



# Investigating the Virtualized Cultural Heritage of Piri Reis with Social Participation and Map Literacy Skills

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## Abstract

*In this study, it was aimed to transfer Piri Reis's 1513 world map into an interactive and dynamic environment to reflect social participation and map literacy skills of pre-service social studies teachers, to determine the reflection of the skills from the views of the pre-service teachers and the information they have structured in the database. In this sense, the virtualized map was integrated into a geographical information system application developed by the researcher. This research, in which a qualitative research approach was adopted, was carried out as a case study. The views of the pre-service teacher's skills and environment were evaluated with content analysis, and their reflection skills were evaluated with descriptive analysis. Eighteen students determined with the maximum diversity sampling method participated in the study, which lasted for two and a half months. It was concluded through the findings obtained from the views of pre-service teachers that social participation and map literacy skills could be reflected in various dimensions, the map could be interpreted collectively with social participation and map literacy skills, and cultural heritage could be transformed into a form of instructional technology. It was determined that the general views of pre-service teachers regarding this environment were mostly positive and the environment beneficially enabled them to discover cultural heritage, developed various skills and gave different perspectives. Still, some pre-service teachers remained passive in the environment. In the findings obtained from the database of the virtualized map, it was determined that the sub-dimensions of map literacy with social participation skill were mostly reflected in the form of understanding- interpreting symbols, finding location - coordinate, measuring distance, finding direction, reading - interpreting a map, but not reflected in using scales.*

**Keywords:** Social participation skill, Map literacy skill, Geographical information systems, Cultural heritage, Piri Reis, Social studies education

## Introduction

Individuals who transfer knowledge into daily life produce solutions to real-life problems organizing their attitudes and behaviors. These actions are defined as processes in which knowledge is transformed into performance and expressed as skills individuals should acquire. These skills included in the curriculum are expected to be taught to individuals and transferred into real life. The social studies curriculum designed in this direction has special skills determined to reflect the acquisitions and values in real life (Akbaba & Aksoy, 2019).

Social participation, which is one of the skills in social studies curricula, is expressed as a process that develops within the framework of the individual's adaptation into society and aims individual's contribution to society, adaptation, and social service. Social participation also helps individuals to create and understand relationships in their real life being directly associated with the concept of citizenship. Due to these features, social participation is considered one of the important and universal skills of social studies (Alabaş & Kaymakçı, 2019).

Map literacy, on the other hand, refers to the acquisition of skills such as understanding and interpreting symbols on the map, finding direction, position, and coordinate, using a scale, measuring distance, and map reading and interpreting (Sönmez, 2019). Map literacy corresponding to every activity in real life of individuals is one of the basic skills of the social studies curriculum. Therefore, map literacy becomes prominent in individuals' perception and interpretation of their environment (Sönmez, 2013).

Whereas social participation included in social studies curricula with the COVID-19 pandemic process has been discussed, map literacy has been transformed into a skill with a completely digital infrastructure with Web2.0 and Web3.0 technologies. The appearance of technology in all areas of our lives (Arıkan & Özgür, 2020) ensures that this special infrastructure of map literacy is designed by the team and group work of the users. Thus, products that are collectively structured with social cooperation are created. On the other hand, the virtualization and reinterpretation of the map dated 1513 by Piri Reis, which is considered cultural heritage, can be described as a different meeting of the old and the new.

The map dated 1513 was drawn by Piri Reis, whose real name was Muhiddin Piri. Apart from this, there was also a world-famous nautical guidebook, *Kitab-ı Bahriye*, written by Piri Reis. Besides the content of the work was entirely based on real geographic data, Piri Reis's observations were also included in the book. The book also reflected the political knowledge of the period. There was a lot of information from the Indian expeditions of the Portuguese and the Dutch and the discovery of the American continent called Antilia. The map dated 1513 included the western coasts of Europe and Africa, the Atlantic Ocean, and America. In this sense, the work was considered to be worthy for analyzing (İnan, 2018). In addition to various maps, there were also world maps in the book (Figure 1).



