

# Multi-method Approach for User Experience of Selfie-taking Mobile Applications

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**Abstract**—Taking selfies is a popular activity in most social media applications and applying filters/lenses to these selfies has become one of the most demanded features of such applications. This paper aims to design an application for taking selfies to minimize the heavy use of beautifying filters. To understand the current user experience of selfie-taking and filter features, multiple user experience research methods were applied in two steps. In the first step, interviews were conducted with 10 participants to collect data. The key findings of interviews were (i) the need for saving memories as users' primary goal of using the applications, (ii) the need for using slightly beautifying filters as their preferred filter type, (iii) the need for a favorite filters list, and (iv) the need for the opportunity to edit selfies after they are taken. This output of the interviews was used as an input for determining the survey questions in the second step. A total of 340 respondents completed the survey and the findings were consistent with those of the interviews. Further pointing to the rising opportunity for a new selfie-taking application designed to save selfies quickly without sharing and only apply slightly beautifying filters. More studies should focus on increasing engagement and including a saved selfie categorization feature in the design.

**Keywords**—Filters; lenses; multi-method; research methods; selfie taking; user experience research

## I. INTRODUCTION

The Social media platforms have become indispensable Internet-based communication tools for daily life, in part due to the wide range of connectivity they provide. Social media and the Internet have caused the social participation rate to increase rapidly over time; in 2021, the number of Internet users worldwide reached 4.9 billion [1]. Furthermore, social media use is considered one of the most popular online activities [2]. In Saudi Arabia, active social media users represent 79.25% of the population, with an annual growth rate of 8.7% [3]. One of the most popular types of social media platforms are those that provide photo-sharing services—e.g., Instagram and Snapchat—and taking, viewing, and sharing selfies has become a daily habit for many people. Selfies edited with filters are an especially rising trend.

Snapchat is one of the fastest-growing selfie-taking social media applications, with a massive number of users that reached approximately 306 million in 2021 [4]. In 2016, Snapchat introduced a feature called Lenses to offer a range of filters to users, making it the first social media application to utilize augmented reality (AR) technology. Its facial recognition software allows users' mobile cameras to detect

their facial features and overlay a chosen virtual effect on their faces, which alters their facial features to look funny, scary, or more beautiful [5].

The problem with many existing selfie-taking applications that allow users to take selfies with filters is the heavy daily use of filters. People seeing each other from a distance may no longer know what their actual faces look like without filters. Social comparisons are no longer made between actual faces but between one's unfiltered face and the filtered faces of others. This may affect self-evaluation and self-esteem, especially because physical appearance is strongly related to self-esteem [6].

This paper aims to apply user experience (UX) research methods to better understand the current UX of selfie-taking and filter feature in order to minimize the use of heavily beautifying filters to help users accept the reality of their appearance. The UX was investigated through three different views—users' goals of using selfie-taking applications, their requirements for taking selfies, and their behaviors when taking selfies—to answer the following research questions:

- [Goal] Why are people using selfie-taking applications and using the filters feature?
- [Need] What is necessary for taking selfies and using the filters feature?
- [Behavior] How do users take selfies with existing mobile applications?

The strength of this paper lies in its use of several UX methods and techniques. Interviews and surveys were conducted sequentially to collect the requirements data. The findings from the interviews determined what to investigate in the surveys to produce clearer insights. Active listening and affinity diagrams were further used to analyze the collected data.

To the best of the author's knowledge, no existing study has conducted a multi-UX research methods approach to study the UX of selfie-taking and filters in order to minimize the reliance on heavily beautifying filters. The findings of the study should lead designers in this domain to consider the following implications in designing a new selfie-taking application:

- Design a selfie-taking application dedicated to saving memories.

- Allow only slightly and realistically beautifying filters in the application to encourage users to accept their looks without relying on heavily beautifying filters.
- Minimize the time required to take a quick selfie with quick reach, and provide a limited number of customized favorite filters.
- Minimize the time required to edit selfies with quick-adding capabilities for items such as gifs, emojis, text, and automatic date and time.

