

Thinking Process of X Science Students in Web Design using Polya

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Abstract— *Degree of thinking process affect student achievement. Measurement of the degree of thinking process with Polya is expected to obtain knowledge in the form of students thinking level abilities. Data collection of respondent used purposive sampling and snowball. The data then analyzed based on Polya. This study concluded that 10th-grade science students completely reach all four Polya.*

Keywords— *Thinking process, students, Polya, HTML, Web Design*

I. INTRODUCTION

The thought process is an activity that involves the process of gathering, interpreting, analyzing and evaluating information to a certain degree [1]. The results of the thought process in the form of thinking levels are divided into 2 (two) levels of low thinking and high level thinking, low level thinking only uses limited abilities and are different in nature from the high level of thinking that shows the ability of students to be able to interpret and manipulate information [2]. Both opinions describe critical thinking processes that are considered to be able to influence student performance both thought processes to the level of student skills.

Research aims to measure the level of students' thought processes has been carried out. Some research related to the level of thinking concludes students with high levels of thinking ability can go through all stages whereas students with low levels of thinking ability cannot go beyond one or all stages [3]. Based on the description, it can be formulated that by doing the level of thought process in students, students in the category of critical thinking level can solve the problem given to a certain degree in solving it, whereas students with low level of thinking cannot solve one or all of the given problems.

The population used in this study is the 10th-grade students of Al Firdaus Sukoharjo High School Natural Sciences as many as 8 (eight) students consisting of 3 (three) female students and 5 (five) male students. This study aims to determine the level of critical thinking of students on web design subjects using HTML.

This qualitative research model uses input in the form of responses from students based on the case given. The responses were collected using purposive sampling. Purposive sampling is appropriate for gaining knowledge quickly because of its ability to select information immediately and is able to open the characteristics of individuals who are closed that are influenced by many things [4], [5]. In addition to the speed of gaining knowledge,

purposive sampling is relatively cheaper when compared to the method of collecting data with the type of probability sampling.

Purposive sampling works directly on respondents often encounters deficiencies in the sample used cannot yet represent the characteristics of a population. These weaknesses can be overcome by using snowball or pyramid data collection methods [5]. This method works by determining the initial pointer or starting point with a minimum number of one respondent and developed into many respondents [6]. Both studies stated that each research method has strengths and weaknesses so that other methods are needed to complement the shortcomings of other methods to achieve research goals or knowledge.

The data is in the form of input from 10th-grade science students of Al Firdaus Sukoharjo High School. The data obtained were analyzed using Polya. Polya has 4 stages in namely: identifying problems, planning solutions, implementing solutions and reviewing work [7]. Polya is a series of procedures whose wide application is not limited to only one discipline. This can be demonstrated by [8], that the polya stage is in the form of students' thinking abilities in mastering problems. Respondent data that has been obtained by using purposive sampling and snowball is then analyzed to measure the level of student skills in solving webpage design cases with HTML scripts.

Web design is a website development activity or web page which involves a visualization process from layout, composition, color to web elements[9]. This web design is an interface design so that users are interested in seeing or visiting because they are interested in the interface created. A good web design contains at least the following conditions: it consists of blocks, logos, navigation, content, footers and finally whitespace [10]. The description shows that the web page contains at least blocks, logos and content. These three components are the basic anatomy used for the beginning of learning web design using HTML.

HTML or Hypertext Markup Language is a document manipulation script used for the majority of websites. Its ability to manipulate various types of documents makes html flexibility used by many people. HTML itself has now reached the HTML5 version which is stated to have had more performance improvements in various sections. This is due to the rapid development of the world of information and communication technology [11], [12].

Measured student thought processes are considered to facilitate the learning process of students. Measurement of

the level of students' thinking processes is done by Polya with the process of collecting data using purposive sampling and snowball. Web design subjects provide cases of making page views with HTML scripts. Students who are given a case to make the front page are expected to make it according to their ability to solve problems. The problems they successfully solve are evaluated by Polya to gain knowledge of the students' thought process level.

