Virtual Museums from the Perspective of Social Studies Pre-service Teachers

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ARTICLE INFO	ABSTRACT
	This study aims to investigate the perspectives of pre-service social studies teachers on virtual museums. The research employed a case study, one of the qualitative research designs. The study group consists of thirty pre-service teachers enrolled in a state university's Department of Social Studies Education, Faculty of Education. Individual online interviews were conducted with each participant using a semi-structured interview form. The method of content analysis was used to analyze the research data, and the data gathered from the research were presented with their frequencies using diagrams incorporating themes, sub-themes- themes, and codes. As a result of the research, Social Studies pre-service teachers who stated that they may encounter technical, virtual environment-related, teacher or student-related problems while using virtual museums suggested that virtual museum applications should be adapted to the level of students in terms of the effective use of virtual museums and technical impossibilities in schools should be eliminated.

1. Introduction

According to the International Council of Museums, a museum is a permanent, public, non-profit organization that acquires, preserves, researches, shares, and exhibits evidence of the tangible and intangible past of people and their environments, serving the development of society (ICOM, 2015). Museums, which were far from being evaluated with an education-oriented perspective at the beginning of the 19th century, were influenced by the political, economic, and cultural transformation experienced during the 20th century, and they were restructured conceptually and institutionally (Hooper-Greenhill, 1999). Along with the exhibition activity that has started to change in museums, museums have acquired the mission of interpreting the exhibited object in a way that conveys its multifaceted value, informing society and giving a message, beyond putting their collections side by side (Alexander et al., 2017). Today, the notion that schools are the only educational institutions is no longer valid. The idea that education is not limited to the use of textbooks in the classroom, that different environments should be incorporated into the learning process, and that museums play an important role at this time has gained prominence (Önder et al., 2009). With educational activities to be organized about museums, it is necessary to emphasize that museums are not just about visiting collections, but that all these activities are a whole in education (Hassan, 2017).

Examining the Secondary School Curriculum of the Turkish Ministry of National Education reveals that education with museums is emphasized in the Social Studies Curriculum, as well as the Turkish, Science and Technology, and Visual Arts curricula. These new additions to the curriculum are labeled "Education with Museum" (MEB, 2008). However, it is frequently mentioned in studies that reasons such as financial inadequacies, transportation problems, difficulty in permitting, economic inadequacies, difficulty in

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controlling and ensuring the safety of crowded groups, the thought that the teaching program may be disrupted, failure of museum officials to transfer information following the level of students, the fact that there is no museum in the region. There is no museum compatible with the content of each lesson makes it difficult to carry out educational museum tours. (Keleş, 2003; Baykan, 2007; Uslu, 2008; Demirci, 2009; Demirboğa, 2010; Selanik Ay ve Kurtdede Fidan, 2014; Çalışkan et al., 2016; Şentürk et al., 2020). Virtual museums, independent of time and space, are considered an option in education with a museum in cases where real museum tours cannot be made.

A virtual museum can be defined as an interactive website that offers digital copies of works of art, historical artifacts and documents, and information about these works to the access of their visitors on the internet by making use of the possibilities of computer and internet technologies (Turan, 2015: 190). Virtual museums are seen as an effective teaching tool due to their three dimensions and interactive technologies (Kim et al., 2006). Virtual museums function as a learning environment in terms of not experiencing resource and time restrictions, being able to go beyond the teacher and textbook-based education in the classroom, and providing access to rich and different learning materials (Salar, 2009; Sungur & Bülbül, 2019). Virtual museums, which provide an environment in which to see and learn about museums that are not always possible to visit in Turkey and around the world (Buyurgan & Buyurgan, 2018), do not replace the experience and pleasure gained from visiting the place, but instead make it possible to easily access the world's cultural heritage through virtual museology (Altunbaş & Özdemir, 2012). In addition, virtual museums have positive features in terms of having worldwide access, accurate and reliable information sources (Çolak, 2006), richer presentation opportunities with activities such as games and animations, and transferring historical artifacts to future generations by protecting them from potential damage caused by visitors (Turan, 2015). The fact that historical artifacts are exhibited behind the glass in museums and cannot be adequately observed in crowds demonstrates the importance of virtual museums being used in educational environments (Uslu, 2008; Kaya & Okumuş, 2018). The fact that the families of the students are insufficient economically, the security weaknesses of the tours, and the inadequacy of the sightseeing places that will provide educational learning outcomes in the region where the school is located, often require the observation method to be carried out in the form of virtual tours. Virtual tours provide important contributions for students who cannot attend tours for various reasons (Tuncel & Dolanbay, 2017).

In addition, research indicates that instructional activities supported by virtual museum tours in social studies classes are advantageous (Südor, 2006; Yıldırm & Tahirolu, 2012; Ustaolu, 2012; Tuncel & Dolanbay, 2017; Altnbay & Gümüş, 2020; Çınar et al., 2021). Educational activities with the virtual museum have been found to have a positive impact on students' cognitive and affective learning outcomes (Demirboağ, 2010; Yıldırım & Tahiroğlu, 2012); Students find the activities conducted with the virtual museum useful (Ermiş, 2010); students' motivation is increased and long-term learning is enabled thanks to the virtual museum events (Kayabaş, 2005), By enriching the lesson plan, virtual museums make the learning-teaching process fun and interesting (Shim et al., 2003; Kaya & Okumuş, 2018; Çınar et al., 2021), they improve students' imagination and problem-solving skills, they create suitable environments for configuring and synthesizing knowledge (Barab et al., 2007; Iqbala et al., 2010), and they enable students to develop skills such as perception of time and chronology, perceiving location, and digital literacy (İlhan et al.,, 2021) in the research.