The rest of the paper is organized as follows: The second section highlights the related work in the field of UX, the third section provides the data collection and analysis, the fourth section presents the results of the study and discussion, and the fifth section concludes the current work.

## II. RELATED WORK

Many researchers have conducted UX studies dedicated to understanding, evaluating, and improving the UX of hardware and software products. One study of hardware aimed to understand the UX of unplanned smartphone use [7] via an ethnographic method that involved video recordings with wearable cameras on the chest to capture spontaneous smartphone use in everyday activities. According to the researchers, unplanned smartphone use leaves no memory of the actions in the past, presents no attributes of what it is, and projects no endings of what it will be in the future. Another study examined the UX of SmartTVs to identify UX factors that influence Smart TV UX factors over different periods [8]. Different UX methods were exploited in different stages, such as surveys, thinking aloud, and daily diaries.

The empirical evidence from each method suggests that the UX factors vary with respect to product temporality. Moreover, UX research has been conducted to design smart, wrist-worn digital jewelry [9]. The authors identified the requirements from the literature and conducted semi-structured interviews with jewelers and potential users. After data analysis and prototyping, they identified the final concept of the digital bracelet and implemented an operable and wearable prototype, which they then used to measure the UX and usability.

The participants' experience was positive. Another researcher used a survey to develop a storyline for an animated video to help generate empathy from the viewer for people with social anxiety disorder [10]. The viewers of the video were able to empathize with the main character in the animation even though the story did not have a defined ending.

Many UX studies have contributed to the UX of mobile applications and websites. For example, the gendered perceptions of and initial UX of Pinterest were studied to improve the binary disparity in its use between men and women [11]. The results of the surveys conducted in the study revealed significant differences in perceptions between users and non-users and between men and women. Another study evaluated the UX of Snapchat's onboarding process,

using a new multi-method approach that could be used to evaluate UX for any mobile application [12]. The new methodology consisted of three methods: a usability test interview, an affinity diagram, and a model of UX attributes. The UX attributes were applied to Hassenzahl's model to define which were most important and identify significant development points for the application management team. One researcher evaluated Facebook's UX and investigated the differences in experiences between frequent users and new users using electroencephalography (EEG) [13]. Their findings present a significant statistical difference between new and frequent Facebook users.

Table I summarizes the published date, type of studied product, UX method used, and domain of these studies.

The achievements of the above studies highlight that UX research can contribute to a theoretical background for the development and design of products and analysis of user behavior for various products and domains. Furthermore, different UX methods can be used to collect and analyze data in UX research to deliver reliable findings, and mixed methods can be used to gain more knowledge about UX [8][9]. The Smart TV study used different methods in different stages (i.e., before usage, during usage, after usage). Similarly, the digital bracelet study used one method before usage and another method during usage.

However, none of the above studies used 1) mixed methods in a single stage or 2) sequential methods where findings from the first method determined what to measure in the second method. Moreover, the only research that studied the UX of social media with selfie-taking focused only on the Snapchat UX in the onboarding process, and it failed to discuss Snapchat filters [12].

TABLE I. RELATED UX STUDIES

Study	Date	Studied Products	UX Methods	Domain	Hardware/Software
[7]	2016	Mobile phone	Video Recordings	Social	Hardware
[8]	2016	Smart TV	Survey, Think Aloud, Daily Diary		
[9]	2016	Wearable	Interview, Live User Observation		
[10]	2019	Video	Survey	Mental Health	Software
[11]	2015	Website	Survey	Social Media	
[12]	2020	Mobile Application	Interview		
[13]	2020	Mobile Application	EEG		

## III. DATA COLLECTION AND ANALYSIS

Multi-sequential methods of qualitative and quantitative were conducted to investigate the topic in more depth. The 2-step process of data collection and analysis is shown in Fig. 1.

