Influence of Infographic on Exhibition Space Towards The Level of Interest, Understanding, and Visitors Behavior

(Case Study : Educational Exhibition on Implementation of Nuclear Power Plant Project)

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***Abstract*—Infographic as a form of modern information design is one of the various information media that is widely use in exhibition. The aim of this study is to conduct the influence of infographic as a visual display of information component in the exhibition space towards the visitor's level of interest, understanding, and behavior. One of many elements in infographic that directly related to the visitor's level of interest and understanding are the visual style. Visual style is a series of visual objects by virtue in logical complexity characteristics. This study used a direct experimental method which subjects are divided into specific age group based on visual literacy skills. By discussing an issue about the use of nuclear technology for energy in particular, this study is expected to answer the problem of dissemination of nuclear science and technology through the exhibitions event. Generally, this research is expected to be an instrument in meassuring the effectiveness of educational exhibition, and as a reference for designing infographic as a medium of visual communication design in exhibition space.**

Keywords—Educational Exhibition, Infographic, Visitor's Perception & Behavior

I. INTRODUCTION

The industry of tourism in 2012 is escalated by 5% and increase 6-7% in 2013, especially MICE (Meeting, Incentive, Conference, Exhibition). Exhibition industry contribute a significant numbers, around 30-40% in 2012, Pamerindo [31]. Exhibition become an important component in every aspects, not only for creative industry, but also for the society. Exhibition is a medium of communication and education, which is full of valuable information and economic value.

Based on purpose of the implementation, exhibition is divided in two types, exhibition for trading [commercial] and educational exhibition (non-commercial). Exhibition for trading focused on commerce activities. The indicators of effectiveness in this area are based on the sales achievement. While educational exhibition focused on the dissemination process.

As mentioned by Falk et al [8], the exhibition effectiveness meassured by four factors, area of the exhibition, number of participants, number of visitors, and sales achievement. But in general it is still refers to indicators of effectiveness for trading exhibition. Effectiveness of educational exhibition involve a human factors. Level of interest, understanding, and the behavior response of visitor to the various elements of the exhibition become an entities that can not be separated.

Smithsonian Accesibility Program [32] state that educational exhibition are closely related to human being as the main object. Educational exhibition has a various complexity of concept, data, and information, as well as the sensation that related to the visitor. All of these elements are summarized into an informational form that is easy to understand and fun. Therefore, the informational components become an important part in educational exhibition, as the main entity that have to be understood by the visitor.

The information components on exhibition has evolve from time to time. That various changes has change the audience's perspective of exhibition into something more than it was before, Hughes [11]. In the modern era, the function of information components are not only as object's label information, but also as a historical narrative that is able to present the story, as well as being aesthetically pleasing elements that embellish the exhibition space. Information components on exhibition space generally appear as an information visualization.

Information visualization method in various fields known as information design. Information design is able to answer the complexity and irregularity by transforming information into the form of valuable message, meaningful, and easy to understand. Information design interact with visitor through various forms of visual representation such as color, typography, grouping information, graphic element, imagery, and utilization of sound and movement instrument, Baer [5]

Along with the development of technology and trend in graphic design, there is a modern information design concept known as infographic. Infographics has been widely applied in various fields, such as advertising, marketing, business, social media, and education, Marabella [1]. Infographics also applied in exhibition industry, especially for educational exhibition as a visual tools to convey the information. Infographics are considered able to summarize the complexity of data into a

simple and structured form. It is easier for audience to capture the idea, Smiciklas [18].

Visual style is a series of visual objects by virtue in logical complexity characteristics. Selection of visual style determine how audience interpret the message, or otherwise confused them in a collection of tables and graphs, Pogorelova [2]. The duration from the audience to interpret infographics display depending on the complexity of visualization and visual literacy skills.

Previous study [3] concluded that there is a significant correlation between visual perception and visitor's behavior on digital simulation of window display. Positive visual perception creates a positive behavioral response as well, and vice versa.

Another study [23] proved that the information design component affects level of interest of the reader with learning style background such as visual, auditory, and kinesthetic. This study proves that the visual content is more desirable than narrative content, and infographics plays an important role as a visual appeal that creating a persuasive thought process.