It is known that drawing students' attention in the learning-teaching process contributes to the process (Zhu, et al., 2004). Virtual tour applications, one of the materials that can be used in Social Studies lessons, attract students' attention by making visual objects three-dimensional instead of two-dimensional (Koca & Daşdemir, 2018). At this point, virtual museums offer a learning environment that can appeal to secondary school students with their rich visual content. In Social Studies teaching, virtual museums can be used so that students can make sense of this information and improve their thinking skills, rather than memorizing information, especially during the teaching of subjects related to historical periods and events. Effective use of this learning environment will be possible with Social Studies teachers who can recognize and apply education with the virtual museum. The data in the literature show that Social Studies teachers do not often make use of virtual museums as material in their lessons (Egüz, 2011; Aladağ et al., 2014; Aktaş, 2017; Doğanlı, 2019; Altınbay & Gümüş, 2020; Zabun, 2020). It is observed that social studies teachers do not use virtual museums due to reasons such as insufficient knowledge about virtual museums (Egüz, 2011; Aktaş, 2017), lack of training about virtual museums in their educational life (Sungur & Bülbül, 2019), crowded classrooms,

and lack of technological infrastructure (Aktaş, 2017). In this study, pre-service teachers' opinions about virtual museums and their perspectives on the availability of virtual museums in Social Studies education were examined. For this purpose, the answers to the following questions were sought.

Social Studies pre-service teachers.
- What are their opinions about virtual museums?
- What are their thoughts on the contribution of virtual museum tours to students?
- What do they think about the appropriateness of the content of the social studies curriculum for the use of virtual museums?
- What do they think about the problems that can arise when using virtual museums in social studies classes?
- What are their thoughts on effectively making use of virtual museums in the Social studies lesson?

2. Methodology

2.1.Research Design

This research was designed with phenomenology, one of the qualitative research methods. The pattern of phenomenology focuses on phenomena that we are aware of but do not understand in full detail. Phenomena can come across in various forms such as events, experiences, perceptions, orientations, concepts and situations in the world we live in (Yıldırım & Şimşek, 2018). The basis of the phenomenology approach is individual experiences. In this approach, the researcher is interested in the p articipant's personal experiences and examines the individual's perceptions and the meanings they attach to events (Akturan & Esen, 2008).

2.2. Research Sample

The study group of the research consists of 30 teacher candidates studying at a state university, faculty of education, or department of social studies education in the 2020-2021 academic year. Criterion sampling, one of the purposive sampling methods, was used to create of the study group. In the purposive sampling (Maxwell, 2018), which is used to select the participants who will answer the research questions in the best way and establish the most productive relationships, information-rich situations are selected so that more in-depth research can be conducted. According to Patton (2018), information-rich situations are situations where the researcher can obtain as much information as possible. The criteria for determining the pre-service teachers forming the study group in this research are studying in the 4th grade and participating voluntarily because they have taken professional field knowledge and teaching profession lessons at previous grade levels. Table 1 contains information about the study group.

Table 1. *Information About the Study Group*

		f	%
Gender	Female	22	73
	Male	8	27
Museum education status	Yes	8	27
	No	22	73
Virtual museum tour status	Yes	23	77
	No	7	23
Virtual museums visited by the study group	Anatolian Civilizations Museum	13	43
	Istanbul Toy Museum	9	30
	Göbeklitepe Ruins	6	20
	Liberation War Museum	4	13
	Ephesus Museum	4	13
	Izmir Ataturk museum	2	7
	Istanbul Archeology Museum	2	7
	Mausoleum	2	7
	Ankara Ethnography Museum	1	3
	Hagia Sophia Museum	1	3
	Ankara Painting and Sculpture Museum	1	3
	Ahlat Seljuk Museum	1	3
	Zeugma Museum	1	3
	British Museum	1	3

Republic Museum	1	3	
Troya Museum	1	3	
Hatay Archeology Museum	1	3	
Eskisehir Archeology Museum	1	3	
Rahmi Koc Museum	1	3	

2.3. Data Collection Tools and Procedure

A semi-structured interview form consisting of a directive and five open-ended questions developed by the researcher was used as a data collection tool in the research. Researchers frequently prefer semi-structured interviews because it removes the limitations of writing and filling-in questionnaires and helps to obtain in-depth information on a particular subject (Yıldırım & Şimşek, 2018).

The prepared interview form was submitted to an expert opinion to ensure internal validity. According to the feedback from the field expert, the interview form was rearranged and the questions that might be difficult to understand were made and finalized by making necessary arrangements. There are questions to identify the demographic characteristics of the pre-service teachers in the study group in the first part of the interview form. The second part consists of five questions prepared to reveal the pre-service teachers' opinions on virtual museums and the availability of virtual museums in Social Studies education.

The research data were collected as a result of online interviews conducted separately with each participant in May 2021 due to the implementation of distance education under the conditions of the Covid-19 pandemic. In the interviews with the pre-service teachers, the purpose of the research was mentioned, and an explanation was made that their personal information would be kept confidential. They were asked to detail their opinions on the questions. To ensure the validity of the research, the data collection and analysis process was explained in detail, and the participants' own statements were included in the analysis and interpretation of the data without intervening.

2.4. Data Analysis

The content analysis method was used in the analysis of the research data. According to Yıldrım and Şimşek (2018), the data gathered in the content analysis is subjected to a thorough process, and as a result, concepts and themes that were not identified by the descriptive approach are uncovered. In this way, the data is first conceptualized, then the emerging concepts are regulated and the themes that describe the data are determined. In the research, codes were created by combining the expressions of pre-service teachers with similarities and differences, and the codes were evaluated under certain themes and sub-themes. An expert opinion was sought to ensure reliability during the research data analysis. In analyzing the data, the researcher's and field expert's coding's were compared in terms of research reliability, and the percentage of agreement was calculated as ([agreement / (agreement + disagreement) x 100]). %91 Over 70% of the reliability calculations are considered reliable for research (Miles & Huberman, 1994). The sections where there were dissensus were re-evaluated, and the analysis of the data was finalized by providing a consensus.