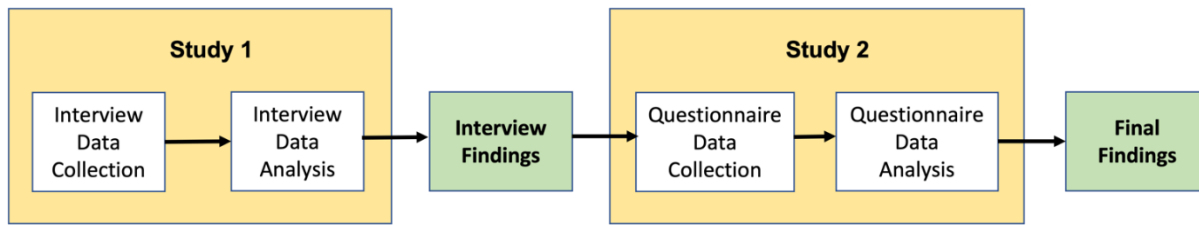


Fig. 1. Two-step Data Collection and Analysis.

The first step of the methodology included interview data collection and analysis. Interviews were conducted first to develop a more thorough understanding with a small number of users. The outcome of the interviews and data analysis informed the topics explored in the survey, which were narrowed in scope to just a few key findings to allow for a deeper investigation. The second step was survey data collection and analysis, which sought to determine whether the interview key findings applied to a broader subset of Snapchat users.

#### A. Step 1: Interview Data Collection and Analysis

The interviews were designed with 9 opening questions to elicit initial responses to a specific topic, providing a useful springboard for follow-up questions. The questions explored the participants' demographic information, previous and current usage of selfie-taking apps, goals and motivations of using these apps, pain points and needs within the apps, and contexts for taking selfies with and without filters. Recruiting of interviewees ensured they met the following criteria: selfie-taking applications used at least once a week, filters used at least once a week, and at least 1 month of previous use of selfie-taking applications.

Ten participants were recruited for 30-minute interviews, which were conducted in the summer of 2021. Nine participants were interviewed by phone due to circumstances related to the COVID-19 pandemic and one was interviewed in person. Six participants were women and four were men. Their ages ranged from 19 to 32 years, and each had used some combination of Snapchat, Instagram, and TikTok for taking selfies.

The data collected from the interviews were analyzed using two UX methods: active listening and an affinity diagram.

1) *Active listening*: The active listening technique condensed the large amount of data gained from the interviews into smaller units that were easier to understand [14]. This technique involved listening to the important things said by the interviewees, then paraphrasing each response into a single quote that captured its essence. The digital tool Miro was used for this task [15]. The following sentences fragments are examples of the small-unit responses resulting from active listening of the interviews with Participants 1, 2, and 4:

- Participant 1: "I would like to reach my favorite filters quickly".

- Participant 2: "I use Snapchat 90% for saving memories".
- Participant 4: "I like using filters that beautify me but allow me to look like myself".

2) *Affinity diagram*: The affinity diagram technique was used to organize and analyze the large amount of data gathered from the interviews. Its purpose is to arrange many pieces of data into manageable clusters or groups that identify patterns in the data [16][17]. To construct the affinity diagram, the responses were categorized into three main groups—user behavior, user needs, and filters that users like or dislike—and further subcategorized into a total of 9 specific themes, as shown in Fig. 2.

The key findings of the affinity diagram are listed below. The finding names (e.g., F.A, F.B) correspond to Finding A, Finding B, etc., and were used to simplify the process of mapping the key findings from Step 1 to the survey questions in Step 2.

These findings are accompanied by supporting evidence, such as screenshots, quotes from the participants, and the number of participants that agreed on the finding.

Key findings:

F.A: Users take selfies primarily to save memories.

- "I use Snapchat 90% for saving memories" Participant 2.
- "Saving memories is my first goal, then viewing others' selfies." Participant 3.
- "I usually take selfies with others, mostly for saving not for sharing." Participant 7.

