MANAGING PRIVACY SETTINGS AND INLINE FEATURE CONTROLS IN SOCIAL NETWORKING APPLICATIONS

by

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Abstract

Prior research has found that users of Social Networking Sites (SNSs) are often concerned about their online privacy; however, most users rarely make use of the privacy settings provided by such platforms. There are inconsistencies between privacy attitudes and observed privacy behaviours due to a lack of understanding, lack of control, abstract interfaces, and concerns about current privacy settings. Studies show that users still struggle to comprehend and control their privacy settings. In this thesis, a novel model called Privacy Settings Model (PSM) that assists users to understand, control, and update their privacy settings on SNSs is proposed. The model would enhance users' privacy behaviours and thereby reduce their privacy risks.

The research comprised of three major phases. A mixed-method study (Phase 1 and Phase 2) was conducted to explore users' behaviours with respect to various privacy settings and the factors that impact users when learning and applying a particular privacy setting. In the first phase, a qualitative study of 22 SNS users was conducted to explore the behaviours and factors associated with privacy settings. Using thematic analysis, factors related to users' concerns and behaviours according to the PSM components were obtained. After collecting, transcribing, and analyzing the data using the thematic analysis, 15 factors that influenced users' behaviours when understanding and changing the settings, and receiving or finding new privacy updates were identified. Furthermore, it was observed that SNS users often rely on external resources for help and accurate information on how to understand and change their settings.

In the second phase, a large-scale quantitative study of 101 users to validate the obtained factors that impact their behaviours from the qualitative study was conducted. Based on the findings in Phase 1 and Phase 2, significant design guidelines to assist in the design of usable SNS settings that meet users' expectations were derived.

In the third phase, using the design guidelines, a proof of concept application (PrivSet) was developed to help SNS users learn and configure the settings and new updates efficiently and effectively. To evaluate the system, a mixed-method study was conducted to compare the PrivSet application with the default settings in SNSs with respect to efficiency, effectiveness, and users' satisfaction. The results of the evaluation showed that the SNS users who utilized the PrivSet application spent less time and successfully completed the process of understanding and changing the settings in comparison to the users who did not use the PrivSet application (i.e., they only used SNS settings). Additionally, the PrivSet application was well received by the users and offered promise to facilitate the steps required to achieve PSM components.

List of Abbreviations Used

SNS	Social Networking Site
RT	Retweet
PSM	Privacy Settings Model
OSN	Online Social Networking
Apps	Applications
SD	Standard Deviation
TAM	Technology Acceptance Model
PU	Perceived Usefulness
PEOU	Perceived Ease of Use
ANOVA	Analysis of Variance
SPSS	Statistical Package for the Social Sciences

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Chapter 1 Introduction

1.1 Motivation and Overview

Social computing systems such as social networking sites (SNSs) have experienced enormous growth over the past decade, and the number of users of platforms such as Facebook, Twitter, and Instagram has also dramatically increased. More than half of all Internet users have accounts on at least two SNSs [1][20][41][49]. SNS users rapidly share and distribute information such as thoughts, photos, and videos with their friends or with the public at large. Likewise, SNSs have become a cumulative archive not only for individuals but also for marketing professionals, government agencies, and academic institutions, who use them to show and display products, information and other content [22][25][34][39][43][45][50][62].

1.1.1 Social Networking Sites

Facebook remains the most popular social networking site in terms of the number of active users (approx. 2 billion users at the current time) [20]. Facebook was launched in February 2004 and it is a significant tool for social communication, friend identification, and friendship building among students. Seventy-five percent of active users check Facebook daily, while 51% use it several times a day. Users are not only reading and viewing their Facebook profiles, but also sharing, posting, and commenting on their profiles. Interestingly, the majority of users who use other SNSs are also active users of Facebook [17][55][67].

Twitter is a social networking site that sets a 280-character limit for creating the texts that are used to communicate between users. It was launched in March 2006 and has 330 million active users [20][67]. Twitter users can follow each other and check each other's tweets (i.e., posts) without requiring permission. Abbreviations and symbols can be used when responding to tweets or when you like someone's tweets. For instance, "RT" means retweet and "#" refers to a hashtag, which allows users to join and participate in recent discussions. In addition, users can engage in the most recent discussions in their areas by checking the lists of trending topics in their profile sidebar. They can click on any one of the trending hashtags and participate by commenting, retweeting, or liking a particular tweet. Furthermore, Twitter has experienced a significant increase in the number of active

users; particularly among adults. Twitter is especially popular among college-educated users, and 46% of Twitter users check their profiles daily [38][59].

