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Abstract

This paper observes whether a digital virtual gallery application can arouse young adults' curiosity for art and eventually encourage them to learn it practically in today's digital world. The younger generations today are more attached to their phones than before. Modern children and young ages constantly feel like checking their smartphones to be in the flow of the streaming platform applications. Consequently, concentrating in classes gets more challenging, and they do not want to learn new things due to a lack of interest. Therefore, the goal is to boost their creativity and curiosity by learning famous paintings and drawing through a developed smartphone application Artify.

Museum-based learning has various benefits for the development of young children and adult learning. This application aims to give that boost through the digital world and give a more personalized feeling to learning in an interactive environment. Digital gallery tours allow their audience more intercommunication than a traditional museum tour and let them explore and learn with game-like tests and activities.

The article presents the educational virtual gallery application first. There are different materials available in the application for a friendly learning environment. The application contains general information about famous paintings, drawing tutorials, a quiz, and a personal gallery for users to interact with the paintings themselves, which is more described in the section 3 Introduction to Application: Artify on page 6.

The second part of the paper will evaluate the interview data with participants based on their experiences visiting exhibitions, personal views on learning about art and using the developed application Artify. We have 15 questions and analyze them through the thematic analysis method.

Keywords: Virtual gallery, Virtual museum applications, Art learning, User engagement, Thematic analysis

1 Introduction

In the last decade, online museum tours gained more popularity and took the shift, especially after the Covid-19 pandemic, with the following museums offering more online services and encouraging digital transformation in the art world. Virtual tours are practical for users for countless reasons. Virtual galleries can provide a more personal approach than being in a museum and following a tour guide getting the same information repeatedly, followed by a monotonous tourist group. In digital tours, people do not have to wait in lines for hours, so it saves a significant amount of time, especially considering how people stand in line for hours just to see the Mona Lisa for twenty seconds. People have more control over their experience and create personal tours, including skipping depending on their likes and dislikes. They are bringing the gallery experience to the user's screen at a meager cost. Visitors do not need to spend some extra time commuting or waiting in line. Therefore they are cost-effective and accessible at any time, anywhere in the world. Virtual gallery or museum applications not only allow users to have personal time with art from the comfort of their homes but also, this way, they can skip the lines or engage with the paintings that they are more interested in alongside the physical museums' digital application. The digital applications at the museums do not seem to go anywhere. For this reason, it is important to develop them in an effective way to create a similar online museum experience to the physical counterpart because users will have more positive perceptions. [10] While technology is emerging more features and possibilities in the digital world, it is important to us to use it as effective as possible in this study.

This study aims to find out whether a virtual gallery application that integrates with the user motivates students to better learn about art by investigating their own experiences of relationship with art, digitalization, and preferences by visiting art exhibitions. More research report on interactive educational environments to integrate learners by providing more opportunities. [4] Knowledge is constructed and not passed through to learners, so the role of learners cannot be underestimated.[10, 5] Learning experience can be measured by presence, motivation, cognitive benefits, and active learning. [11] By this kind of learning, the learner is focused and targets their needs to build up their knowledge. [11, 14, 16] Learner-centric approach is also beneficial in the Artify application as our purpose is to put the user in focus by allowing them to learn at their own pace and they take control of the learning process. Learners need to be active and in control of their learning. Technical and technological tools can support these learning principles by making the learners responsible for their learning. [3] The findings of the study show high engagement, motivation, and presence from respondents help to achieve better learning. This result indicates that this application aims to create a better learning approach by understanding users' needs and enhancing their creativity. Later in the article, during our interviews, we better understand their learning concepts and compare and analyze their learning outcomes using the Artify application.

This paper shares the findings of how young people integrate with art and virtual art gamification-based gallery applications. During our interviews, we began with getting-to-know participants' approach to art. While learning about their background and vision of how they see digitalization's role in this sense, we bring in the application Artify. Therefore, we focused our research on how digital technologies support galleries to keep them up with the latest trends, how they can be adapted to the applications, and the role of interactive gamification-based applications in the learning process. The key areas we examined from our participants were how young people see the digitalization approach in arts, whether they enjoy virtual gallery experiences, how this application can support their learning, and whether it would change their class experience in school.

2 Literature Review

2.1 Influence of Learning from Museums and Role of Art in Learning

Research shows that museums play a significant role in learning and influence visitors' learning. Learning develops in relationship to a place, situation, and time. [6] Museums are, in this sense, these "places", which are public institutions for personal learning. [6] They are educational institutions recognized by the society, known for bringing art, history, and cultural resources to the knowledge of the public.

Museums provide sources for visitors to engage with cultural heritage, history and possibilities to explore new things. They value visitors' freedom to choose how and what to engage with and use this strategy to follow their personal needs and taste. [7] Art galleries offer numerous opportunities to experience the culture in this educational environment. Visitors can learn about particular periods in history and events by observing art. Throughout history, different art movements have reflected artists' thinking processes. These processes can be based on historical or political events, figures, and periods in time. Museums also play an essential role in early childhood development. [15] Children can study history by learning about the paintings and styles. Art connects people through feelings and understanding of different stages of authentic global pieces. It helps people to understand and feel the world from artists' views and experiences through different artwork. Not only art inspires people, but it opens a creative, enjoyable, innovative process. The creative process can shape a person's personality and how they think and make decisions. [8] Creating art as simple as trying to draw teaches a valuable life skill of decision-making. Being surrounded by art helps visitors to cope with stress and anxiety. Specifically for children or younger adults who sometimes struggle to understand what bothers them, art comes in at this point. It can be a more accessible or easier way of self-expression for those who do not know or struggle to express themselves verbally. People can discover more about their decisions by helping them express this frustration healthily by creating or even being surrounded by artwork as meditation and letting the frustration out.

Accordingly, art therapy is also a form of expressive therapy that improves resolving a person's emotions, thoughts, and, eventually, well-being, creating better communication. Especially with children at an early age, museums help to shape young visitors' opinions, creativity, focus, and concentration. [19] Drawing or participating in making any kind of art increases focus for extended periods. Visiting museums and seeing different exhibitions are undeniable parts of integrating with art. Being alone with the art to have the chance to be around it is a feeling hard to replicate. Being in a museum physically is not just seeing known art pieces. However, it is also, on its own alone, an experience to be surrounded by other curious visitors and feel the atmosphere.