The data obtained at the end of the content analysis were presented with their frequencies by creating diagrams containing themes, sub-themes, and codes. In the presentation of the findings, pre-service teachers were coded as PT1, PT2, …PT30 (PT-Pre-service Teacher) to protect participant confidentiality following ethical rules. Since credibility and transferability are important for the validity of the research process, direct quotations were made from the participants' opinions and the results were interpreted based on these opinions.

2.5. Ethical

The research was completed following the guidelines of publication ethics. Ethical permission was obtained from the Afyon Kocatepe University Scientific Research and Publication Education Board for the research.

3. Findings

The findings obtained from the data collected during the research process are interpreted using diagrams in this section. The opinions of social studies pre-service teachers about virtual museums have been analyzed under the themes of virtual museum definitions, the contribution of virtual museum tours to students, the convenience of the social studies curriculum content for the use of virtual museums, problems that may be

encountered while using virtual museums, and suggestions for effective use of virtual museums. Figure 1 depicts how pre-service social studies teachers defined a virtual museum.
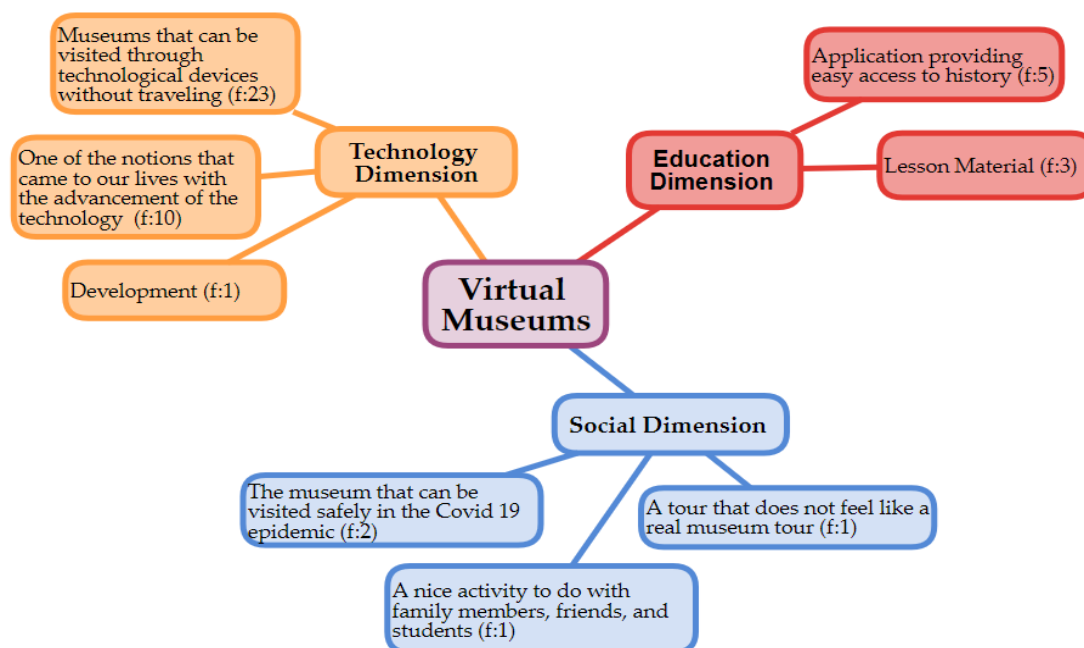

Figure 1. *Virtual Museums According to Pre-Service Teachers*

As seen in Figure 1, the virtual museum definitions of pre-service teachers were analyzed using the sub-themes of technology, education, and social dimensions. In the dimension of technology, they emphasized that virtual museums can be visited through technological devices without the need of traveling, that it is a notion that came into our lives with technology and development. The opinions of some pre-service teachers who define virtual museums through the technology dimension are as follows:

> PT7 *"It is to be physically in an armchair and to taste history, travel, and knowledge spiritually."*

> PT30 *"…One of the beneficial aspects of virtuality that has come to our lives with the development of technology is virtual museums…"*

Pre-service teachers stated that virtual museums are an application that provides easy access to history and that they can be used in lessons as an educational dimension. The opinions of some pre-service teachers who define virtual museums in terms of education dimension are as follows:

> PT28 *"They are imaginary museums without walls which allow us to see works of art and common cultural heritage without going to a country or city in a completely different geography."*

> PT27 *"It is one of the auxiliary lesson materials that can be used in the Social studies lesson."*

Pre-service teachers stated that it could be visited safely in the Covid-19 epidemic, it is a nice social activity to be done with family members, friends, or students, but it does not give the feeling of a real museum tour as the social dimension of virtual museums. The opinions of some pre-service teachers who define virtual museums in terms of the social dimension are as follows:

> PT15 *"It is a good practice for people who want to visit museums while there are restrictions, prohibitions in many areas during the Covid 19 epidemic."*

> PT30 *"…Virtual Museum tours are a nice activity to do with family members, friends, students."*