F.B: Users prefer slightly and realistically beautifying filters over beautifying filters that are unrealistic and over the top.

- Most participants (7 of 10) preferred to still look like themselves after using beautifying filters. They use them to look healthier, with smoother skin and a few realistic changes to their facial features.
- "I hate the beautifying filters that change me to look like everything but me, like I am another person" Participant 2.
- "I like filters that only give me a healthy look" Participant 5.

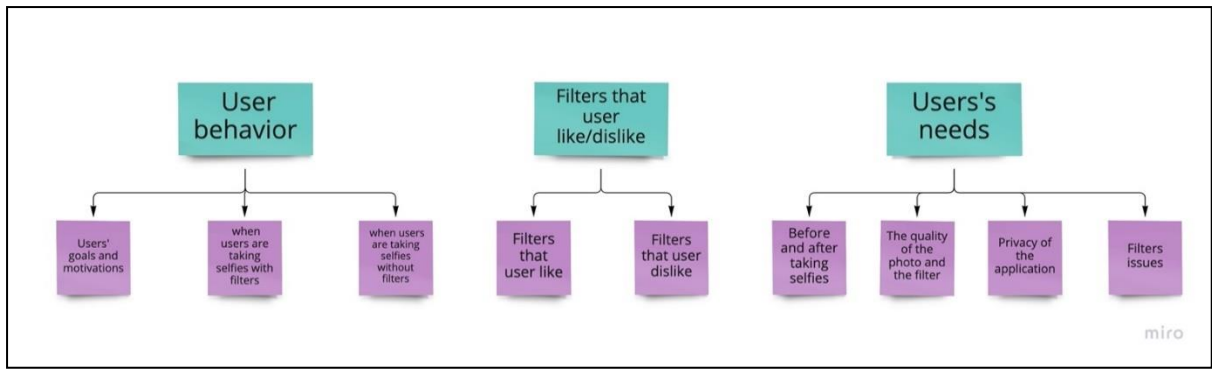


Fig. 2. Levels of Themes of Affinity Diagram.

F.C: Users want to reach their favorite filters quickly before taking selfies.

- “I would like to choose from my list of filters that I can reach quickly” Participant 6.
- “It would be helpful if only the favorite filters appear with one tap before taking the selfie” Participant 10.
- “I like that in Snapchat I can put stars on my favorite filters, but I have to go to explore filters to find my favorite filters” Participant 4, see number 1 and 2 in Fig. 3.

F.D: Users like adding items to their selfies, such as gifs, emojis, text, and the date and time.

- “I enjoy using gifs and emojis on selfies” Participant 1.
- “I like that Snapchat saves the date and time automatically” Participant 3.
- “I like to add music, stickers, text, time, and date to the selfies” Participant 6.

**B. Step 2: Survey Data Collection and Analysis**

The survey was divided into three sections: demographic questions, screening questions, and requirements questions. The demographic questions gathered demographic information that may affect users’ selfie-taking experience. The screening questions ensured that the respondents met the following qualifying criteria: selfie-taking applications used at least once a month, filters used at least once a month, and the device used for taking selfies is the mobile. Finally, five requirements questions were posed to investigate the key findings of the interviews. Table II presents the requirements questions, the corresponding key findings, and the rationale for the selection of these questions.

The survey data were collected in November 2021 in Saudi Arabia. The final sample consists of 460 participants. The quantitative data were analyzed using statistical procedures with SPSS. Descriptive statistics and charts were used.

1) *Demographic questions analysis:* Most respondents were in the 21–30 age group and the 10–20 age group had the fewest number of respondents. Furthermore, 35.2% were

men, 64.8% were women, and 81.5% held bachelor’s or graduate degrees.