Instagram is a social networking site that allows users to easily filter and share their photos and videos. The number of users has dramatically increased since Instagram was launched in October 2010, with the application seeing a spectacular rate of growth in terms of monthly active users, growing from 200 million in March 2014 to 800 million active users in September 2017. Currently, most users are young adults aged between 18 and 29 (53%), and 60% of their active users use Instagram daily compared to 37% in 2013 [20][67]. Although Instagram is presently the most popular photo and video capturing and sharing application, it has not been the subject of many research studies. Instagram is still considered to be a relatively new SNS and it deserves more attention from researchers in comparison to older SNSs such as Facebook and Twitter. For example, researchers could study the user behaviour through uploaded photos and videos and also examine potential privacy issues [29][58].

Pinterest − which was launched in March 2010 − is a pinboard-style site that allows users to save and manage various images and videos – called “pins” – and to browse other user profiles in their feeds [20][67]. Pinterest is becoming increasingly popular because it focuses on visual content instead of textual content. It connects users worldwide, who can then share their tastes and interests through images and videos, and it is recognized as the fastest-growing SNS in terms of visitors and clicks. In Pinterest, females dominate in terms of application usage compared to males, which is the largest difference in terms of gender among all SNSs. Pinterest also attracts more well-educated and higher income users than other SNSs [7][19][51][55].

Remarkably, social media applications are continuously expanding to provide more specific content which does not focus solely on the main features such as posting, sharing, and messaging. For instance, YouTube and Snapchat provide video-sharing features which include various social elements. These two applications are more popular among younger users (18-24 years old). Similarly, the LinkedIn application focuses on professional networking, which allows companies to post jobs and assists users to seek jobs via the posting of resumes. The application remains popular among educated users who have a college degree (as compared to a high school diploma or less). Likewise, WhatsApp is a

mobile social app that allows users to specifically share messages which also include texts, photos, and videos. Although this application is owned by an American tech company, the largest share of the app's population is outside of the United States. For example, Saudi Arabia has the most active users (73% of the Saudi population) followed by Malaysia (68%) and Germany (65%) [55][60].

1.1.2 User Behaviours in SNSs

A systematic literature review [72] explored users' behaviours (the behavioural characteristics) in SNSs and classified the discovered factors that influence SNS users' usage. The authors found that SNSs started to emerge in databases from the year 2005 and publications dramatically increased in 2013. User behaviours on SNSs were compared among different countries. Specifically, the recruited participants were from countries in Asia, Europe, and the Middle East. Various SNSs have emerged based on the users' place of residence; for example, Tuenti is used in Spain, Renren and Kaixiniare are used in China, and StudiVZ is used in Germany and Austria. However, there are also public SNSs that are not specific to countries, such as Facebook and Twitter. The research methods applied in the published studies are surveys, interviews, and experiments. Survey was the most widely used research method in these studies. The researchers found that factors such as trust, privacy, age, gender, culture, and distance set the context for the published studies. The major contribution of this mapping study was in identifying 16 characteristics that directly and indirectly affect SNS usage. They found that social investigation, social affiliation, frequency of use, information control, self-orientation, social influence, and social boldness are seven characteristics that directly affect the user behaviours. On the other hand, the authors identified nine factors that indirectly influence user behaviours while using SNSs which are ease of use, gratifications, personality traits, self-esteem, social influence, regret, emotion, boredom, and self-control. Despite the growing interest in studying SNS users' behaviours, little attention has been paid to assist SNS users to reduce privacy risks associated with users' behaviours.

1.1.3 Privacy in SNS

Privacy has emerged in SNSs as an issue of serious concern not only for individual users but also for research communities, media and press, researchers of collaborative systems, and organizations [22][31][34][42]. SNS users are having difficulty maintaining their

privacy because they expose a large amount of personal information which causes a variety of risks for users [41][62][63][68]. Risks of privacy violations have increased due to personal information being revealed and weak privacy settings being designed [25][45]. When it comes to privacy, Facebook is the most frequently cited SNS due to its popularity and number of registered users. Facebook experienced the highest number of academic research papers discussing its privacy and is also usually the first example cited in the media. For example, according to the Pew Research Center, 39% of Facebook users are connected to people they do not know and have never met in person [20][31][34]. These data indicate that Facebook friends are not real friends, so the privacy of these users might be affected.

Furthermore, there are various privacy issues that might impact other SNSs, such as Twitter. For example, "spam tweets" are messages that impact users in terms of harmful links, sending many messages to follow or unfollow, having multiple accounts, and using automated tweets to trend a particular topic. Twitter forbids all of these behaviours and the Twitter Support Team suspends any kind of spam that may affect user accounts or content. Twitter's users can also remove all spam tweets by using a "Clean Tweets" filter in the Firefox web browser setting [38][69].