Figure 2 shows the evaluations of social studies pre-service teachers regarding the contribution of virtual museum tours to students.
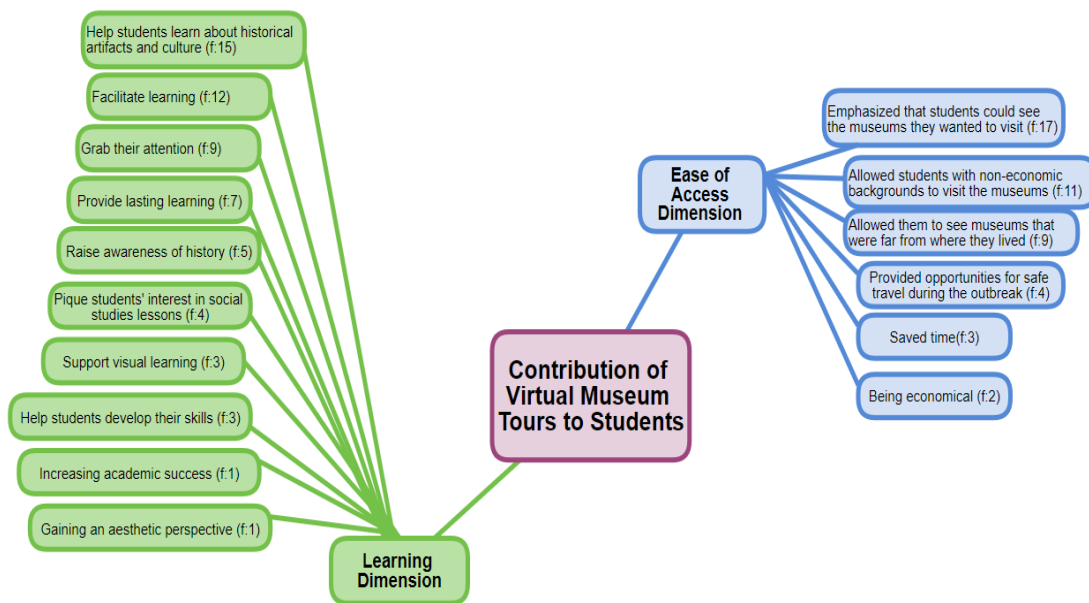
Figure 2. *Pre-Service Teachers' Opinions about the Contribution of Virtual Museum Tours to Students*

As seen in Figure 2, pre-service teachers' opinions on the contribution of virtual museum tours to students were analyzed with the sub-themes of learning and accessibility dimension. Pre-service teachers focused on the learning aspect of virtual museum tours, saying that they help students learn about historical artifacts and culture, facilitate learning, grab their attention, provide lasting learning, raise awareness of history, pique students' interest in social studies lessons, support visual learning, and help students develop their skills. The opinions of some pre-service teachers who explained the contribution of virtual museum tours to students through the learning dimension are as follows:

> PT5 *"Virtual Museum tours used in Social studies lessons facilitate learning the subjects, increase interest in the lesson and academic success, and develop quizzical, creative, and historical thinking skills. They give students an aesthetic perspective."*

> PT9 *"…Virtual Museums help to increase the sense of curiosity in children, especially the retention of knowledge. Virtual museum tours will attract this student's attention if the student's visual intelligence is dominant. Students who are bored with a lot of writing will learn by visiting and seeing a place. While visiting the museum, it is possible to learn instantly from the boxes that give information about the object, writing, what the object is and what it means."*

Pre-service teachers explained the contribution of virtual museum tours to students in terms of the ease of access dimension, emphasized that students could see the museums they wanted to visit, allowed students with non-economic backgrounds to visit the museums, allowed them to see museums that were far from where they lived, provided opportunities for safe travel during the outbreak, and saved time. The opinions of some pre-service teachers who expressed the ease of access to virtual museum tours are as follows:

> PT2 *"…Not all student's financial resources are favorable. With the virtual museum, the distinction between distance and close has been removed, and students can now visit museum tours as they wish."*

> PT7 *"During the pandemic, many students could not physically make any tours or had difficulties in doing so. Virtual museums have allowed us to easily access information without risking our health."*

In Figure 3, the evaluations of the Social Studies pre-service teachers regarding the availability of the content of the Social studies lesson Curriculum for the use of virtual museums are given.
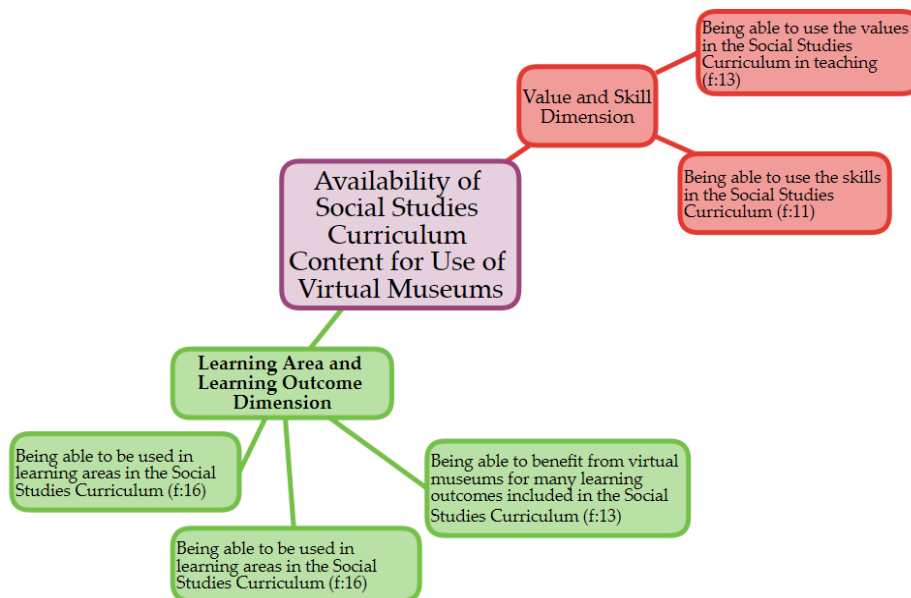
Figure 3. *Pre-Service Teachers' Opinions About the Availability of the Content of the Social Studies Curriculum for the Use of Virtual Museums*

As seen in Figure 3, the opinions of pre-service teachers about the availability of the content of the Social studies lesson curriculum content for virtual museums were analyzed with the themes of learning area and learning outcome, and values and skills. In the theme of learning area and acquisition, pre-service teachers stated that virtual museums could be used in learning areas in the Social Studies Curriculum. The information explained in the lesson can be concretized by visiting a virtual museum tour in many acquisitions.

