Maritime History Learning Based on Digital Map in the Disruption Era

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Abstract. Maritime History Learning in higher education has some of obstacles when students are required to determine coastal areas, patterns of networks shipping and trade in Indonesia. This is because the media used is inadequate and less attractive. This study aims to produce some kind of Maritime History digital maps application product and to determine the effectiveness of its use in improving student competency in learning Maritime History. This research method uses a research and development methods. The results of the material expert validation and media expert validation got a percentage score of 85,4% and 88,5 %. Based on the results, it's indicating that the digital maps based on application media was declared very valid and feasible to be used in learning Maritime History. From the small group trials and large group trials conducted on students of History Education Department. The small group trials got the percentage scores of 84 % and for the trials of the large groups got the percentage scores of 86,1% which indicates that the media is valid. The result can be concluded that the digital map based on application media is suitable to be used as a learning media for Maritime History.

1. Introduction

In the era of disruption, there are so many learning media which began to be marginalized, especially the use of print media, including print maps. Now, learning media that are always used are the media that utilize computer technology and internet networks. The presence of these two media in the world of education has changed the mindset of educators and students, both at the elementary and tertiary levels. The development of computer technology and the expansion of internet networks increasingly demand the availability of learning media based on computer and internet networks. The learning media that previously printed were then digitalized to be accessible through computers and the internet.

Maritime History as one of the studies that studied by History Education Department students has a various kinds of learning media, one of them is thematic and administrative maps. So far the media of maps that used are analog maps, can be in form of paper or other printed media. The use of analog maps creates difficulties for students because it is less attractive, easily damaged and requires a large place. The obstacles that faced by students in using analog maps makes the learning activities become less attractive and less quality. Students have difficulty in describing and visualizing learning materials

in Maritime History, such as coastal boundaries, networks and patterns of trade in Indonesia in ancient and modern era.

The obstacles that faced by students in learning Maritime History, especially in the use of maps, can be overcome by developing this media. Analog maps can be converted into digital maps by utilizing computer and internet technology. Development of analog maps into digital maps can be done with the help of Geography. This field of science has a spatial approach based on Geographic Information Systems (GIS) using Arc GIS software.

Digital maps are very useful to help students to improve the competence in learning maritime history. Some of the expected competencies in maritime history include 1) able to understand the scope of maritime history studies, 2) able to explain explaining the boundaries of coastal areas in Indonesia, 3) able to explain shipping patterns. Therefore, to find out the effectiveness in the use of digital maps in learning maritime history, it is necessary to do the research in learning maritime history based on digital maps. The focus of the study is how to develop the learning media based on digital maps media of maritime history and the feasible of this media. The purpose of this study is to produce historical digital maps and test the feasibility in improving student competency.

Conceptually, learning can be interpreted as a process of teaching students to use the principles of education and learning theory which are the main determinants of educational success. Learning is a two way of communication between educators and students [1]. This is in line with the opinion of reference [2] that learning is essentially a process of interaction between students and their environment, so it can be occur the changes of behavior to get better, where in that interactions there are so many factors that influence it, both internal and external.

Good history learning must be able to encourage students to think critically and study any kind of changes in their environment. Beside to being required to understand history from the point of view, students must also understand the space. Talking about maritime history is inseparable from the concept of space. This is because maritime itself refers to space, the sea. The meaning of the word maritime in reference [3] everything related to the sea, shipping and trade. Maritime history is the study of human activity in the past related to maritime aspects, especially shipping and trade [4].

In studying maritime history, appropriate learning media are needed. The choice of media must be based on the basic concepts of media itself, graphic, photographic, or electronic tools to capture, process, and reconstruct visual or verbal information [5]. One of the media that can be used in learning maritime history is a map that can be categorized as multimedia [6]. Map can be interpreted as describing the surface of the earth or part of the earth directly or not revealing much information, such as the location of a region, the shape, the spread of occupation, land waters, climate, economic resources and their relationship with one another [7].

Now, the use of maps as learning media hasn't been fully utilized, especially historical maps. This is because some historical maps are still analog (made by print). Students in the disruption era who rely more on technology and the internet are less interested in print media. Making and utilizing historical digital maps media in learning maritime history will produce visual literacy skills [6]. Students have the ability to interpret visual messages contained in historical maps. Beside that, through learning by using maps it will be easier for students to remember the information that observed. Therefore, students must be encouraged to use maps through digital maps media-based learning.

