to analyze and understand the glaze material content.

The most common obstacles participants encountered in studying glaze production were material substitution and function, calculating percentages, consistency of burnt products, and naming different materials. To be able to produce a glaze, the participants

admitted that it took about 1 to 1.5 years to experiment with different firing methods. In other words, making glaze is a long and tedious process.

Journey of Making Glaze using Glaze Database Platform

The observation was held on independently in studio, using a simple scenario which is making ceramics glaze using the Glazy website as a guide. The results of these observations are summarized using the Journey Map. The scenario used is to choose a glaze recipe by considering the firing temperature, available materials, and the atmosphere of the furnace. Then, the glaze is made according to the instructions included in the recipe.

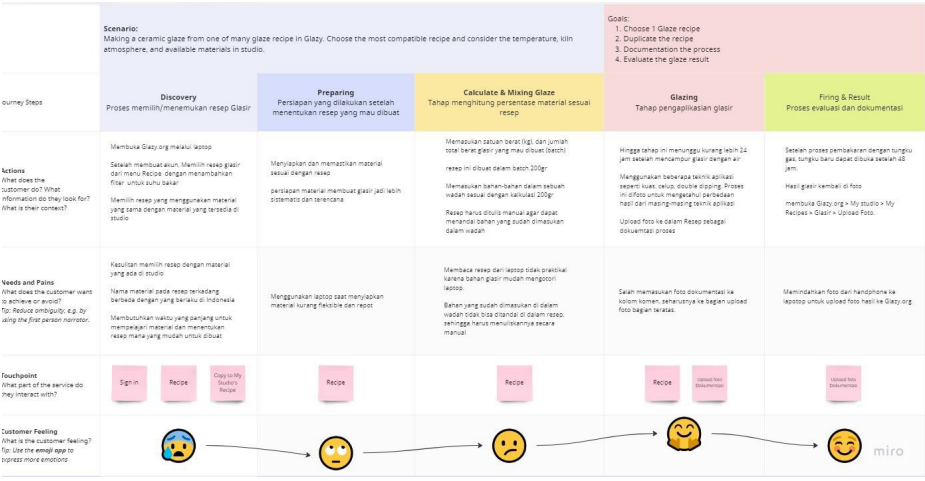

Fig. 9. User Journey map of using Glazy.org for making ceramics glaze. User journey divided in 5 phases.

This observation process is carried out by mapping the pain points encountered during the glaze- making activity so that development potential can be mapped on the Glazy website. Using predetermined scenario, the user journey is divided into 5 phases namely: Discovery, Preparing, Calculating & Mixing Glaze, Glaze applicating, Firing & Result. In general, the scenarios that were carried out went well, but if we look in more detail, there are needs and also obstacles faced by the user. The following are the obstacles encountered.

Table 1. Pain points and need of user in observation using Glazy Website

Phase	Pain Points & Need
Discovery	Hard to find a right glaze based on many requirements such as temperature, atmosphere, available materials in Indonesia Different material's name with materials called in Indonesia Need long duration to understand the material and decide which glaze that will be made.
Preparing	Working with powder and water make using Glazy on laptop is inflexible and inefficient
Calculate & Glaze Mixing	Read the recipe in laptop is not practical No Checklist button to check the materials that already added. It made user need to write down manually on paper
Glaze Application	Upload photos documentation in a wrong section.
Firing & Result (Documentation)	Since mobile phone is handy to take picture, the images need to tranfer to laptop before upload to Glazy.

Based on these findings, the most basic challenges of the obstacles that occur are heavily influenced by the device used. On the other hand, the Glazy mobile application does not have as complete features as the website. In addition to the constraints on the device used, also relate to the processing of basic information regarding the glaze before users are presented with a variety of complex information. Glazy as a glaze database platform has quite an interesting potential to be further developed as an instructional learning media that can accommodate novice ceramicists who need sources of Glaze information.

Glaze Learning Process in Academic Institution

The expert interview was conducted with Natas Setiabudi, a ceramicist and also a lecturer at Bandung Institute of Technology. This interview was conducted to gain insight into the stages of making glaze applied by formal educational institutions majoring in ceramics. With targeted learning outcomes, the learning process will be more measurable and systematic. The achievement of the course is that students can make glaze independently. In general, there are 4 learning methods that are carried out which are Activation theory, demonstrations, problem-centered learning, and application. This is

in line with the 'First Principles of Instruction' proposed by David Merrill, which consists of problem- centered, activated, demonstrated, applied, and integration. The following is a description of the activities of each method carried out in the Introduction to Glaze course.

Table 2. First Instructional Principles and learning activity in Glaze Introduction Class

No	Methods	Activities
1	Problem Centered	Students are given a case study, in this case, glaze with various conditions and identify the causes and effects of the glaze content
2	Activation	Students are given insight and theory so that students have insight and basic knowledge
3	Demonstration	The lecturer shows how to use the tools and demonstrating of making glaze
4.	Application	Practicing to mix the formula and turn it into a glaze recipe
5	Integration	Students are expected to implement their glaze knowledge to studio activities independently.

