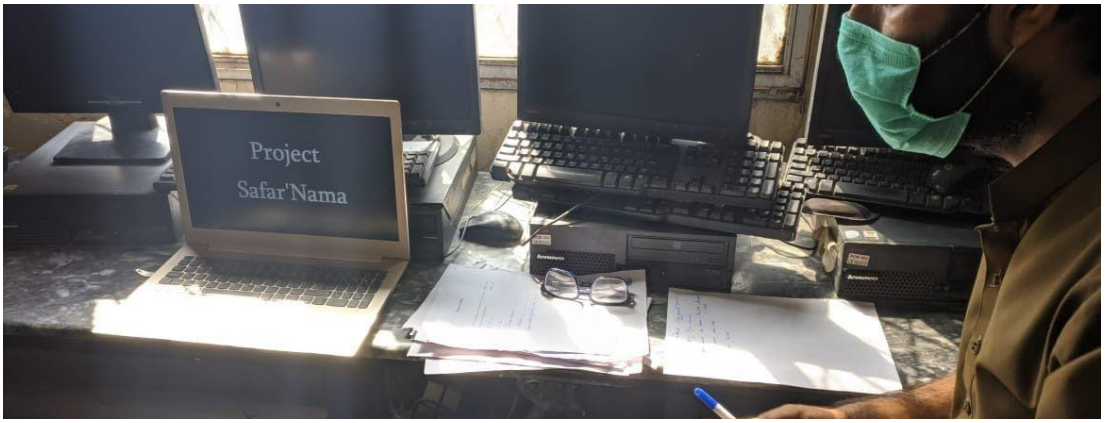
# SafarNama

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| **Group Number:** | 14 |
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## 1. Problem description

The advancements in knowledge has also led to progression in how individuals attain this knowledge. The emphasis has shifted towards creative and critical thinking which has led to adopting new strategies for teaching. Older approaches were primarily teacher-centered, such as the lecture format, which led to passive listening from students, student marginalization and only promoted remembering and understanding. However, these approaches lacked the vital skills of application, analysis, and evaluation. The modern approach is
learner-centered and consists primarily of activity-based learning. The active participation and consistent engagement of the learner is encouraged which promotes critical thinking. Different formats of teaching have been introduced to classrooms to promote these changes such as the flipped classroom format.
Additionally, more care is taken in designing the course structure to make sure proper interactive methodologies are used to maximize potential learning.
Physical changes have also been implemented into classrooms such as replacing hard-copy textbooks with digital methods such as virtual classrooms. Video lectures are also widely used due to flexibility as well as video controlling features.

## 2. Introduction

Pakistan's culture, is it monolithic or is it diverse? This is a question that has been widely debated over. On one side, the evidence suggests that Pakistan was only separated from India to allow the Muslim minority to govern itself rather than live in persecution. This shows Pakistan as a country of Muslims. However, it should be noted that the Muslim population itself is diverse. The country consists of multiple ethnicities including Punjabis, Sindhis, Kashimirs, Siraikis, etc . Each of these brings with it, its own traditions, ideologies, music, cuisine, etc. In terms of history, the country, prior to independence, was part of the Indian subcontinent. This subcontinent included Pakistan, India, Bangladesh, Nepal and Sri Lanka which is why these countries still share some similarities in their cultures [12]. The country has also picked up some influences from the British Empire during their rule over the Indian subcontinent which explains the inclusion of British architecture, education, English Language, etc. withinthe

country. As an example, the Lahore railway station is a prime example of British architecture. Going even further back in time leads to the era of the Mughal Empire. Famous Mughal emperors including Akbar, Babar, Aurangzeb are still taught about in schools. Their influences are still present throughout Pakistan, for example, the Badshahi Mosque and Lahore Fort. Moving to the times of the bronze age from c.7000 to c.600 BCE, is the era of the Indus Valley Civilization [15]. The evidence of this civilization is present through the cities of Harappa and Mohenjo Daro and evidence also shows that these cities were technologically advanced. As an example, they had built the world's first sanitation system.

Given these vast resources for culture and influence, it would intrigue the curious minds to study about them. Yet, there is a lack of interest in studying about history and culture in Pakistan. The current generation has little interest in studying about history and culture and prefer most other subjects to it. A possible reason for this is the lack of promotion of history and culture in Pakistan. Moreover, these topics are usually taught through textbooks which are boring for students and do not keep them engaged at all. These lead to children not forming a bond with their history or culture and neglecting it. To grasp the importance of these, it is vital that students experience these instead of just reading about them. Not only will experiencing these, in museums or landmarks, lead to better engagement of the students, but it will also instill an interest in exploring these topics further. Furthermore, owing to the current situation, school trips to historical landmarks, museums, etc. have been completely stopped which will only aid in reducing this interest.

Given this issue of the lack of interest and learning of history, a different method to teach it should be approached. Active learning may prove to be useful for this subject. Active learning involves engaging the student to the course content, having students actively participate in activities and collaborate with peers rather than just listening to the instructor. Not only does this improve learning, but it also helps the student build up their analytical and critical skills. A study also showed that active learning leads to students learning more and scoring higher [21]. A research paper involved testing the use of active learning for a history course [16]. This involved dividing the class into groups where each group was assigned a historical role to study about and then role-play. Each group was provided a series of general questions that they would be investigating. This experiment was divided into a control and test group where the test group used roleplays while the control group studied normally. After the experiment was performed, both groups took an exam, and the results were used to verify if active learning made a difference. The results showed that the groups involved with active learning i.e., the test group performed better than the control group and scored higher. Conclusively, this showed that active learning could have a positive impact.

## 3. Literature review/Previous work

The problem area can be divided into four major categories which consist of Active learning, Education technology, Augmented reality based learning, and virtual tours. The papers studied were either related to findings about the category or application which were related to the category.

Active learning is a useful tool to enhance the learning experience of students in modern times. An active pedagogy involves engaging students by using methodologies which promote active participation. A study was conducted to review whether active learning is actually effective. The study explained how the classical learning model actually opposes the ideas of human cognition. It explains that active learning encourages problem solving and critical thinking skills. The main purpose for active learning is to help students build mental models, test them, and patch them to validate what they have learned. This is explained through cognitive psychology on how learners solidify new knowledge by making connections to existing knowledge and mental models. This explains how obtaining information is different from applying it. Another finding was that individuals learn more in groups with peers rather than studying alone. Findings also concluded that for science disciplines, labs and classroom experiments improve student performance and understanding. However, it is also found that specific active-learning methods work for specific types of courses and thus requires the instructors to learn about how to actively apply it as well [17].

Another study focused on a particular area of active learning, which is digital games-based learning. This paper studied about the impact of digital game-based learning on young children and how it can impact their creativity. It found that the majority of devices used by users consists of smartphones, tablets, and computers with the key factor being portability. It was also found that digital game-based learning was effective in various topics such as arts, storytelling, mathematics, and problem solving. A major finding was that there was a correlation between the games and the rising levels of creativity and learning amongst children. Results pointed out that introducing Digital game-based learning to studies led to improvement in creativity, learning performance, better engagement, and improved collaboration for students. However, there were some limitations as well. A limitation in digital game-based learning was that it relied on the pedagogy model which needed to be effective to produce good results from the students. Additionally, the same system could not be used for multiple subjects and had to be adjusted accordingly [4].

Moving onto applications that use active learning, we can see that multiple applications have been developed that promote learning in various different areas. A research paper explores the use of an application known as “Ori-Gami”, the purpose of which is to improve the spatial learning of children. This application works towards improving the orientation, wayfinding, and map understanding skills of children with the use of user-centered design and digital

game-based learning. Key factors of this app included user usability and satisfaction. The app provides the user with a simple map which shows instructions of the route that are input by the teacher. The user has the option of clicking on a location to move there or use GPS on their device to map their
real-life movements to movements in-game. The goal of the user is to go through various checkpoints on the map to reach the destination. A blue dot on the map indicates the user's current position, and a smiley changes color and emotion to provide hints to the user if they are moving towards the intended target. The usability tests revealed that the walking speed of children was a little slower compared to older students. This may be due to children taking longer to understand the map or due to their shorter strides. Additionally, only two students from the test group made an error which showed that the app was easy to use for most. Touchscreen examination showed that children and students made use of rotation and zoom features of the map to build a better mental map of their location and get an overview. Finally, both children and students liked the app because they felt it was intuitive and interesting. They would prefer if this was introduced in some course. Thus, it can be seen that game-based learning provides a promising platform for learning [3].

Another research paper explores the use of multitouch flash memory games to enhance the learning abilities of children. This paper studies the viability of educational entertainment mediums, specifically through the use of a flash memory game. Flash memory games exist for children to develop visual recognition and memory retention. The proposed game involves showing users a grid of images for a short while and then flipping the images so that students have to guess the positions of the same pair of images. A memory game was particularly chosen because research showed that children's retention and intelligence could be improved through activities that put an emphasis on right brain functions. Research also indicated that learning abilities could be developed through flash cards and flash memory games were an example of this. Evaluation of the application with users showed that users who had no prior experience with computers were also able to intuitively pick up the game, albeit with a little steeper learning curve. Children were excited and engaged by the game. Children preferred if teachers would adopt more interactive games in their daily activities. The results showed that the game provoked users to enhance their imagination, concentration, focus, and social skills. A limitation was that exposure to such technology was still limited at the time [11].

An additional study focused on developing an application to promote out-of-class activities for students through the use of interactive apps. The purpose of this paper is to study the use of active learning to keep students engaged with course content outside of the class. The researchers developed an app called "Dysgu" which provides students with interactive out-of-class activities. Dysgu optimizes the utility and experience by personalizing according to the user's needs.
Moreover, the activities provided by Dysgu are short and flexible so that the user can attempt them at any time. Additionally, Dysgu is built for mobile platforms

since those are the most used by students. It also comes with social features allowing students to interact with each other as well as check each other's progress. Finally, gamification has been widely used throughout the app as it encourages competition amongst peers and leads to more participation [9].

Education technology is a field that is based on researching, designing, developing and evaluating how technology can be used to improve learning. Therefore, it is a very important field which can aid in learning through active learning. There has been various research conducted on this field. A study focused on how the learning of students is impacted by the use of technology. It reveals that the use of modern technology helps increase the learning, and interactivity of students. The research highlights some ways in which technology can be used by students such as the internet, projectors, through digital footprints in educational factors and also through online degrees. The positive impacts of using technology are that students are more excited to learn, allows students to work from home at their own times, and teaches students technology skills that can be used in the workplace. Some limitations of this include that there can be health issues from overuse, it can be costly, and there are increased chances of cheating [19].

Another research focused on how effectively education technology could replace traditional schooling. It consisted of two large-scale randomized experiments, involving ~10,000 primary school students from China and Russia. The first experiment, conducted in China, focused on examining whether EdTech improves academic outcomes relative to paper-and-pencil work-book exercises of identical content. Students aged between 9–13 were followed for several months over the academic year. The results showed that EdTech appeared to be a perfect substitute for traditional learning. The same experiment was conducted in Russia, and it showed that EdTech could substitute traditional learning only to a limited extent [8].

A third paper reviewed the design of education technology initiatives within Pakistan. In this study, meaningful learning is based on a constructivist approach, which is that learners are actively engaged in the learning process where they interpret and process information which leads to construction of knowledge. A theoretical framework was used for evaluation which was based on five attributes consisting of active learning, constructive learning, intentional learning, authentic learning and cooperative learning. Three educational initiatives were used for the study and analyzed. The first EdTech initiative used the model of a live online teacher. The teacher was experienced and delivered live lectures to students. At the end of lecture, the teacher asked factual questions from the students. The questions do not engage the students in drawing inference, making hypotheses, constructing knowledge, or relating knowledge to real life context. In the second initiative, videos were developed to make Urdu and Mathematics interesting for students. Each video had an interesting story line and used cartoon characters. This initiative had been implemented in CARE

foundation schools of Pakistan. The design of the video made the learners passive by default. There were also no activities, post-video, that would have helped in making the students active learners. Hence, students did not engage in active, constructive, intentional, authentic and cooperative learning. In the third edTech initiative, videos were developed to teach Math and Science to students of middle school. At the end of the video, MCQ questions were shown and students answered by using clickers. Responses of students were saved, and students got virtual coins for answering correct questions. The teacher discussed the mistakes of students at the end of the lesson and shared the correct answers. The clickers, used to answer the questions, did not engage the students in discussion to facilitate constructive learning. Again, in this design of EdTech implementation, students were not engaged in active, constructive, intentional, authentic and cooperative learning. In all the three EdTech initiatives discussed above, the students were passive learners and the teaching approach was teacher directed. The focus was entirely to get the content delivered to the students. However, for students to retain and deeply understand what they had learned, they needed to be engaged in active, constructive, intentional, authentic or cooperative learning [25].

Another research dives into the educational impact of Augmented Reality as well as factors that determine its effectiveness, along with both positive and negative impacts on student learning. A corpus of online conference databases and journal articles comparing AR and non-AR applications were used. The positive learning effects are described to be increased content understanding, long-term memory retention, increased student motivation and satisfaction and improved collaboration. It has proved to be most resourceful in learning spatial structure and function, language associations and physical tasks like those for maintenance of machinery. On the other hand, there are negative learning effects as well including attention tunnelling (high attention demand leading to ignorance of other parts of the experience later), usability difficulties (compared to desktop or physical systems), ineffective classroom integration and learner differences (high-achievers not showing any learning gains compared to low- and average- achievers). The factors for the learning benefits were found to be the transformation of content representations to more visual and animated ones, spatio-temporal alignment of the models with physical items, natural interactions and reduced cognitive load, directed attention via highlighting important components to focus better and dynamic 3D simulations that can be often interactive and collaborative [18].