Recent studies about SNSs have discovered discrepancies between privacy attitudes and observed privacy behaviours due to a lack of understanding, lack of control, abstract interface, and concerns about current privacy settings. The studies indicated that users are still struggling to recognize and change their privacy settings [22][63]. Moreover, there is a contradiction between user attitudes regarding privacy and user sharing behaviours, even in cases that involve restrictive default privacy settings. For instance, although users claim to be highly concerned about their privacy (attitude), they are still posting personal information without applying access restrictions or privacy settings (behaviour) [50][68]. SNS privacy settings are generally permissive, difficult to employ, and not elastic enough to prevent privacy breach [43][45][49]. Using such settings prevents users from anticipating the effects of their decisions, and the outcomes usually do not match user expectations [31].

1.1.4 Facebook and Cambridge Analytica

The data of over 80 million Facebook users were misappropriated by the British data analytics company "Cambridge Analytica". The story began when Aleksandr Kogan collected data of Facebook users and their friends through an online personality quiz application with the consent of only Facebook users but not their friends. In addition, it appeared that the Cambridge Analytica case was not the only breach of Facebook. Facebook started reviewing third-party applications and found malicious actors who take advantage of searching tools that collect personal information. This personal information can be easily used by cybercriminals to attack individuals using social engineering techniques. Meanwhile, Kogan confirmed that Facebook allowed not only personal information to leave Facebook servers but also some private messages were allowed to be used by the public. However, Facebook, in December 2015, identified this issue and the decision was obviously made in Facebook not to inform the users. The co-founder and CEO of Facebook, Mark Zuckerberg admitted that this decision was a mistake and that they should have handled this breach differently. In fact, this issue raised a significant question about how SNS users can consent to different types of third-party applications without understanding and being informed of the consequences. It also indicated that the users might not know how to take action and stop such authorizations. Remarkably, most of the articles and news were focused on helping users learn how to control their privacy settings while SNSs are focusing on how to internally solve the problem [6][33][36].

In March 2018, the users' main reaction was to delete their Facebook accounts and an active hashtag (#DeleteFacebook) was created on Twitter to support their campaign. This hashtag was mentioned more than 40000 times and some people decided to switch to Twitter or Instagram [28]. In addition, there were points of view questioning whether deleting Facebook is the right step toward protecting the user data since companies such as Instagram and WhatsApp are still owned by Facebook [44]. Guessoum [27] indicated that deleting a Facebook account is not the right decision and there should be debates between SNSs and users regarding how their data is being collected. The users should also take into consideration the protection of their personal data. Likewise, it has been found that deleting a Facebook account does not solve the issue of privacy; instead, the users should participate in discussions to establish new regulations [70]. Unless SNSs attempt to enhance

transparency about their systems and inform the users about their use of data, people will still have doubts about SNSs intentions to protect their privacy [4].

Mark Zuckerberg clarified most of the issues related to the Cambridge Analytica dilemma as well as how Facebook works in his US Congress testimony. One of the key points that the senators concentrated on in the testimony is ensuring that the users are properly informed and able to understand and change their settings and the inline feature controls (i.e. controls that are included along with each activity such as allowing specific people to see a particular post; these controls are not merged in the main settings page). Apparently, Mark Zuckerberg assumes that people know about the settings and the inline feature controls and how to use them because the instructions are provided in plain English that people can understand. However, he − in response to a different question − admitted that in some areas there are controls that are not working. He also mentioned that SNSs are responsible for providing users with plain information that enhances their ability to properly consent to the use of information. In fact, a message that was clearly emphasized in the testimony is that data privacy should be tethered to SNS users' needs and expectations. In sum, even though SNSs such as Facebook, Snapchat, Twitter, and Google should get together and establish privacy regulations, the users should go to the settings pages to understand and change the settings in accordance with their preferences.

1.2 Problem Statement

A lack of understanding of how to find and change the SNS settings, inline feature controls, and new updates influence users' privacy attitudes and behaviours. Firstly, the lack of understanding of SNS settings and inline feature controls increased user apprehensions regarding their ability to comprehend and to make proper decisions that ensure the desired level of privacy. It is essential to enhance users' understanding and awareness of the settings' terminologies, descriptions, and functions. Improving users' knowledge about the settings' meanings would help the users to determine and anticipate the outcomes when changing the settings. It will also assist them to overcome the complexity and confusion associated with the settings and inline feature controls.

Secondly, SNS users tend to disclose more factual and sensitive information without applying access restrictions. The lack of ability to change or control of SNS settings and inline feature controls have forced the users to establish various interpersonal privacy

boundaries or coping mechanisms. The users would create various boundaries to manage and control their accounts and profiles instead of using the default settings and inline feature controls. Thus, there is still a need for mechanisms or tools that can assist SNS users to enhance their performance when configuring the settings and inline feature controls.