II. LITERATURE REVIEW

Research related to students' thinking processes to measure students' abilities can be done in various stages and the results show students feel confident in solving the problems given [13]. The thought process is a learning approach that aims to make students become active in finding solutions to the problems given. Case-based learning is an appropriate method to help students in the learning process. The case-based learning process shows students become more active interacting and intense in finding solutions to problems encountered [14]. The thought process also shows the ability of students to find alternative solutions to the problems given. Increasing the ability and skills of these students are asked to understand the problems given [15]. Measurement of the level of ability and skills of students in solving problems given can be done with Polya. Polya divided the steps into four stages, namely: 1) understanding the problem; 2) make a solution plan; 3) carry out the planning and finally 4) re-examine the results of his work [2]. Polya is one technique to solve problems, the process of solving problems involves thinking processes. This thought process is expected to produce solutions that are acceptable, feasible, reasonable in solving new problems based on a certain degree [16].

III. METHODOLOGY

The research model is a plan or stage of research carried out in such a structured and systematic way to achieve research objectives. The research plan or stage is shown in Figure 1.

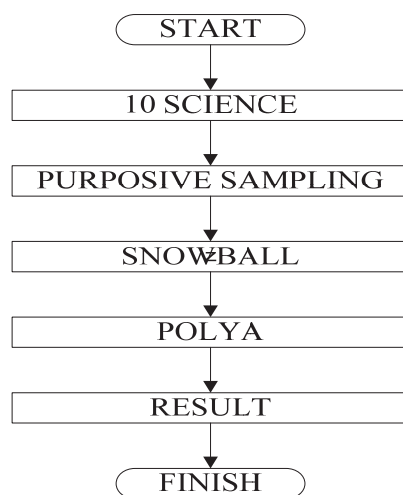


Figure 1. Research Model

Figure 1 explains the stage of the study begins with collecting data from a class 10 natural science population using two purposive sampling methods and snowball. The samples that have been obtained are then analyzed using Polya to measure the level of thought or critical thinking

processes the results are the achievement of the Polya stages of each grade 10 student at Al Firdaus Sukoharjo High School Science.

Purposive sampling data collection techniques were used to develop knowledge of the research target of 10th-grade science students at Al Firdaus Sukoharjo High School. This technique directly corresponds with the target to explore the knowledge of the thinking processes of 10th-grade science students in completing assignments given to web design subjects with HTML.

Snowball method is the pyramid model, a technique that studies flow patterns by selecting one 10th grade science student as a starting point for continuing to a group of 10th-grade science students until a number of respondents are met.

Polya, Understanding The Problem Students are given a front page view of the Facebook social network and are asked to understand the structure of the page. Students who are able to understand the structure of the page are expected to be able to estimate the need for the HTML script used to create the page, Planning Solving Students who have previously been asked to understand a page view are then asked to plan solutions or estimate the need for HTML scripts provided from the layout to form the page structure, the need for input elements to compile user input to reinforce the visualization of the page views, Implementing The Plan The previous step students are asked to plan solutions or estimate needs. The third part of the Polya, students are asked to implement solutions or estimated needs that have been determined by writing the solution in HTML script format and displaying the results of their work in a network browser, Looking Back The last part of the Polya serves to conduct an evaluation or review of the application of the previous step with the results of student acquisition. The results of this review or evaluation are expected to students to recognize errors, deficiencies to find solutions for better page views by using HTML scripts.

IV. RESULT AND DISCUSSION

Web page view, Web page display is a communication interface between computer system users and computers. The appearance of this page is arranged based on the needs of web users. Display web pages used in this study in the form of a login page and registration page. Display login page and registration page that is made based on the front page display on Facebook social networks as shown in Figure 1. The front page image is used as a basis for students of grade 10 science to create a similar look using table and form tags using HTML scripts. Table tags are used to set the main layout or appearance and form tags to create text field elements, select boxes, radio buttons.