Some of the opinions of pre-service teachers who think that the information explained in the lesson can be reinforced and concretized by making a virtual museum tour are as follows:

PT9 *"A student who learns Anatolian Civilizations in the Social studies lesson can visit the Anatolian Civilizations Museum to consolidate the subject. This tour will attract the student's attention and ensure the permanence of the knowledge he has learned."*

PT10 *"Making virtual museum tours in the Social studies lesson contributes to effective learning. In cases where students do not have enough opportunities to make museum tours, historical and cultural tours, virtual museum tours can be made in the classroom environment following the content of the lesson."*

Some of the opinions of pre-service teachers who consider the availability of virtual museum tours to support the learning areas and learning outcomes of the Social Studies Curriculum are as follows:

PT9 *"Virtual museums can be used to support the learning outcomes in the Social Studies Curriculum…"*

PT6 *"We can benefit from virtual museums to reinforce many learning areas and learning outcomes. For example, a virtual museum tour can be made in the Culture and Heritage learning area."*

In the theme of value and skill, pre-service teachers stated that virtual museums could be used in teaching the values and skills included in the Social Studies Curriculum. The opinions of some pre-service teachers who think that virtual museum tours in Social Studies classes will be beneficial in terms of teaching values and skills are as follows:

PT5 *"…by questioning the historical evidence of different periods and places, they can identify the similarities and differences between people, objects, events, and phenomena, and to perceive change and continuity."*

PT13 *"…Science, sensitivity, aesthetics, patriotism, freedom, independence values as values education; research, digital literacy, observation, media literacy, perceiving space, perceiving time and chronology as skills can be gained."*

Figure 4 shows the evaluations of the Social Studies pre-service teachers regarding the problems they may encounter while using virtual museums.
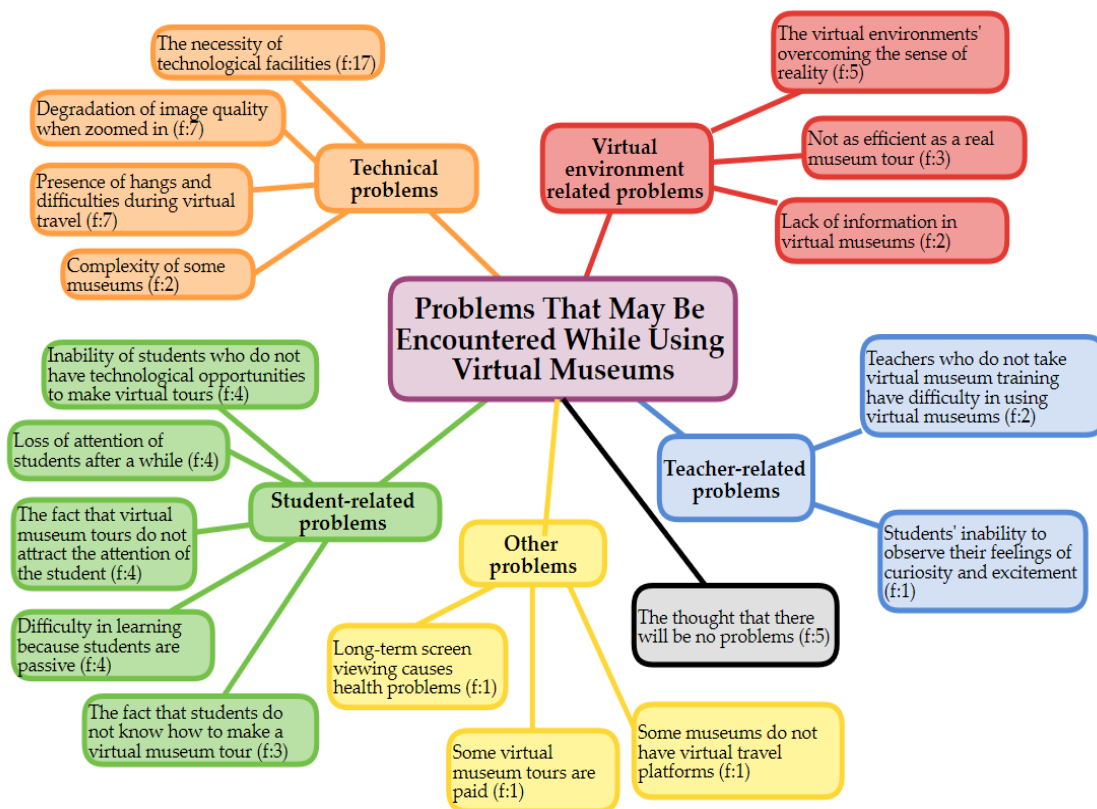
Figure 4. *Pre-Service Teachers' Opinions About the Problems that May be Encountered While Benefiting from Virtual Museums*

As seen in Figure 4, the thoughts of the pre-service teachers about the problems they may encounter while using virtual museums were analyzed with the themes of technical problems, virtual environment-related problems, student and teacher-related problems, and other problems. Some pre-service teachers aid they do not think they will encounter a problem using virtual museums. In the theme of technical problems, pre-service teachers emphasized the necessity of technological facilities to benefit from virtual museums, degradation of image quality when zoomed in, the presence of difficulties during the virtual tour, and the complexity of some museums. The opinions of some pre-service teachers on this subject are as follows:

PT2 *"There are difficulties in guiding the direction we will go… Additionally, the cameras' quality must be high because in some situations it is necessary to zoom in and the image quality declines as a result."*

PT9 *"…Technological facilities should be good in schools and classrooms. …"*

PT15 *"In today's technology age, yes, but not every home may have a computer, telephone or internet."*