Furthermore, the conclusion of research [4] stated that visual literacy by the people in a particular age group affects how these groups interpret a variety of visual elements on the infographic. Millenials [born in 1980 above] has a better level of interest and understanding than Generation X [born in 1964-1974], and Baby Boomer [born in 1943-1963].

To determine the role of infographics related to the level of interest and understanding, as well as behavioral responses of visitor in exhibition space, require a comprehensive issue. In this study, it is the use of nuclear technology for energy adapted as the main information content. The issue is selected based on its controversy and the lack of understanding about the value by the community. Moreover, visual literacy in Indonesian people associated with various objects nuclear technology became an obstacle in the process of designing visual aids to illustrate the various data and facts.

Based on the description above, this study conduct various reserach about the influence of infographics in exhibition space. The research focused on measuring the level of interest, understanding and behavioral responses of visitors. Certain age groups into demographic factors are calculated with the assumption that the visual literacy of each age group in society affect how these groups interpret a variety of visual elements in infographics, Young etal [4]. This study once said that the ideal form of indicators of the effectiveness of educational exhibitions.

II. Visual Style

Data visualization on learning activities will be captured quickly than presenting on a narrative form by the audience. It is because the human brain has the ability to process visual object faster than a verbal object, Lankow [14]. We have the ability to interpret a wide variety of visualization objects of an entity, such as graphs and symbols.

The problem is how long does the infographics interpreted by the auidences. Duration required to interpret the data visualization is largely dependent on the complexity and amount of detail. It is also influenced by the audiences ability to explore the entire point of the data and find out the relation. Entertaining graphic form with low complexity allows purport faster, while the form of graphics with the analytical type makes the audience take a little while to read.

In a study conducted by Pogorelova [2] there are two types of visual style that works as visual appeal in infographic, fast thinking visualization and slow thinking visualization. Both of visual style based on the complexity of form and information.

A. Fast Thinking Visualization

Fast-thinking visualizations contain a clear message that can often be summarized in a graphics' title and don't require the viewer to spend more than some seconds scanning it. Fast-thinking visualizations usually show a visible trend [unemployment rate is rising; sales are dropping down], providing little to no possibilities to learn more or explore the provided information further.

According to Kosara as cited by Pogorelova [2], They tend to be rather simple in appearance, mostly using common or highly intuitive graphic displays like bars, fever graphs or maps. Their short, clear message can also be rendered in a pictorial style like Nigel Holmes' – as a visual metaphor where images are woven into the presentation of the data.

B. Slow Thinking Visualization

Slow-thinking visualization demands more from its viewers. It can range from more sophisticated or unfamiliar ways of visualizing data to complex, highdensity displays of information that contain a plenty of details.

Slow-thinking visualization highlights most important, interesting or unusual points in an overall context, letting the viewer to explore the data. Besides, unusual visualization forms may attract much more attention than familiar, easy-toread but a tad boring bar or pie charts, Gelmanet al cited by Pogorelova [2].

However, slow-thinking visualizations, especially those using a novel graphic form, face a danger that they can be not intuitively understandable.

III. Visual Perception and Behavior

Stimulus - Organism - Response [SOR] paradigm by Mehrabian et al as cited by Widasati [3] stated that the response to environmental stimuli [S] can be treated as an approach or avoidance [R], with the experience of individuals in the environment [O] as a mediator. Individuals react to the environment in two behaviors: approach and avoidance. Behavioral approach include all the positive behavior directed

at a particular place, such as the desire to live, investigate, work, and to gather, whereas avoidance behaviors reflects the opposite of positive behavior.

The Process for the audiences are influenced by the sensation and itensity result. If the sensation was quite strong and has great appeal, object or stimulus can directly enter the mind of the audience through the various pathways (senses) - there is a response in the form of a change - like-dislike, agree-disagree, and so on.

IV. Object Analysis

Science and publishing are two sectors that use information design as a communication instrument for centuries, Lankow [14]. Study and development in this field is dominated by academics and scientists, mostly to convey the theoretical information. Until the discovery of internet, infographics on science and publishing are growing along with the development of technology.

In 2007, the interest of infographics are increased. Audience individually begin to designing and distribute infographics by the internet. Since then, a new type of infographics appear in large numbers and carry a wide range of issues. Marketing is a popular field for infographic utilization. Infographics assures the quality of a product to prospective customers.