**Figure 1: Map Samples in Kitâb-ı Bahriye**

In the research, the world map drawn by Piri Reis was integrated into an internet-based geographic information systems application (İneç, 2012; İneç & Akpınar, 2012) developed by the researcher to enable pre-service social studies teachers to reflect their map literacy skills. The locations on the map, on the other hand, were designed as windows where common information was structured to use social participation skills. Therefore, the study aimed to analyze the reflection level of pre-service social studies teachers' literacy and social participation skills on a virtualized map of Piri Reis drawn in 1513. The study was considered to be remarkable in terms of virtualizing a cultural heritage into a different format and thus making it suitable for the use of two different skills. In this context, answers to the following questions were sought:

Question 1: What are the levels of pre-service social studies teachers' reflecting their social participation and map literacy skills on Piri Reis's virtualized map and their views on this environment? To answer this question, the following questions were asked to the pre-service teachers:

1. What are your views on reflection of social participation skills?
2. What are your views on the reflection of map literacy skills?
3. What are your views on the interpretation of the map with social participation and map literacy skills?
4. What are your views on transforming a cultural heritage element into an instructional technology form?
5. What are your views on your general determinations?

Question 2: What are the levels of pre-service social studies teachers' reflecting their map literacy skills to Piri Reis's virtualized map with their social participation skills?

## **Method**

### **Research Model**

The research was carried out as a case study within the framework of the qualitative research approach. The reason for preferring this type of research was to describe and analyze the virtual platform in all aspects (Merriam, 2018). Two different stages

were followed in line with the questions that the research sought answers to. Within this framework, standardized open-ended interviews were conducted to do individual interviews for assessing pre-service teachers' skills and the virtual environment. So, the experiences of the pre-service teachers were measured by the case study. Content analysis was used to explain the data obtained. The data that the candidates reflected their map literacy skills collectively on the virtualized map were analyzed with descriptive analysis evaluating as a document (Yıldırım & Şimşek, 2013).

### Study Group

The study group included eighteen pre-service social studies teachers determined with the maximum diversity sampling method. The reason for preferring this was to reflect the diversity of individuals' thoughts to the study at the highest level with a small sample group (Yıldırım & Şimşek: 2013).

### Data Collection Tools

Two different data collection tools were used in the study. A semi-structured interview form was created by the researcher with the support of experts and literature and converted into an online format to obtain the views of pre-service teachers on the skills and virtual environment. Map literacy skills reflected by the pre-service teachers on the virtualized map with their social participation skills were saved in the application's database. Six sub-dimensions of map literacy (Sönmez, 2019) were used to make a descriptive analysis of the information collectively structured by the pre-service teachers. Research permission was obtained from Erzincan Binali Yıldırım University Rectorate Human Research Ethics Committee to conduct the research. The date of the ethics assessment decision was 30/03/2020, and ethics assessment document issue was: 03/06.

### Data Analysis

Content analysis was used to make inferences analyzing the interview transcripts of the pre-service teachers related to skills and virtual environment. Themes with the meanings identified in the content analysis suitable for case studies were determined (Patton, 2018).

Descriptive analysis was performed to analyze the map literacy skill levels reflected by the pre-service teachers on a virtualized map with their social participation skills interpreting the findings and summarizing them according to themes (Yıldırım & Şimşek, 2013). The skills recorded simultaneously in the virtual environment were analyzed through six sub-dimensions of map literacy (understanding - interpreting symbols, finding direction, finding location - coordinate, using scale, measuring distance, reading - interpreting map) (Sönmez, 2019).

To calculate the reliability of content and descriptive analyses, the reliability formula suggested by Miles & Huberman (1994) was used, taking the opinions of two experts. In calculations, the reliability of the content analysis was found to be 89%, and the reliability of the descriptive analysis was determined to be 85%. These results were regarded to be reliable (Miles & Huberman, 1994).

### Material

For the research, the map of Piri Reis dated 1513 was redrawn by the researcher by the original in graphic processing programs and transferred to the digital environment. After this process, the digital map was integrated into the geographical information systems application called Seyyah developed by the researcher with ADDIE instructional design model (İneç, 2012) and later upgraded to version 1.1 for another study (İneç & Akpınar, 2020). All locations on the map were saved in the Seyyah database by their original. Information was included on the map as clues. The updated system was available to users via researcher's precoder.net domain name (Fig. 2).