Pre-service teachers who stated that there might be problems arising from the virtual environment while benefiting from virtual museums emphasized that the virtual environment overtakes the sense of reality, virtual museums are not as efficient as the real museum tours. There may be a lack of information in virtual museums. The opinions of the pre-service teachers on this subject are as follows:

PT6 *"Although virtual museums provide us with the opportunity to travel, they may not be as efficient as the real ones. The virtual environment can overtake the sense of reality."*

PT10 *"…it is certainly much better to travel by touching the objects that are allowed to be touched in the museum's atmosphere and feeling the past experiences during live tours."*

On the theme of student-related issues, pre-service teachers emphasized that students without technological access cannot take a virtual tour, that students become distracted after a while, that virtual museum tours do not capture the students' attention, and that learning becomes difficult due to students' passivity, and that students do not know how to take a virtual museum tour. The opinions of the pre-service teachers on this subject are as follows:

PT5 *"Students who do not know about the use of virtual museums may have difficulties in how to use them at first. Students without internet, phones, tablets, or computers cannot benefit from virtual museums. The visuals may not catch their attention because they can't see them fully. An outside element can immediately distract them."*

PT18 *"…the one-sided communication and interaction of the students who reach the virtual museum, the fact that the students cannot get feedback during the virtual museum tour, and the fact that they cannot ask what they do not understand can be listed."*

In the theme of teacher-related problems, pre-service teachers emphasized that teachers who do not take virtual museum training experience difficulties when using virtual museums and cannot observe students' feelings of curiosity and excitement. The opinions of the pre-service teachers on this subject are as follows:

PT5 *"…Teachers who do not take virtual museum training may initially have difficulties in how to use it …"*

PT18 *"…The teacher's inability to observe the students' feelings of curiosity and excitement while visiting the virtual museum…"*

In the theme of other problems, pre-service teachers stated that looking at the screen for a long time causes health problems, some virtual museum tours are paid and not every museum has a virtual travel platform. The opinions of the pre-service teachers on this subject are as follows:

PT1 *"…Some students may want to be on the move instead of looking at the screen and looking at the screen."*

PT16 *"…Some of the virtual museum tours are paid…"*

PT30 *"…The museum we want to visit may not have a virtual tour platform..."*

Some pre-service teachers stated that they do not think that there will be a problem while using virtual museums as follows:

PT13 *"I don't think we will encounter a problem. If we can see the places we cannot go at such a time (when there is a COVİD-19 epidemic) from our homes as if we were there, this is not a problem, this is a benefit for us."*

PT3 *"I don't think there is a problem in the presence of the internet."*

Figure 5 shows the evaluations of social studies pre-service teachers about making effective use of virtual museums.
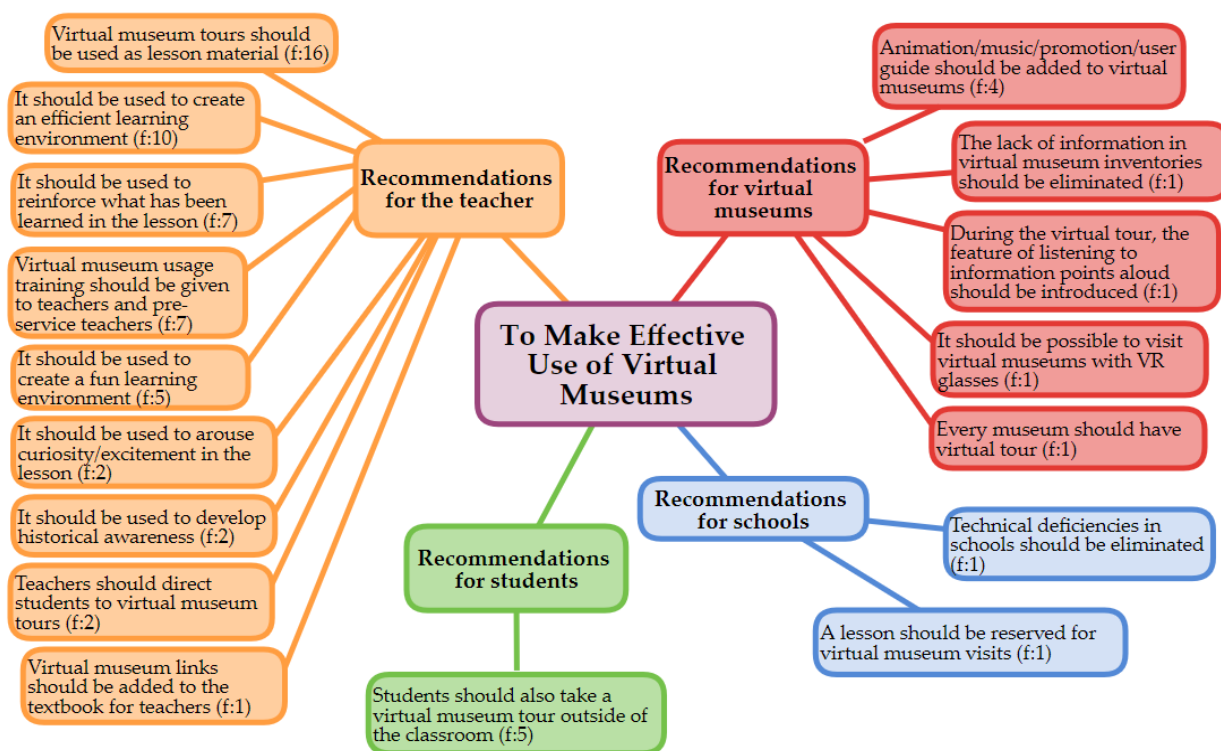
Figure 5. *Opinions of Pre-Service Teachers on the Effective Use of Virtual Museums in the Social Studies Lesson*