In this study the issue of nuclear technology used as a main research study. The selected issues converging on the utilization of nuclear technology for energy, especially nuclear power plants. Nuclear technology is considered as a negative things by the society. That perception of nuclear technology does not match with the facts.

V. Method

A quantitative method with experimental research design is used in this study. According to Sedamyanti et al [17], experimental research is a kind of research in order to find the impact of certain variable to another variable with tight control. Experimental research aims to examine the hypothesis, predicted event in the experimental background, and generalize the relationship between the variables, Zuriah [20].

Experiments aims to measure the level of interest and understanding of visitors towards visual style of infographic. Experiments involving observation, procedures, and data collection from respondents by questionnaires. At the final phase, quantification and data analysis conducted to examine hypothesis and get a conclusions.

Here is a flow chart in this study:

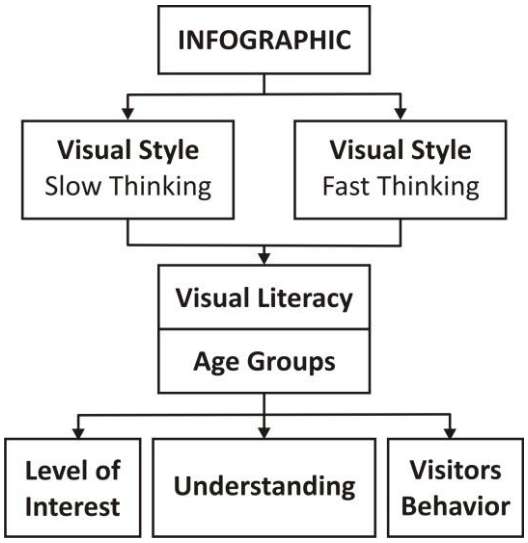

Image 1. Flow chart of the study

The subject in this study are public visitors from RITECH EXPO 2015 at the age of 20 years and above. Subject are visitors whom interested with the stimulus by themeselves. Furthermore, visitors are asked to join with the experiment, and fill out a questionnaire at the end of each part of the experiment.

The subject of the study consist of two [2] age groups, the early adult [21-30 years] and late adult [31 years and above]. The respondents assumed as an individual that has a psychologically stable, productive, actively interact, close to a variety of media, self-contained in making decision and up to date on social and environmental issues.

The number of respondents is 6 [six] people in every age group. This study use a purposive sampling technique, or sampling with a certain consideration. The number of samples taken from the average number of visitors from RITECH EXPO who visit the booth area of BATAN and interested to the stimulus.

Stimulus are based on the visual style. Visual style consists of two patterns, there are slow thinking visualization and fast thinking visualization. Both of them is distinguished by adaptation stylish from data visualization, based on the level of complexity of the forms and information.

The information content on stimulus are the points issue of nuclear technology for energy problems in Indonesia, that summarized as nuclear paradigm ala Moore and research data from BATAN. Stimulus aims to present data and facts related to the use of nuclear technology for energy. By utilizing the style of visualization, data and facts presented in a balanced, and relevant to the negative information in society.

Controlled variable is an infographic panel made from polyform placed in the exhibition booth area of RITECH

EXPO 2015. RITECH EXPO is an annual technology exhibition organized by the Ministry of Research Technology and Higher Education.

The main topic of RITECH EXPO 2015 is food, energy, and maritime, held on 8-11 August 2015 in Lapangan D Senayan, Jakarta. Followed by 124 participants from various backgrounds. Experimental activities in this study conducted in the energy zones of BATAN (National Nuclear Energy Agency).

The exhibition booth design took a concept of island booth in the area of 54 m2. Inside the bbooth area there are 6 [six] research institution consisting of BATAN, BPPT, BIG, BSN, LIPI, and Eijkman Institute. Booth material used a plywood for the walls and floor, stickers as a finishing material lining the walls, and as a finishing material layer HPL flooring (flooring). Lighting using halogen lamp and a spotlight at some point.

Infographic panel on the experiment are 90 cm long and 50 cm wide. Infographic printed with digital printing and placed on polyform media with the same size. Infographic panel then placed in the booth area.

Experimental activities consist of two independent variables were based on the visual style of infographics. The viusal style that used on the stimulus is slow thinking visualization (S1), and fast thinking visualization (S2). Infographics components used in these variables include, visual [color, graphics, icons], the content [text / narrative, statistical data, the time span, reference], knowledge [facts and conclusions].