Another research explores developmental changes in children due to AR designs, investigating their skills in motor abilities, spatial cognition, attention, logic and memory and the relationship of these factors to AR designs. There is a lack of design guidelines in the space of AR design for children, and developmental psychology aids them to understand child abilities for this purpose. They have discovered four general categories of development abilities including motor abilities (comprising of fine motor skills, hand eye coordination, multi-hand

coordination and gross motor skills and endurance), spatial abilities (spatial perception, spatial memory, spatial visualization), attention abilities (divided and selective attention), and lastly, logic and memory (memory capability and recalling items/actions in the reverse order as well as thinking beyond a topic with abstraction). Each of these challenging AR interactions are explored and considered in the basis for design, for example, studying one hand gesture motion as well as two-hand coordination motions in children using differently designed handheld-AR applications in both 2D and 3D contexts. However, this research does not cover other developmental abilities with potential like visual acuity, visual tracking and symbolic reasoning and it most covers AR games since applications available lie in this domain mainly so more applications in the different contexts like for classrooms have to be explored against these abilities. Moreover, it does not identify how children's age influences performance with different AR designs [19].

Researchers have further created a virtual tour application using augmented and virtual reality both for a one-day campus tour for undergraduates students for the Management and Science University (MSU), Malaysia, to reduce the logistics involved in an actual tour and enable those that cannot visit physically to do so. Users could interact with the content and modify the position of the markers (placed on landmarks and signboards). Blender (3D modelling), Vuforia (AR SDK) and Unity (IDE) were used for its development. Questions after the tour were also included to evaluate the effectiveness of the application, as well as statistics like time taken to complete. In comparison to a group that took the physical tour, the virtual tour took less time but had the same mean score for the quiz. For evaluation of the application functions, they used UX, UI, navigation, performance, level of tutorial help, intuitiveness and the ability to handle target scans as metrics. High personal satisfaction scores were received as the majority of users highly valued the use of visualized campus information on mobile devices. Performance was ensured due to absence of excessive animation, however, the application required more time to load 3D buildings and 360-degree views, depending on hardware specification of devices. Other limitations include the lack of studying gender differences to explore better learning outcomes [1].

A prototype of a mobile interactive museum guide system is developed, which consists of an ultra mobile PC (tablet size) equipped with a webcam. It can automatically find and retrieve multimedia information about the museum objects using image recognition with occlusion handling. It then projects AR multi-modal, context-sensitive information regarding the object identified to visitors, with icon buttons to adjust rotation, translation and scale the virtual 3D models. Users were satisfied with the overall handling and visualization but complained about slow processing speeds and portability [13].

In another paper, a game-based guidance system and a time travel game using augmented reality was proposed for the Yuanmingyuan cultural relic park with six different interactive modes to make tourist experiences more engaging and

improve their immersion and experience. These six modes were divisions of a single story as missions or tasks that tourists must complete. Plaques, stone tablets and building patterns as well as geolocation were used to identify user positions for the interactive game. A cartoon is displayed at first in order to help its user learn the legend of the game and then the hints of designated places are displayed. After identifying that a user has arrived at the designated place, this application called MAGIC-EYES will continue to display the mission or puzzle of the task. It jumps to the next task once the current one is fulfilled until completion of the whole game. Moreover, an embedded questionnaire was used to evaluate the touring application. The potential of this application was shown through their pilot study using this questionnaire. It proved equivalent to the process of learning historical knowledge, since AR can provide a reasonable level of realism and interactivity, while game-based learning can improve learning experiences and student motivation [24].

Another study employed simultaneous-localization-and-mapping-based (SLAM) augmented reality technology in a guided tour for a historic site, the Nishi Honganji Temple in Taiwan. Virtual objects integrated real environments to promote users' senses of immersion, and a gamification mechanism was applied to enhance their experience and learning outcomes. The results indicated that use of the technology was effective for enhancing users' learning, and most of the participants reported having a positive experience [23].

A tour guide robot using augmented reality and a hybrid localization method to know its precise whereabouts was developed to communicate and guide people through a complex museum tour in real time. It interprets user information like interests about exhibits, average age of visitors and requirement of expertise then plans a guiding procedure accordingly. Input from sensors, gestures and manual input are received. It includes hybrid localization (metric and topological), advanced image recognition including camera pose estimation and pattern searching as well as sensors to determine the local position of the robot as well. Multimedia elements such as 3D objects, music clips and sound clips were associated with every artifact [10].

Another research shows a developed tool for teaching English colors, shapes, and spatial relationships to young children aged 4 to 6 years old who are non-native speakers of English, using speech recognition and video input. Children can interact with virtual objects using specific AR markers and speech input using voice commands, like reciting colors and words to see live changes. This application shows how speech recognition can be a very effective addition for interaction with AR. It has both an AR and non-AR mode. The objects only include several markers though and primitive shapes [7].

Augmented reality field trips for mobile devices have potential to be an accessible and financially viable means to bring field trips to a diversity of students who would otherwise experience none. A study examined the impact of augmented

reality (AR) field trip exercises on the interest levels of students using readily accessible mobile devices (smartphones and tablets) as a means to provide simulated field trip experiences to a larger number of learners. The results showed that students who completed three geospatially oriented Grand Canyon field trip game modules were significantly more interested in learning the geosciences than control students and participants who completed only one module. It was concluded that AR field trips increase student motivation to pursue geoscience learning [5].

Another research was conducted to measure and understand the impact of an augmented reality mobile application on the learning motivation of undergraduate health science students at the University of Cape Town. It was found that using an augmented reality mobile application increased the learning motivation of students, with the attention, satisfaction, and confidence factors of motivation being increased [14].

Another study found that in comparison with the conventional inquiry-based mobile learning activity, the AR-based inquiry learning activity is able to engage the students in more interactions for knowledge construction. The study was done to provide guidance for helping teachers develop effective strategies and learning designs for conducting inquiry-based learning activities [6].

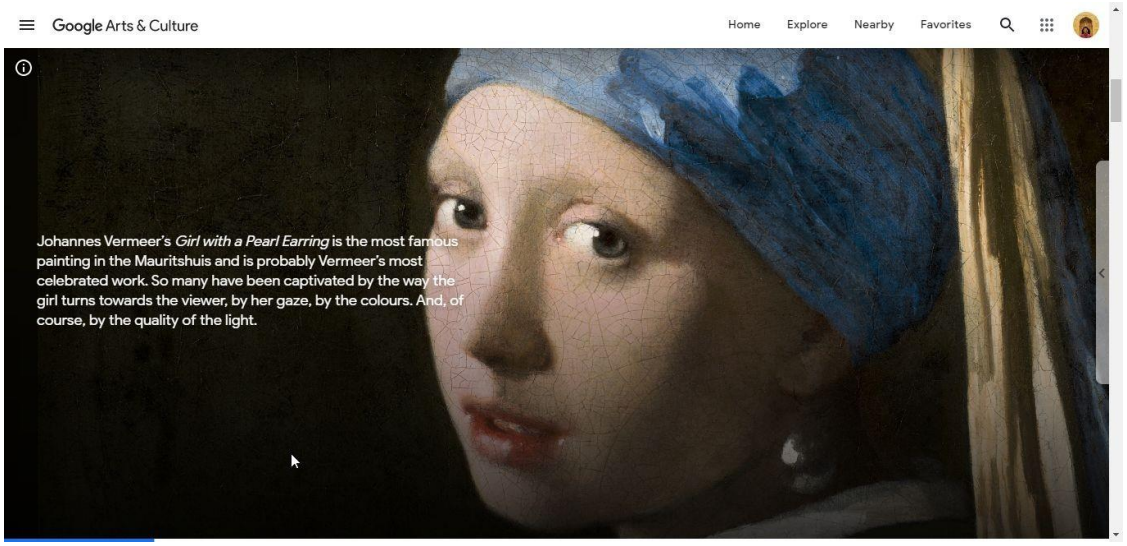
According to another paper, Augmented Chemistry provides an efficient way for designing and interacting with the molecules to understand the spatial relations between molecules. For Students it is very informative to see actual molecules representing 3D environments, inspect molecules from multiple viewpoints and control the interaction of molecules. The researchers presented an Augmented Reality system for teaching spatial relationships and chemical-reaction
problem-solving skills to school-level students based on the VSEPR theory [22].

Another study mentioned that in recent years, there has been an increasing interest in applying Augmented Reality (AR) to create unique educational settings. The study reported a systematic review of literature on augmented reality in educational settings considering factors like the uses, advantages, limitations, effectiveness, challenges, and features of augmented reality in educational settings. The paper mentions some findings that will be extremely helpful for our own research. The number of published studies about AR in education has progressively increased year by year especially during the last 4 years. Science and Humanities & Arts are the fields of education where AR has been applied the most. Health & welfare, Educational (teacher training) and Agriculture are the research fields that were the least explored fields. AR has been mostly applied in higher education settings and compulsory levels of education for motivating students. Target groups like early childhood education and Vocational educational Training (VET) are potential groups for exploring the uses of AR in future. Marker-based AR is the most used type of AR. In addition, location-based AR is being widely applied. This can be due to the availability of

sensors in mobile devices like the accelerometer, gyroscope, digital compass, and the possibility of using GPS. Marker-less AR needs some improvement in algorithms for tracking objects, but the use of Microsoft Kinect is becoming more and more popular. The main purpose of using AR has been for explaining a topic of interest as well as providing additional information. AR educational games and AR for lab experiments are also growing fields. The main advantages for AR are learning gains, motivation, interaction, and collaboration. Limitations of AR are mainly: difficulties maintaining superimposed information, paying too much attention to virtual information and the consideration of AR as an intrusive technology. AR has been effective for: a better learning performance, learning motivation, student engagement and positive attitudes. Very few systems have considered the special needs of students in AR. Here there is a potential field for further research. Most of the studies have considered medium research samples (between 30 and 200 participants), and most of the studies have used mixed evaluation methods. The most popular data collection methods were questionnaires, interviews, and surveys and most of the studies were
cross-sectional [2].

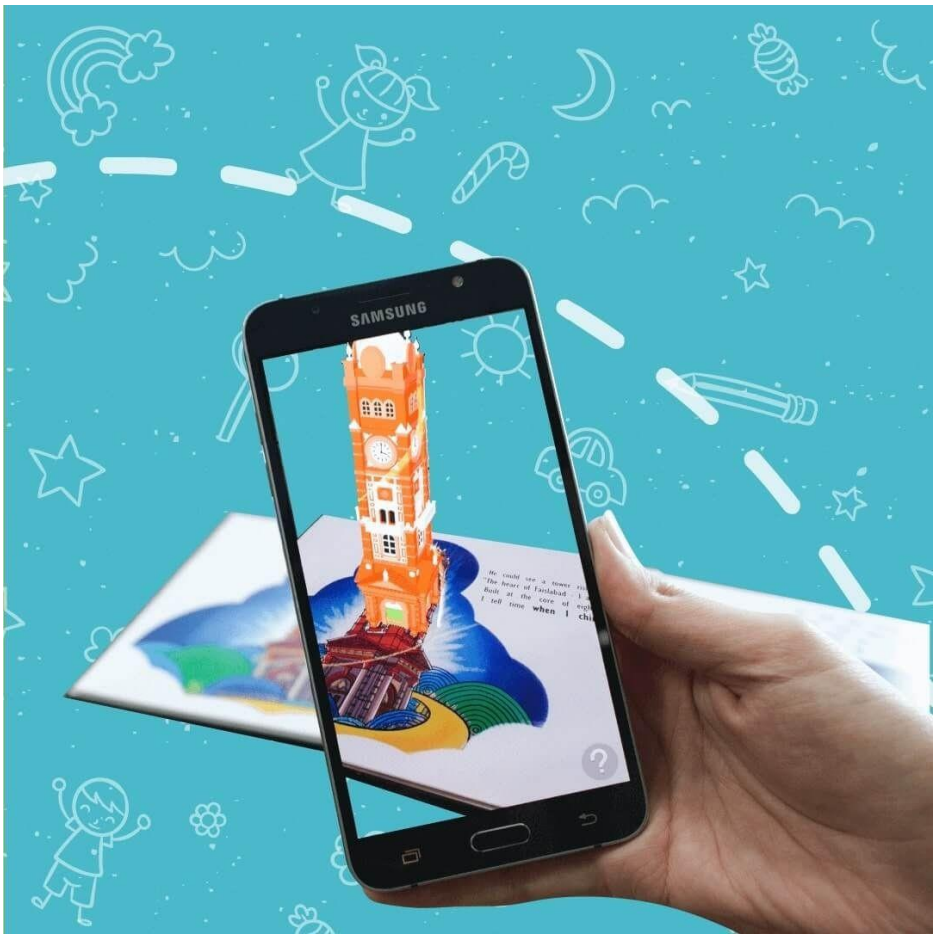
## 4. Existing Products

### Google Arts & Culture




It is an online platform through which users can see high-resolution images and videos of artworks and cultural artifacts from partner cultural organizations throughout the world using a Virtual Gallery Tour, an Artwork View, Art Selfie and Video and Audio Content as well as tour quizzes.The platform includes advanced search capabilities and educational tools. One limitation of this platform is that it requires the user to be skilled enough to use technology to its maximum effect.

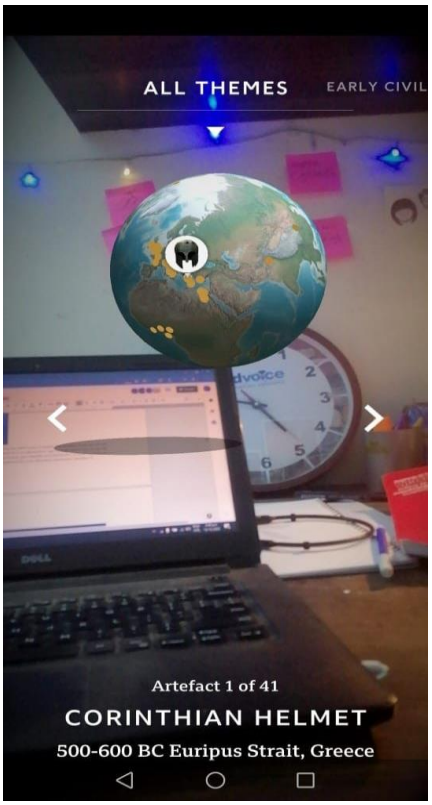
**L earn Interact Think's Pehchaan**




The personalized AR storybook Pehchaan takes children on a tour through Pakistan, showcasing its famous monuments as children try to uncover their lost identity letter by letter, uncovering the story in a comprehensive poetic prose. It is supported by an AR mobile application to interact with high quality custom made 3D models of illustrations and use finger gestures to transform them.