Lastly, SNSs update their settings and inline feature controls. If SNS users are not able to understand and change the new updates, users' privacy attitudes and behaviours toward the settings would be negatively influenced. For instance, SNSs tend to send enormous numbers of updates whether inside SNSs, such as warning messages and notifications, or outside SNSs, via Email. Although SNS users showed that they are concerned about their privacy settings, they would not check the new updates or apply them. Thus, SNS users should be instantaneously and properly notified about any changes to a particular setting or inline feature control. Notifying the users about new updated settings and inline controls as well as assisting them to understand and change their settings would ensure proper and accurate outcomes.

1.3 Objectives and Research Questions

Motivated by the above observations, the main research objectives of this thesis are: discovering the factors that impact the user learning process and behaviours when using SNS settings and inline feature controls; designing guidelines that can help the designers to facilitate SNS settings and inline feature controls; and designing, implementing, and testing an application – based on the obtained guidelines − that can assist users to easily learn about and confidently apply the SNS settings and inline feature controls.

In this thesis, a novel model called the Privacy Settings Model (PSM) is derived. The model would help SNS users to learn about SNS settings and inline feature controls (i.e., understand and change the settings as well as find the new updates, the PSM components). Furthermore, users' concerns and the factors that influence users' learning and behaviours of SNS settings and inline feature controls according to the PSM components is investigated. I also aim to find the design guidelines that can help in the design of usable SNS settings and inline feature controls. Consequently, a mixed method study (exploratory sequential design) to achieve the following objectives was conducted:

- ***Phase1: Qualitative Study Objectives***
    - Examine SNS users' concerns over SNS settings and inline feature controls according to the PSM components.
    - Identify the factors that impact SNS users' performance over SNS settings and inline feature controls according to the PSM components.
- ***Phase2: Quantitative Study Objectives***
    - Validate the obtained factors that impact SNS users' performance over SNS settings and inline feature controls according to the PSM components.
    - Derive significant design guidelines or considerations for SNS settings that can help in enhancing users' behaviour.
- ***Phase 3: Proof of Concept***

The obtained factors and guidelines of Phase 1 and Phase 2 were both considered to design the proof of concept application. In Phase 3, the PrivSet application, a website that can help SNS users to understand and change the settings, and find new updates based on features, such as posting, sharing, ads, location, and apps was designed and implemented. Next, the usability of the PrivSet application was evaluated. First, I used a usability testing approach to evaluate the tool's efficiency (time to complete the tasks) and effectiveness (the successful completion of the tasks). The participants were asked to perform five tasks in Facebook, Twitter, and Instagram settings without using the PrivSet application and then to perform the same tasks after using the PrivSet application. Second, I conducted a post-task questionnaire to measure the perceived usefulness and ease of use of the PrivSet application. Eventually, I conducted semi-structured interviews to examine the strength and weakness of the PrivSet application. The following research questions were formulated to guide the study:

- ***RQ1:*** *To what extent is the PrivSet application efficient in terms of time spent to complete the tasks in comparison to the users' current experience?*
- ***RQ2:*** *To what extent is the PrivSet application effective in terms of successfully completing the tasks with the least number of errors in comparison to the users' current experience?*
- ***RQ3:*** *How do SNS users perceive the usefulness of the PrivSet application in comparison to the users' current experience?*

- ***RQ4:*** *How do SNS users perceive the ease of use of the PrivSet application in comparison to the users' current experience?*
- ***RQ5:*** *What are the strengths and weaknesses of the PrivSet application from the users' points of view?*

1.4 Research Contributions

This thesis contributes to the field of privacy behaviours in social networking sites and design of tools that assist SNS users to understand and change the settings and inline feature controls, as well as finding new updates. Precisely, this thesis makes four contributions: obtaining validated factors that influence SNS users' learning and behaviours regarding settings and inline feature controls; deriving design guidelines that can help in the design of usable SNS settings; designing and implementing an application (PrivSet) to manage SNS settings and inline feature controls; and conducting a usability testing study to evaluate the PrivSet application in comparison to the actual settings.

1.4.1 Obtaining Validated Factors

In this thesis, a mixed-method approach was conducted to explore users' concerns about privacy settings and the factors that impact users when learning and applying a particular privacy setting or inline feature controls. Firstly, a qualitative study was conducted to explore the concerns and factors associated with SNS privacy settings. I used thematic analysis to obtain themes (factors) that reveal users' concerns and behaviours toward privacy settings and inline feature controls according to the PSM components. Secondly, I conducted a large-scale quantitative study to validate the obtained factors that impact SNS users' behaviours. Also, I utilized a hypothesis testing approach to verify the obtained factors in Phase 1, and the findings of Phase 2 essentially proved that SNS users are influenced by these factors.