2.2 Various Approaches of Technological Support in Museums

In last years more museums are adapting their environment to digital space in many different ways. Various museums use social media as a tool to attract more visitors, developing and improving their websites or applications. Users visiting these websites or applications are likelier to visit the physical museum. [18] Many museums have developed on-site applications that help users guide them through the exhibitions. Today's museum-goers can experience these kinds of applications in the physical environment. These applications work as digital tour guides, help them sometimes navigate through the exhibitions, provide detailed information about the artwork, and contain audio recordings to not miss out on specific details. Even some applications allow users to join a virtual exhibition, where with the support of technology, users can get the illusion of being there. [13, 12]

By this navigational support museums provide in virtual galleries, visitors found more support and found themselves more likely to explore. [9, 10] In order to attract more visitors, some museums are interacting with art enthusiasts not only inside the museum walls but also allowing them to create and personalize their exhibitions. Volunteers can submit their version of the art shows and work actively on the shows with other people alongside the museum. This process helps people open up, share experiences, and exchange ideas and knowledge. With the growth of technology, the concept of being present is changing, including virtual reality, video conferencing, home theater, and visual tours. [13] As magical as the museum atmosphere is, being present is evolving due to its practicality. Technology provides an enhanced sense of being present, and it is impossible for art enthusiasts to visit every museum personally and spend time on the floors of various museums due to many reasons like time and place.

In consequence, countless well-known museums have started creating virtual tours to engage more people worldwide and achieve more popularity in the digital age. Virtual gallery applications come in various kinds and prospects. They are great for art lovers as they allow greater access to paintings from many locations all over the world and a countless selection of art pieces and artists. They offer endless possibilities. Many artists can benefit from these applications by sharing, presenting, and promoting their work, connecting with art lovers from everywhere, and having a wider audience. This way, they can reach a wider audience, and the audience can share their work using social media and the web. So these applications also make it possible for them to list and sell their work.

3 Introduction to Application: Artify

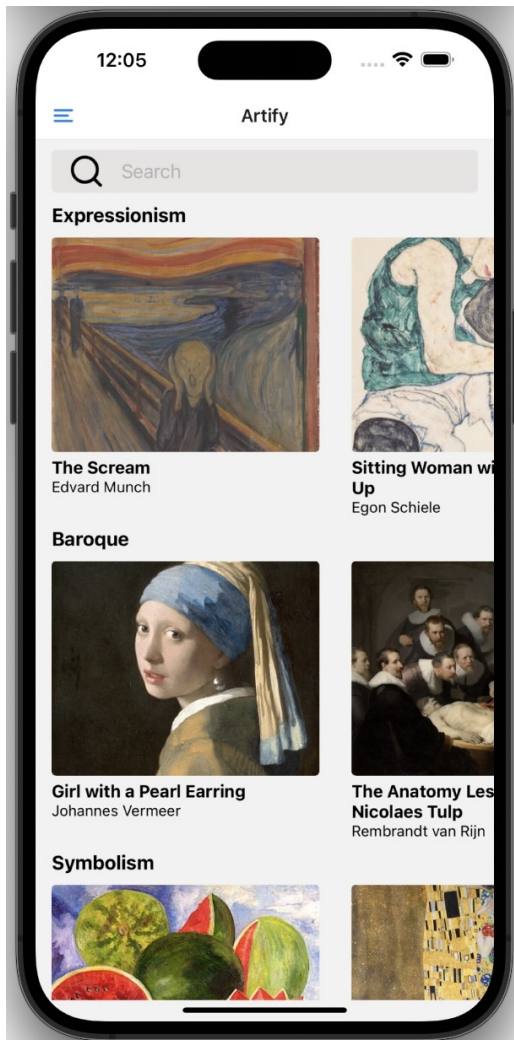
In today's modern information age, traditional museum experiences, as we know them, are changing. Museum-based learning has its limitations. Traditional museums can still be threatening to people, and it can be overwhelming to be overloaded with information coming from everywhere. Visitors often get confused with the information flow. For beginner museum-goers, museums can be overwhelming, filled with excessive information, and have huge floors, including various amounts of displays. These static displays often do not inspire greater interest on the viewer's part; at the end of the visit, visitors can end up uninformed and exhausted. This can demotivate them to learn about art. How people learn has changed due to the shortened attention span of modern people. To help people to guide their experience and to create a better foundation of information sources while engaging the user, the Artify application is developed.

Artify is a virtual gallery-like entertaining informative application with the goal of using digital technologies to implement a setting for people to learn about art at their own pace in a clean, friendly, not-so-intimidating environment while bringing the latest trends to the digital display of the users. The name Artify comes from combining Art and Gamifying aspects to present a welcoming learning environment to boost motivation for all kinds of users. The application is compatible with platforms iOS and Android and can also be used offline. For the usage of the application, no other feature, including the internet, is needed besides a person's device. Artify consists of a simple design to make it approachable for users of every age.

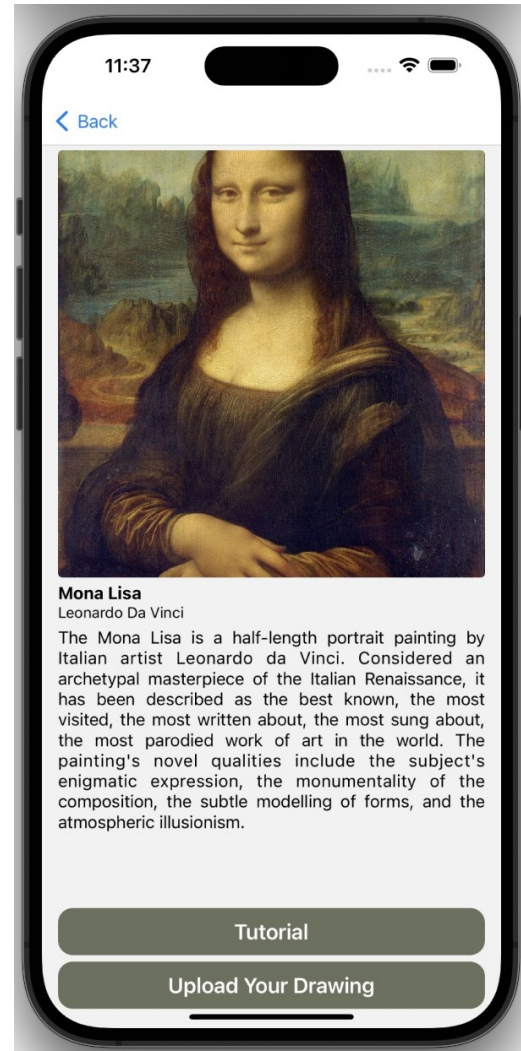
The Artify application contains three main pages called "Artify", "Quiz", and "Profile". These main pages can be navigated through the drawer navigation located top of the screen on the left. The application's home screen welcomes users with a collection of famous paintings stored in one place, separated through different art movements. The screen is filled with lists of famous paintings, which can be scrolled down or to the right, which can be seen in Figure 1a. It is desired to have a straightforward design to make the users more interested in the process. No information is shown on the homepage but the small thumbnails of paintings with small texts including their names and artists. A search bar on the top of the screen helps users to search quickly through their favorite art pieces or artists and get fast results. After typing their favorite artist, all the work done by the artist is shown on the page immediately. The search bar can be used both for searching after paintings' or artists' names, so the users can instantly find what they are looking for or by scrolling through their screen. The idea behind categorizing the pieces into art movements on the home page is to give a general idea to users about different movements at first sight. Before they read about the movements or get informed, the goal is to create a general idea about them in the user's head. So the user can observe the paintings' common parts and see what differentiates them from other categories. It is essential to be able to understand art, to be able to learn more about it, and to be able to experience it in a better way or even to create it.