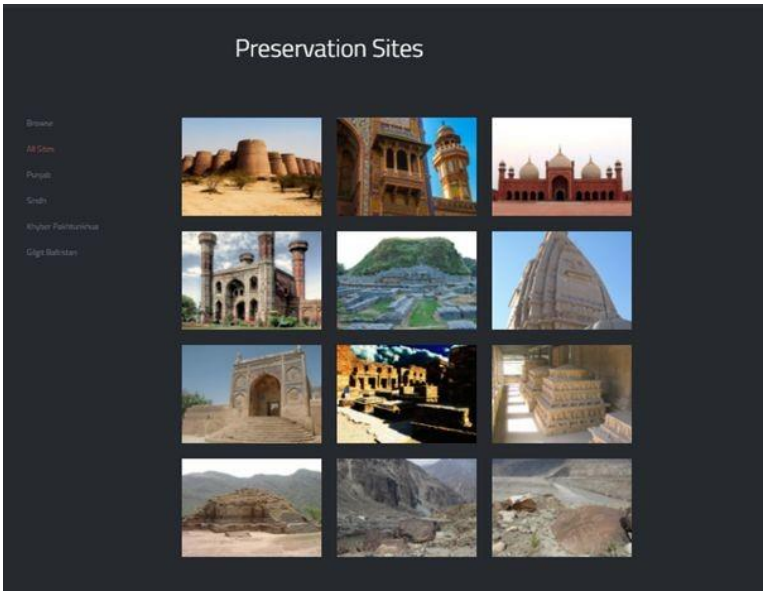
However, the book does not dive deep into the insides of these historical places and the AR feature lacks sound or haptic feedback and is dependent on the availability of the book.

**C ivilizations AR**



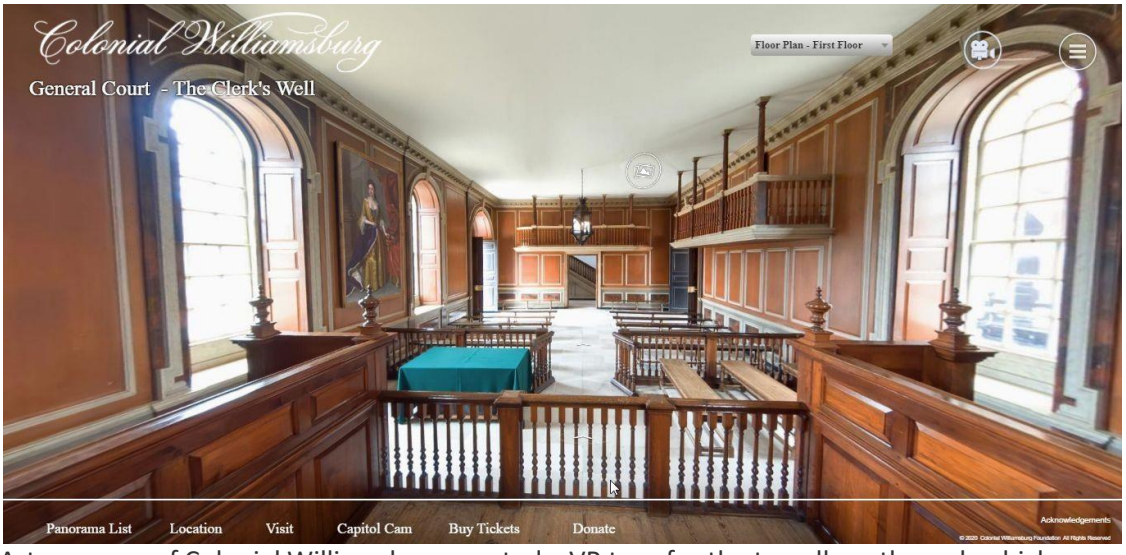

An AR based app designed by the BBC team to display the artifacts from all over the world at your home or at school. The user has the option to either listen to the information using narration or to read it and take photos of the projected models and interact with them. However, it is not in Pakistan's context specifically and has performance issues.

**h eritage360**



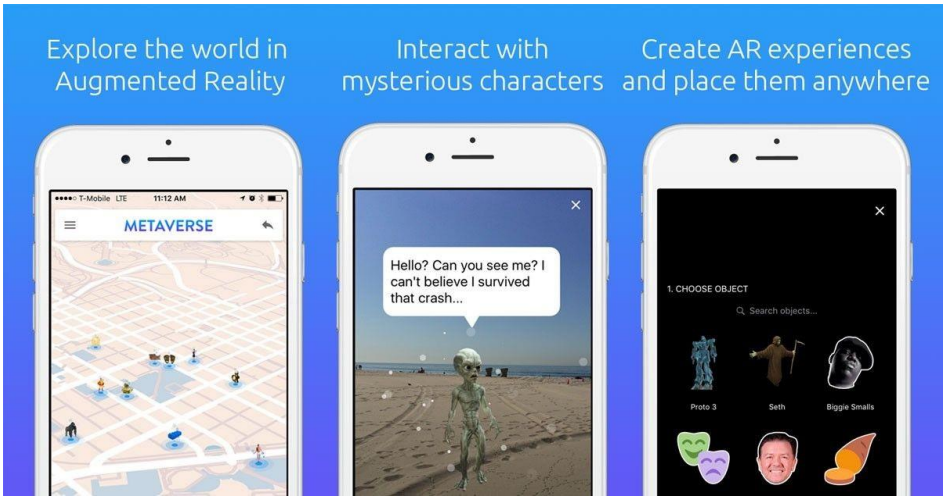

Digital preservation of Pakistan's Heritage is a project of LUMS x USAID. The main aim of this project is to preserve the historical placing of pakistan through 3D models, 360 videos and VR. There are multiple categories, including panoramas, elevation and floor plans through which users can get the information. However, it takes a lot of time to load, the site is not updated or secured, and you cannot interact with the surroundings but only traverse them.

**colonial williamsburg**




Art museum of Colonial Williamsburg created a VR tour for the travellers, through which users can see the museum items and explore the historical shops, homes and gardens of an early American community returned to its
18th-century. Again this is not in the context of Pakistan which we plan to fix for our problem space and does not involve any interactions. No information about artifacts is displayed either.

## Metaverse




The Metaverse is an AR based educational app that interacts with the user through Augmented Reality and interacts with the user by solving puzzles and tricky questions. It also includes storytelling through dialog choices.
However, this is a tour/game builder but has no historical/cultural context. It has lots of bad user reviews due to functional issues, textbox input, GPS and QR glitches.

## Discovering Egypt


Discovering Egypt is a Webapp, allowing the user to discover Ancient Egypt Pharaohs, pyramids, temples, mummification and the ancient write ups. The main innovation lies in the minigames available like Typewriter and Hieroglyphs and views available for 3D temples to keep children engaged for longer. However, this is not in Pakistan's context and is not a very immersive experience.

## 5. User research method

1. *Online surveys, quantitative only for children and mixed for parents* - To gather widespread opinion and interests of children and parents on specific questions, reaching more people in a time saving, cheap and effective, and also parallel manner while we can continue with other activities, followed by visualization and to test potential correlations using quantitative data analysis.
2. *Individual interviews (semi-structured and unstructured with probing) of parents* - mostly qualitative. Since guiding the interviewee is possible towards more specific topics and it encourages user-developer contacts, also providing us with potential application users for the future.
   Moreover, our user groups of parents and teachers are more likely to come on for individual interviews as well and offer comprehensive responses on open-ended questions to explore problem issues further.
3. *Focus groups* - for children in our target user group to gather their collective in-depth opinions and thoughts on the problem domain, which is more feasible for children compared to individual interviews, and also utilizes a lot more users. This was followed by a controlled experiment in the focus group - to test the potential of the concept of virtual trips using a basic prototype against textual learning from books by dividing a group of children into two such groups and then evaluating their experiences and knowledge obtained.
4. *Expert review (Teachers)* - to understand how different learning methods can be used for this problem space from the experts (teachers) themselves.

## 6. User details

1. Students from grades 4 to 8
2. Parents/Guardians of these students
3. Teachers of these students

The reason for choosing students from grades 4 to 8 is because these are the ages at which interests can develop and students can also effectively understand what is being taught in regards to history. The reason for choosing parents is to get an understanding of the issues that they have with students going on educational/school trips as well as what they hope for the students to learn.
Finally, teachers are chosen to find out the effective methods for approaching this issue.

## 7. Method plan

Two online surveys were conducted, one for children and one for the parents to get quantitative data from primary users. 450 responses were recorded for the children survey,while the parent's survey received 62 responses.

The interviews conducted were that of parents, teachers, and children. 3 in-person teacher interviews were conducted at a local school in Lahore,
Standard Model School, on 09/10/2020. Interviews of experienced teachers were done to get an expert review on the potential solution. The teachers and parents interviews were semi-structured. The children's interviews were also
semi-structured and informal. The teachers were asked to fill a digital consent form prior to recording the interview. The consent form was followed by the interview questions and some general feedback on our problem space and potential solution.

At the start of each Zoom interview, the interviewee was asked for their name, age (or age range) and email address for the consent form. They were also asked if they would allow the interview to be recorded as well as for the permission to share these recordings in public for the purpose of research. Once the consent form was filled, they were asked the respective interview questions, mentioned in the appendix.

All other interviews were conducted via Zoom and WhatsApp between 10/10/2020 and 12/10/2020. Each interviewee was contacted via phone or email that they had provided a response to the parents' survey that they had filled. At most 2 team members were conducting an interview, one person for the task of transcription and the other for asking questions and guiding the interview via follow-up probes. Some interviews were conducted by the members individually, mostly for parents that were not comfortable with having a group call, they only felt comfortable in speaking to their primary reference and/or did not use Zoom frequently, so were more convenient with a one-to-one WhatsApp call. The recording of such interviews was done via the device speaker, thus there were issues in the recording volume and some background noise.

A focus group was also conducted, at a local school in Lahore (Standard Model School) on 09/10/2020, to get direct contextual responses of children to understand the problem better. Students of class 6 and 7 were split and merged equally into two groups of 7 for two separate activities. In the first activity, the students were given a video tour of Lahore Museum. In the second activity, the students were given a write-up on Lahore Museum. The students, in each group, were given a short quiz that was based on their activity. The quiz questions are attached in the appendix.

We did not conduct CI, because we thought that for our particular problem space, a focus group would yield more valuable data and results. In addition to that, it was difficult for us to find a school for conducting the focus group, as the schools

were not giving permission for any in-person activity within the school premises. So we had to choose between conducting CI or focus group keeping in mind which would provide valuable data for our problem space.

# 8. Your Findings/Results

## 8.1. Qualitative Analysis

**Importance of trips**

**Gain Confidence**

*"To get more confidence. To get the skill to interact with other people." [Parent 3]*

When children go on trips, they interact more with their fellow students during the journey and also meet new people and make new friends on the trip. This helps them overcome the fear of initiating conversations and such students become more confident in voicing their opinions on matters and actively participate in class discussions.

*"It gives exposure learning and interactive skills. It also provides confidence." [Parent 7]*

Students who go on trips become more aware of how the world around them works and they learn simple tasks like buying a bus/museum ticket or how to converse with people in a professional manner. Usually, all these tasks are done by parents or guardians, but during a school trip, students get first hand experience which makes them sharper and more confident.

*"They learn things from nature and other circumstances. Feel free to think about it. Built self confidence." [Parent 1]*

Visiting different places in the form of school trips helps students gain more self confidence as they see their peers (who are the same age as them) perform various tasks or engage in activities, and they also want to be a part of what their fellows do and as a result they all learn from each other. Furthermore, visiting new places means that they get a chance to see new things and meet new people, which helps them learn about various cultures and traditions.

**Personality and Social Development**

*"Out of class learning. Social skills. Personality Development." [Parent 1]*

*"I believe kids should be well-equipped with how to develop relations with friends and human relations, to realize the other person's importance and care for them,*

*to feel for them. It is a materialistic school system - you just come and study, they try to make it creative but there is no implementation. More importantly, there is a lack of social development." [Parent 9]*

Trips help students gain more confidence and exposure, which in turn helps develop their personalities as they learn new skills like communication (by meeting new people and making new friends) and teamwork (by performing various group activities). They also learn how to behave in a certain way which helps improve their relationships with their friends and family.

**Gain Exposure**

*"It is an effective and fun way for them to learn about the historical places, monuments and different things and professions of their country" [Parent 4]*

At school, students learn subjects like history, geography, cultures, etc. through books and by studying for exams, but most of the students don't really feel connected to topics that they study in their course books. Trips to historical and cultural places can help them learn about the subjects in a more meaningful way as the images of objects/ monuments stay in their memory longer than the words they read during classes.

*"Currently due to COVID-19 I'm not comfortable but it breaks the monotony of school routine. Kids also learn and remember a lot about the places they visit since teachers always design activities post the trip." [Parent 2]*

Furthermore, students get tired of their same school routine and tend to zone out or become sleepy during classes sometimes. Visiting the places or seeing the objects they read about in their books can greatly help the students with their learning as they get to try something different (new in their routine) and feel more energetic to learn about things outside their classroom. Moreover, the activities that the teachers design after the trip keep students more engaged and they actively participate in the tasks/quizzes etc, which ensures learning.

*"It helps children develop soft skills. Learning by doing/experience based learning also tends to enhance retention." [Parent 4]*

Seeing new places/objects and learning about them through an informative and entertaining tour can really help students grasp concepts more effectively and they tend to remember what they see more due to visualisation as compared to reading about them from course books.

*"Bookish memory is short compared to what you experience, you retain more." [Parent 6]*

*"There are lots of variations in learning with books, sometimes kids understand the context, sometimes not and so revert to rote learning." [Parent 7]*

Moreover, parents have claimed *that* learning through visualization is more effective and long lasting as compared to memorizing content or rote learning from books. This is true in the common case as learning varies in children, this variation causes some children to be directly comfortable with understanding concepts from textbooks while others require further reinforcement and when they are unable to understand they revert to rote learning of facts for the graded tasks. Consequently, they are likely to lose interest in the topic as a whole and also retain less, compared to something they might experience in life.

