Designing edugraphic using thinking map applied in the case of knowledge about Indonesian hero for elementary school as an effective media

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Abstract. In this paper, the material of the book in the form of long text is transformed into education graphic (edugraphic) by using thinking map and applying design principles. The goal is to parse the intent of complex text lessons into more effective and understandable forms. The use of thinking map is specifically the tree map, bubble map, flow map and brace map which is then also applied the design principle, which uses character illustration and place focused on simple outline, hierarchy of information by using typography and line and shape as navigation map thinking in one edugraphic. The results show a communication creation that the content is more simple than long text because the intent of the content of knowledge has been conveyed through the thinking map and design principles.

1. Introduction

There is a manifesto that infographic is “A picture is worth a thousand words”, other definition is a visualization of data or idea that tries to convey complex information to an audience in a manner that can be quickly consumed and easily understood [1]

The density of information in school books is a form of complex information and became a reality in the current education world. There are plenty information that has to be delivered to students. In addition to many, it also varies in forms of printed books or digital media. Attached below is an example of a book and digital content in delivering complex information about Indonesian heroes that is dominated by text.
The mastery of material requires other support so that the knowledge material has other ways to be easier to comprehend. In this case, instructional media also needs creative approach [2]. Edgar Dale (1969) the Cone of Learning, stated that humans can absorb 30% of information through pictures or diagram, in comparison to 10% of information by reading [3]. Other facts are 65% of humans are visual learners, 70% of the sensor receiving nerve is in the eye, 50% of human brain’s work is included in visual process and human can sense a visual scene in the count of 1/10 visual per second, because human brain’s respond to visual simultaneously meanwhile texts are responded sequentially [4]. These facts support that the learning process should be done visually to achieve bigger learning outcomes.

Learning methods that use visuals as escorting media is called visual learning, because visual has important roles such as strengthening memory, streamlining understanding, and grow student interest on the said information. Visual itself has many ways to be understood and characters. Visual must be right on target, consist of right composition, and right principle so that it could be used as visual learning. Visual learning could be understood as a meeting point between information and graphic design. The complexity of knowledge material that is given, if not accompanied with the science of visual communication design, could not reach the goal of visual learning. Visual communication design is a discipline whose method is as the solver of communication problems, that is learned from design elements, principle, and function to deliver information.

In the case of submitting visualized information that is a complex data or varying data, infographic (information graphic) is used. Infographic is also called information illustration [1]. This information could origin from many things—whether the information is in the form of explanation, statistic information, relation information, timeline information, process information, and so forth. Visualization is very easy to comprehend by visual learners. Because visual learning tends to spend so much time in seeing things, they often need to make the material more prominent. If not, the information tends to get lost in their mind. To recall information, visual learners must: use varying colors in their notes, draw the things they visualize, make a mind map, organize the design elements and make diagrams.

When information is paired with graphic design, visual learning is produced by combining data or information into graphic design. Visual learners process information by seeing graphic format such as chart, map, and diagram, in contrary to the VARK (Visual, Aural, Read/Write and Kinesthetic) model that bases of information written in words, resulting in faster and easier process of delivering information. In line with the communication are the delivery of information and understanding, the process of sending and receiving message, network, the exchange of information, process and essence of things of persuasion [1]. Which results visual communication design science becoming the main strategy for delivering knowledge and information visually in visual learning.

Meanwhile education graphic or edugraphics is a visual representation which content is information for education purposes. Edugraphic has begun since the beginning of education. Edugraphic is known from the term ‘infographic’ that is used to explain the difference between subjects such as geography, history, biology, etc. Edugraphic commonly use illustrations such as map, timeline, internal organs, etc. The term is first used during the first international conference regarding graphic education which was held in Alvor, Algvare Portugal in 1993. Despite of the term is yet to be widely known, it is
already used in many countries—taking example of the usage of timelines in history books, social status and population described in pie chart and bar chart. The difference between infographic and edugraphic are found in the content treatment. Edugraphic are based on knowledge content instead of data in the process of learning.

Neil Fleming stated that visual preferences includes: map depiction, diagram, spider web, chart, graphics, flow chart, labelled, symbolic arrows, circle, and hierarchy that are usually used to represent information that could be delivered in words. This mode is called graphic, which is divided into various design elements such as line, shape, form, type, texture, image, and point. In visual designing, there is a requirement of tools or methods that is called illustrative design such as Visual metaphors; visualization by assuming and comparing one thing to another, Symbol and icons; visualization by representing brand, condition, and class that are already understood generally. Another thing is that the visual image that is already familiar to us, which also herds an amount of experience related to it, resulting in the usage of iconography in as much as introducing the navigation system much faster. The last is decorative; visualizations such as paintings are clear, and they typically attract attentions [5].