Users can preview the painting's thumbnails from the home screen and get a detailed view of the ones they are interested in by clicking on them. When clicked, the user is navigated to another screen which gives a better idea of the painting where they can check them out better, which can be seen in Figure 1b. On this screen, information about the specific artwork is provided. Users can simply find out more about the selected painting. There are two buttons on the bottom of the screen: "Tutorial" and "Upload your Drawing". By clicking on the tutorial button, users can be directed to a page where they can find drawing tutorial videos about specific paintings or artists. It is intended to motivate people not just to observe the artwork themselves but also to try to create something themselves. The video tutorials are provided to users to guide beginners show how to

start engaging with art on their own. The video tutorials are provided to users to guide



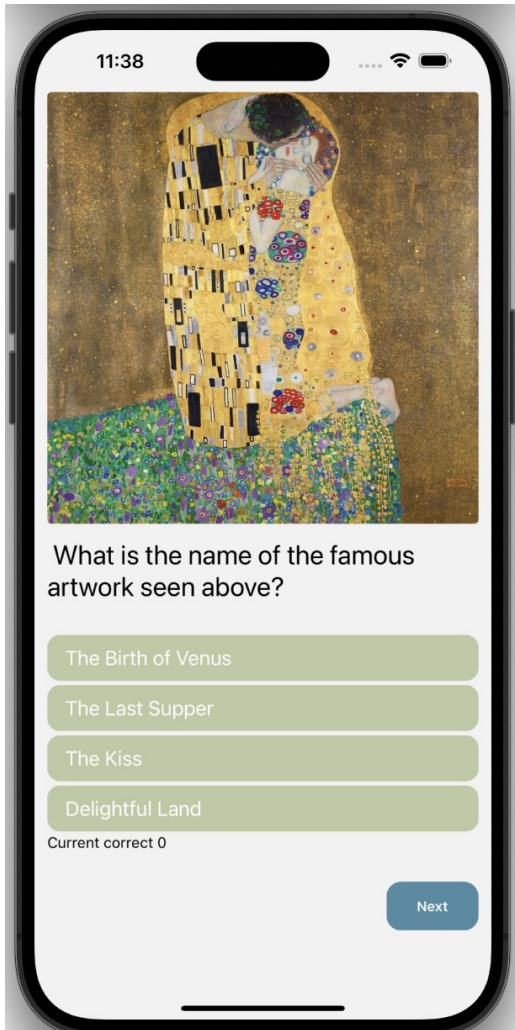
(a) Home Screen.



(b) Single Painting View Screen.

Figure 1: Artify Informative Screens.

The other button on display, "Upload Your Drawing", brings the user to a camera screen. This screen is designed as a second step for the tutorial screen. The goal here is that users watch the video tutorials and try to recreate the famous paintings themselves. After recreating these paintings, they can take photos of them. When they take photos, they can save the photo on their device, share it with friends, or post it on the profile screen inside the application. The Firebase database is used with the implementation of the application. In the Firebase database, the photo the user takes is saved with the original referenced painting, and this relationship is used under the Profile page



(a) Quiz Question Screen.



(b) Quiz Result Screen.

Figure 2: Artify Quiz Screens.

from the application.

The Profile screen is created with the idea of a personal gallery. The intention behind this is that users recreate the famous drawings themselves and then present all their work collected in one place. This page serves as a storage place for the users to compare their work, see their progress, and share it with their friends. The user can recreate a painting more than once and also be able to compare their own work on that single painting by scrolling to the right. This page is planned to raise users' motivation to check how much they have done and to show how far they have come in their drawings. So art enthusiasts who like to draw do not have to save their work in different other places but have them all in one place, and whenever they log in to their profile can see their gallery.

The third segment of the application is the quiz part. The quiz part can be reached from the drawer navigation located at the top of the screen. The welcoming quiz home page is the first screen user sees after clicking on the quiz. Users can start a quiz on this page and test their knowledge. The question screen can be seen in Figure 2a. As the user clicks on the start on the quiz home page, they are navigated to the next screen by each question through the "next" buttons. On each question page is a photo of a painting, and some related question is attached about the painting displayed. As the user clicks on an answer option, that option is selected and highlighted. Ultimately, the user can preview their result on the final screen. Based on the number of correct answers, either a successful or sad quiz final screen appears, which can be seen in Figure 2b. The two buttons on this page are either to retake the test or to navigate back to the home page.

4 Method

In this chapter, we discuss technical implementation, describing the technology used to implement the application and detailing the method used for creating interview questions and analyzing the participants' answers.

4.1 Technical Implementation

We implement the application in React Native Framework. React Native is an open-source Javascript framework to help us develop mobile applications on Android and iOS devices using Javascript and React. We chose this framework because of its speed, efficiency, and performance when creating the application. In addition, we use the Expo CLI as the developer environment,

Expo is an open-source framework for building React Native applications. We chose Expo for the initial utilization of this project after we built the application accordingly Expo Architecture. We chose Expo because it eases the coding and makes it simple for the development process to work on Android and iOS platforms. Expo also made it easier to do the setup in the beginning, to React Native to work and get fast feedback, making it possible to run the application instantly and allowing developers to see the changes on the mobile device immediately. Even though Expo also comes with its limitations, in terms of this project, it serves as a better development experience. Expo can run the app also without a phone plugged into a computer but also over the WiFi and sync on different mobile devices.

The application also has a storage layer for persisting the information. The Database we chose is Firebase, which is a NoSql-like database. It provides a library to interact with the storage and a free tier for private projects.

4.2 Participants and Settings

In total, we conducted ten interviews, including six females and four males. The participants were between the age of 18-23. Interviews were conducted hybrid, as some were in-person and some were online meetings through Zoom. Before the interviews, we presented the Artify application, which they got familiar with. We gave time to participants to play around with the application. Each interview took fifty minutes to an hour. The questions are available in Appendix on page 34, and answers are available in section Findings on page 12.

4.3 Data Collection

To understand how the participants are connected to the art and how the application can help them, We designed a detailed questionnaire with open questions, which we can see in the Appendix on page 34. The questionnaire consists of fifteen open questions. The questions were prepared before the interviews, and to get more information from the participants, all the questions were formed as open and detailed questions. We made some follow-up questions depending on the participant's responses to understand their experience better.

We formed the interview to make it possible to get the most out of the participants' personal views on the subject. The questionnaire follows different stages.

The first part of the interview (Q1-Q8) is about getting to know the participant's relationship with art, what they are looking for when visiting an exhibition, their personal preferences, and how they are involved in the process of observing the art pieces.

The second part of the questions (Q8-Q15) is about the expectations of the participants of the digital world and their opinions on how digitization in museums or applications at home can support their user experience in the future. Getting into detail about what they pay attention to during their visit was also valuable for the project's future work, where a better user experience can be offered depending on the user's feedback.

The third and ending part of the application focuses on the Artify application developed for this project.