**Teacher perspectives**

*"Trips are important for students as they lead to a routine change" [Teacher 1]*

Students normally attend school, go home, do their homework and occasionally go out with their families and friends. School trips would therefore be a good change in their daily routine and they would get to experience something new and different.

*"For trips, museums and labs would be good options for students. This is because children are better at being able to remember what they experience." [Teacher 2]*

*"Trips to historical landmarks would indeed be very interesting for children and they would learn a lot about them from the trips. They will be able to retain more information compared to reading about it in class. Trips would be quite beneficial for students and especially for their mental health." [Teacher 3]*

Trips to historical places and museums would give students a chance to see the objects and monuments they read about in history lessons and would help them learn about various civilizations and empires.

*"Educational trips are very informative for students. Even at montessori level, children are taught through materials. The classical method of ABCD has ended now and instead the focus has shifted to material work. These encourage children to use all their senses and thus learn more. The same logic works for field trips as students use all their senses and attain a better understanding. On the other hand, to understand something via books, it requires a deep reading. On trips, students use their observation to perceive more information and also retain it for a longer time period. These are especially important in this era because children these days are very active and possess a high learning capacity." [Teacher4]*

Observation and imagery greatly help students understand concepts. Even at the kindergarten level, students are taught counting and mathematical tables with the help of an abacus. Children should be given physical experience of things that they read about in the books. Children tend to engage all their five senses at the same time to learn and interact on educational trips. Children, today, are active and interactive and have an eagerness to learn new things, so providing them with opportunities to physically experience what they learn in readings, will be beneficial for them.

*“Real world examples and experiences help children visualize things more efficiently. The trips are fun and students learn more from going on field trips. They learn from the environment, they ask questions from the experts and by asking questions, they learn new stuff. Class-based learning can only teach them enough. With trips, they get to have first hand experience of the stuff.” [Teacher 5]*

*“Trips lead to better learning and also a routine change which is good for the students. Compared to classes, going on a trip is more interactive for the students. Before going on trips, inform students about the location and its relevance. Show documentaries before the trip as well. At the trip location, discussions will be key to better understanding. ”- [Teacher 6]*

First hand experience in the form of trips provides details about objects/places that books usually don’t cover. For example, reading about the Wazir Khan mosque and seeing pictures in a book is very different from seeing the place in person. In person or through a video, we can actually see the fresco work and the paintings in the niches. Classical form of learning is limited to an extent that children can only learn enough. They can memorize dates, remember pictures or quotes, but they would still not be able to get deep knowledge of the concepts and importance of the place or thing. The change of routine from the daily classical form of learning is also a major benefit of trips. It excites the students about the same thing that they might find boring in class. When going on trips the students must be given a brief introduction of the place and relevance should be created about the place to make the students interested in the trip.

**Making educational trips more engaging**

*“Kids today are sharp; they require something new every time. It is hard to predict what they want. When they have visited a place, they ask what’s next?” [Parent 4]*

*“A tour guide is a must, along with informatory videos to tell the complete historical background for a trip. There are 360 videos, vlogs right now, animated videos and all of these are very visually attractive. There should be a narration of detailed stories of not just significant figures but also tales of Pakistan’s unsung heroes, that were forgotten, belonging to minor casts etc.” [Parent 7]*

*“We did have a VR tour showcasing how Pakistan was formed. The kids found it very interesting, they believed they were part of the struggle in the events, watching the sacrifices made for Pakistan.” [Parent 8]*

An excellent tour should include tour guides who tell background stories about the places/monuments and the people who originally resided or worked in those places or owned those objects. This way students will be able to remember details of what they read in their history books and would gain more knowledge about their culture, traditions and important personalities. Furthermore, they would take more interest in their country's heritage and heroes and be more aware of the significance of what they read. There are a number of ways to make a trip

engaging for the students. Some of them include: providing brief information about a place, showing documentaries, vlogs, animated videos and more. These help the students to get excited about a place before they visit it and also helps them develop references from what they read and what they see, when on trips. The kids nowadays are sharp and eager to learn. They want to learn exciting facts and figures. They tend not to stop on one thing rather engage themselves into multiple things at the same time. On trips, they take interest in finding out about the place and its history.

*"It is important to go together as a family, have children play together and enjoy food along the way to make it more engaging." [Parent 8]*

Everyone is busy with their own life engagements and work these days and sometimes it becomes really hard for families to plan trips and outings together, and spend some quality time with each other. Going on trips will be a very constructive solution to this issue.

*"I believe trips at this age should help children visualize their subjects better, for example, the topics they study even in science or depictions from their Urdu story books should be shown in real life." [Parent 6]*

The kids should be able to visualize what they read. Trips provide an opportunity for them to see, first hand, what they have read or seen only in books. Trips to scientific laboratories, to cultural plays etc, helps them to understand and engage in the subject with more interest and excitement.

**Making learning more engaging for children**

*"We can use storytelling to improve interest (of students)." [Teacher 1]*

Students sometimes become mentally exhausted when they have to constantly learn and memorize information related to new topics. Storytelling can be used to keep them more engaged and enhance their interest in the topics that would otherwise become boring, as stories involve new characters and journeys which help children learn through imagination rather than memorizing.

*"Students remember whatever they directly experience. As an example, since I'm a science teacher, we had a science-based activity in class where we had students taste various types of foods. The children still remember the details from that activity to this day." [Teacher 2]*

Experience and activities are a better way of learning as compared to reading. For example, reading about scientific experiments can never be as good as actually performing them in a lab setting or seeing a video of someone else performing them. Simple text or images can't explain the concepts fully.

*"Classical lecture methods are not very engaging for students. Active learning, on the other hand, is more fruitful. Students are more responsive and their*

*performance improves. Even students who are usually slow-learners give a better response and are more engaged in active learning methods. Lectures, on the other hand, are boring and lead to students not reaching their potentials. Besides that, active learning consists of multiple methodologies and those lead to better improvement, engagement and the teacher is also able to get an encouraging response from the students. This shows the teacher that their efforts are not wasted." [Teacher 4]*

*"Classical learning is limited to an extent. Interactive learning, on the other hand, is important as activity-based methods works better than classical methods"- [Teacher 5]*

The readings in coursebooks provide a limited amount of information about a particular topic whereas in activity-based learning, the topics can be shaped according to the needs and requirements of the students. There are a number of key benefits of active learning which are missing in classical based learning.
Active learning makes the children more responsive and interactive thereby improving their educational performances. Interactivity in education enables slow learners to also actively take part in the discussion and activities. The benefits are not just limited for the students, the teachers can also look at the interactivity of the kids and their eagerness to learn, showing that their efforts are not wasted and that the students are learning what they are being taught.

*"Comparatively, students engage more in active learning because they get an equal chance to interact with other students, engage with them and openly discuss with their teacher." [Teacher 6]*

During normal classes, a few students participate in class, give their opinions on the topic being discussed, ask and answer questions. A lot of students feel shy and don't possess the confidence to speak in front of the whole class.
Activity-based learning can help students overcome their fear of speaking and lack of confidence as all the students will have to participate (equally). And when the students will see their more confident peers perform an activity, they would be able to learn from them and also take part in it alongside their peers (e.g in a lab experiment, students learn from each other's good work as well as mistakes).

However, there were also a lot of teachers who claimed that they have never heard of any such teaching modes and active or interactive learning. They only grasped the term until it was explained by us during interviews.

*"We did not go into such teaching modes. There was no such training to make classrooms more engaging using something like active learning." [Parent 9]*

A specific parent, a teacher by profession, said she had not received any such training to adopt this sort of learning involving peer reviews, visualization through multi-media and case study discussions in class. Most of them had only been trained on lecture-centered, traditional methods. It shows that there is a

lack of awareness and training about active learning methods in Pakistan's school system.

**Examples of active learning techniques being employed in classrooms**

*"We use videos in classrooms and virtual classrooms. Videos played in virtual classrooms are usually motivating and encouraging for students. Interactive classes are also very beneficial and engaging for students. These are specially useful and fruitful for language based classes. In these, we invite students from different countries to converse with each other and share words. This leads to a huge improvement in language. In terms of history, the most beneficial of our class is video classes where we show videos about the topic to students. They are able to perceive more in these compared to book reading which not only are boring, but also are difficult for students to interpret and understand. Finally, drawing on boards or using pictorial methods are quite beneficial to understanding as well.*
*These also lead to a better mental model for the students"- [Teacher 4]*

Through virtual classrooms and videos, students can not only meet new people, interact with each other and gain confidence, but they can also learn more about the cultures and traditions of various countries. This helps enhance the personalities of students and makes them more sharp and they know how to converse with different kinds of people. Furthermore, imagery in the form of videos, pictures and labelled diagrams can help the students grasp concepts in a better way through visualisation.

*"I use an app which takes surveys about multiple subjects from students. This app keeps the identity anonymous which helps introvert students as they do not fear their information being disclosed." [Teacher 5]*

Some students refrain from speaking in class or participating in discussions as they fear that other students might judge their language, pronunciation or points of view and form opinions about their personalities and mindsets. Apps can help solve this problem through the option of anonymity and students can freely provide their opinions without any fear of being judged.

*"Open discussions, role play, brainstorming, mind mapping." [Teacher 6]*

Role play is another way of ensuring learning of subjects as students tend to remember stories more if they play a character and learn about the character's journey through performance, rather than just reading about it. For example, we remember the dialogues of Harry Potter more through the movies than the books. The reason is that after watching the movie we automatically imagine Daniel Radcliffe whenever we think about Harry and remember the exact scenes from the movie. However, those who haven't watched the movie will have to create their own image of the character in their mind. Similarly, we remember the stories and dialogues of the plays we see or perform in school more than we remember the plays or books we read.

*"The traditional method has been changed,it is necessary to leave rote learning behind. The second method (interactive learning) is better. Take a brief quiz, keep the class engaged by discussions, call them by their names and check their participation - this involves children more in learning."* [Parent 8]

There are a number of methods to incorporate active learning in the class. Some of them include taking small quizzes, positive and interactive discussions and at times include cold calls. These methods make the children get more involved in the learning process in class. Traditional methods restrict the amount of learning to just books and lectures, whereas active learning techniques being used in the classrooms are changing the way children are learning in class.

**Developing interests of students in history and culture**

*"(Students are) More interested in science rather than history. However, trips to museums and monuments will be beneficial in improving their interest. Compared to our childhood days, kids today don't have much of an interest in history and culture. However, they should take interest in it and these trips do help them in developing this interest" [Teacher 2]*

*"Students find history a little boring compared to other subjects. However, trips to museums and landmarks can help rectify this and develop their interest towards this. Students being able to see and experience, for example, old money notes would be more interesting for them and will lead to better engagement. Being able to virtually examine these would also be helpful as they would be able to view these from home as well as in school." [Teacher 3]*

*"History and Culture are usually very dry subjects and thus there are only a few students who develop interest in these. Therefore, if active learning or trips are used to teach these subjects, then they are able to learn more swiftly and are able to understand more as well." [Teacher 4]*

*"50/50 involvment. There is a lack of effort put towards encouraging history and culture in Pakistan. Experiencing these in early life will be beneficial for children. One finds their identity through history and culture" [Teacher 5]*

Trips can make boring subjects like history and geography more interesting. At school students usually like science subjects as they get to perform or see experiments in their school labs. But subjects like history are often considered to be dull even though a lot of children like watching historical movies (e.g. Troy, Outlaw King, Bajirao Mastani, Mohenjo Daro, etc). So the subjects could be made more interesting through storytelling and trips. This way the students would no longer find subjects like History and geography boring and would be able to remember all the details from their topics without having to memorize them.
Rote learning and memorizing dates of historical events, seeing pictures and just text on culture does not help in developing interest of students in these subjects. Students find it difficult to remember dates and thus move away from liking history related subjects. On the other hand, science labs in school provide good

physical experience to kids thus they prefer to take interest in science. Therefore, trips to historical and cultural sites have become a necessity for students, nowadays.

*"I allow them 1-2 hours to play games but for educational learning apps, definitely, I would permit them 2-3 hours or more time." [Parent 7]*

These days, parents can't really keep their children from using mobile apps/ playing games, but if these games involved an educational aspect, then the parents would also be satisfied as their children would learn something from the apps rather than playing some meaningless games. Additionally, the children would also get to play something new, which would be both entertaining and informative.

**Lack of educational school trips**

*"There are not enough trips at the school level as much as they are required. Kids forget their Grade 1 or 2 trips. Trips are not so necessary at this young stage, they do not have a vision built for it. There should be more trips at my daughter's age of 5, which is a developing age, they are able to understand the significance of these places and the context better. Parents have to take responsibility when schools do not indulge." [Parent 4]*

Most of the parents we interviewed expressed the same concern that there are not enough educational school trips happening nowadays. For the trips that do happen, most of them claimed that the last trip their children had gone to were family trips and even the educational ones. Most of the school trips had occurred when their children were younger, in grades 1 or 2. When we inquired their children if they recalled anything from that trip, they were unable to answer as well. Another important issue is that children are not being taken on educational field trips by schools at later ages or grades , when they reach more maturity and are able to grasp the context of these historical places better. Consequently, parents have to take responsibility. Another issue expressed is that when schools do take them on trips later, these are recreational trips for social interaction and not educational.

"There are more recreational trips nowadays than educational trips. The last time they went out with their school, it was to the play area of the Emporium Shopping Mall." *[Parent 4]*

Students really need to go on trips other than family outings and recreational trips with friends. They need the trips to teach them something related to the subjects they are studying at school. Educational trips should therefore be arranged by school more instead of fun trips as students usually go on such entertaining trips with friends and families and not educational ones.