3.3 The potential of Glaze Database Platform

Based on the data that has been collected, the glaze database platform has a lot of potential that can be developed further. What's interesting about a glazing database platform like Glazy is that this platform has become a melting pot for ceramicist contributors around the world to be able to share their recipes and exchange knowledge. This shows that the use of this platform is needed and plays an important role as a medium of information and learning for many people with backgrounds and levels of expertise.

One of the advantages of a glaze database platform like Glazy is that ceramicists are able to access it independently anytime and anywhere. For ceramicists in Indonesia, Glazy is a new alternative to learning glaze. The process of making glaze is still a scourge of many novice ceramicists. Through this information media information can be accessed easily and well documented. If previously in Indonesia learning glaze was only obtained through formal education, this information disclosure provides an opportunity to learn glaze more easily. Various approaches from interfaces, features, and information can be one way to attract the attention of the target user.

Glaze database generally uses a website to present its information. Glazy has various platforms that can be used, such as desktop or mobile websites, and mobile applications.

Internet-based media allows storing data flexibly which is useful as a documentation step. The documentation step allows users to study ceramic and glaze trends, techniques, and technologies from time to time through a digital platform. With this aim, the Glaze database is not only a medium for digital documentation but also contributes to cultural preservation. With the intensity of using this platform when making the glaze, it will be easier if Glazy develops its mobile application with more practical features and makes it easier to document glaze making.

Through the features that exist in Glazy, the complexity of the information is presented in a different way. If conventional media is like a minimal book with interaction, this platform allows users to be able to interact with information in a different way. The complexity of information can be conveyed more efficiently and easily absorbed by users by applying instructional design. Instructional design helps organize and describe a series of information based on the knowledge and abilities possessed by its users.

Glazy is a material information platform and glaze recipe that has the potential in helping ceramic activists find glaze recipes easily. Glazy has the potential to become an instructional information medium for many people. Although Au claims that Glazy is intended for users with various skill levels, it must be admitted that using this website requires a basic understanding of glaze. There are several points that could be further developed by Glazy both in terms of information and maximizing the user experience.

3.4 The User Limitation

Although Glazy as a glaze database platform has been used by many users, Glazy has a unique selling point that can be developed further. With so much potential, this platform is not free from several limitations that hinder its users from doing their activities. Based on Glazy users in Indonesia, these limitations are divided into 2 categories based on the information and user experience.

Based on data collection, the information barriers are:

1. Glazy as a database platform has limited basic information for the user who has no experience in making the glaze.
2. No guidance on how to use the features available in Glazy
3. Bunch of information that shows on one page. Information and complexity cause obstacles in absorbing information.
4. Since Indonesia have limited options of materials, hard to filter or avoid recipe with specific materials that are unavailable in the studio

In addition to information-related barriers, there are other barriers related to experience in making glazes using the Glazy website:

1. Long duration for understand how to use the platform.
2. Information architecture and user flow structure make users unable to execute certain tasks in a simple way.
3. Read the recipe on a laptop is not practical and it might have caused users to add the wrong materials.
4. Many buttons or links are not actionable

4 Conclusion

Internet-based information technology is developing to make it easier for people to access information, including ceramic activists who are looking for information about glazes. In Indonesia the ceramics community strives to be able to create glazes of good quality, fulfilling its main function and also having aesthetic value that fulfills the characteristics of the studio's identity. However, to be able to create glaze, knowledge, and experience are needed which is not easy. The glaze learning process is generally obtained from experiments carried out independently armed with information from books and from fellow ceramicists who are more experienced. Glaze database platforms like Glazy are not new. But Glazy has some uniqueness that makes Glazy different from most websites with similar topics.

What makes Glazy different is that Glazy has a feature that users can use to help make glaze with hundreds of thousands of glaze references from contributors around the world. Glazy is not only an information medium but also offers features where users can interact and make this website a forum for exchanging ideas with other ceramic enthusiasts. One of its superior features is the feature for calculating recipe batches that can be adjusted to your needs. With its many advantages, Glazy is a media that has a lot of potentials that can help the ceramics community in Indonesia.

It is undeniable that the features possessed by Glazy are still not enough for novice ceramic enthusiasts in Indonesia due to the limited basic knowledge of ceramics that they do not have. The main obstacle faced by ceramicists is the lack of understanding of the forming material and the calculation of the glaze forming formula so that ceramicists are limited in analyzing and evaluating the condition of the glaze produced. Glaze databases such as Glazy have the potential to be used as instructional information media for the learning of novice ceramics activists, taking into account the systematization of information based on the user's level of knowledge.

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