We chose the participants by considering their interest and relationship to arts to have diversity who approved that they enjoy visiting museums and exhibitions in general. The interviews were conducted one-on-one, and they were all audio recorded. Each interview session with a participant lasted fifty minutes to one hour. The goal was to allow participants to express their feelings, memories, and ideas freely.

We noted the responses collected from the participants, and more details were added after the interview by listening to the audio recordings.

Participants freely got involved with the application and tried it out to get rich information about their opinions. The findings have documented the initial hypothesis that functional interaction with art would help better learn and raise children's or young adults' curiosity. The results from the responses showed that participants enjoyed such an application to support their time in an exhibition and would also use it outside the museum to spend some alone time with the artwork while playing games.

4.4 Data Analysis

We decided to analyze the data using thematic analysis. Thematic analysis is a method used for identifying, analyzing, and reporting patterns in qualitative behavioral data collected during the interviews. [2] We decided that thematic analysis is applicable to the project, considering it works with the data, is able to analyze the data step by step, and arranges the qualitative data. [1] Therefore, examining the pattern of data collected from the participants during interviews is suitable and allows us to investigate the research hypothesis efficiently.

We followed the thematic analysis techniques throughout the research. After obtaining the interview responses from a group of participants, we became familiar with the data. As the next step, we assigned codes from the response texts and then used these codes to identify themes. As the final step, we summarised the results. The response data and the analysis are explained in more detail in the section Findings on page 12.

5 Findings

In this section, we iterate over the interview questions. Each question section starts with a table describing the codings and groupings. Similar codes are grouped under themes in the tables with given percentages to observe how much participants reacted the given way. There is also an explanation of what the question aims to prove and a brief observation. We also consider and comment on possible connections between distinctive questions, participants, and answers.

At the end of this section, we give a general conclusion and the most interesting findings throughout our analysis.

We recommend reading the question in each section, which is placed in the header of the table. After understanding the question, we encourage you to look at the themes that occur for particular questions and then go into detail about the answers.

Note: the percentage number at the very right in the table describes how many of our participants fall into the certain theme in that row.

5.1 Analysis of the Collected Data

Q1: How did you first get in touch with art?	Theme	Percentages
<ul style="list-style-type: none">• Meeting through family at an early age• Family profession in arts• Proceeded to study in arts later• Family brought to a museum as a kid and fell in love• Family bought art books	Family	50%
<ul style="list-style-type: none">• Art classes at school• Drawing activities in preschool	School	30%
<ul style="list-style-type: none">• Started drawing with Bob Ross programs• Started drawing cartoon characters as a young kid	Media	20%

Table 1: Q1

Our interview starts with the question of how participants met with the art. This question aims to be able to analyze their background in art and how much they get involved in arts later on in their life. Most participants, with a percentage of 50%, met art through their families. Either their family was interested in arts or had a job related to arts, or the family motivated their children to be involved in arts. School comes in as the second highest percentage of 30% and follows media as the

last theme. Later on, during the analysis, we see that children who met with art at a younger age before school were eventually more interested and visited museums or actively did art in their lives.

Q2: What are the reasons for visiting a museum for you?	Theme	Percentages
<ul style="list-style-type: none"> • Increase knowledge, learn new things • Keep self up to date with new artists/art pieces • Get a new point of view • Learn about certain age in the history 	Increase knowledge	50%
<ul style="list-style-type: none"> • Give joy in spare time 	Happiness	40%
<ul style="list-style-type: none"> • Interested in the exhibition's theme • See one particular artist 	Certain artist/theme	40%
<ul style="list-style-type: none"> • Visit because of a new city • In different cities, you find unique artists 	Touristic activity	30%
<ul style="list-style-type: none"> • Activity with friends or family 	Social Activity	10%

Table 2: Q2

The second question is about what are the reasons for visiting a museum from the participant's point of view, as can be seen in Table 2. We aim to get to know the participants and learn more about their vision of art based on this question and also is useful to see what kind of features we can invest in the application for future work to see what interests the participants.

From the data we received from the participants, we recognized that most of the participants visit exhibitions to increase their knowledge. The participants who are more interested in art try to keep themselves up to date with new art pieces or artists, so they go to the exhibitions more often, and when they are going, they invest in the exhibition theme more. The participants who don't know much about art would like to visit exhibitions as an activity they can share with friends or to get to know more about age in history. What is common about both groups is that all participants enjoy visiting exhibitions more when visiting a new city. Almost all participants see this as an opportunity to have a quality time and discover unique artists or famous paintings in that region.

Q3: What do you expect to see when you visit an exhibition?	Theme	Percentages
<ul style="list-style-type: none"> • Get to know the artist at every stage in their life • Get to know the artist even though they don't like all their pieces • Get to know the artist to understand their art better 	Get to know the artist	50%
<ul style="list-style-type: none"> • I like not to get what I expected • Different storytelling patterns • Wow effect, which allows me to be amazed 	Get surprised	50%
<ul style="list-style-type: none"> • Excellent lighting and production 	Production	30%
<ul style="list-style-type: none"> • Learn new things and improve knowledge • In different cities, you find unique artists to learn about 	Improve knowledge	20%
<ul style="list-style-type: none"> • Expect to see famous paintings 	Famous paintings	20%
<ul style="list-style-type: none"> • Expect unknown paintings about known artists makes motivated and pushed to create 	Unknown paintings	20%

Table 3: Q3

In table 3 we try to understand the expectations of the participants from an art exhibition. We can see that they had some common ideas. 50% of the participants mentioned they wanted to have a better idea of the artist in their mind.

The participants who don't visit exhibitions very often try to seek something familiar, so they feel better about the visit. This can be an artist they have heard of or some famous painting. The participants who spend more time on exhibitions expect better storytelling about what they already know, or they want to be fully surprised by the new information they receive. They want to be surprised about the experience. In general, this can be an artist who knows that they just know one painting and that they have a chance to get to know other works, or they want to experience the storytelling in a different way that they can't read on the internet about it.

It is important for us to see different participant groups have different expectations from the exhibitions and during the development the application should unite them all under different activities.

Q4: Can you tell me how you start your tour inside a museum?	Theme	Percentages
<ul style="list-style-type: none"> • Follow the specific path from the museum • I like to follow the rules in chronological order 	Trusting the path of the museum	90%
<ul style="list-style-type: none"> • I let the digital tour guide lead • Use a tour guide with the works that I want to know more about 	Usage digital tour guide	20%
<ul style="list-style-type: none"> • Quick scanning of the exhibition first, then checking the paintings that I find interesting • If there is some artwork I know, I start there (first to superstar, then can see others) 	Going to interested paintings first	20%
<ul style="list-style-type: none"> • Getting myself familiar with every piece of information • I initially read every flyer or article I could find 	Slowly reading through	20%
<ul style="list-style-type: none"> • Useful to be with someone who has better knowledge • Discussing works with friends can be fun 	Going with & Friends	10%

Table 4: Q4

By this question, we try to be familiar with different participant approaches. Based on the answers we received, as can be seen in table 4 above almost all the participants agreed they followed the guide from the museum and that they like to follow the rules and go in chronological order of the tour. Following that, common themes were using a digital tour guide, going to the pieces that attract the participants first, slowly reading their way through, and lastly, going through the exhibition with friends. If there is no order, participants shared they like to have a detailed view of the pieces that attract them first. A participant shared he runs to his own favorite, “to the superstar” in his own words, and after he views other artworks. However, after the entrance, participants can also follow different paths. A participant who doesn’t have much deep art knowledge can’t concentrate on following the path and reading every single piece of information about the artwork. She said it is too boring, then she can’t enjoy the exhibition, and not all the information stays with her after the tour therefore, she enjoys having a quick scan of the tour and having a detailed view of the ones that she finds interesting.