**Physical trips are better than virtual trips**

*"Going out is a breath of fresh air and leads to physical activity and live interactions. When my children went to the seaside, they would touch and bring back seashells home as souvenirs, they would feel the waves of the ocean and make houses in the sand." [Parent 8]*

Visiting various places that the students have never been to before can be really beneficial for their physical well being as they will see new things and learn more about the outside world. It would also be a fresh new change in their usual routine.

*"It is important to appreciate God's blessings, the atmosphere, the landscapes, the fruits in natural environments created by Him." [Parent 8]*

Another reason for students to go on educational trips is that they need to see the beauty created by the Creator and they need to appreciate what they have been blessed with so they know how to take care of it (e.g trees and rivers etc). They should know more about their ecosystem and how to preserve it and reverse the harm done to it by society and how not to cause further harm to it.

*"It could be a good option if a physical trip is not feasible, but I would still prefer they go on field trips as leaving the class environment decreases stress, it is more fun, you absorb more, interact more and have a more immersive experience.*
*Meanwhile, indoors virtual learning does not have a positive effect on physical and mental relaxation." [Parent 5]*

*"I work within the textile field and I believe it is necessary to take them out on such trips. Concepts are not clear until children visualize them - they should watch these machines printing and testing fabric from a given design motif. Understand how it is supplied etc. It is necessary to watch these things in the field to understand them." [Parent 9]*

Some parents and teachers believe that students need outdoor activities in order to sharpen their mind and be part of a healthy lifestyle. Studying in class or watching videos or going on virtual trips are all indoor activities which would give exposure and confidence to children only to a limited extent. What children really need are in person trips and activities where they can physically interact with other people, meet new people and make new friends and be face to face while conversing with them. This would not only be beneficial for their physique but also for their mental health and wellbeing. Furthermore, the students need to see objects and places with their own eyes rather than the lens of the camera, and they need to touch what they see in order to know more about the materials and functions of objects.

**Supervision in trips**

*"Definitely I would want to be a part of their trips, since I have studied architecture, I can guide them better. I would want to teach them that." [Parent 5]*

Some parents believe they can be a better guide than actual tour guides. School trips usually have tour guides or teachers who explain the significance of the places that the students visit during the trips, but parents can also be given the opportunity to go on the trips with their children (one parent or guardian with each student). This way the parents would be able to transfer their own knowledge about various subjects to students and they would also not worry about their child's safety.

*"No, I would never go on school trips with them. The kids should have their freedom, they should know of their good and bad and since they have to spend their life alone, they must learn to go on such ventures alone." [Parent 1]*

*"As long as the content of an educational application is verified safe and reliable for learning by me initially, I will leave them to use it independently without any supervision." [Parent 7]*

On the other hand, some parents think children should be left independent. Some parents also believe that children should be allowed to go on school trips on their own so they can get some exposure, that they won't be able to if the parents go with them. They want their children to learn how to be independent and do things without their assistance, provided that the trips are safe andsecure.

## 8.2. Focus Group

In the first focus group activity, all 7 students said that they played video games on mobiles and 6 students told that they used mobile for games for less than 2 hours per day.

When asked when and where they last went on a trip. Almost 70% kids stated that they visited a cultural or historic place e.g Faisal Masjid and Badshahi Masjid showing that the students will be interested in using our app because of its cultural prospect. 6 out of 7 students stated that they had visited these places one or more years ago portraying how important it is to have an app dedicated to virtual trips.

The focus of this activity was to see their understanding of culture and history. A write up was provided to the children. The write up had a short text on Lahore Museum and pictures of some artifacts present in the Museum. The students were asked to read the write up and retain as much information that they can for a quiz based on the same write up. During the reading, most of the students were not able to understand the meanings of some words and at the same time found it

hard to visualize the artifacts by just the name. The students kept on asking the meanings of several words due to which one of the moderators had to read the write up loudly to the students and explain it in depth. They were finding it difficult to understand the text in English. After they had read the write up, a quiz was conducted based on the content of the write up. The students were shown five pictures and were asked to identify them.

The quiz results of the quiz showed that only 4 out of 7 students got the highest marks, 2 out of 5. The other 3 students scored 1 mark each. The results show that the students found it difficult to read and retain the information and hence found it difficult to score a good score even when they were given a quiz immediately after reading the text.

Overall this focus group activity showed that there is a need and interest to use an app that can take them on virtual tours so this served as a great basic prototype. The activity also showed that there was a definite language barrier in schools. The students were limited by the language of the write up to understand the exact meaning of the content. The students' responses showed that they had interest in culture and history. Most of them said they enjoyed the tour and later asked on how it was created. Similarly, the last trip most of them had been to was one or more years ago, showing that a virtual trip application can be beneficial for them since all of them use mobile phones to use apps and play games.

In the second focus group activity, 6 out of 7 kids had gone on an educational trip but with family only. Only one child had gone to a museum an year ago and that was not based in Lahore, his area of residence, but Rawalpindi. 6 kids had gone to historical places and monuments specifically Badshahi Mosque and Minar e Pakistan. They did remember some basic historical facts about them like when it was constructed. We found out that these children had gone on recreational trips mostly, northern areas and shopping malls. All of them owned or were allowed to use phones for online education and gaming, and proclaimed unrestricted daily usage. The present children of this class had English as their favorite subject and not Social Studies or Science. When asked for preference over the latter two, they preferred Social Studies more, and specifically remembered incidents of warfare and emperors that fought in them in ancient history.

For evaluation after the Lahore Museum virtual Google Earth Street View tour, every child remembered the name of the place, and when we asked what they remembered from the virtual tour they remembered everything, recalling the statues first then the paintings, and finally the names and legends of each at the end upon some probing. However, some of the children were repeating along with the others and on individual questioning forgot the names of the artifacts only a moment later. During the discussion they further confused names of some artifacts with those they had learned from textbooks. Some children only retained more information about the things they personally liked, for example, traditional weapons - swords and cannons. Conversely, when we gave them clues

about an artifact using the direction we turned in the tour and of other artifacts in the room, they were able to remember it. “What central object did you see when we turned left after the first artifact and saw between the cannon statue and weapon cases?” and their answer was “Queen Victoria” correctly. Moreover, they were able to recall the exact order of discovery of the artifacts upon asking.

## 8.3. Surveys


*Fig 8.3.1. A word cloud showing the places children wish to go to on a trip*

The first survey, that of children, involved 450 students to evaluate their responses on trips that they have been to or would like to go. It also provides statistics of a short quiz that the students took as part of this survey. Of the 450 respondents, 93.8% were female and 6.2% were male as shown in Appendix (Fig 4.1). The students belonged to five different classes: below class 5, class 5, class 6, class 7 and class 8 shown in Fig 8.3.2. There is an even split of respondents being from class 7 and class 8. In the survey, the focus was to determine whether students have been or wish to go on trips. The results also show that 72.4% of students use mobile phones to use apps or watch online videos which means that there are roughly 72% potential users of our app, Appendix (Fig 4.2). Similarly, 77.1% of students have gone on school or family trips, Appendix (Fig 4.3). The students tend to prefer Northern Areas, specifically Mountains, Museums and Historical Places(Mosques, Forts, Shrines etc) as their preferable destinations for trips, Fig 8.3.3.

The quiz findings show that almost 50% of the students were successful in answering at least 4 out of 6 answers correctly, Appendix (Fig 4.10 - Fig 4.13).

The quiz mean was 3.13 out of 6 for the children, of class 6 to 8 mostly, in a simple history and culture driven quiz like this. This highlights that the children do study history and culture in class but they find it difficult to retain the information. At least 50% students successfully answered the questions related to their history and culture.

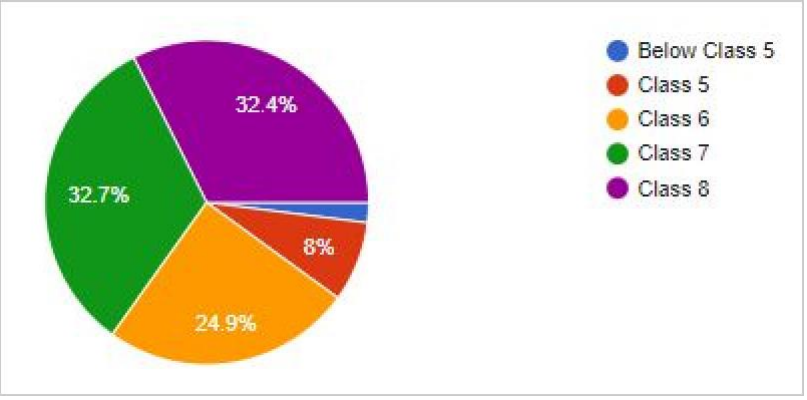



*Fig 8.3.2. Children Grade*

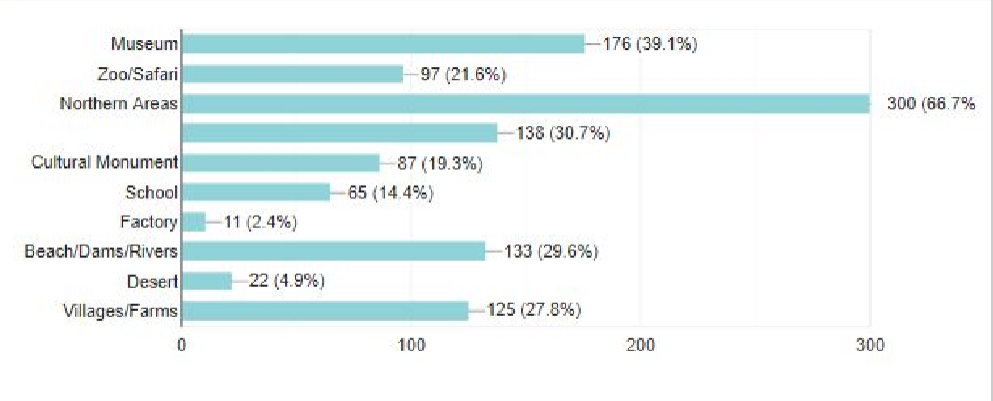



*Fig 8.3.3. Where would children like to go for trips*

The second survey, that of the parents, involving 62 parents, to evaluate their opinions of their children's trips. Of the 62 respondents, 44 were female and 18 were male, Appendix Fig 5.1. The location demographics of the parents shows that almost 63% are from Sindh while 31% are from Punjab and the rest from Islamabad, KPK and Azad Jammu and Kashmir, Appendix Fig 5.2.

When asked whether they would or would not allow their children to go on school or educational trips, 91.9% of them responded with a Yes, while 8.1% said No, Appendix Fig 5.3. Also, 29% of the parents picked security concerns as the reason for not allowing their children to go on trips shown in Fig 8.3.5. Those who said “Yes”, stated that increased confidence and interaction with other kids was the driving factor for them to allow their kids to go on school trips.

Interestingly, like the students' responses in the previous survey to the same question, most of the parents prefer Northern Areas, specifically Mountains, Museums and Historical Places(Mosques, Forts, Shrines etc) as the preferable trip destinations for their children, implying that both children and parents prefer cultural and historical sites as the second most popular option for trips for themselves and their kids respectively.. However, 65% of the parents stated that it has been over a year that their children last went on such a school/educational trip (Fig 8.3.6).

The findings also show that 88.7%, Appendix Fig 5.4, of the parents allow their children to use apps on mobile phones and 71.2%, Fig 8.3.7, of the parents allowed mobile usage for less than 2 hours. However, almost 92% of them said they would prefer mobile usage for apps if the apps were made for educational purposes, Appendix Fig 5.5. Since 92% of the parents agree with letting the app be used for educational purposes, it means that our app would be usable by a majority of the user base without external issues.

Conclusively, 87.1% of the parents said that they would allow their children to go on virtual trips, Appendix Fig 5.6.