1.4.2 Deriving Design Guidelines

Based on the findings in Phase 1 and Phase 2, I derived a set of design guidelines and considerations that can help designers facilitate user understanding of the settings. The design guidelines are simplifying the paths and steps when navigating through the settings; designing the settings or tools based on the provided features; providing all possible features, SNSs, options, and platforms on separate pages; avoiding the use of distracting

icons or links (e.g., “learn more” links) buried under the texts; preparing informative and attractive notifications of the new updates; using SNS help centre information to provide trusted and accurate information; including visual content to assist users to follow the process while understanding and changing the settings; displaying the expected outcomes after understanding and changing the settings and inline feature controls; and declaring full information (e.g. the last date and time) about the settings’ updates that users desired to control.

1.4.3 Designing and Implementing the PrivSet Application

In general, online privacy applications concentrated on educating users about current privacy issues. However, tools or applications that can assist SNS users to understand and change the settings and inline features’ controls as well as find new updates are limited. In this thesis, I designed and implemented the PrivSet application to help SNS users properly manage and confidently configure SNS settings and inline feature controls based on the obtained guidelines and the PSM components. The application utilized a feature-based approach. That is it did not focus on the category of setting (Account, Privacy, Security, etc.), but rather on the type of feature (Tags, Posts, Locations, Apps, etc.), which allowed the participants to begin properly when attempting to understand and change the settings and inline feature controls.

1.4.4 Conducting Usability Testing Study of the PrivSet Application

The usability evaluations of the tools that assist SNS users to control their settings are limited in comparison to the studies conducted on the actual settings. In this thesis, I simultaneously tested the usability of the PrivSet application and the actual settings to evaluate the efficiency (time to complete the tasks), effectiveness (the successful completion of the tasks), usefulness, and ease of use. The usability testing study findings verified that using applications such as PrivSet would enhance SNS users’ ability to manage the settings and inline feature controls.

1.5 Organizational Overview

The research comprised three major phases. The thesis is organized to reflect this flow. Chapter 2 presents the previous work on online privacy; the privacy paradox in SNSs; SNS users’ interpersonal privacy boundary management; SNS users’ behaviours toward privacy

settings; and interfaces and simulators of privacy settings. Chapter 3 illustrates the proposed model (PSM) and its components. It also provides an overview of the mixed-method research and the reasons for choosing this method. Chapter 4 presents the first phase of the mixed method which is the qualitative study. Chapter 5 presents the second phase of the mixed method which is the quantitative study. Chapter 6 interprets the overall results of the mixed method and also develops design guidelines based on the results. Chapter 7 presents the design, implementation, and evaluation of the PrivSet application. I then used a usability testing approach to evaluate the efficiency and effectiveness of the application. I also conducted a post-task questionnaire to measure the perceived usefulness and ease of use of the application. Lastly, I conducted a semi-structured interview to examine the strengths and weaknesses of the application. Chapter 8 concludes the thesis with the research summary, contributions, limitations, and future work.

Chapter 2 Literature Review

Encouraging and guiding SNS users to learn about and manage settings and inline features controls is a largely unstudied area, though it does build upon research from several domains including online privacy, the privacy paradox in SNSs, SNS users' interpersonal privacy boundary management, SNS users' behaviours toward privacy settings, and interfaces and simulators of privacy settings. In this chapter, I describe the previous research, contributions, and limitations in these areas.

2.1 Online Privacy

Online users often utilize applications to share information without considering the consequences and are later astonished when they have to deal with the results of their behaviours. Exploring users' online privacy behaviours may assist designers in creating secure applications and enhancing users' privacy behaviours. Gambino et al. [24] conducted in-depth semi-structured focus groups to explore online privacy behaviours and the reasons behind them. The researchers concentrated on six major topics: general privacy and security, e-commerce, cloud services, online messaging, and SNSs. During the focus group sessions, the participants' first impressions regarding their online privacy behaviours were complete disbelief and only became worse when they investigated further. For instance, one participant assumed that the lock icon in the browser address bar usually indicates good security is being provided; however, when discussing safety issues, the lock icon is meaningless. User decisions and privacy attitudes (e.g. quick, in-the-moment, non-systematic judgments) have not been altered, whereas the heuristic users employed encouraged them to either disclose less or more information. Furthermore, the investigators discovered eight heuristic themes (four positive heuristics and four negative heuristics) that users applied when revealing or concealing information.

Positive Heuristics

The following four heuristics elucidated the rationales that induce users to reveal information in an online context.

- ***Gatekeeping Heuristic:*** The users were inclined to prefer a system that includes layers because it shows the stages they can use to safeguard their information.

Nevertheless, the users rapidly became irritated if the system demanded periodic log-ins such as on Facebook.

- ***Safety Net Heuristic:*** The users specified that third-party companies such as Visa, PayPal, or Apple are trusted companies that mitigate the risks of exposing their personal information.
- ***Bubble Heuristic:*** This heuristic signifies the strategies that users apply such as using private features or networks. The users relied on features or places that provide a high level of privacy and security. For instance, users utilized incognito or private modes in browsers, which may provide activity protection. Likewise, other users trust home networks, thus they would share personal information at home instead of using public networks such as coffee shops' networks.
- ***Ephemerality Heuristic:*** The users preferred using applications (e.g. Snapchat) that allow them to share temporary content without accumulation. Remarkably, this approach encouraged users to be more accessible and reveal more content.