Most participants agreed they enjoy an audio guide but don’t like to use it all the time. Participants who are more interested in the subject mostly like being alone with the artworks and trying to understand and analyze the art piece themselves. These participants shared that if they

read or hear about the work before they think about it beforehand, it affects their creativity in a bad way. From the responses, we analyzed that although almost all participants follow the museum route, they also enjoy getting help from the tour guides, flyers, or any information they can find to receive more related information.

Q5: When you are spending time on a painting, what attracts you there?	Theme	Percentages
<ul style="list-style-type: none"> • I try to give a meaning myself • The painting must excite me • The feeling that awakens first, colors second 	Giving a meaning and Feeling	70%
<ul style="list-style-type: none"> • Fine craftsmanship, details • Time spent on the piece from the artist • It must be different to be an artwork, not something one-to-one from the environment • Details, color, lines 	Physical details	60%
<ul style="list-style-type: none"> • Information plays an important role in making the painting interesting 	Information	30%
<ul style="list-style-type: none"> • I try to figure out the artist's vision • I try to recognize the painting style to match it with an artist 	Artist	30%

Table 5: Q5

The question of how participants decide to invest their time in a piece is important to us to see in which kind of activity they will be more involved inside of the application and will guide us to compare our results. Regarding how participants decide to spend time on a painting, we can observe the differences between participants' different behaviors. The most common themes were firstly giving meaning to the painting, emotions of the participant, physical details of the painting like the details, the craftsmanship of the artist invested in the painting, information received about the work, and the knowledge about the artist.

The participants who are more interested in art get inspired by the painting based on their emotions. They stick to the piece they are interested in and try to understand it themselves. They try to understand which painter it is by recognizing the artist's style. These participants mentioned they try to understand what the painter expressed in that artwork. The second group of

participants, who don't really pay attention to art in a special way, see the paintings differently. They like to be informed by the text and audio guides at the museum first. After they know more about the painting, they share that it gets interesting. They mentioned this information is important because they can make sense of the paintings with their acquired information. Fun facts also play an important role in the process. This way, the painting gets more interesting and becomes more memorable.

Q6: Have you seen a digital gallery application, and what would you expect from one or think about one?	Theme	Percentages
<ul style="list-style-type: none"> • Don't like behind the screen • Need to see the texture • Visitors, other artworks, atmosphere 	Lack of Atmosphere	90%
<ul style="list-style-type: none"> • Stronger concentration at the museum • Need to be alone with the painting 	Lack of Concentration	60%
<ul style="list-style-type: none"> • Makes sense when the exhibition is far away and not possible to visit personally • Better than nothing in times like a pandemic 	Benefits when physical presence not possible	20%

Table 6: Q6

The goal of this question, which can be seen in table 6, is to see how familiar are the participants with virtual gallery applications in order to analyze later on if it is a new concept for them and if so what are their reactions about it. From the information we received from the participants, we discovered that around 30% of the participants have used such a digital gallery application. Through their experiences, almost all of them shared that they didn't like the feeling of the virtual gallery tour. The participants shared they couldn't get the same experience from behind the screen and needed to see the artwork's texture. The participants shared that the museums' old buildings full of historical paintings make the atmosphere magical, and this feeling can't be receivable through the application. Other common themes were lack of concentration from an application. The participants shared that even though they try to concentrate on the tour, the notifications on a device they do the tour can be distracting. Minotory part of the participants shared a virtual tour they could enjoy if there were no possibility for them to be psychically present in that exhibition.

Q7: How would you expect digitalization would support user experience in painting exhibitions more in the future?	Theme	Percentages
<ul style="list-style-type: none"> • Common applications to prepare me before exhibitions • Accessible applications to filter information • Video tutorials about the paintings inside the specific exhibition 	Accessible Information	60%
<ul style="list-style-type: none"> • VR glasses making you feel in the painting • interactive paintings • AR to extend exhibitions in large spaces 	Interaction with Art	40%
<ul style="list-style-type: none"> • QR codes for artists to get direct feedback 	Interaction with the Artist	10%
<ul style="list-style-type: none"> • Analyse user mistakes in exhibitions and fix them 	Improve User Mistakes	10%

Table 7: Q7

This question was about what was participants' expectations about the effects of digitalization in the exhibitions in the future. Here some participants who enjoy exhibitions more traditionally mentioned digitalization shouldn't get ahead of the art but should support it. By that means, they told the importance of the fact that digitalization shouldn't become the art. They explained they wouldn't prefer museums going more digital but would support digital tours, making the experience more convenient. For example, participants explained accessible, informative guides are nice to have for the personal need so that each person can hear more about their interests. They are interested in if they could use applications with audio explanations just for the paintings. We found out from the answers we received that the participants who don't go to exhibitions so often suggested digitalization can be used to make the art more interesting for them. They would enjoy it more if the exhibitions could be more interactive. This aspect had different suggestions for making the exhibitions more fun and interactive. There can be VR glasses, and visitors can see themselves inside the paintings to feel the atmosphere. Some participants mentioned that traditional museums could be more boring for the younger generation because they grew up in the digitalization age, and museums should adapt themselves to this modern age. One suggestion was to have filters in the exhibitions where visitors can put their faces on the paintings' faces and see themselves inside a painting or some visual shows from projectors where it moves when visitors pass by. Some other expectations from the participants were to interact with the artist and improve user mistakes. Participants shared it would also be useful for the artists if they could directly get productive feedback from the visitors. The other suggestion focused more on analyzing the behavior of the visitors in an exhibition to see how was the expectation that they complete their tour and check what went wrong to concentrate on improving the tour for other visitors.

Q8: Do you believe that practically interacting with the paintings would it be more fun, and why?	Theme	Percentages
<ul style="list-style-type: none"> • Spending time on a specific painting stays with you longer and makes it memorable 	Memorable	90%
<ul style="list-style-type: none"> • More fun to interact than just observing 	Fun	90%
<ul style="list-style-type: none"> • Create a new relationship between you and the artwork 	Bonding with Art	30%
<ul style="list-style-type: none"> • Get a new perception 	Change of Point of View	20%

Table 8: Q8

With the question about if the participants believe that practically interacting with art would be more efficient, we dive more into our research hypothesis to determine whether it is helpful for users or if it would interest them at all. Although participants reported they don't find digital gallery tours or exhibitions that attractive, they admitted they would enjoy digital attraction through the Artify application with the art.