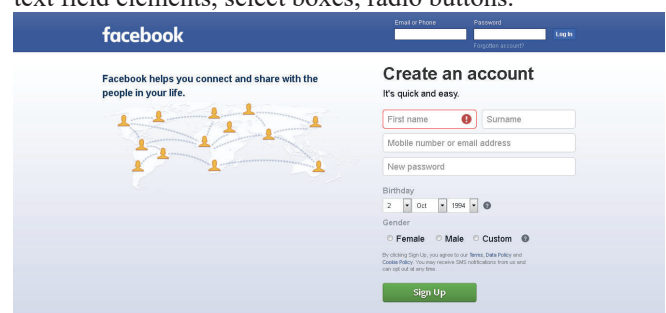


Figure 2. Facebook landing page

Generally, the Facebook front page consists of three rows of two columns. Facebook's conceptual layout is shown in Table 1.

Table 1. Web page structure

LOGO	USERNAME, PASSWORD, TOMBOL
FIGURE	REGISTRATION FORM
	FIRST NAME, LAST NAME
	EMAIL/PHONE NUMBER
	PASSWORD
	DATE OF BIRTH
	GENDER
LANGUAGE OPTION	

The display has a three-row, two-column main structure, with the first row divided into two columns for the logo placement and login function for social media services. The second row is divided into two columns for image placement and new member registration forms. Finally, the third row consists of only one column, this column to display the language support provided.

Purposive sampling, Data collection with purposive sampling in this study is to handle in general the characteristics of high school level students who tend not to want to be seen because there are negative assumptions because they can. The purposive sampling approach is considered to bring about a sense of security and comfort for students. The emergence of a sense of comfort and security has an impact on student confidence. The existence of this belief is able to provide two-way interaction well in this study.

Purposive sampling used in this study is appropriate for students who are applying high school level characteristics because in general, they do not want to be seen in general to avoid the most assessment possible. This technique is used because when data collection is done with probability sampling characteristics like these tend to have unreliable results [4]. Purposive sampling in this study aims to get whatever HTML scripts students use to create page views. As:

Basic HTML Structure

The basic structure of good HTML is shown in Figure 3. HTML tags are created in pairs with the <html> structure as the beginning of the HTML block and </html> as the end of the HTML block.

```

1 <html>
2   <head>
3     <title></title>
4   </head>
5
6   <body>INI HALAMAN DEPAN</body>
7 </html>
```

Figure 3. HTML Structure

The <head> </head> section is used for metadata purposes such as using <title> </title> to display the website name. The <body> </body> section contains the code that is used to structure the page to other needs.

File Extension

HTML files can only be displayed properly with web browsers such as Firefox, Chrome, Opera, IE, Edge, until the UC browser. The web browser has the provisions that the HTML document displayed properly must use the *.htm or *.html extension in the paging file used for student work.

Tag Usage

The structure of HTML and the use of HTML file extensions do not make the document that is done appear as expected. This is due to the characteristics of what you see is what you get (WYSIWYG). In this way, students are required to know the basic HTML tag function so that the appearance in the web browser will later display elements or layout that are appropriate or close to the examples given.

The three basic HTML structural information, the use of the *.html extension and HTML tags are used as criteria for selecting or determining students in the purposive sampling method. The selection of students with these criteria shows good student skills. The skills of students in either category are used as initials pointers or initial points used later in the following snowball method.

Snowball

Snowball or pyramid is a data collection technique that uses the initial pointer or initial point as a prefix. This initial point represents students with prominent skills compared to other students. Snowball or pyramid shown in figure 4.

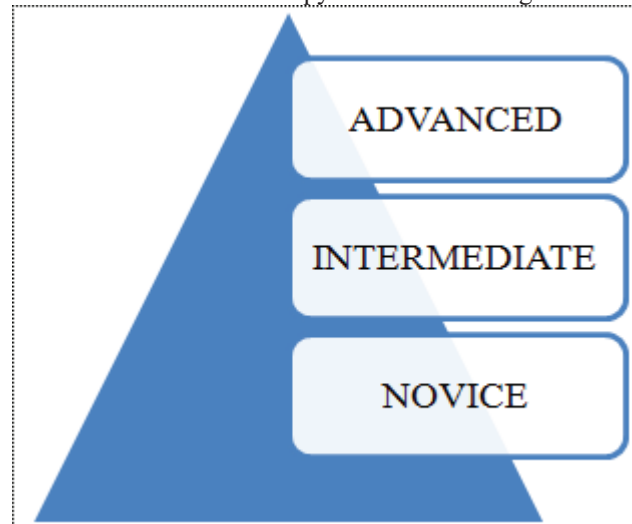


Figure 4 Snowball or Pyramid

Students skill level categorized divided to three level according snowball or pyramid:

Advanced

Named as advanced if they meet the three criteria in the previous stage, namely purposive sampling such as the use of basic HTML structures, writing HTML extensions to using HTML tags.