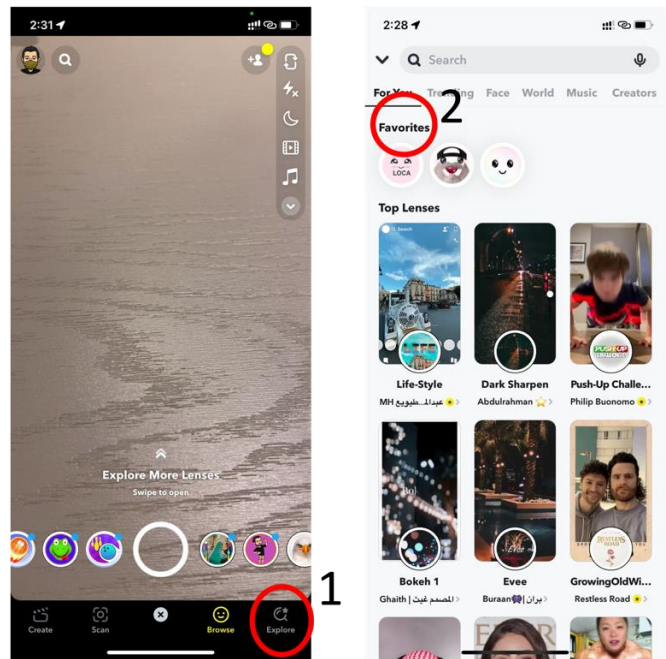


Fig. 3. Reaching Favorite Filters in Snapchat.

TABLE II. REQUIREMENTS QUESTIONS

Requirements Questions	Key Finding(s)	Rationale
Which of the following is your goal of taking selfies?:	F.A	Understand the user’s goal
Which type of filter do you prefer to use?	F.B	Understand the user’s preference of filter types
Do you have any favorite filters that you usually use?	F.C	Identify if the user has a favorite filters list
How many favorite filters do you usually use?	F.C	Identify the usual number of favorite filters for users
Based on your experience with the selfie-taking app(s) you use, how essential were the following features?:	F.C , F.D	Determine what is necessary for users before and after taking the selfies

2) *Screening questions analysis:* The screening questions filtered out 120 respondents, leaving 340 to complete the survey.

Table III shows the percentages of male and female respondents who were frequent users of filters (i.e., used filters daily or weekly) and those who were infrequent users of filters (i.e., used filters monthly or less).

Most respondents (53.55%) used filters daily or weekly. The 21–30 age group had the highest daily usage of filters in selfie-taking applications, and women had higher daily filter usage than men.

TABLE III. FREQUENCY OF USING FILTERS BY GENDER

Gender	Frequent use of filters	Infrequent use of filters
Male	42.86%	57.14%
Female	59.12%	40.83%
All	53.55%	46.45%

3) *Requirements questions analysis:* The selfie-taking application used most often was Snapchat with 95.6% of responses. The results of the multiple-choice questions regarding the users' goals of using selfie-taking applications revealed saving personal memories as the most common goal (71.1%, n=241), followed by sharing with family and friends (64.9%, n=220). For most age groups and both men and women, saving personal memories was the most chosen goal; the exception is respondents over 40 years old, for whom sharing with family and friends was most chosen. Seeing one's face with a filter was the third most chosen goal, mostly by female respondents (76.62%, n=118) and respondents who used filters daily. Sharing with public users was the least chosen goal (9.4%, n=32); male respondents chose this goal more than female respondents. Fig. 4 shows the distribution of goals for each age group, and Fig. 5 shows these goals for men and women.

For the questions on filter type preferences, most of the respondents chose the slightly beautifying filter type (83%, n=284). The advanced beautifying filter type was chosen mostly by respondents who used filters daily.

The majority of respondents (58.1%) had favorite filters that they usually used, whereas the other 41.9% did not. The most common numbers of favorite filters were 3 (28.4%, n=56), 2 (24.4%, n=48) and 4 (19.8%, n=39).