As can be seen in Figure 5, as a result of the analysis of pre-service teachers' opinions about the effective use of virtual museums in the Social studies lesson; The themes of suggestions for teachers, suggestions for virtual museums, suggestions for schools, and suggestions for students were determined. The theme of suggestions for pre-service teachers emphasized that teachers use virtual museum tours as lesson materials, use them to create an efficient and fun learning environment, reinforce what is learned in the lesson, and provide virtual museum usage training to teachers and pre-service teachers. Examining the expressions of pre-service teachers on the topic of suggestions for the teacher revealed that teachers who use virtual museums effectively believe that they can enrich the learning-teaching environment and that they should use virtual museums as an interesting and helpful learning resource. The opinions of some pre-service teachers on this subject are as follows:

> PT1 *"I think every teacher should use virtual museum tours in their lessons and every pre-service teacher should take museum training…"*

> PT13 *"…It will be a fun and productive lesson because the permanence of the lesson increases…"*

In the theme of suggestions for virtual museums, pre-service teachers stated that animation/music/promotion/user guide should be added to virtual museums, the lack of information in virtual museum inventories should be eliminated and this information can be listened to audibly, virtual museums should be visited with VR glasses and virtual tours should be available in every museum. The opinions of some pre-service teachers on this subject are as follows:

> PT10 *"During the virtual tour, the feature of listening to the information points aloud can be introduced. Since asking questions during the virtual museum tour is impossible, a quick question and answer section such as a tour guide can be added."*

> PT18 *"During the tour in the virtual museums, the virtual museums can be accessed with a special option for students, more suitable and understandable voice narrations can be made, and interactive questions that will arouse excitement and curiosity can be asked at the end of the lecture…"*

In the theme of suggestions for schools, pre-service teachers stated that technical impossibilities in schools should be eliminated, and a lesson should be reserved for virtual museum tours. The opinions of some pre-service teachers on this subject are as follows:

PT8 *"Technical deficiencies in schools can be eliminated so that every student can benefit effectively. …"*

PT11 *"A lesson should be reserved for virtual museum tours, and teachers should make this lesson fun…"*

In the theme of suggestions for students, pre-service teachers stated that every student should take a virtual museum tour outside of the classroom. The opinions of some pre-service teachers on this subject are as follows:

PTA9 *"…Even though I am a university student, I took a virtual museum tour for the first time and I enjoyed it very much. Virtual museum tours should be used in every period of education life, starting from kindergarten, to reinforce knowledge and make people wonder. It requires financial means for a student in Afyon to visit a museum in Ankara in detail. However, museums are always available for students thanks to virtual museums…"*

PT14 *"…We can encourage students in this regard. This encouragement may allow them to visit the museum they want outside of the classroom …"*

4. Conclusion and Discussion

This study evaluated the definitions of virtual museums, the contribution of virtual museum tours to students, the convenience of the Social Studies lesson curriculum for the use of virtual museums, the problems that may be encountered while using virtual museums, and suggestions for the effective use of virtual museums. The purpose of this study was to examine the opinions and perspectives of social studies pre-service teachers on virtual museums. The study results were discussed with similar and different research results in the literature. According to the prospective teachers who define the virtual museum in terms of technology, education, and social dimensions, virtual museums, which have entered our lives with the advancement of technology, offer the possibility of visiting a museum without having to travel, and can be used as teaching materials, give access to history, and allow safe travel and social activities in the virtual environment without the risk of contracting the epidemic. COVID -19. Still, virtual museum tours do not give the feeling of a real museum tour because real museum tours enable children to develop their imaginations, aesthetic feelings, and creative thoughts (Şişman, 2019). In terms of the social dimension of virtual museums, Yıldırım & Tahiroğlu (2012) evaluated virtual museums as an environment that can be used to connect and show the museum in question at any time during class, even though they do not replace real museums, and to enable students to achieve the learning outcomes of the class. In this context, virtual museums are also seen as an effective teaching environment because they have three dimensions and interactive technologies (Kim et al., 2006). According to Çalışkan (2011), virtual applications should be compared with other teaching methods and techniques instead of comparing them with real museum or travel observation applications. Öztürk (2012) also states that virtual museum applications should be evaluated and implemented as a new and different teaching method, not as an alternative to real museum tours. According to Kabapınar (2014), virtual museum tours encourage the idea of seeing the real museum itself. Virtual museums make culture and art livable for those who cannot find the time or live in areas far from museums. Virtually watched works arouse curiosity and increase the desire to see the originals (Teather, 1998, cited in Barlas Bozkuş, 2014).

Pre-service teachers expressed their opinions about the contribution of virtual museum tours to students through the ease of learning and access. According to pre-service teachers, virtual museum visits conducted by students will help them learn about historical artifacts and culture, facilitate learning, provide lasting learning, raise awareness of history, increase interest in social studies, support visual learning, and contribute to the development of skills. When examining the contribution of virtual applications in education, it is found that students' motivation increases and enduring learning is enabled (Kayabaşı, 2005; Yıldırım & Tahiroğlu, 2012; Çalışkan et al., 2016; Altınbay & Gümüş, 2020), that it has positive effects on cognitive and affective learning outcomes (Demirboğa, 2010), that it creates a fun. students find the activities related to the virtual museums useful (Ermiş, 2010), it will create a fun learning environment and help to learn (Shim et al., 2003), increase the interest level of students, facilitate learning historical facts and allow the use of first-hand resources in learning environments (Ergüven, 2016), have a positive impact on students' academic successes (Koca & Daşdemir, 2018), successful museum experiences are experienced with virtual tours and new meanings can be added to real museum experiences (Çolak, 2006). In the research conducted by Turgut (2015), it was discovered that in classes where virtual museums and active teaching techniques are utilized, students also bring their emotions into the learning activities, they empathize with certain people through the objects, and they feel as though they are in the real museum, they are more active, willing, and attentive in class, they

can learn by seeing, and learning is made easier and more long-lasting through the use of different sensory organs. Pre-service teachers emphasized the ease of access to virtual museum tours, noting that virtual museums allow students to see the museums they want to visit, provide safe travel options during the epidemic, and save time for students who cannot afford to visit museums that are far from their homes.