Intermediate

Named as intermediate if only one of the criteria at the previous purposive sampling stage is to only write HTML tags without the use of closing tags or the use of extensions.

Novice

Named as novice if none of all three fulfilled by the students.

These initials pointers cannot be stated as population representatives. Hence, it is necessary to look for some

students who have similar skills one level below repeatedly to be able to represent a population of 10th-grade Natural Sciences.

The first sample used was Student Group1 with a skill level. This Student Group1 was declared skilled because it was able to write HTML structures, the use of HTML extensions and the use of HTML tags with general provisions, however the sample was unable to represent the population, therefore, snowball data collection was continued with the Student Group2 with a somewhat skilled level of skill.

This group of students was stated to be rather skilled because they were able to implement the HTML structure well and use HTML extensions well but the difference was shown in the use of HTML tags that were less consistent. Snowball data collection is currently at the group level. Students are rather skilled. The snowball grouping aims to obtain a comprehensive level of skill in each population.

The snowball step continued at the Student Group 3 who was declared unskilled. Indicators of inability in this group are shown in the use of inconsistent HTML structures, the use of HTML extensions that are often not properly written and the inability to understand the problem for the application of HTML tags on the web pages being worked on.

Analysis Of Polya Thinking Process Level

This study found the level of thought process of 10th-grade science students at Al Firdaus Sukoharjo High School with a total of 10th-grade science students of 8 (eight) students with 5 (five) male students and 3 (three) female students.

- Understanding the problem The stage of understanding the problem (identification) shows students can imagine the hierarchy of web pages. The imagining process shows the ability of students to directly process information given and received. This stage students actively imagine the main layout of the page design.
- The thought process of students at the stage of planning solutions to problems In the previous identification stage students who already have an initial description of the layout then define the need for tools to create a complete page structure with supporting components. Like making tables, making text fields, making radio boxes, making select boxes to making buttons.
- The thought process of students at the stage of implementing a problem plan Students who in the previous stage already have a plan or strategy in solving the problem at hand. The strategy is then applied to the practicum tools used. This application process takes time because students conduct trial and error activities. This activity is an activity to try every solution that is implemented in order to display the results resembling the given case examples.
- The thought process of student reconsiderations Trial and error activities produce a variety of displays. The display is compared with the results of his work. This stage the students process back to identify the needs, plan solutions to repair problems, implement improvement plans and then re-evaluate the results of work that has been done.

The level of thought process of 10th-grade science students at Al Firdaus Sukoharjo High School, in general, has

reached the four stages of Polya well, only the six students really need more flying hours by handling various types of web design cases. Web design is a web page design technology that is considered to be able to increase visitor interest when reading articles that appear on a site. Web design technology is a part of web development technology that involves a lot of use of advanced technology with Polya as a method to find out the level of thinking of students so that it is possible that with a basic understanding and application of these simple technologies students can improve to the level of use of advanced technology based on ability levels think by each student. Web design is a discipline that requires a lot of flying hour experience so that the level of thought process in students determines the quality of the design produced. Project-based learning requires students to understand the complexity of difficulties, foreign knowledge, knowledge transfer, and independent learning abilities [17]. Measurement of the thought process that has been done on the 10th-grade students of AL Firdaus Senior High School earlier with Polya shows the ability students must have to develop web-based applications in the future.

V. CONCLUSION

Polya uses four stages in measuring students' thinking abilities. This research shows that 10th-grade science students in Web Design subjects, in general, have reached the fourth level of the Polya stage only that the appearance is very simple, to improve these abilities students need to practice independently.

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