All participants agreed it is crucial to interact practically with the paintings to learn about the paintings and artists, but it would be more fun than just reading about them. Participants shared they can spend long time periods just reading or hearing about the concepts in classes, daily life, or newspapers, but the information doesn't really stick with them. The participants shared that if they could do any activity, including one specific painting, artist, or any other aspect which is as simple as doing a puzzle about a painting, they enjoy getting information with details would be more memorable and fun. The participants stated when they are doing a practical activity about the context, it doesn't feel like serious or boring time invested in learning. Accordingly, they learn more than they realize, and for this reason, it is more entertaining. They shared that this way, they would create a special kind of relationship with that piece and eventually get a new point of view. Some of the most common themes we received from the participants are categorized in table 8 above.

Q9: What kind of functionalities would you like to see in such a virtual gallery application from your point of view?	Theme	Percentages
<ul style="list-style-type: none"> • Take notes and personalize them more • Mark where you left off • Mark specific works to come back later 	Personalisation	60%
<ul style="list-style-type: none"> • Have a map in the application • Check all exhibitions on a map near me 	Location Services	50%
<ul style="list-style-type: none"> • Summarized information where museums are sorted by different categories (city, exhibition, museum) 	Categorised Information	20%

Table 9: Q9

In the following question, we asked about what kind of functionalities the participants would like to see in a virtual gallery application. Based on the responses, we mostly see users enjoy having personalization in such an application where they can take personalized notes under specific paintings, save what is important for them to access these later on, and mark where they are pointed to come back later when they are reading more. The second place, users would like to have location-based services. Participants enjoy using their location and finding current exhibitions as events close to them. In third place came more categorization of the museums and exhibitions. The users wanted to be able to summarise the information and use filters to match the results.

Through the analysis process of this question, we observed that all kind of users enjoys personalization. This makes them feel better about their learning and helps them be able to track their knowledge. Also, the participants who are more invested in learning about art or visit exhibitions more often would enjoy navigation located services. These participants already visited exhibitions, but they mentioned it would be practical for them to be able to be aware of the program without checking each museum or exhibition but categorizing under the location would be handy.

Q10: Do you think it would change your class experience in a museum if you had this application in your school when you were a student, and how?	Theme	Percentages
<ul style="list-style-type: none"> • Fast access and save time • Avoid information loss • More freedom due to not taking notes of everything • Provide information that is not enough in the class no artist or artwork knowledge, in the end, stays in memory 	Efficient	90%
<ul style="list-style-type: none"> • Share and compare paintings with other students • Not boring class experience getting the same information as everyone • Allow more creativity 	Fun	80%
<ul style="list-style-type: none"> • Various examples to expand and shows no style is false • More sources of what is learned in class • Inspiration due to more sources besides media 	Diversity	60%

Table 10: Q10

This question digs more deeply into how the participants think about the class experience they would have if they used such an application. All participants pointed out that the Artify application would change their class experience in primary school if they used such an application in class. This was important to us since we also get children at school ages more involved into gamify learning. All participants mentioned they didn't learn about the paintings, artists, or art movements enough to remember after the class. Therefore they would enjoy it if they could cooperate more. 30% of the participants mentioned the information was theoretical and followed a lack of interest at the end of the classes. The common themes received from the participants were they found the application fun and efficient and allowed more diversity.

They shared that the boring class experience and application would change how they experienced the class. They could share more knowledge with their friends, and comparing their progress would lead to more creativity. They shared that the classes were not very memorable, and not many participants had school trips to exhibitions. Therefore, they haven't seen enough examples of paintings to compare and learn, and the information they received was much theoretical for this reason, they would like to check more sources in one place.

Q11: Would it be interesting to create your own gallery inside the application to track your own progress?	Theme	Percentages
<ul style="list-style-type: none"> • Having a gallery is specialized for one goal feels more professional • Progress challenges me to create more 	Progress	90%
<ul style="list-style-type: none"> • Seing progress can boost motivation • All drawings stored in one place • No risk of getting lost everywhere in different devices 	Visualisation of work	90%
<ul style="list-style-type: none"> • Interaction is more interesting • Interesting if the Profile is public 	Interaction	30%

Table 11: Q11

With the question of whether participants would enjoy creating their gallery inside of the Artify application, we seek information specific about the application. The feedback here is important for us the consider the aspect of our research theme.

According to answers from the participants, if it were interesting for them to create their own gallery in the application we received, they would find it easier to track their progress, and visualization of their work would be useful. They would like to have more interaction with other users. 90% of the participants said they would like to have their own personal gallery inside the application. They explained it would be interesting to have drawings in one place without having the risk of getting lost in many different devices. Participants mentioned it would feel more professional to have one place to store and be able to visualize their drawings. All of the participants who would like the personal gallery mentioned it would boost their motivation to be able to see all their work so they can track their improvements. They said it would be more challenging to grow. 30% of the participants shared it doesn't play a big role where they have their drawings, but interaction would be more important for their motivation.

Q12: Do you think learning together motivates young students and would it motivate them if they could share their drawings in this app with others to learn together more about art?	Theme	Percentages
<ul style="list-style-type: none"> • More fun to share with others • I can say as someone who studied pedagogy group work teaches students 	Fun	100%
<ul style="list-style-type: none"> • People get motivated by others' motivation and creativity • Allows exchanging experiences about others' drawings 	Sharing Experiences	100%
<ul style="list-style-type: none"> • People can get influenced by others' creativity and threaten their own • Art is the expression of self, and learning together at young ages can be vulnerable • Sharing drawings can be open for bullying kids can be mean 	Threatening	50%
<ul style="list-style-type: none"> • Competitiveness can also be fun • Challenges to try harder and be better 	Good Challenge	40%

Table 12: Q12

This question is about researching the concept of the Artify application could be a tool that students learn together and if it would be helpful.

Regarding if learning together motivates participants or younger students, all participants agreed. This can also be seen in table 12 Two participants specifically mentioned teamwork challenges to try harder and better, and they can share their experiences. One participant said as someone who studies pedagogy, learning together is very important for children, and therefore, at schools, it is suggested to have group work activities. It motivates students and adds competitiveness and fun. Learning to work together from a young age leads to better communication. However, 50% of the participants specified learning together can be motivating and demotivating at the same time. They wouldn't like to share their drawings with everyone. They said it would be better if they could set who to share it with. They mentioned that sharing drawings can be open to bullying, especially for younger students. One participant specifically mentioned art is the expression of self, and learning at young ages can be vulnerable. Young children can be mean.