The independent variable for the level of interest measured by three indicators, level of preference, level of boredom, and level of brightness. While the independent variables for understanding measured by three indicators, ease of recall, relevance, and ease understandable.

In the experiment, respondents did a direct observation of two (2) kind of infographics placed in the exhibition space. This phase is divided into two (2) times the observation activities.

A. 1st Observation

Done by observing alternately of infographics display begin from slow thinking visualization (S1), followed by fast thinking visualization (S2). At the end of each observation, subjects were required to fill out questionnaires.

B. 2nd Observation

Done by observing alternately of infographics display begin from fast thinking visualization (S2), followed by slow thinking visualization (S1). At the end of each observation, subjects were required to fill out questionnaires.

Subjects were not given a time limit when do an observations. There are no organizers or other visitors, observations were independently. Assessment of questionnaire using a Likert scale [1-4].

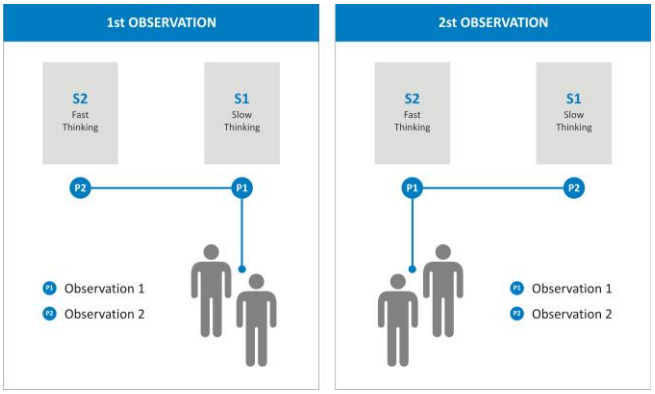

Image 2. Obsertvation Step

This research uses descriptive quantitative analysis methods. Data analysis was conducted by classifying variable data based on group that has been determined, and then interpreted as a conclusion of the study.

Data obtained from observation and questionnaires that given on experiment activities. Data processing is done by comparing the value of means (average) of the variables, and ANOVA statistical test to determine the significance of the research results. The results are presented descriptively in the form of charts and diagrams

Responder is measured using a Likert scale (1-4). Likert scale calculation used to get the conclusions using scale analysis. This analysis is used to determine the scale of dependent variable from the experiment. Range analysis is an indicator of high and low values in accordance with the answer given value.

The main constraints of this study is the target number of respondents were not achieved, because the low number of visitors on the exhibition in general. because the target number of respondents were not reached, it affects the age groupings of research subjects. From these data, there is new hupothesis that certain of age groups has a low level of interest to educational exhibition, but to prove it needs to do further research.

VI. Result and Discussion

Based on the experimental results, obtained a comparison of the level of interest from two age groups to both types of stimuli :

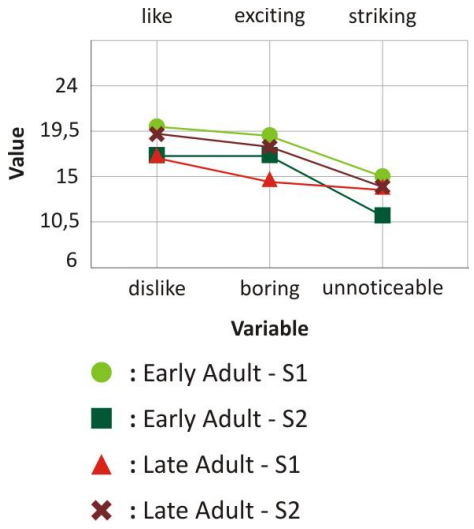

Image 3. Comparison of the level of interest in the age group

Description :
a. 6 to 10.5: Strongly Unattractive
b. 10.5 to 15: Unattractive
c. 15 to 19.5: Attractive
d. 19.5 to 24: Very Attractive

Based on image 4, the conclusions are :

1. Stimuli 1 (S1) of infographic with slow thinking visualization has the highest value of interest for early adult group.
2. Stimuli 2 (S2) of infographic with fast thinking visualization has the highest value of interest for late adult group.