Digital maps are representations of geographic phenomena that saved and analyzed by digital computers. Each object on a digital map is saved as a set of coordinates, for example an object in the form of a point will be saved as a coordinate while the object in the form of a region will be saved as a set of coordinates. Digital maps have several advantages over analog maps (which are made in form of paper or other printed media), including fixed map quality, easy to keep or save, and easily updated.

2. Methods

The method used in this research is research and development. Research and development methods include the following steps; potential discovery and problems, collecting information, design creation of product, design validation, design improvements, product testing, product revisions, product usage trials [8]. Stages of research and development methods in learning media for historical learning are mentioned as in the following diagram:
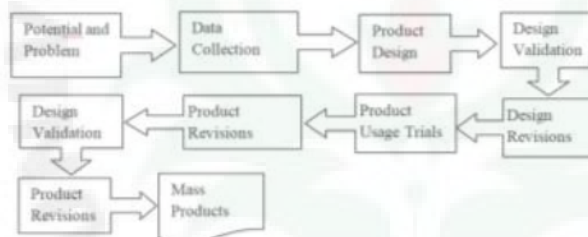

Figure 1 Research and Development Methods

This research was conducted on Department of History Education students', Faculty of Social Sciences, State University of Medan 2018 Academic Year who took a maritime history course. The technique of collecting data uses an assessment sheet instrument that aims to determine the eligibility of maritime history learning media based on digital maps. The form of the assessment sheet that used is a multilevel scale which is a question that equipped with columns that indicate the levels [9]. There are 3 instruments of assessment sheet instruments that used in this study, 1) media expert feasibility test instruments, 2) material expert feasibility testing instruments, and 3) limited user test instruments for students.

3. Result and Discussion

3.1. Digital Map Design of Maritime History

Collaboration between history and geography is done in making digital maps of maritime history. Historians provide material in the form of maritime history learning materials, while geographers design historical maps through Geographic Information Systems or GIS. Making a history maps is using ArcGIS Software. ArcGIS software is a new one of GIS software from ESRI (Environmental Systems Research Institute), which allows users to utilize data from various data formats. Through ArcGIS, users can take the advantage of desktop and network functions. On the other hand, users can also use ArcView, ArcEditor, ArcInfo levels with ArcMap, ArcCatalog and Toolbox facilities. The material presented is GIS concept, map knowledge, introduction and operation of ArcGIS, data input and spatial data management, ArcCatalog operation, composition or layout of maps with ArcMap, utilizing ArcGIS 10 software for management of spatial and tabular data, and for presenting information of maps.

ArcMap is a central application program in ArcGIS Desktop for displaying, geographic data manipulation, map drawing, querying, selecting, and map editing. ArcMap gives users the opportunity to create and work with map documents. A map document consists of data frames, layers, labels, and graphic objects. ArcMap has two main windows that are used to work with map documents, namely: table of contents window and display window. The table of contents window contains geographic data to be depicted in the display window, and how the data will be described. The display window will display geographical data and display layout.

ArcCatalog is an application that helps you to organize and manage GIS information which includes GIS data, map documents, file layers, and others. GIS data consists of various data formats and types. Inside ArcCatalog, users can delete, give new names, create new map files, preview the maps, view metadata, create database and so on. The point is, ArcCatalog is a map explorer program in ArcGIS.

3.2.Steps of Digital Maps Design
3.2.1.Preparation Phase
At this stage, spatial data collection and attribute data are needed in making digital maps. Spatial data collected is an analog map of the Asia and Southeast Asia Region. While the attribute data collected is data regarding the distribution of trade routes in the Asian region in the year 1000-1400 AD.

3.2.2. Data Processing Phase
At this stage, the data that has been collected is then processed into a digital map. The initial stage is to convert analog maps into digital forms with the scanning process. Next, the map is inputted into ArcGIS software. In this software stage, a map digitization process is done and input data attributes are performed. After all data has been inputted, the map is then layout and data processing is complete.