Q13: What do you think about the quiz in the app? Would you enjoy something like that?	Theme	Percentages
<ul style="list-style-type: none"> • I would like it to improve my knowledge • I would like to recognize the information • I like to know the history behind the art • I enjoy learning more through questions than reading through the same information again • I would like to mark the ones I know and be able to do the quizzes I don't know • I would like to have multiple quizzes so I can play more than once, once I read and learn more 	Improve Knowledge	90%
<ul style="list-style-type: none"> • I would like to see a ranking • I like to be competitive and younger kids are the most competitive • I would like a reward like a city culture card depending on the rating • I would like a reward print of your favorite art piece 	Challenge and Motivation	40%
<ul style="list-style-type: none"> • I would be interested in creating my own quiz and being able to • I would like to share the quizzes with others, • The quizzes can be rated, and the most popular one of the week/month can be voted 	Creativity	10%

Table 13: Q13

We aim to find out with this question what are the participants' opinions regarding a game-like quiz section. Different themes are summarized in table 13 above.

When it came to the question if the participants enjoyed the quiz section, 90% of participants answered they liked the section and found it useful. 10% have said it would be boring and exam-like learning was not enjoyable. For the participants who enjoyed the quiz, we asked what they liked and what they would like to see more in this section as follow-up questions. 40% of the participants mentioned they would enjoy some competitiveness and be able to see their place among other users. The participants shared younger kids are also more competitive, so if there were a ranking, it would motivate people to learn more and be better.

Another suggestion from 30% of the participants was that they would like to have a feature where they could see the ranking, and from that ranking, the best ones can get some small rewards. One participant especially mentioned that the application could offer a reward like Vienna Culture Card so that users can visit museums and exhibitions with that card. This way, the participants said they would be more interested in playing if there was a reward in the end. Two other participants mentioned they would enjoy a licensed product like a painting poster for first place in the quiz results. Many participants were motivated by the quiz segment and came up with different ideas. Another suggestion was to be able to create the user's own test and share it with friends. This way, everyone could create their own quizzes and share them. The quizzes could be ranked too to have popular quizzes of the week or month. The goal here would be to push users to be more creative and push their limits. Some other interesting idea from a participant was that she would like to take the quiz, and then the application would suggest other quizzes based on her wrong answers.

Based on the answers, we discover that participants are particularly interested in the quiz section. They all come up with different ideas and reported that they enjoyed this section of the application. Therefore there were also many other suggestions on how they would like to see this section could be improved. We can report from the feedback that we receive quiz is a fun way where users can take a break from reading plain texts, and come and challenge themselves.

Q14: What do you like about the application?	Theme	Percentages
<ul style="list-style-type: none"> • The concept • Improves my knowledge • Summary of the information under each artwork 	Informative	100%
<ul style="list-style-type: none"> • Application makes it accessible and simple for everyone • Exact essence of the knowledge you need and seek 	Simplicity	80%
<ul style="list-style-type: none"> • Having my own gallery • My drawings won't get lost 	Having own Gallery	35%
<ul style="list-style-type: none"> • Paintings categorized under art movements 	Art movements categorisation	35%
<ul style="list-style-type: none"> • Having Tutorials 	Tutorials	10%

Table 14: Q14

As we are coming to the end of our interview, we asked what the participant found valuable and entertaining in the Artify application. We find out different parts take the attention of the participants. These themes can be easily seen in the table 14.

As the question of what participants particularly liked about the application is asked, we initially discover that the participants liked the concept a lot. They mentioned it is refreshing to have an application that gives information in the right way without making it exhausting to learn. 80% of the participants mentioned it helps to have a simple design for learning. The simple design makes the application accessible for everyone of every age and for every person of different art knowledge. Participants said it doesn't look intimidating to approach, and they would like to add the application to their life when it is also more developed. They all admitted the application would be a practical tool for improving their art knowledge. Participants mentioned different reasons for what they specifically liked about the application.

Common themes that they came up with were the informative concept, the simplicity of the design and information provided, having its gallery inside of the application, the way that it is designed to categorize the paintings under different art movements, and having tutorials.

Participants said they would use it to draw more and store their drawings in one place, knowing they won't get lost. Participants also enjoyed viewing paintings on the home screen, separated under different art movement categories. They said it is nice to see at first glance.

5.2 Results

The interview results allow us to discover the general behaviors of different participant groups. During the check of the questionnaire, we inspect who have more interest in practicing or enjoying art tend to develop more interest in the online world too. Thus, those with little interest will get less use of the application.

We examine through the responses that the participants who met with engaged with art at younger ages developed a greater interest later in their lives. Hence, those with more passion and excitement tend to be more motivated to learn actively about the concept of art and get the most out there, including improving their knowledge from rich material about paintings or artists. Additionally, they also have more comprehensive expectations. These participants expect to be surprised and experience something different they can't just read about on the internet. However, the case differs slightly for participants with more minor or foundational knowledge. Those with a distant relationship with art may receive less from the application. We also seek to attract these users too hence it is crucial not to overwhelm them with the new information they receive. In order to attract the attention of these users, we should include them in the effective learning concept. The users with less knowledge slide more in a direction where they can actively participate during the process. Here, we should take advantage of the technological tools in our favor and guide them. This can be done by, instead of offering long texts that we lost the users after a few sentences, more fun audio guidance, podcasts, and videos can support. These participants can have shorter attention spans when it comes to reading long comprehensive information and prefer more compact, fun ways. We also detect in the tutorial segment of the application that users with "poor information" find it more challenging to start somewhere, including drawing. Hence, the participants also reported they need a less complicated start. To make it easier for them, we observe in table 15 more guidance is needed.

The participants share, in this sense, accessible links, which forward them to online stores where they can easily find the art supplies making it less intimidating. These participants further addressed that developments in digitalization can make things interesting for them. As another finding of the research, today's users enjoy more personalized services, which include individuals where they can find their paths. To make their experience more unique and more than touring the traditional museums, they enjoy more interactive exhibitions. These exhibitions can contain technologies, the latest trends, virtual reality, augmented reality implemented exhibitions, and "moving" exhibitions where paintings are projected through walls and moved when visitors pass by. Some participants even mentioned exhibitions where technology makes it possible to use filters and that they can get a sense of being present in the painting. Using these technologies may attract the less interested crowd too and be helpful to include them more in museums.

To summarize, we detect in table 7 that there are different expectations from digitalization in the exhibitions and to support the learning progress. Based on our analysis, digital gallery applications were mainly new to the participants, and we saw that only a few of them had brief experiences with them at the time of the pandemic when it was not possible to visit the museums personally. Even though these participants find these applications useful for the case, we observe they prefer real physical experience, but additionally, they find it helpful in learning through applications. Even though online exhibitions are not big attractions to the participants, as a common practice, all participants enjoy the gamification aspect of the arts. They describe learning through games makes learning concepts more exciting. When including themselves in the application and interacting with the idea by doing quizzes or drawing, they learn more than they actually invest their time learning by reading plain texts. The research has shown the power of online experiences highly depends on

how much the users feel they are present in the mediated environment. [10, 17] Therefore, online tours should give more sense of being physical in the museum. Online tours offer 3D instead of 2D behind a display, more of the feeling of being present and create the perception of a "museum" environment experience. [10] This can result in influencing users' intentions to visit the real museum. As the virtual visitors interact with the museums, they develop cognitive involvement and gain more learning possibilities for engagement.