**Figure 2: 1513 dated virtualized map of Piri Reis**

### Research Process

The research was carried out with extracurricular activities in eight weeks with pre-service teachers studying in the social studies education of a state university education faculty. For the material of the

research, it took ten days to virtualize the Piri Reis map and three days to link the application named Seyyah with the database. The database was adapted for this research in two days.

### Findings

When Table 1 was analyzed, pre-service social

**Table 1: Views of Pre-Service Social Studies Teachers on Reflecting their Social Participation Skills**

Themes	Codes	Views	Frequency (f)	%
Reflected	Social participation was achieved	S2, S4, S7, S9	4	77.7
	Ideas were developed collectively	S3, S8, S14, S15, S16	5	
	Different views and thoughts were benefited	S10, S12, S13, S17, S18	5	
Neutral	Active participation should be ensured	S1, S5, S6, S11	4	22.2
Total			18	100

Some of the views of the pre-service teachers under the ‘reflected’ theme on reflecting their social participation skills were as follows:

Social participation was achieved: S2: *“We did group work with Seyyah. A team spirit was created. We all acted together. Sometimes we supported each other and sometimes we corrected each other’s mistakes. Teamwork requires this.”*

The ideas were developed collectively: S8: *“We performed a study in which social participation was present and common ideas emerged.”*

studies teachers were noticed to express their views under the theme of “reflected” as social participation was achieved ( $f=4$ ), ideas were developed collectively ( $f=5$ ) and different views and thoughts were benefited ( $f=5$ ), and under the theme of “neutral” as active participation should be ensured.

Different views and thoughts were benefited: S13: *“... The subject can be regarded from a different dimension based on different interpretations. In this way, many views appeared with social participation.”*

One of the views related to pre-service teachers’ reflecting their social participation skills under the theme of “Neutral” was as follows:

Active participation should be ensured: S6: *“We could improve our social participation skills even more with Seyyah. ...Better could be done with a good team.”*

**Table 2: The Views of Pre-Service Social Studies Teachers on Reflecting their Map Literacy Skills**

Themes	Codes	Views	Frequency (f)	%
Reflected	Skill development was achieved	S2, S5, S11, S12, S13, S14, S17, S18	8	94.4
	A suitable environment for skill was provided	S3, S4, S6, S7, S8, S9, S10, S15, S16	9	
Neutral	Complicated	S1	1	5.5
Total			18	100

When Table 2 was analyzed, pre-service social studies teachers were noticed to express their views on their map literacy skills under the theme of “reflected” as skill development was achieved ( $f=8$ ), a suitable environment for skill was provided ( $f=9$ ), and under the theme of “neutral” as complicated ( $f=1$ ).

Some of the views under the theme ‘reflected’ on pre-service teachers’ reflecting their literacy skills were as follows:

Skill development was achieved: S13: *“... I realized that I have map literacy skills. So when I see*

*a map somewhere, I immediately get curious about different places. This helps me to develop my map literacy skills.”*

A suitable environment for skill was provided: S3: *“Seyyah offered a suitable environment for map literacy. It became possible to develop this skill in it.”*

The view of-service teachers related to reflecting their map literacy skills under the theme of “Neutral” was as follows:

Complicated: S1: *“It seemed a little complicated.”*

**Table 3: Views of Pre-Service Social Studies Teachers on Interpreting the Map with their Social Participation and Map Literacy Skills**

Themes	Codes	Views	Frequency (f)	%
Reflected	It enabled discovering while interpreting	S1, S7, S8, S10, S12, S13, S15, S17, S18	9	88.8
	It enabled structuring the information collectively	S2, S3, S4, S5, S11, S14, S16	7	
Neutral	Active participation should have been provided	S9	1	5.5
Not reflected	It should have been productive	S6	1	5.5
Total			18	100

When Table 3 was analyzed, pre-service social studies teachers were noticed to express their views on interpreting Piri Reis’ map with their social participation and map literacy skills under the theme of “reflected” as it enabled discovering while interpreting ( $f=9$ ), it enabled structuring the information collectively ( $f=7$ ), under the theme of “neutral” as active participation should have been provided ( $f=1$ ) and under the theme of “not reflected” as it was not productive ( $f=1$ ).