3.2.3. Output Phase
The output stage is the final stage in the process of working on the map. At this stage the processed map is then determined by the output which can be either softcopy or hardcopy.

Figure 2. Digital map distribution of Asian Maritime Trade in the year 1000-1400 AD

In the early stages of design, digital maps that generated are input based on analog maps. The first map to be digitized is the map of the distribution of Asian Maritime trade in the Year 1000-1400 AD. This map contains information about trade networks and shipping patterns in Asia in the year 1000-1400 AD. Based on information that obtained from maps, students can describe and visualize Indonesia's economic position in the maritime world in Asia in the past. In the process of learning digital maps media, maritime history, in use is combined with learning resources such as books and journals.

The second map that digitized is a map of the 15th century Malacca maritime trade network. This map is sourced from analog maps that published by the Nation of Archives of Malaysia in 1993. In addition to describing the trade network in Malacca in the 15th century, the map also informs about traded commodities, such as cotton, cloth, cloves, pepper, rice, gold and others.

Figure 3. Map of the 15th Century Malacca Maritime Trade Network

3.3. Eligibility Test

After the design of digital maritime history media product is produced, the next step that must be taken is the eligibility test. The instruments that used for the eligibility test consist of three types, 1) eligibility instruments for material experts, 2) eligibility instruments for media experts and, 3) eligibility instruments for users or students. The eligibility instrument for material experts refers to the Competency Standards for Maritime History Courses: (1) Explain the limits and scope of maritime history. (2) Analyzing trade and shipping networks. (3) Describe the sea and its mastery.

The eligibility instrument for testing the media includes 3 aspects, communication, design and presentation format. Instruments for students include material quality, quality of learning strategies. This eligibility test is carried out by conducting validation tests by material experts, media experts, and students on the product. This research and development method validation test is carried out in two

stages, 18 initial and revised stages. The scale used for the eligibility test is a rating scale with 4 points, 4 (very good), 3 (good), 2 (good enough), and 1 (bad). Quantitative data that obtained were analyzed by adding up, compared to the expected number, and obtained by percentage [9]. The calculation is done by the formula as follows:

$$Eligibility\ of\ percentage\ (\%) = \frac{Score\ Obtained\ 100\%}{Expected\ Score}$$

Then the scale of percentage is presented in the table below:

Table 1. Eligibility of percentage

Subject	Percentage	Interpretation
Material expert	85,4	Very Good
Media Expert	88,5	Very Good
Small group	84	Very Good
Large group	86,1	Very Good

Based on the calculation results of the initial validation test by the material expert obtained a score 33, while the expected score is 48 with an average of 2.75 and a percentage of 68,75%. Media expert validation test obtained a percentage of 67,30 with a score of 35, an expected score of 52 with an average score of 2,69. While the product trial was carried out on students of the Department of History Education 2018 in both small and large groups. Small group of 9 people and large group of 32 people. After the product test was carried out the scores were 76,01 in the small group and 75,5 in the large group with an assessment score of 33,44 and 34,68 respectively. The average obtained from each small and large group was 3,04 and 3,15. Thus, the overall of percentage obtained a good score. But material experts and the media still recommend that the product should be improved in quality, because there are still some lacks. Material experts assess the clarity of material content, the accuracy of the material and the attractiveness of the material still need to be improved, while media experts judge that user interaction with the media must be improved and must be equipped with supporting images. Based on suggestions for improvement from material experts and the media, product revisions and re-validation were carried out, and the results of the validation from material experts were 85,4% and media experts 88,4%. Product trials for small groups obtained a percentage score of 84 % and 86,1 % in large group . This shows that the media is very good or valid and can be produced in bulk.

Figure 4. Revision of Digital Map Design Distribution of Asian Maritime Trade in 100-1400 AD

PETA JARINGAN PERDAGANGAN MARITIM MALAKA ABAD KE-15

4. Conclusion

Based on the results of validation tests by material and media experts and product trials on students of maritime history courses in the Department of History Education, 2018 Academic Year, it was concluded that maritime history learning media based on digital maps in the disruption era could be developed in higher education. This is because the validation score obtained is > 75% or very good. However, there is one aspect that must be considered in making historical digital maps, it's the compatibility between material and media, so the digital maps will be more interesting and informative.

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