6 Discussion

The Artify application and this work have more room for investigation. In this paper, we argued that if a virtual gallery application can help younger students to motivate in the end for better learning in arts. The goal was to create a more individual learning platform for learners. We implemented an application to make them curious to visit museums and be more involved in visual arts, not just by seeing them but also by creating them themselves. We argued that by creating and involving learners more in the process, more people would get curious and would be eager to learn more. In several research mentioned throughout the paper, we see the similarity with our findings from the interviews that the more similar a digital tour feels to a physical museum tour, the more motivated people are to visit a real museum. Museumgoers don't particularly enjoy it when they observe artworks behind a screen. Still, with our findings, we can confirm that digitalization in the museums can make the exhibitions more interesting for the less interested crowd. Several research and also from our findings from the interviews reference that personalized features and gamification aspects positively influence the learning process and make students more motivated to learn more, and the learnings are more memorable.

7 Conclusions and Future Work

In this paper, we discussed different kinds of virtual museum applications and online tours. We formed a questionnaire to understand the expectations and needs of various participants. With the use of the questionnaire, we analyzed the outcome we received from the participants, who shared their experiences with the developed gamified art learning application Artify.

Based on our results, we argued virtual gallery applications' success highly depends on the "presence" feeling; additionally, we noted that constructive learning can only be built by active learners. Learners need to take control of their learning, and in this application, we aim to achieve this by focusing on the users. This leads users to be more effective with a higher involvement level, which results in more intense behavior and helps build a relationship between users and art. We discovered the participants who have a deeper knowledge of the concept will get the most from the application, and those with less knowledge need more guidance in their progress. We take advantage of gamified learning approach to attract the less interested audiences by involving them. From the interview responses, we analyze different participant groups and had different expectations from the exhibitions.

Entertaining gamelike activities made learning more accessible for everyone. From our feedback, we noted that participants would include the Artify application in their daily life either to have quality time and improve their knowledge or in museums as a tool to support their experience. In order to raise the curiosity of these participants in the art, it is necessary to involve features that make the users more included in the process, and digitalization provides this feature to us. Users enjoy having their own notes, audio or other features they can customize inside the application. To summarize, to reach all groups of participants, we discover that it is necessary to have a diversified approach to online learning in the application.

7.1 Further Development of Application

For the further development of this study, we asked the participants one last question regarding what they found confusing in the application or how they would like to change it in order to improve the Artify application. These themes, which are relevant for further development and future work, are summarized in the table 15 below.

Regarding the information received from the participants, there was nothing in particular that they didn't like or found confusing about the application. Still, they shared they would enjoy having additional features. We asked follow-up questions for their suggestions. The most common themes were around the "Quiz" and "Profile" sections in the application.

50% of the participants agreed they would like to see the quiz segment separated into different categories. They explained it would be more fun for them not to just play with the questions one time, and they could have multiple quizzes. They also explained that if there is just one quiz, they need to read all the information in the application and then do the quiz, which can be very hard. They wanted to have separated categories so they could spend some time in one category and then do the quiz and go on so.

50% of the participants shared they would like to share their profiles with other users and be able to see other users' profiles. They shared it would make it unique not to be able to see their own drawings but share them with the world.

Other common concepts were around having location-based services and an online store in the application, then following design improvements and being able to personalize the application. 35% of the participants wanted to have a map inside the application to be able to check different exhibitions near them. This way, not only can they be up to date with the exhibitions in their city, but when they are planning a trip, they organize it depending on current tourist exhibitions and attractions. For example, one participant specifically mentioned he missed the "Basquiat exhibition" in Vienna and added, "These exhibitions usually visit nearby cities. If I could be able to see if it went somewhere close without doing a long Google research, that would be very practical for me that differentiates from what I can find on the internet". Participants suggested seeing the famous artworks as a thumbnail on a map that they can zoom in and out on would make it very interesting. 25% of the participants suggested having an online store or links to online stores in the application. One participant mentioned she would very much enjoy recreating paintings. Still, as a beginner, she wouldn't know how she should start drawing, so if she could see which specific materials she needs under the specific painting would be useful. It was also mentioned that they would like to buy posters of some drawings, so if the application could share links with them where they can buy paintings or use printers nearby for guidance would be practical for them. Under design, users wanted to be able to check all related paintings under one art movement full screen. There were also some other suggestions about personalization. Participants mentioned they would like to save paintings under their Profile, the ones which they find especially interesting, and write personal notes about what is attractive to them or recent new information they learned under the paintings. They mentioned it is easier and more memorable for children if they can add something from themselves.

To summarize the further development of the study, the application aims to increase the categorization of the information, having short compact, memorable information to attract more users and giving more detailed information sources in the background to the genuinely interested users.

Q15: What do you not like/change about the application?	Theme	Percentages
<ul style="list-style-type: none"> • Quiz can be divided into sections/art movements 	Quiz	50%
<ul style="list-style-type: none"> • Profiles can be shared with other users 	Profile	50%
<ul style="list-style-type: none"> • Audio information • A tree to visualize which artists were influenced by which artists • Links to articles about related artwork • Podcasts about art • Scan paintings in an exhibition using Google Image Trace to get direct information without searching 	Additional Information	35%
<ul style="list-style-type: none"> • Add the artwork on a map as small thumbnails to see all of them with locations (exhibitions near me) 	Navigation	35%
<ul style="list-style-type: none"> • links to order painting poster • links to specific art supplies to buy for recreating the paintings • I would like to be able to sell my own drawings 	Online Store	25%
<ul style="list-style-type: none"> • The drawer navigation has three options that can look more professional • Visualizing all paintings under one art movement full screen • Design can be improved 	Design	25%
<ul style="list-style-type: none"> • Take personal notes under the artwork • Save paintings under the Profile or mark where I left off last time 	Personalise	25%

Table 15: Q15

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8 Appendix

List of Questions Asked During Interview
Q1: How did you first get in touch with art?
Q2: What are the reasons for visiting a museum for you?
Q3: What do you expect to see when you visit an exhibition?
Q4: Can you tell me how you start your tour inside a museum?
Q5: When you are spending time on a painting, what attracts you there?
Q6: Have you seen a digital gallery application, and what would you expect from one or think about one?
Q7: How would you expect digitalization would support user experience in painting exhibitions more in the future?
Q8: Do you believe that practically interacting with the paintings would it be more fun, and why?
Q9: What kind of functionalities would you like to see in such a virtual gallery application from your point of view?
Q10: Do you think it would change your class experience in a museum if you had this application in your school when you were a student, and how?
Q11: Would it be interesting to create your own gallery inside the application to track your own progress?
Q12: Do you think learning together motivates young students and would it motivate them if they could share their drawings in this app with others to learn together more about art?
Q13: What do you think about the quiz in the app? Would you enjoy something like that?
Q14: What do you like about the application?
Q15: What do you not like/change about the application?