Some of the views under the theme of “reflected” related to pre-service social studies teachers’ interpreting Piri Reis’s map with their social participation and map literacy skills were as follows:

It enabled discovering while interpreting: S10: *“The ideas that were not interpreted in Piri Reis map were interpreted. Different thoughts were suggested.”*

It enabled structuring the information collectively: S3: *“It creates an environment that harmonizes multiple ideas.”*

The view under the theme of “neutral” related to pre-service social studies teachers’ interpreting Piri Reis’s map with their social participation and map literacy skills was as follows:

Active participation should have been provided: S9: *“If the group were a little more active and in communication, better results would have been created.”*

The view under the theme of “not reflected” related to pre-service social studies teachers’ interpreting Piri Reis’s map with their social participation and map literacy skills was as follows:

It was not productive: S6: *“We tried to read the map with all group. But it was not very efficient.”*

**Table 4: The Views of Pre-Service Teachers on the Transformation of a Cultural Heritage Item into an Instructional Technology Form**

Themes	Views	Frequency (f)	%
It was provided to reach large masses	S1	1	5.5
Cultural heritage was tried to be analyzed	S2, S4, S6, S8, S9, S10, S11, S12, S17	9	50
Technology-culture interaction was provided	S5, S7, S13, S14, S18	5	27.7
It was considered to be a creative idea	S3, S15, S16	3	16.6
Total		18	100

When Table 4 was analyzed, pre-service social studies teachers’ views on transforming a cultural heritage element into an instructional technology form were noticed to be expressed as it was provided to reach large masses ( $f=1$ ), cultural heritage was tried to be analyzed ( $f=9$ ), technology - culture interaction was provided ( $f=5$ ). It was considered to be a creative idea ( $f=3$ ).

The views of the pre-service teachers on transforming a cultural heritage item into an instructional technology form were as follows:

It was provided to reach large masses: S1: *“I think this element of our culture will be more beneficial in the form of instructional technology as it will reach larger masses.”*

The cultural heritage was tried to be analyzed: S4: *“Of course, that is very good. In this way, we both learn new things about our culture and our perspective on our culture is changing or getting stronger.”*

Technology - culture interaction was provided: S18: *“Interpreting an element belonging to our*

*culture is proud, everyone can easily reach turning it into technology. There anyone can interpret what Piri Reis meant. Transforming it into technology makes it easier for us. We can look at any time and understand what he wants to reflect there.”*

It was considered a creative idea: S16: *“It is something admirable embracing our values.”*

**Table 5: Views of Pre-Service Teachers Related to their General Determinations**

Themes	Codes	Views	Frequency (f)	%
Positive	It allowed to discover cultural heritage	S2, S6, S12, S13, S17	5	77.7
	It was beneficial	S3, S8, S11, S14, S16	5	
	It developed various skills	S7, S15	2	
	It gave different perspectives	S4, S10	2	
Neutral	It should be developed	S1	1	5.5
Negative	The group members were passive	S5, S9, S18	3	16.6
Total			18	100

When Table 5 was analyzed, pre-service social studies teachers were noticed to express their views on their general determinations under the theme of “positive” as it allowed them to discover cultural heritage ( $f=5$ ), which was beneficial ( $f=5$ ), it developed various skills ( $f=2$ ). It gave different perspectives( $f=2$ ) under the theme of “neutral” as it should be developed ( $f=1$ ) and under the theme of “negative” as the group members were passive ( $f=3$ ).

Some views of the pre-service teachers related to their general determinations under the theme of “positive” were as follow:

It allowed us to discover cultural heritage: S12: *“We continued the opinions of others evaluating Piri Reis’s map with social participation skills. I had the chance of analyzing and interpreting this map which was our culture more closely.”*

It was beneficial: S8: *“It was enjoyable to be on such a platform. It was a very beneficial study.”*

It developed various skills: S7: *“Seyyah improved our skills and views...”*

It gave different perspectives: S10: *“We gained different perspectives interpreting the map of Piri Reis in the virtual environment with different ideas. I had not studied this map in such detail before. Thanks to this, I had the opportunity to analyze.”*

One of the views of the pre-service teachers related to their general determinations under the theme of “neutral” was as follow:

It should be developed: S1: *“I believe that if it is studied a little more, it will yield positive results.”*

One of the views of the pre-service teachers related to their general determinations under the theme of “negative” was as follow:

The group members were passive: S5: *“... We could not create the desired product because we could not participate as required. We could do this. Differently, I do not know, ensuring more participation, with the application in a conversation mood maybe would make us more effective...”*

**Table 6: Pre-Service Social Studies Teachers’ Level of Reflecting the Map Literacy Skills with their Social Participation Skills in a Virtualized Map of Piri Reis**

Themes	Codes	Participants	Frequency (f)
North America	Understanding & interpreting symbols	S1, S4, S5, S6, S10, S12, S13, S14, S17, S18	10
	Finding location & coordinate		
	Measuring distance		
	Reading & interpreting map		

Central America	Understanding & interpreting symbols	S2, S3, S5, S7, S8, S10, S13, S14, S16, S18	10
	Finding direction		
	Finding location & coordinate		
	Reading & interpreting map		
North America	Understanding & interpreting symbols	S2, S3, S5, S6, S7, S10, S13, S15, S14, S16, S17	11
	Finding location & coordinate		
	Reading & interpreting map		
Africa	Understanding & interpreting symbols	S1, S2, S3, S4, S6, S8, S9, S10, S11, S13, S15, S16, S18	13
	Finding direction		
	Finding location & coordinate		
	Reading & interpreting map		
Europe	Finding direction	S1, S3, S4, S5, S7, S11, S13, S14, S15	9
	Finding location & coordinate		
	Reading & interpreting map		
Trade Routes	Understanding & interpreting symbols	S1, S2, S3, S4, S7, S8, S10, S11, S13, S15, S16, S18	12
	Finding direction		
	Finding location & coordinate		
	Reading & interpreting map		
Total			18

When Table 6 was analyzed, it was noticed that there were different sub-dimensions of map literacy under six different themes in the map when the information that pre-service social studies teachers constructed together was evaluated. The coding was noticed to be created as understanding & interpreting symbols, finding location & coordinates, measuring distance, reading & interpreting map under the theme of “North America” ( $f=10$ ), understanding & interpreting symbols, finding direction, finding location & coordinates, reading & interpreting map under the theme of “Central America” ( $f=10$ ), understanding & interpreting symbols, finding location & coordinates, reading & interpreting map under the theme of “South America” ( $f=11$ ), understanding & interpreting symbols, finding direction, finding location & coordinate, reading & interpreting map under the theme of “Africa” ( $f=13$ ), finding direction, finding location & coordinate, reading & interpreting map under the theme of Europe ( $f=9$ ), and understanding & interpreting symbols, finding directions, finding location & coordinates, reading & interpreting map under the theme of “trade routes” ( $f=12$ ).

Some of the common views of pre-service teachers were as below:

North America (*understanding & interpreting symbols, finding location & coordinates, measuring distance, reading & interpreting map*): “This continent is the American continent. It was discovered by Christopher Columbus. Columbus thought this continent was India. When they first set foot here, they met and fought the Mayans. The Spanish and Portuguese who learned about this place later invaded this continent and destroyed the civilizations here and met with many riches. ...This region was under the colony of Portugal for a long time. Portugal established its colonies here. ...When we started from the clues, those who discovered this continent built the people here and it has been said that they wandered naked. Maybe the people living here were far from civilization. ...The Turkish people discovered this continent before Columbus and named it the Continent of Antilia. The difficult and costly voyages to be made on the continent’s adventure were not regarded to be correct.”

Central America (*understanding & interpreting symbols, finding direction, finding location & coordinates, reading & interpreting map*): “The people mentioned in this continent were the Inca and Maya civilizations. ...As a result of geographical discoveries, the Spaniards eliminated these

communities one by one and started to establish a colony. The continent of America was discovered by the Genoese seafarer Christopher Columbus. ...While the Spaniards came to this region, they brought germs and some diseases together. Because of this, 20 million people lost their lives. As stated in his tip, the colonization of this place started from religion and agriculture. ...With the discovery of this place, the theory of the endless Atlas Ocean was also refuted.”