Cronbach's  $\alpha$  (0.71) was calculated to test the reliability of the responses to the five questions on the essentiality of different features in selfie-taking applications. Most respondents (55.16%) considered accessing favorite filters quickly to be a must-have feature and 35.40% considered it a nice to have feature, as shown in Fig. 6.

Adding text and date features were mostly considered nice to have features. Adding the time, emojis, and gifs were mostly considered unnecessary or nice to have features.

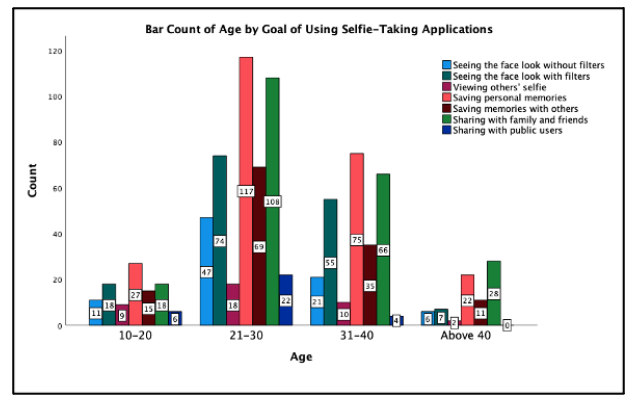


Fig. 4. Goal of using Selfie-taking Applications for Each Age Group.

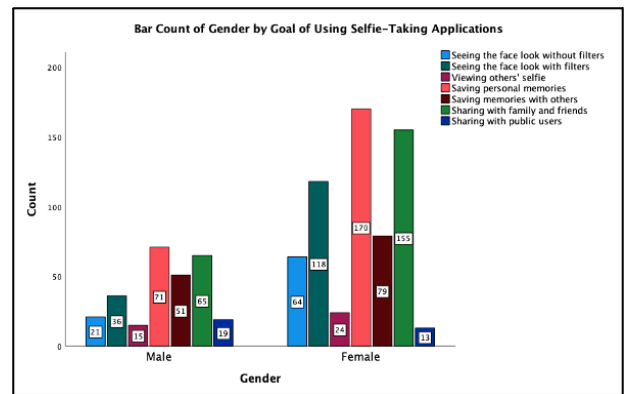


Fig. 5. Goals of using Selfie-taking Applications for Men and Women.

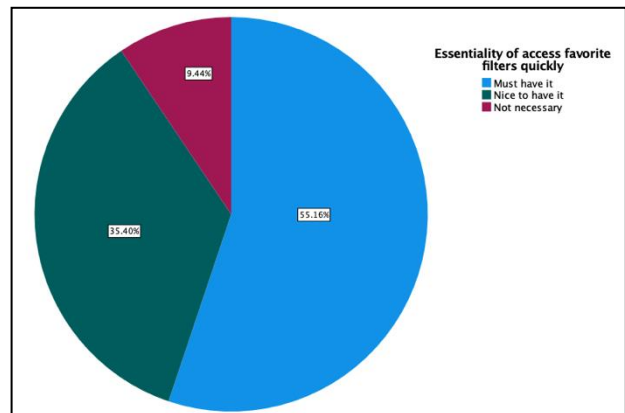


Fig. 6. Percentage of Essentiality of Accessing Favorite Filters Quickly.

#### IV. RESULT AND DISCUSSION

By focusing on areas that were rich with respondents, the final key findings were identified and supported by evidence.

Final key findings are:

- Users prefer slightly and realistically beautifying filters over unrealistically and excessively beautifying filters.
- 83.8% of participants preferred slightly beautifying filters and only 15.6% preferred advanced beautifying filters.