Information category will also show the usage of comprehending plot, such as statistics; explaining matrix such as sales, revenue market research, and surveys, are typically shown in diagrams. Diagrams are divided into several types; line diagram, stem diagram, and circular diagram. Statistics also explain comparison and categorization. Second in the line is process; explaining activity plot. This is very useful to elucidate the steps of a process, from the beginning to the end. Idea; concept, theory, leadership thinking, ideology. With the usage of infographics in many communication activities, ideas are easier to understand. Chronology/Timeline, useful in history, sequence of events, schedule. Geography is about pointing out location, position, distribution. Very useful in explaining location and matrix based on regions. Hierarchy explain about organization structure, needs assessment. Hierarchy is commonly used to convey position, eminence, and content focus. Relations; internal, external, people, products/services. Visualization of people connectedness, concept, or entity in speeding up comprehension. [1]

Associated with graphics or visual usage in learning, it is necessary to understand the map language—which is usually called “Thinking Maps Language”® put forward by David Herley in 1995. Herley claimed the Thinking Maps, as patterns language of knowledge process, is a way for learner to be more prepared in the implementation in every learning environment. Several graphics that are prevalent to use are flow map/flow chart; elucidating process, tree map to explicate hierarchy concept and taxonomy, and brace map to explain anatomy diagrams. Every visual tool offers a useful way to access visual knowledge. They stated that there eight thinking maps for each corresponding information. They are Circle map to defining in context, bubble map to describe, double bubble map to compare and contrast, three maps to classify, brace map to identify a whole part, flow map to explain a chronology, multi flow map to show a problem solution and the last is bridge map to see an analogy [6]. Figure 2 shown eight Thinking Maps® put forward by David N. Hyerle and Larry Alper

![Figure 2](image-url)

**Figure 2.** Eight thinking map at (a) load circle map, (b) load bubble map, (c) load double bubble map, (d) load tree map, (e) load brace map, (f) load flow map, (g) load Multi Flow Map and (h) load ridge map

Using thinking map while making layout is important, because thinking map doing half part, so student can understand the meaning. The layout is to organize the information with design principles can create the unity and shown about the hierarchy [7].
2. Method
This research uses qualitative research with the approach to break down the lesson information in the case of Indonesian Hero lesson according to the thinking map and design it into edugraphic by applying the principles of Visual Communication design in order to obtain a communication work so that the knowledge can more easily understood.

3. Results and Discussions

3.1 Information category and thinking map implementation
Content meaning comprehension are composed based on delivered information, associated with time consisting of date, month, and year indicated regarding timeline. The information used in thinking map is in the form of timeline, bubble map, tree map, and multi flow map. Timeline pointing out sequence of events, bubble map explaining things related to the event, tree map elucidating hierarchy, multi flow map exposing multiple events related to one impact and explaining the correlation.

![Figure 3. Thinking Map combining flow map, bubble map and tree map.](image)

3.2 Hierarchy and visual system
The hierarchy in this edugraphics contains (1) image / illustrations, (2) headline, (3) subhead, (4) body copy are shown in figure 4. Illustration Character adopted the drawing style and character pioneered by Gerge, a comic from Belgium. The character focuses on firm and equivalent lines, also block coloring and simplification, but still in the form of realistic visuals. This character is called *Ligne Claire*, Frenc for evident line.

![Figure 4. Illustration Style and Visual Hierarchy.](image)
3.3 Edugraphic Result

Figure 5. The process of using thinking map at (a) load basic layout thinking map (b) load end result of using thinking map.

Figure 6. Edugraphic using thinking map at (a) load dr. Muwardi edugraphic and at (b) load dr. Soetomo edugraphic.

4. Conclusions
Thinking map can categorize information from the sample case of Indonesian Heroes because every hero has diverse data, causing the need of several thinking maps that have to be combined into one edugraphic page when it comes to the use of information. Every hero narration has to be categorized based on the content. In which are process, idea/concept/theory, chronology/timeline subsequently, thinking pattern or explanation plot is also decided, flow map, multi flow map and bubble map.

Through the esoteric knowledge of visual communication design as a knowledge that places the power of its communication to visual media, it has a role to keep the National Heroes content for civic education communicated through design elements, principle, and communication hierarchy plot. The meaning of visual in this case represents the form so that it reaches edugraphics which generates a faster comprehension of positive values from a hero in medical field. By using the Thinking Map, comprehension plot will be easier to understand, and the role of visual communication design will be easier to understand, creating other references aside of text books and supporting the sub theme ‘My Hero’. In the future, further research will be required to make proof of the comprehending levels of knowledge contents using edugraphic.
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