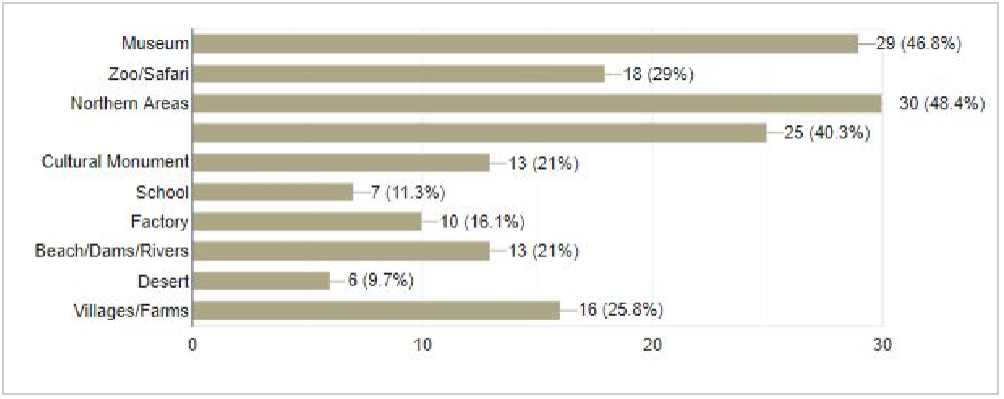



*Fig 8.3.4. Where would parents like children like to go for trips*

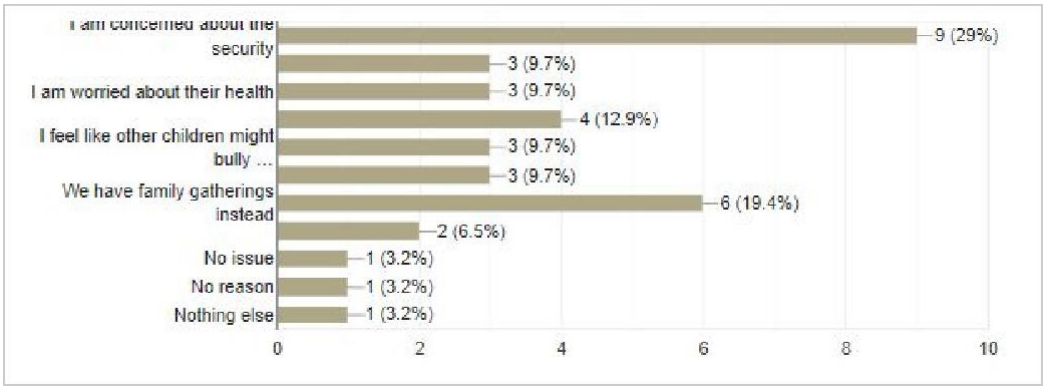



*Fig 8.3.5. Reasons for not allowing children to go on trips*

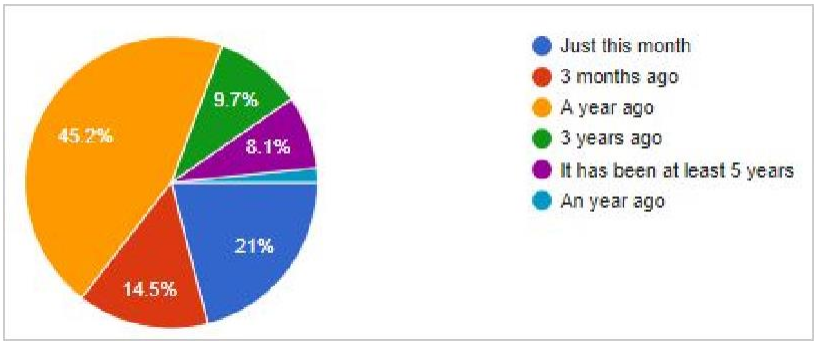



*Fig 8.3.6. Time passed since last trip*

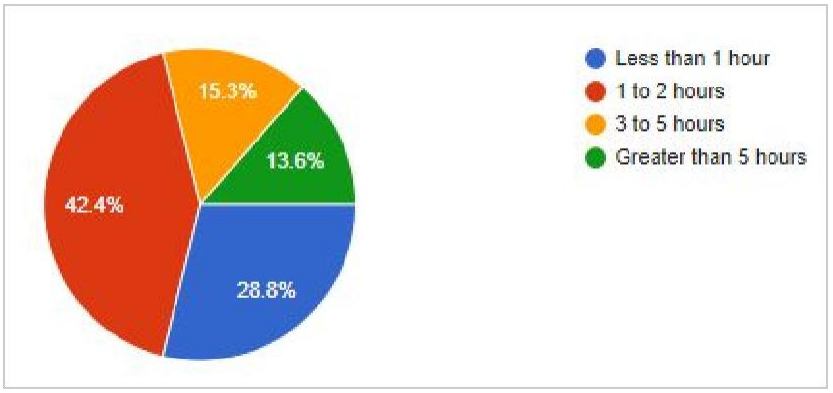



*Fig 8.3.7. Time allowed to kids for using mobile for recreation*

## 8.4. Limitations

1. For our parents and children surveys, the ratio of males to females is very low. The female to male ratio in children survey is 94% to 6%.
2. The students in our focus groups were all male.
3. The video for the focus group tour had more images of the museum objects as compared to the excerpt. However, that is a bias that is generally present in our history books (there are less images related to the objects and places mentioned).
4. The schools whose students filled out our surveys majorly belonged to certain schools in Karachi like SMB Fatima Jinnah Government Girls School, and Khatoon-e-Pakistan Government Girls School, so our results couldn't be generalized to the whole Pakistani population as we used convenience sampling.
5. Due to the pandemic we couldn't employ the contextual inquiry method properly and our interviews were also impacted to some extent due to the Zoom meetings.

# 9. Needs and desires

## Needs

- **Story-based learning**
  Young school-going children report getting fed up while studying due to the dryness of concepts and the monotonous nature of classes. Our user therefore prefers story-based learning- it would help them connect with the content by maintaining their curiosity with respect to how the “story” in the curriculum unfolds. By getting them invested in the course material, learning can be maximized.

- **Interactions**
  Children today are growing up in a world where technology has been accessible to them from the start; they are quicker and smarter.
  Therefore, by the time they reach elementary school, sitting at a desk passively copying figures from a chalkboard is not playing to their strengths as students. Their parents also want the learning process to be interactive, to stimulate active learning as much as possible. This kind of learning inspires young minds, also keeping the teacher-student relationship vital. The user needs something interactive to keep their pace with the constantly advancing world.

- **Visualization**
  One of the major drawbacks of passive learning is the lack of visual representation of concepts. It is not feasible in the long run to make primary school students, with their sharp minds and creative instincts, sit at the table and read about novel concepts. They would benefit more, in terms of learning outcomes as well as encouraging creativity essential as an adult, to visualize what they study and have as much of a first-hand experience as possible.

- **Education**
  In these unprecedented times of a global pandemic, online classes are even less fruitful than the usual school experience. In an attempt to use the methods of teaching in-person classes for the online setup, the quality of learning has been vastly overlooked, which has caused it to decline exponentially. The gap between students and teachers has further increased, often leading to demotivation and lack of interest. Parents are worried about the education of their children, and rightfully so. They believe a tailored platform for their kids’ education is essential. In addition, a majority of parents would be willing to give devices to their children if an education-based learning application is being used.

- **History, Science and Culture**

  Our user wants to learn more about the history of different regions of Pakistan, the science behind the rotation of the sun, and the cultural roots of their forefathers. Learning about history and culture is imperative because it allows us to understand our past, which in turns allows us to better interpret our present. It could provide us with the information we are less familiar with, which could increase cross-cultural awareness and understanding. Similarly, according to some of our students, science was their favorite subject and most of them wanted to learn more about it to better understand nature.

- **Active Learning**

  Our users want a platform that exercises active learning, engages students through different learning activities and imparts skills that would aid in problem solving. Furthermore, most of the parents we interviewed wanted their kids to learn via activities that kept them engaged rather than simply sitting in a classroom and listening passively. We realize how important active learning is, especially for the school going students. It helps in promoting deeper understanding of concepts, as well as imparting the very valuable skill of critical thought.

- **Pakistan context**

  In an international landscape where Western influences seep into cultures all over the world, Pakistan is no exception. Most of our knowledge, our understanding of themes ranging from politics to entertainment, are a reflection of American paradigms and Western contexts. In order to preserve our culture and impart a sense of individualism in our citizens, it is essential to expose them to topics in a Pakistani, or at least, South Asian context. It would be most effective if this starts from the grass-root level, such as the elementary and secondary schools of the country.

- **Exposure**

  In a global society where increased awareness about global and local issues and news is preferred, Pakistani school-going children can be considered living in a bubble, sheltered from the extra-curricular hordes of knowledge that would not only groom them but also prove useful once they enter the competitive professional sphere years down the line.

  Parents, too, prefer a learning environment that would expose their children to culture, science, and history among many other disciplines.

- **Parental supervision and involvement**

  When engaging in any activity, parents consider proper supervision of their children a primary factor; an environment that ensures the safety of the students and gives it the utmost importance. They like being informed and kept in the loop when any activities of this kind are taking place.

- **Long term memory of trips**
  When asked about any memories from school trips, students of first and second grade scarcely recalled anything. However, developing students of the fifth grade ended up recalling several details. This indicates an appropriate age-group who should be engaged in trips, since their retention rates are higher. The parents too wanted school trip activities to be more engaging so the experience can be retained in their children's long term memories for longer.

- **Physical activity**
  In present times, increased screen-time and social isolation due to the pandemic have limited the already minimal physical activity of school-going children. This has also affected their learning capacities.
  Both parents and teachers, therefore, want some form of activity or exercise to be incorporated into the children's everyday schedule. This is also one of the core reasons why physical trips are preferred and encouraged, since they make use of active learning paired with physical exertion on the students' part.

- **Guidance**
  In order to ensure that a student's learning outcomes are being achieved, it is important to supervise them and keep their parents in the loop as well. The parents we interviewed also shared the same sentiments; they are looking for an efficient mechanism that would guide them to support and take part in their child's learning process.

- **More educational field trips in schools**
  Parents want more educational field trips for their kids, which they believe could enhance their critical thinking and problem solving skills. This has made us consider an educational trip travel agency for children as an alternate design solution.

## Desires

- **Tour Guide**
  The purpose of school trips is to educate students about the various aspects of science, history and culture. However, this essence is lost today where the focus of trips is confined only to entertainment, often due to lack of knowledge- children are rarely encouraged to ask questions and engage with what they are being taught. According to our users, the introduction of a Tour Guide would largely improve the experience since they would be able to explain significant details and answer any questions the children may ask.

- **Gamification**
  Since our users are from a younger demographic, their inclination lies towards games and similar activities; most of our interviewees were avid players of PUBG and other games of the sort. They suggested if games could somehow be incorporated with education, learning could be maximized. Along with the aspect of enjoyment, gamification could also help engage the users to learn about the subjects they are interested in. Group-based projects and team-building can also be encouraged by introducing multiplayer team games, where students learn to cooperate and collaborate.

- **AR/VR**
  21st century school-going kids, growing up in the technology rich environment of today, want to visualize the concepts they are learning about. They suggest that AR/VR is an advanced way to teach with added benefits. Most importantly, in our context, this is a great alternative for a more immersive experience; virtual trips could also be organized, especially given the COVID-19 situation where children are quarantined at home.

- **Music**
  Students have distinct ways of learning and retaining information. For many of our users, background music helped them focus while studying. It is also known to help improve cognitive and motor skills. Our users would prefer if given the option to listen to music simultaneously, while studying.

- **Cartoons**
  Since our users are regular consumers of cartoons, their parents also think that cartoons or animated characters could be a good way of incorporating learning into their daily lives as they will be able to relate with the content and actively partake in the process.

- **3D**
  Studying concepts through 3D learning can boost immersion and have the kids learn with efficiency while also providing them with satisfaction. For our user, it would be a great idea to somehow incorporate a 3D environment and learning activities.

- **360° Videos**
  The 360° videos available on Facebook really fascinate our users,and they wish for there to be a platform which displays the 360° videos of Pakistani Monuments and cultural heritage. This way, staying at home due to any constraints would not be a hindrance to their learning process and include more immersive engagement .

- **Roleplay**
  Most of the children we interviewed in our focus group claimed they played PUBG and other RPG application games, and they show more willingness to use a platform that involves role-play setting so they could imagine themselves as a part of it

- **Speech interaction**
  As it can be seen in the literature review, interaction through speech is a major factor in boosting learning using voice commands and responsive feedback to voice cues. This would result in increased engagement, consequently leading to improved learning outcomes.

- **Stories of forgotten heroes**
  Many parents are of the opinion that their children are not informed about the great minds of Pakistan, people who have made great advances in the fields of science and technology especially. If told about the inspiring stories of many such forgotten figures, it would give the children someone to look up to, providing a boost of motivation.

## 10. New and Final problem statement + Description

Advancements in knowledge have also led to the progression in how individuals attain this knowledge. The emphasis has shifted towards creative and critical thinking. The modern approach is more learner-centered and consists of activity-based learning. The active participation and consistent engagement of
the learner is encouraged which promotes critical thinking. One method of active learning that can be used to instill critical thinking is taking children on educational field trips.

Children are not going / being taken on educational trips enough by schools and parents. They are confined at home due to the COVID-19 situation currently.
There is also a lack of awareness of digital mediums which provide these opportunities virtually as well as the fact that even if people are aware of such mediums, they rarely make use of them.

Moreover, parents and children, both are not aware of the platforms related to the problem space. Kids already have technological devices available at their home and are regular users of it. Moreover, children are interested in history and culture and have a spark to learn more about it. However, the methods used to teach about history and culture are lacklustre. Students do not develop any interest from studying history through textbooks and are instead bored by it.
This is because they are not provided with real life experiences for the respective

subject. They are taken on recreational trips but the number of trips taken to historical and cultural places are quite less in comparison. The focus behind most of the trips is fun and excitement rather than education.

When educational field trips do occur, it is when children are too young to understand the context and do not retain anything. The focus should be to take trips at an age where they can understand and interact with the environment. It becomes the responsibility of their families to do so, who are bound by time constraints and too busy to do so regularly. Additionally, there are minimum efforts made to make trips engaging and interactive.

Unexpectedly, there is also a strong language barrier in Pakistan, in gaining education from these trips or understanding any historical context at all.
Initially, we considered it to be a first world problem, but with the focus group conducted, we found that even students of grade 6 and 7 find it extremely difficult to read a text passage in simple English.

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# 12. Appendix

**1- Consent form**

**CONSENT**

I hereby give consent…

…to use my video recordings/Pictures foreducational/research purposes ( ) YES ( ) NO

…to publicize pictures from my recordings inwritten papers ( ) YES ( ) NO

**Date:** ……. - …. - 2020

**Gender:** Male/Female

**Name:** ……

**Age:** ……

**Email:** ……

**Signature:** ……

**2- Interview Questions for Parents**

Q1. Are you a housewife or do you have a job? (in case of a mother) What is your profession? Q2. How old are your children? In what grade/class are they?

Q3. Have you taken your children on an educational trip (museum/historical/monumental place)? When did you last take your children on a trip? What are all the places have you taken them to?

Q4. Would you like your children to go on a school trip? Where would you like them to visit?

Q5. What would you want your children to learn from it? How would you like it to be engaging?

Q6. If it was possible to tour certain places virtually for both educational and entertainment given that they cannot go on physical trips right now, would you allow your children to do so? Reasoning.

Q7. Have you gone on trips with your children? Would you like to be involved in a virtual trip?

Q8. Do you allow your children to use apps on mobile phones? How long do you allow them to? Would you allow it if the apps were made for educational purposes?

Q9. Would you want to supervise/oversee them or leave them to their own device if they were using such an educational app?

Q10. Have you heard about these technologies? Google Earths, Virtual Earth, VR, AR

**3- Interview Questions for Teachers**

Q1. What are your opinions on classical/lecture-centered learning vs active learning methods?

Q2. Any new techniques being used in classrooms to engage the students and which may have resulted in better understanding for students?

Q3. What would you want your students to learn from trips? How would you make it more engaging?

Q4. Would you prefer taking the students on educational trips instead of only class based learning? Why?

Q5. Do they like history and culture? If not, how can you make students more interested about history, science and culture?