Negative Heuristics

The following four heuristics explained the rationales that prevent users from disclosing information in an online context.

- ***Fuzzy-boundary Heuristic:*** This denoted that the users do not trust companies because they may share their information with other third-party platforms without their consent. For instance, Facebook may seize users' information to provide specific advertisements for other organizations. To decrease these negative impressions, firms can perform data minimization instead of storing users' data. Data minimization allows the storing of specific or necessary content and helps users to show their privacy concerns.
- ***Intrusiveness Heuristic:*** This designated that the users do not trust companies because they send emails, requests, notifications, and advertisements that disturb them, which led to the hindering of sharing of information and questioning the integrity of the application.
- ***Uncertainty heuristic:*** Users' lack of understanding of the online systems or applications increased users' apprehension regarding the disclosure of their information.

- ***Mobility heuristic:*** This heuristic signified that devices that can be carried around may be easily targeted (e.g. phones can be easily stolen).

In sum, the findings confirmed that users usually perform their activities online without considering the consequences and are astonished when they have to deal with the results of their behaviours. Studying and analyzing these heuristics may assist designers in providing secure applications and enhancing users' privacy behaviours.

Further, online users usually differentiate between the types of information that can be revealed or concealed. Taddicken [65] conducted an online survey to examine the self-disclosure of personal information, online privacy concerns related to self-disclosure, the importance of social relevance, the number of social web applications used, the general willingness related to self-disclosure, and how age and gender are related to self-disclosure. In this study, Taddicken evaluated various Internet applications (Social Web applications) such as SNSs, blogs, wikis, and platforms that provide photos and video sharing options. She also analyzed the data using path models to explain the dependencies between the discovered variables and then confirm or reject the hypotheses. The researcher began to identify what personal information social web users revealed by performing an exploratory factor analysis. Although the majority of social web users revealed their first names and email addresses, this information was not taken into consideration in this analysis because it is required when creating accounts in social web applications. Two major factors were discovered: *sensitive information* and *personal information*. Personal or factual information included last names, birth dates, professions, and mailing addresses and 55% of the participants admitted that they have exposed this information at least once. However, sensitive information involves photos, personal experiences, thoughts, feelings, and fears and concerns. The findings showed that a large number of social web users revealed this information. The most commonly exposed information was photos (67.5% of social web users) and almost half of them did not apply access restrictions to their photos. Furthermore, the investigator predicted that social web users' privacy concerns have no direct influence on users' public self-disclosure. The results confirmed that the path coefficients are not significant between privacy concerns and self-disclosure, whereas influence may occur via other factors such as social relevance. Taddicken also found that previous researches indicated a strong relationship between social relevance and social web

users' privacy concerns as well as self-disclosure. Thus, she assumed that online privacy concerns are positively related to the significance of social relevance. In addition, the significance of social relevance is positively related to self-disclosure in the social web. The findings proved that the path coefficients of both assumptions were significant and social web users revealed more sensitive information when their close circles (friends and acquaintances) were involved. The high social relevance also encouraged social web users to share more personal information with open access to allow others to find them in social web applications.

In terms of the number of applications used, the more social web users are concerned about privacy, the fewer social web applications they use. However, users tend to disclose more factual and sensitive information when they use fewer social web applications. They do not also consider open or restricted access when they reveal this information, which indicates that the users are usually concentrated on friends and family circles. In terms of general willingness to engage in self-disclosure, the path coefficient indices revealed that a user's general willingness to disclose restricted sensitive information is correlated to actual self-disclosure in the social web. Further, social web users who are generally willing to reveal information are not completely concerned about online privacy. In terms of the influence of each, the results showed that age has no major effects on social web users' privacy concerns and self-disclosure. However, female users' privacy concerns and general willingness have an evident impact on self-disclosure.

In general, the study emphasized that it is significant to distinguish between personal and sensitive information and how social web users control this information in terms of applying open or strict restrictions. When social web applications required personal information, the users usually entered real and accurate personal information. In addition, the study demonstrated that the self-disclosure of sensitive information such as photos, experiences, and feelings was widespread. When social web users consider social relevance (usually friends and acquaintances) as significant, they concentrate on using particular social applications and release more personal and sensitive information. Users resist the encouragement of social web applications to share more personal and sensitive information unless they are generally willing to disclose it. The researcher eventually emphasized that

social web users – all ages and genders – should be aware of and educated about online privacy.