South America (understanding & interpreting symbols, finding location & coordinates, reading & interpreting map): “This continent is South America. Since different climatic types are seen on this continent, different animal types have emerged as well. And in some places, it has limited the living space. ...That’s why the Portuguese resembled the animals living in this continent, different from their climates to monsters. ...Since this region is very hot, there are not many places built here and people have lived here in tribes. ...Because the tribes lived together, the Portuguese could not invade here, and this place remained in ruins. Because the animals they see here were unlike the animals in their habitats and saw them for the first time, they likened them to monsters. Although they could not exploit this place, it attracted the attention of the Portuguese and even they wanted to tell what they saw returning to their own country, not going to India.”

Africa (understanding & interpreting symbols, finding direction, finding location & coordinate, reading & interpreting map): “If we look at the animals in the pictures, we can understand that they are resistant to heat and drought. These features show that this region is the African continent. ... It is also seen that people believe in different types of religion, that is, half-human and half-animal. It seems that everywhere is surrounded by castles. This shows that the country is under colonization. ...As it can be understood, while the side of Africa facing the Atlantic Ocean and North Africa have been shaped by various civilizations, the indigenous people are dominant in Central and South Africa. In addition to this, it is understood that exploitation activities did not reach Central and South Africa in the 16th century. ...If we look at the clues given by the pictures, we see that there are traces of

more than one civilization. Animal diversity is also available. In addition, the sculpture in the painting is an indication of the existence of different beliefs. Having different beliefs is an indication that people think differently. Locations shown in brown in the picture may be different civilizations. Thus, we can understand that there are people from many civilizations and also from many cultures.”

Trade Routes (understanding & interpreting symbols, finding directions, finding location & coordinates, reading & interpreting map): “This region is around Cuba or Panama Canal surrounding the Caribbean Sea between today’s North America and South America. The sailors who came here encountered the civilizations here and destroyed them. ...It is where the Spaniards made Europe richer with the gold they received from Aztec and Inca civilizations. The animal, whose height is 5 inches between two eyes, may have adapted to that area. ...Besides, not many people live because this place is newly discovered. ...Because of these riches, there is a constant danger of being invaded like the present-day Middle East and Africa. ...By taking many immigrants from Europe, America has been Europeanized.”

## Conclusion and Discussion

In this study, Piri Reis’s map dated 1513 was virtualized and presented to reflect the social participation and map literacy skills of pre-service social studies teachers through a geographical information systems application.

The findings obtained in line with the first question of the study revealed that pre-service teachers could use their social participation and map literacy skills alone or together. In addition, it was noticed that the transformation of a cultural heritage element into a technology-based form and such a situation was generally responded to positively. When these obtained results were evaluated in terms of social participation, it was determined that these did not show similarities with the results indicating that social participation was not reflected very much (Hayırsever & Kısakürek, 2014; Sömen & Bilgili, 2017), partially reflected (Çelikkaya, 2011) or moderately (Öğretmenen, 2017), but it was also observed that this was similar to the studies showing

that it was reflected positively (Coşkun, 2020). In terms of map literacy, it was not similar to the studies where the map literacy level was low (Koç, et al., 2017) or medium-level (Koç & Çifçi, 2016). These results revealed that two skills should be developed and reflected with special activities. Indeed, the studies carried out by Coşkun (2020) and Akengin, et al., (2016) confirmed this discussion.

The findings obtained in line with the second problem revealed that pre-service social studies teachers' level of reflecting their map literacy skills to Piri Reis's virtualized map with their social participation skills was realized at four levels according to locations. It was determined that the sub-dimensions used for North America were understanding & interpreting symbols, finding location & coordinates, measuring distance, reading & interpreting map, these were understanding & interpreting symbols, finding direction, finding location & coordinates, reading & interpreting map for Central America, understanding & interpreting symbols, finding location & coordinates, reading & interpreting map for North America, understanding & interpreting symbols, finding direction, finding location & coordinate, reading & interpreting map for Africa, and understanding & interpreting symbols, finding directions, finding location & coordinates, reading & interpreting map for trade routes. For all locations, it was determined that five sub-dimension skills as understanding & interpreting symbols, finding location & coordinates, measuring distance, finding directions, reading & interpreting maps were used. Still, the skill of using scale was not used.

### Recommendations

- Similar applications should be developed to support and develop skills.
- New technologies should be used for the protection, dissemination, promotion, and exploration of cultural heritage.
- Further studies should be carried out to understand the values.

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