**4 - Figures for Children Surveys**

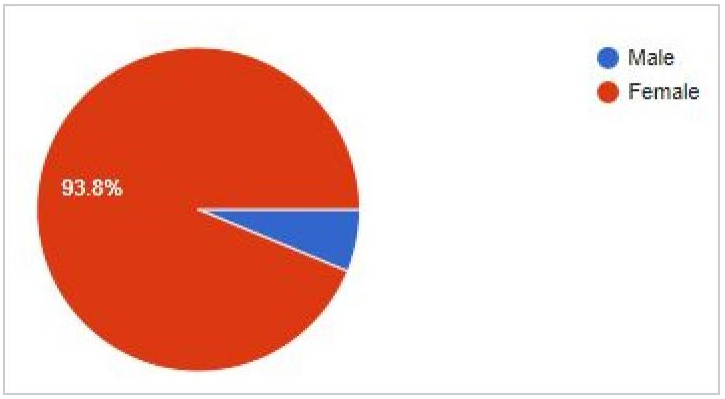


*Fig 4.1. Children Gender*

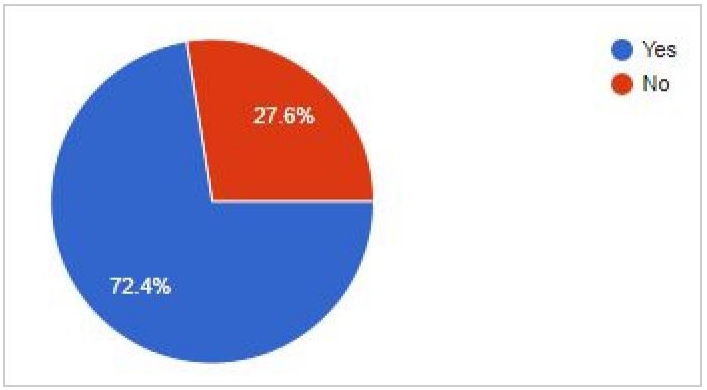


*Fig 4.2. Play video games or watch videos on mobiles*

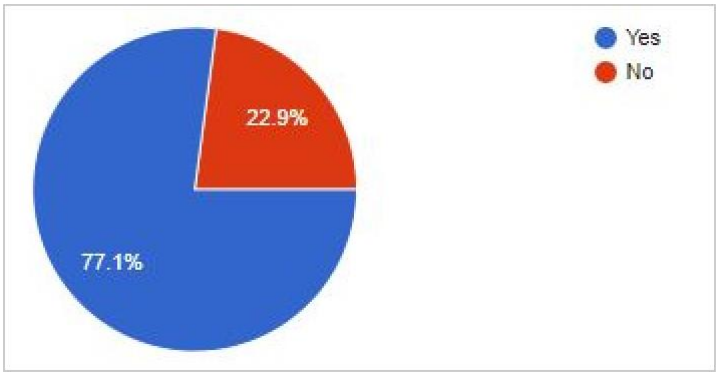


*Fig 4.3. Gone on school/family trip*

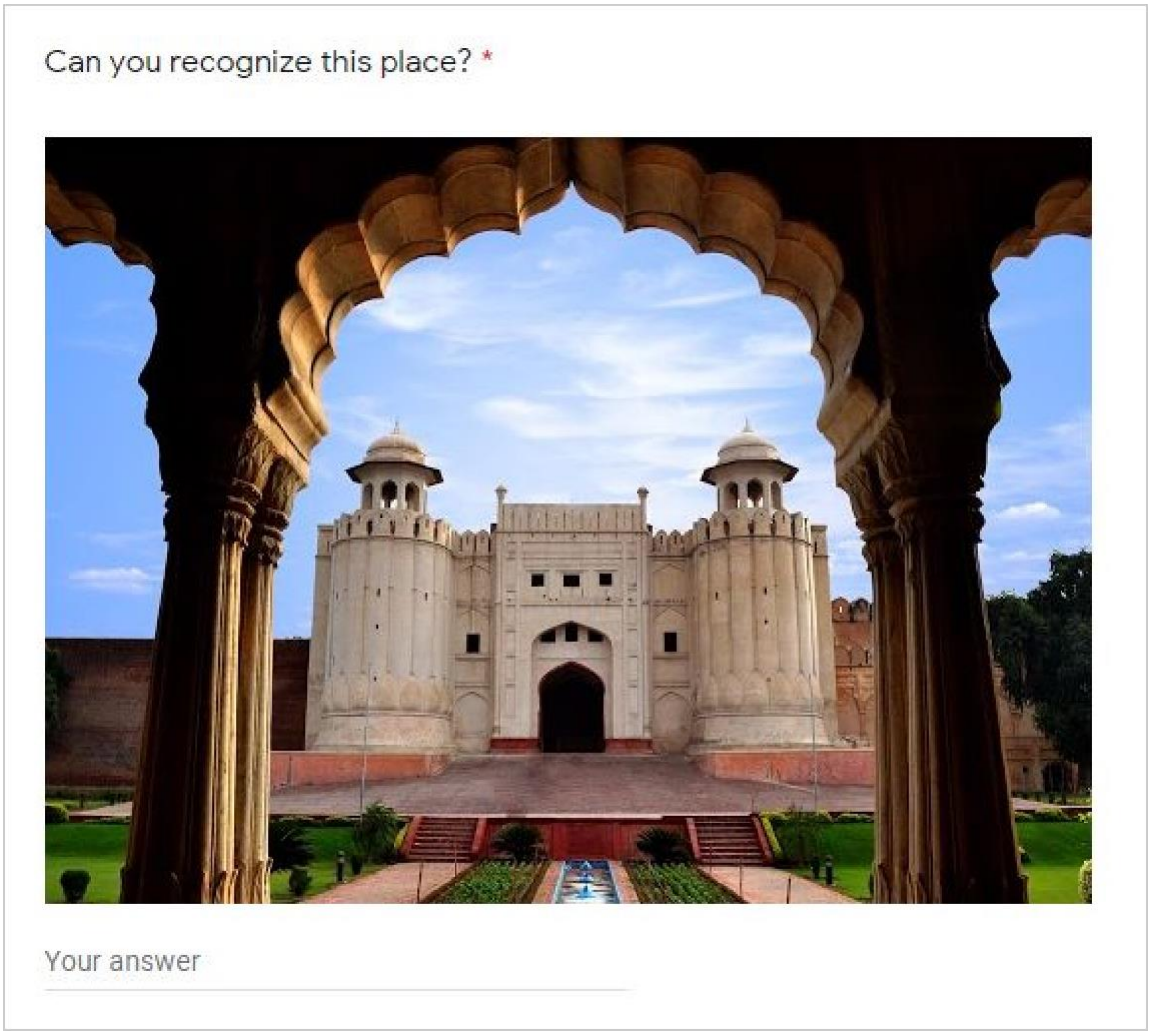


*Fig 4.4. Quiz Question 1*

Where do you think this statue is from? *

- ◯ Aamrih Village
- ◯ Harappa
- ◯ Mohenjo-Daro
- ◯ Taxila

*Fig 4.5. Quiz Question 2*

Who was the longest reigning Mughal emperor? *

- ◯ Jalal-ud-din Muhammad Akbar
- ◯ Jehangir Saleem
- ◯ Hrithik Roshan
- ◯ Zahīr ud-Dīn Babar
- ◯ Aurangzeb