Privacy education is essential to overcoming online privacy obstacles such as a lack of understanding and insufficient content. Egelman et al. [21] established the Teaching Privacy Project (TPP) [66] which assists people in learning about online privacy matters, gaining knowledge from adequate information, and applying proper mechanisms to solve online privacy issues. The developers tested the TPP curriculum in a university course to assess the enhancement of students' privacy behaviours. High school teachers participated in this course to improve their knowledge about privacy and to be more confident when applying privacy concepts in high school classrooms. Two identical online surveys were conducted before and after the university course to detect the changes in the collected data. In TPP, the researchers involved ten principles (Appendix A) of online privacy in the curriculum to demonstrate privacy risks and the strategies that can be followed for mitigation. The findings showed that the curriculum is effective because students intended to constantly manage their personal information and observe how their information is going to be interpreted by others. Furthermore, the curriculum assisted the students in increasingly comprehending privacy policies that are being sent from various companies. The main contribution of this study is that educating users about online privacy and integrating the ten principles in schools' curricula would gradually enhance students' knowledge regarding online privacy matters.

2.2 Privacy Paradox in SNS

Various factors might impact SNS users' privacy consciously or unconsciously. These factors also differ based on numerous causes such as the experience of other users and social norms. Spottswood and Hancock [56] conducted two usability testing studies to investigate how explicit cues and implicit cues (surveillance primes) influence SNS users when they disclose their information and attempt to protect their privacy in SNSs. The researchers defined and presented the explicit cues as histograms that included how frequently other users share their information (e.g. high or low disclosure of information). In both studies, the histograms were included in the profile and privacy settings to show the results of others who disclosed their information or changed their privacy settings. In contrast, an implicit cue or surveillance prime is a fixed image placed in the SNS navigation

bar or header to show the users that they are constantly observed, which will encourage SNS users to support prosocial behaviour such as being kind, honest, generous, or moral. It can influence SNS users' behaviour without their being totally aware of it. The researchers utilized a new SNS that was developed by their university to test the participants' performance when filling out a profile and selecting privacy settings. They designed and implemented the new SNS to match an actual SNS's features and settings. In Study 1, the explicit cues and surveillance prime were placed in the profile page, and the participants filled out the profile information and then selected privacy settings. However, in Study 2, the explicit cues and surveillance prime were placed in the privacy settings page and the participants first selected privacy settings and then filled out the profile information. The participants also completed a survey after finishing both studies.

In Study 1, the investigators hypothesized that the explicit cues (histograms) that present high disclosure rates of other users would increase the disclosure frequency of the newcomers and the explicit cues that present low disclosure rates of other users would decrease the disclosure frequency of the newcomers. Moreover, they hypothesized that the surveillance prime (the fixed image) would increase disclosure frequency and accuracy in comparison to when the image is not included. After collecting the data in Study 1, the researchers analyzed if the entered information is accurate or inaccurate and if the selected privacy settings make the user's account private. The findings proved that the explicit cues and surveillance prime in study 1 affected disclosure frequency and accuracy in SNSs, which promotes prosocial communication in SNSs. In Study 2, the researchers investigated how SNS users' privacy settings choices (strict or open privacy settings) and disclosure behaviour are influenced by the explicit cues and surveillance prime. They hypothesized that the explicit cues (histograms) that show how other users applied strict privacy settings will increase the use of strict privacy settings by the newcomers. In addition, the explicit cues (histograms) that show how other users applied open privacy settings will increase the use of open privacy settings by the newcomers. They also predict that the implicit cue or the surveillance prime (the fixed image) will increase the open privacy settings in comparison to when the image is not included. They also expect that selecting privacy settings before filling out the profile information reveals more information than configuring the privacy settings after completing the profile information. After collecting the data in

study 2, the researchers analyzed if the configured privacy settings are strict or open and how frequently and accurately the users revealed information. The results confirmed that the explicit cues or the histograms influenced users' decisions when applying strict or open privacy settings. However, the surveillance prime did not influence the users' decisions when selecting strict or open privacy settings.

Generally, the outcomes showed that new users in SNSs learn about privacy norms in SNSs when including explicit cues about other users' activities regarding the disclosure of information and privacy settings configuration. For instance, if the newcomers noticed that the majority of SNS users entered their phone number in the profile, they will most likely expect that they should provide their phone number in their profile. Remarkably, SNS users would perform behaviours (social norms) to gain others' approval and it may become a rule that other users who do not follow the SNS's norms may get punished. The researchers indicated that there is a need for further research to investigate how SNS users who do not follow explicit cues get sanctioned only because they did not follow the expected social norms in SNSs. Furthermore, the surveillance prime (unconscious cue) influenced users' behaviour by increasing the disclosure of information, whereas the effects of these cues were weak in privacy settings selection. Thus, the researchers recommended conducting further studies about the unconscious factors that increase the disclosure of information and that such research is essential because users need to properly safeguard their personal information in SNSs.