Based on the experimental results, obtained a comparison of the level of understanding from two age groups for both types of stimuli :

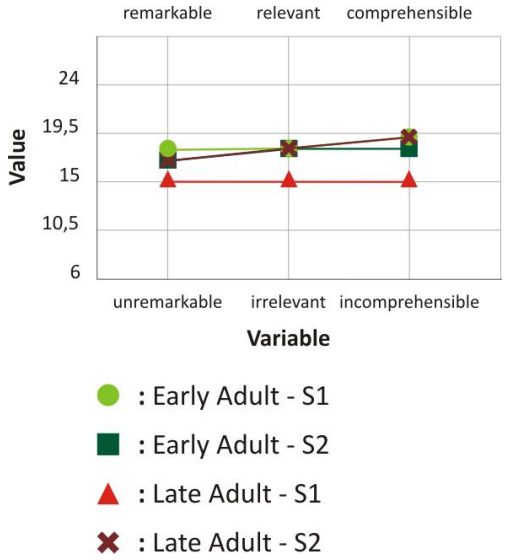

Image 4. Comparison of the level of understanding in the age group

Description :
a. 6 to 10.5: Strongly Unattractive
b. 10.5 to 15: Unattractive
c. 15 to 19.5: Attractive
d. 19.5 to 24: Very Attractive

Based on image 4, the conclusions are :

1. Stimuli 1 (S1) of infographic with slow thinking visualization has the highest value of understanding for early adult group.
2. Stimuli 2 (S2) of infographic with fast thinking visualization has the highest value of understanding for late adult group.

To determine the significancy of how visual style influence the behavior response of age group, statistical tests are performed using Pearson Test Correlation with normality test on variables before. Below is a table 1 shows the normality test results from two variables:

TABLE 1. NORMALITY TEST

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Visual Perception	,262	12	,022	,911	12	,221
Behavior Responses	,154	12	,200*	,954	12	,702

From the table above normality test obtained value of Sig. Kolmogorov-Smirnov with the number 0.22. With the value of Sig. > 0.05 correlation test to determine the significance of the relationship between two variables is feasible. Below is a table 2, show the Pearson correlation between the two variables:

TABLE 2. COLLERATION TEST

		Behavior Responses	Visual Perception
Behavior Responses	Pearson Correlation	1	,676*
	Sig. (2-tailed)		,016
	N	12	12
Visual Perception	Pearson Correlation	,676*	1
	Sig. (2-tailed)	,016	
	N	12	12

In the table 2 Pearson correlation values obtained Sig. 0.16, in other words the value of Sig. > 0.05. It can be concluded that there is a significant correlation between the two variables. Sign correlation coefficient worth [+], it means that if the variable X is high then Y is also high.

By the three hypotheses, the conclusion is that visual style has an impact in the level of visitor's interest, understanding, and behavior. Appropriate visual style raises a positive value from the level of interest, understanding, and behavioral responses. Three variables related to one another, with changes in value are directly proportional.

Associated with the object of the study, the issue the utilization of nuclear technology for energy proved to bring

significant influence to the third form of variables. Impression respondents appear different to each stimulus. Therefore the visual style can be used in exhibition for dissemination with a specific target audience.

VII. CONCLUSION

Visual styles affect the visual perception of visitors by age group. Further note that the visual style with slow thinking visualization have a significant effect compared with a fast thinking visualization. This is because of slow thinking visualization requires the respondent to focus more in response to the complexity of the visualization. In other words, the visual literacy of each age group affects how these groups interpret this complexity. This conclusion reinforces previous research [23].

Visual style affect the visitor behavioral responses by age group. It shows by the behavioral response that is proportional to the value of visual perception. So the theory proposed by Mehrabian et al as cited by Widasati [3] through the paradigm of Stimulus-Organism-Respone (SOR) support this conclusion. Positive behavioral responses appear when environment is fun or interesting to the organism, and vice versa.

Internal factors that directly affect the visual perception of the visitor attraction including physiological factors, attention and interest, while the internal factors that affect the visual perception visitor understanding of factors including unidirectional needs, experiences and memories. Mood and physiological as internal factors of visual perception has influence visitor behavior response. In the experimental activities, there are several respondents who were not able to complete the phase of the experiment due to the emergence of physiological disorders that impact the mood.

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