- Users enjoyed adding text, the date and/or time, and emojis to their selfies.
- 75.2% of participants considered adding text as either a must-have or nice to have feature.
- 67.3% of participants considered adding the date as either a must-have or nice to have feature.
- 59% of participants considered adding the time as either a must-have or nice to have feature.
- 58.4% of participants considered adding emojis and gifs as either must-have or nice-to-have features.
- Users had favorite filters and wanted to reach them quickly before taking selfies.
- 58.1% of participants had favorite filters they usually used.
- 55.16% of participants considered quick access to their favorite filters as a must-have feature.
- Users take selfies primarily to save memories.
- 71.1% of participants chose saving memories as their goal of taking selfies.
- Saving memories was the most chosen goal for both men and women and all age groups, except >40 years.

The above result shows that the key findings of the survey align with those of the interviews. From this, an opportunity was identified for a new selfie-taking application that differs from the existing selfie-taking applications. The main points considered for the new application were:

- The ability to take a selfie just for saving, not for sharing.
- The ability to reach one's favorite filters with one click before taking selfies.
- A collection of slightly and realistically beautifying filters.
- The ability to add the time and date, gifs, emojis, and text on taken selfies.

Each research method has both positive and negative attributes. Surveys and interviews are two of the most used methods in UX studies. However, using a survey alone leads to a disconnection between the researcher and respondents to observe emotional concerns that may be evident in respondents' responses. Also, no possibility of correcting the misunderstanding which may be due to the wording or ambiguity in the survey. In other hand, using interviews alone has several cons such as sex, race, and class affiliation of the interviewee may play a role in the bias of the interviewer. Also, recruiting a large sample in the interview method will require higher costs and time. The limitation of a single-method approach was overcome by employing multiple research methods and the double diamond framework to understand the full UX. The sequential usage of these research methods allowed the researchers for a more in-depth investigation of the research topic. Rather than using the

survey to investigate every point or issue from the interviews, the scope was narrowed to the key findings of the interview that merited further investigation. The survey therefore focused on users' goals of using selfie-taking applications, their preferences for filter types, the need for a favorite filters list, and the essential features for taking selfies. This multi-sequential approach proved able to provide consistent findings.

The existing studies had a limitation in evaluating the UX of selfie-taking applications, especially the evaluation of filters feature. The contribution of this paper is using the benefits of multi-sequential research methods and the strength of the double diamond framework to evaluate the UX of selfie-taking and filters.

People's daily reliance on heavily beautifying filters motivated this research. However, the results of the research methods illuminated two new problems in selfie-taking applications. The first is that most selfie-taking applications focus on sharing selfies with other users because, like Snapchat, they are considered social media platforms. However, most of the participants of both the interviews and surveys chose saving memories as their goal in using these apps, which answers question 1 of this study. The second problem is that the excessive numbers of filters available mean that users must search through them to choose one for each selfie; this extends the time required to take a quick selfie. Many respondents expressed the need for a quick reach time to the favorite filters list, which answers question 2 of this study. Because people live busy lives, they sometimes wish to stop only for a second to take a quick and almost neutral selfie with slightly enhancing beauty—just to save the memory for themselves, not to share, which answers question 3 of this study. A new selfie-taking application could solve these problems by focusing solely on taking selfies instead of sharing them and by offering slightly beautifying filters and the option to quickly save the memories.

## V. CONCLUSION

Recently, applications that support people's interest in taking selfies by providing various features, such as filters, are in high demand. However, the consequences of daily reliance on beautifying filters have increased. Thus, to understand the current UX of selfie-taking applications, this empirical study investigated the goals, needs, and behaviors of their users in order to find opportunities for improvement and solve the rising reliance on heavily beautifying filters. The multi-sequential methods approach was conducted to collect and analyze data on two steps. The result of these analyses revealed an opportunity for a new selfie-taking application that focuses on taking selfies to save memories rather than sharing them, providing only slightly beautifying filters rather than heavily beautifying filters, and improving the speed and ease of the selfie-taking process to make it compatible with people's busy lives.

The multi-sequential approach of qualitative and quantitative methods combined is expected to be easily generalizable to similar applications and products. Also, this research can serve as guidelines for building new social applications with selfie-taking and filters features. Future

research can build on this study to determine new features for categorizing and handling the saved memories and increasing the level of engagement.