*Fig 4.6. Quiz Question 3*

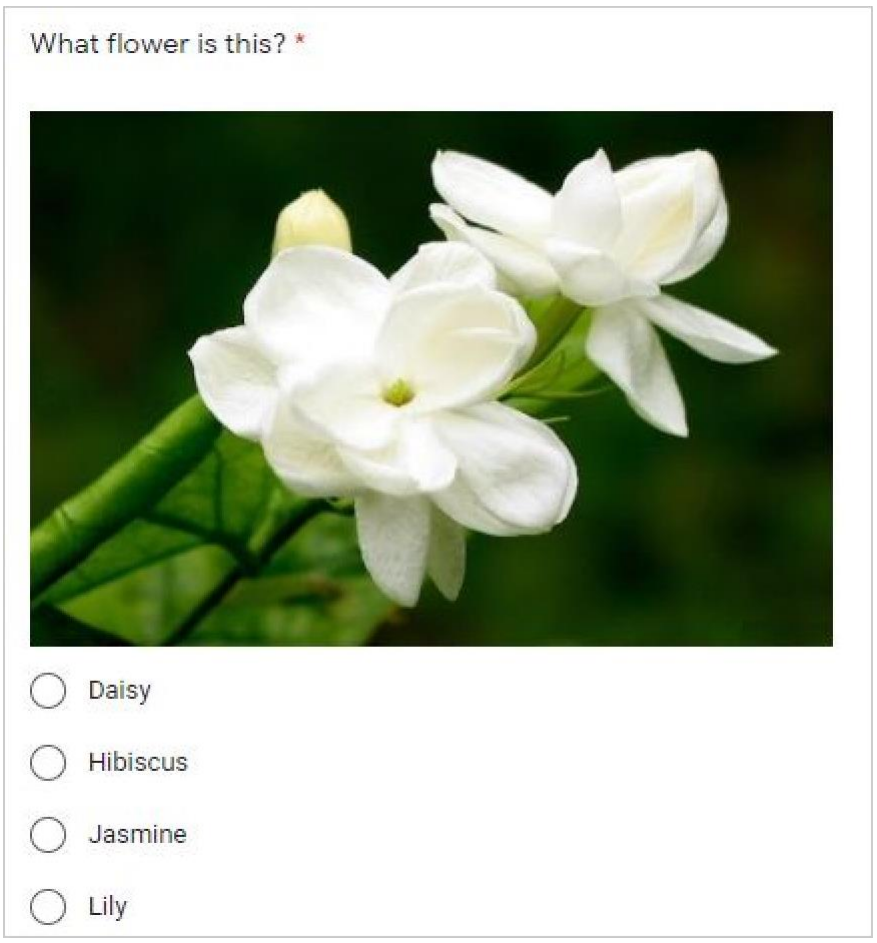


*Fig 4.7. Quiz Question 4*

Who's status is this? *

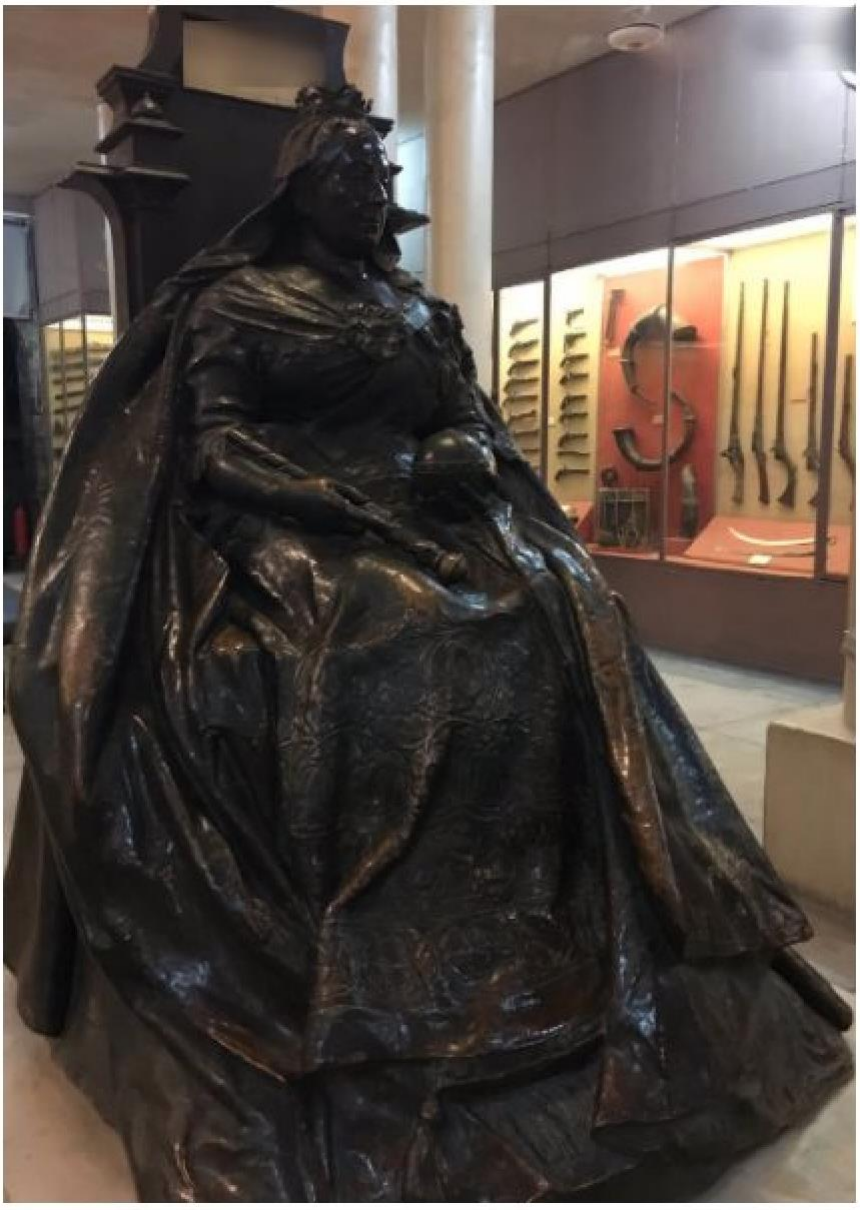

*Fig 4.8. Quiz Question 5*

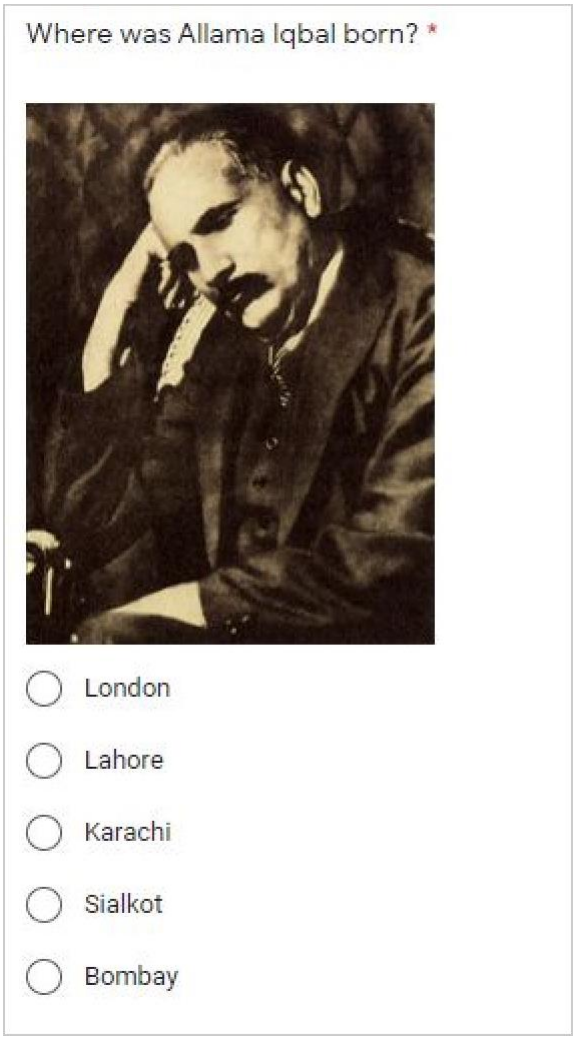


*Fig 4.9. Quiz Question 6*

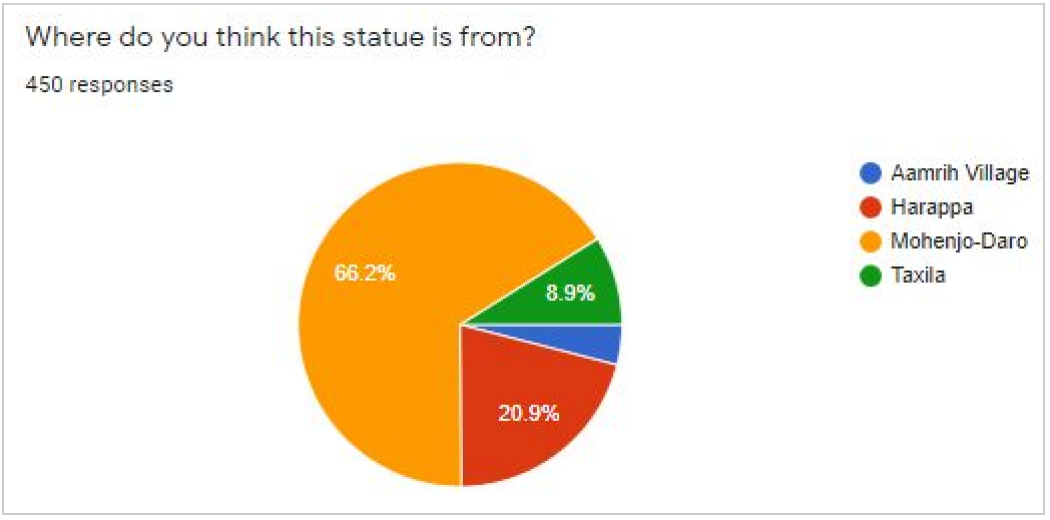


*Fig 4.10. Student Quiz Question 1*

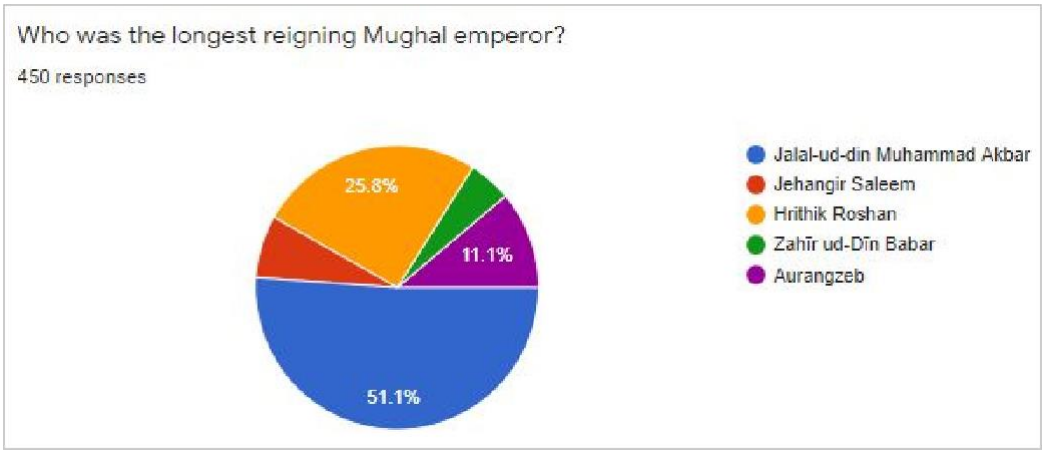


*Fig 4.11. Student Quiz Question 2*

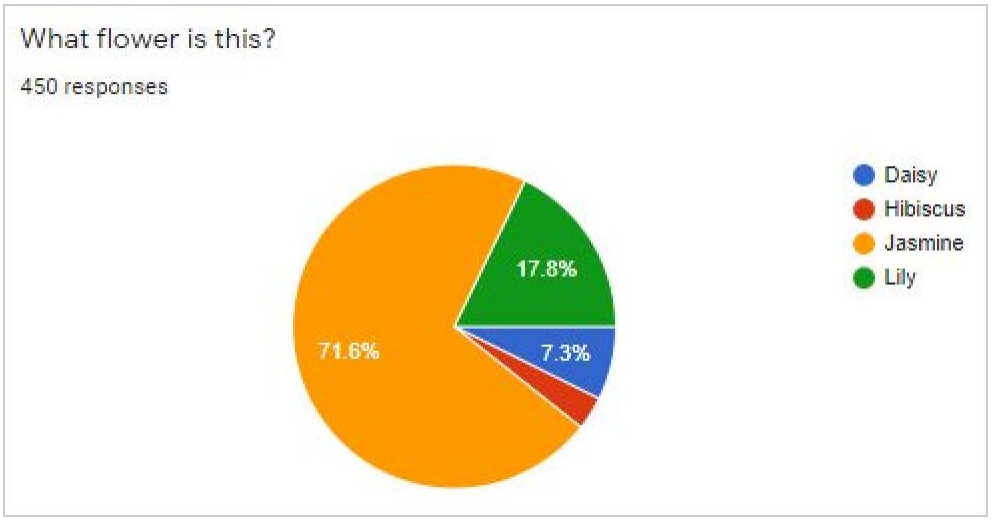


*Fig 4.12. Student Quiz Question 3*

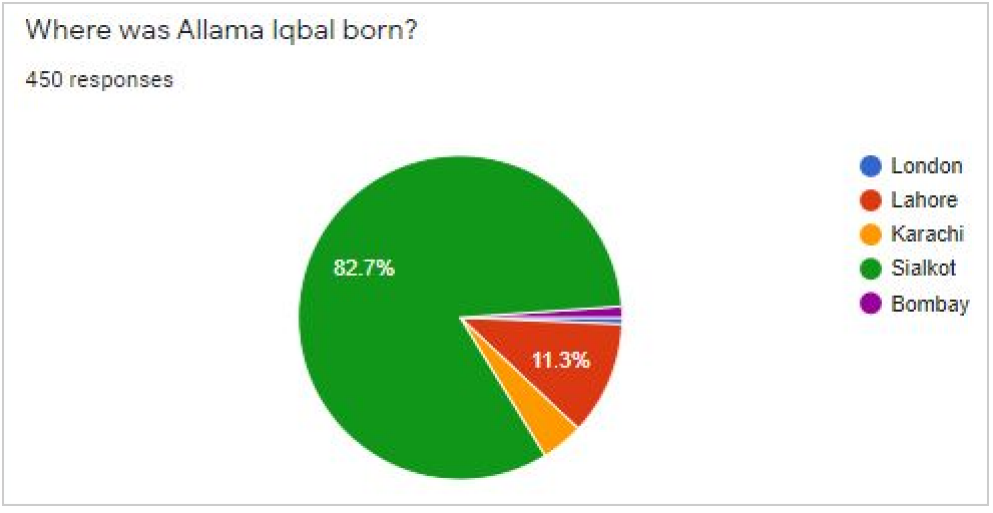


*Fig 4.13. Student Quiz Question 4*

**5 - Figures for Parents Surveys**

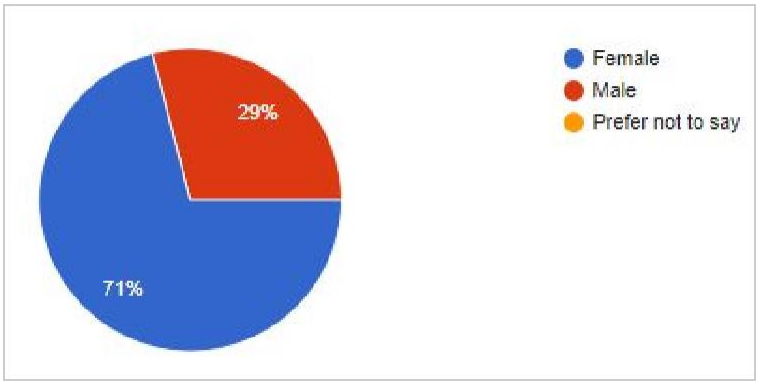


*Fig 5.1. Parent Gender*

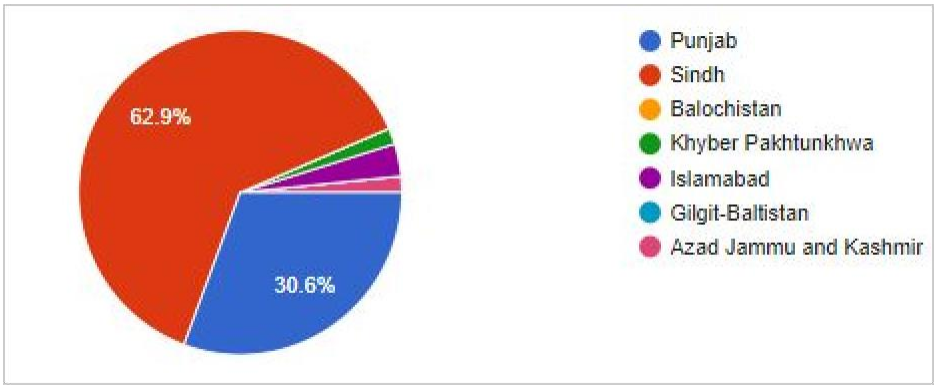


*Fig 5.2. Parents Location Demographics*

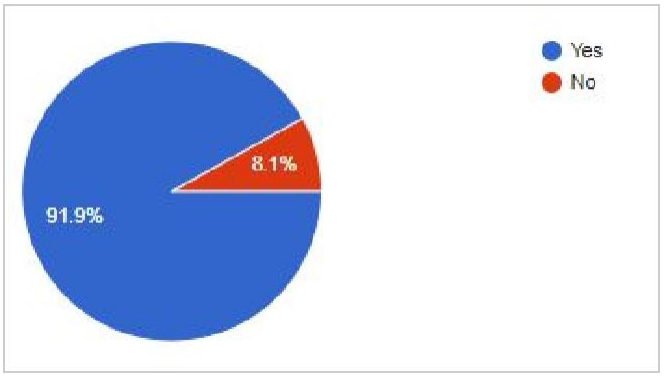


*Fig 5.3. Allow children to go to school/educational trips*

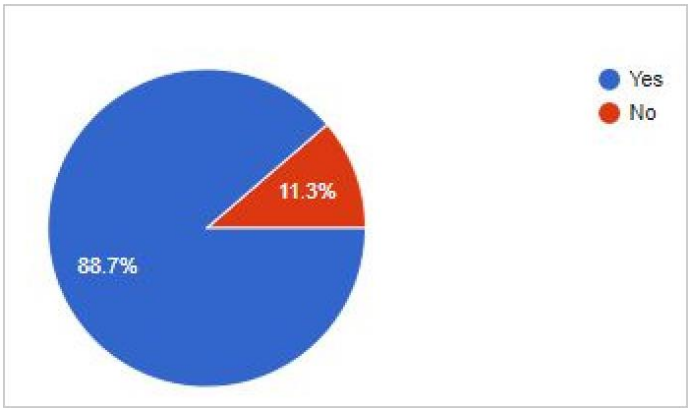

*Fig 5.4. Allow children to use app on mobiles*

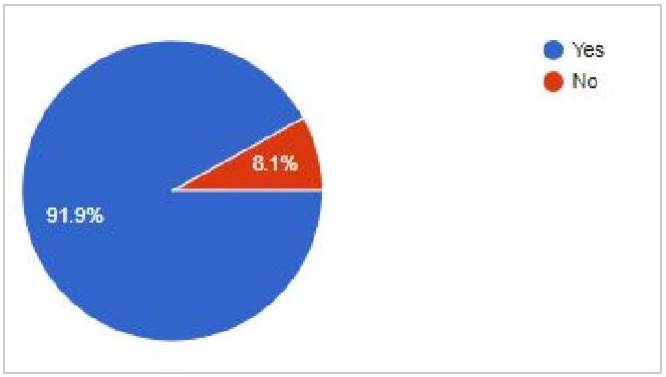


*Fig 5.5. Allow children to use apps for educational purposes*

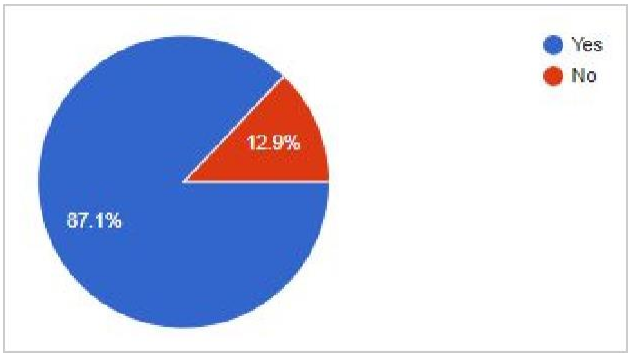


*Fig 5.6. Allow children to go on virtual trips*