According to Altınbay & Gümüş (2020), virtual tours are an effective solution in terms of providing permanent learning, controlling crowded groups, lesson time, and transportation costs. Zanuta (2017) stated that virtual applications that contribute positively to learning in the Social studies lesson offer an economical and practical solution. According to Tuncel & Dolanbay (2016), the age of technology, which makes virtual tour opportunities possible, provides important contributions for students who cannot attend tours for various reasons. In the research of Aladağ et al., (2014), it has been stated that virtual museums are useful material for students and teachers to introduce students to museums that cannot be visited due to their distance to the region working with three different student groups, disabled, non-disabled, and degree classes, Okolo vd. (2011) determined that virtual museums contribute to the learning of all students in history teaching and that students with disabilities are at least as successful as degree classes. Altınbay and Gümüş (2020) evaluated the tours as a positive solution in terms of overcoming financial and physical obstacles.

Pre-service teachers stated that virtual museums could be associated with many learning areas, learning outcomes, skills, and values in the Social Studies Curriculum and that the information explained in the lesson can be concretized by making a virtual museum tour. According to Yılmaz and Şeker (2011), the use of museums in the Social studies lesson is very useful for students in terms of information, visuality, and general culture and helps the development of historical thinking skills. Safran and Ata (1998) stated that children can easily learn the concepts of change and continuity thanks to the materials exhibited in the museum; Seefeldt et al. (2015) that children who examine ancient items in museums can perceive the difference between the past and the present. Kaschak (2014) and Marcus (2008) stated that students would develop different perspectives and empathy skills. According to Çalışkan et al., (2016), the use of museums as a teaching tool in Social studies lessons will help students learn permanently and provide active and enjoyable teaching. Turgut (2015) determined that the activities planned by using the virtual museum in Social Studies lessons successfully conveyed the learning outcomes, the students felt like they were in a museum during the lesson, and the activities carried out brought dynamism to the lessons.

Pre-service teachers explained their thoughts on the problems that may be encountered while making use of virtual museums as technical problems, virtual environment-related problems, student and teacher-related problems, and other problems. Some pre-service teachers stated that they do not think that they will encounter a problem while using virtual museums. In their research, Çalışkan et al. (2016) asked pre-service teachers for their opinions on virtual museums' positive and negative aspects and concluded that positive opinions were expressed more. Despite its various advantages, it is one of the most obvious criticisms of virtual museums that it does not provide a real museum experience because no one can touch the object and walk in the corridors (Barlas Bozkuş, 2014). Pre-service teachers who are the participants of Çalışkan et al., (2016) research stated that the tours made in the virtual environment will not give the psychological effect of real museums and will not provide concretization and experience-based learning. According to Altınbay and Gümüş (2020), teachers use virtual tours because of their many benefits although they have difficulties in using virtual tours due to problems such as connection problems, lack of content and equipment, and lack of time. In addition, it is seen as a necessity for the texts used in virtual museums to be legible. An unreadable text prevents the perception of the message intended to be given to the user (Kalıncı, 2015). Accordingly, the virtual museum needs legible texts and a visual design with integrity to be functional (Sungur & Bülbül, 2019). In Stoddard's (2009) research revealing the benefits of integrating virtual field tours into lessons, he emphasized that teachers should be trained on this subject and that virtual tour applications should be integrated into the curriculum. In order to make effective use of virtual museums in Social Studies lessons, pre-service teachers recommended that teachers need to use virtual museum tours to create an efficient and fun learning environment and to reinforce what is learned in the lesson, that teachers and pre-service teachers need to take virtual museum training, that animation/music/user guide needs to be added to virtual museums, that the lack of information in virtual museum inventories need to be eliminated. This information needs to be listened audibly, virtual museums need to be visited with VR glasses, virtual tours need to be available in every museum, technical impossibilities in schools are eliminated, and every student should visit virtual museums outside of the

classroom. According to Çıldır and Karadeniz (2014), the use of virtual museums for educational purposes will become widespread if education units develop training programs that include games, puzzles, videos, and animations based on their collections and distribute them to schools. According to Çalışkan et al., (2016), benefiting from museums in teaching activities positively contributes to students' attitudes and achievements. At this point, the most important responsibility falls on the teachers who are the process administrators. In the study conducted by Yeşilbursa and Uslu (2014), it was found that the self-efficacy beliefs of prospective social studies teachers who participated in museum education courses were higher than those of prospective social studies teachers who did not attend museum education courses. Because the teacher plays the leading role in integrating virtual museums into education, it is necessary to provide virtual museum training and awareness to Social Studies pre-service teachers in undergraduate education (İlhan et al., 2021)

5. Recommendations

In line with the results of the research, the following suggestions can be made:

- o Awareness of pre-service teachers and teachers on the subject can be increased to expand the use of virtual museums, which do not require special knowledge and skills, in lessons. In this context, training can be given to pre-service teachers about the use of online environments in the education process during their undergraduate education. By giving seminars to the teachers on duty, the knowledge about the subject can be increased.
- o Deficiencies in schools and classrooms that lack technological equipment can be eliminated, and the internet network infrastructure in schools can be strengthened to support virtual tour applications.
- o A more effective visitation environment can be provided by establishing cooperation between museums and the Ministry of National Education, considering age groups, and creating educational packages with various activities according to the relevant lessons and with audio narrations.

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