#### REFERENCES

- [1] “Number of internet users worldwide 2021 | Statista.” <https://www.statista.com/statistics/273018/number-of-internet-users-worldwide/#statisticContainer> (accessed Jan. 22, 2022).
- [2] “Top mobile-first activities 2019 | Statista.” <https://www.statista.com/statistics/783357/leading-mobile-first-activities/> (accessed Nov. 11, 2020).
- [3] “SAUDI ARABIA SOCIAL MEDIA STATISTICS 2021 - Official GMI Blog.” <https://www.globalmediainsight.com/blog/saudi-arabia-social-media-statistics/> (accessed Jan. 22, 2022).
- [4] “Snapchat: daily active users worldwide | Statista.” <https://www.statista.com/statistics/545967/snapchat-app-dau/> (accessed Jan. 22, 2022).
- [5] C. Allsteadt, “An Exploration into the Effect of Advancing Technology on UX of Social Media Applications I . Introduction II . Literature Review,” *Elon J. Undergrad. Res. Commun.* Vol. 8, No. 2, pp. 121–130, 2017.
- [6] “Physical appearance is positively related to self-esteem level.” <https://www.ukessays.com/essays/psychology/appearance-is-positively-related-to-self-esteem-level-psychology-essay.php> (accessed Jan. 08, 2021).
- [7] J. Cousins, “Timelessness,” *Self Soc.*, vol. 15, no. 5, pp. 216–216, 2016, doi: 10.1080/03060497.1987.11084862.
- [8] J. Jang, D. Zhao, W. Hong, Y. Park, and M. Y. Yi, “Uncovering the Underlying Factors of Smart TV UX over Time,” pp. 3–12, 2016, doi: 10.1145/2932206.2932207.
- [9] J. Fortmann, E. Root, S. Boll, and W. Heuten, “Tangible Apps Bracelet: Designing modular wrist-worn Digital Jewellery for multiple purposes,” in *DIS 2016 - Proceedings of the 2016 ACM Conference on Designing Interactive Systems: Fuse*, Jun. 2016, pp. 841–852, doi: 10.1145/2901790.2901838.
- [10] N. Andalibi, “Development of a 2D Animated Video Using UX Research Methods to Generate Empathy for People with Social Anxiety Disorder,” p. 1, 2019.
- [11] H. Miller, S. Chang, and L. Terveen, “‘i love this site!’ vs. ‘it’s a little girly’: Perceptions of and Initial User Experience with Pinterest,” *CSCW 2015 - Proc. 2015 ACM Int. Conf. Comput. Coop. Work Soc. Comput.*, pp. 1728–1740, 2015, doi: 10.1145/2675133.2675269.
- [12] K. Kapusy and E. Lógó, “User Experience Evaluation Methodology in the Onboarding Process: Snapchat Case Study,” *Ergon. Des.*, pp. 1–7, 2020, doi: 10.1177/1064804620962270.
- [13] R. S. Mangion, L. Garg, G. Garg, and O. Falzon, “Emotional Testing on Facebook’s User Experience,” *IEEE Access*, vol. 8, pp. 58250–58259, 2020, doi: 10.1109/ACCESS.2020.2981418.
- [14] C. R. Rogers and R. E. Farson, “Active listening.” Chicago, IL, 1957.
- [15] “The Visual Collaboration Platform for Every Team | Miro.” <https://miro.com/index/> (accessed Feb. 14, 2022).
- [16] C.-K. Kwong and H. Bai, “Determining the importance weights for the customer requirements in QFD using a fuzzy AHP with an extent analysis approach,” *Iie Trans.*, vol. 35, no. 7, pp. 619–626, 2003.
- [17] B. Martin, B. Hanington, and B. M. Hanington, “Universal methods of design: 100 ways to research complex problems,” *Dev. Innov. Ideas, Des. Eff. Solut.*, pp. 12–13, 2012.