In contrast, the founder of Facebook, Mark Zuckerberg, declared that "Privacy is no longer a social norm" since Internet users are willing to exhibit more information to others [30]. This declaration provoked researchers to clarify if privacy is still a concern to SNS users and how SNSs should enhance their privacy settings instead of forcing their users to disclose more information. Hence, Blank et al. [2] concentrated on proving that younger SNS users are more concerned with privacy than older users. In addition, they showed that SNSs became involved in their users' lives to share more information while providing insufficient privacy controls. The researchers investigated the relationship between age and privacy by gathering data on British Internet users and non-users based on the Oxford Internet Survey (OxIS). The participants were asked questions regarding their daily activities on SNSs and risks that might occur while using SNSs. In addition, the participants

were asked about having a profile and personally checking and changing privacy settings, considering whether the disclosure of personal information is hazardous and may affect privacy decisions, encountering bad experiences, and being apprehensive about negative experiences. The findings indicated that the median age of participants who never check privacy settings was 43; however, the median age of participants who check privacy settings every day was 26. Thereby, any claim that young SNS users do not pay attention to their privacy is inaccurate. Furthermore, the results showed that young SNS users (95% of those 14-17 years old) tended to check and change the settings to safeguard their privacy in SNSs in contrast to older SNS users (32.5% of those 65 years old and over). The extent of the difference between the two age groups in terms of protecting privacy in SNSs is remarkable at more than 62 percentage points. The researchers debated these findings and discussed the possible reasons for obtaining such significant outcomes. For instance, they justified that younger SNS users were able to control their privacy settings because they are more comfortable and familiar with using the Internet than elder users. Likewise, a sociological theory of privacy is developed to clarify how privacy is originated in SNSs and why it is important. The social structure that establishes the context of privacy is comprised of people, experiences, and purposes. Each SNS user is the center of social circles that consist of other users, whether they have a strong relationship (e.g. family) or causal relationship such as friends in school. Moreover, the shared information is usually diverse in the circles because what is appropriate in a circle might not be suitable in another circle. To illustrate this, SNS users may share information about their health with their family, whereas this information will not be shared with friends in school or workmates. Consequently, privacy was impacted by the circle or social context and SNSs should assure that their users are skilled in controlling their privacy properly. On the other hand, privacy is not restricted to a single domain (e.g. interpersonal); instead, it is involved in institutional domains such as corporations and governments. In corporations, SNS users may impact their reputation by sharing inappropriate content on their SNSs, which leads to not being employed or in the worst case being fired from a job. In governments, SNSs encourage their users to share more content, which includes personal information and governments do not need to expend effort on surveillance. Examples of information that can be collected by governments include who SNS users are communicating with and what types of

information are being shared or stored. Therefore, privacy usually occurs in different circles (i.e. interpersonal, corporations, or governments) and is not restricted to one circle. When applying the sociological theory to younger SNS users, the researchers anticipated that younger users would be more anxious about privacy than older users. The younger users usually start with one circle (e.g. family or friends) and throughout their life stages they may include more circles, which increases privacy risks. In sum, the researchers deduced that there is a new privacy paradox in that social connections and communication are mostly carried out online and SNS users do not have the proper mechanisms or tools to assist them in controlling their privacy, especially inside SNSs.

2.3 SNS Users' Interpersonal Privacy Boundary Management

Understanding how SNS users manage features and settings in SNSs can aid in identifying various methods to use to enhance privacy behaviours. Vitak et al. [71] conducted a qualitative study to investigate the privacy strategies applied by Facebook users to manage their audiences. They identified four categories that Facebook users employ to control their audience: network-based control, platform-based control, content-based control, and multiple profiles as a control. In network-based control, the users employed the site's tools to reject unknown friend requests, defriend, or block. Likewise, the users tended to hide friends instead of unfriending them, although the hiding mechanism does not prevent the audience from viewing the content. In platform-based control, the users controlled the audience through the provided privacy settings. In this category, the users considered the most limited option, which is "Friends Only" and then created friends lists inside their friends circle. In content-based control, the users attempted to manage their information disclosures via self-censorship. They determined to deliberate self-reflection when sharing personal data with their audience in order to avoid "context collapse". To illustrate this, the users take into consideration reflections of past activities on SNSs that might affect their future. As a result, they resolved such concerns by utilizing external and private features or methods such as private messages, chat, or phone calls. In multiple profiles as a form of control, a few users created various SNSs accounts or separate profiles in the same account to divide the audience based on their relationship. This strategy was not effective because it requires resources and time. In this paper, the users obviously struggled to adapt to

privacy strategies on Facebook. Thus, there is still a need for tools that can assist SNS users to enhance their performance when employing privacy strategies.

Wisniewski et al. [77] leveraged common features in five different SNSs (Facebook, Myspace, LinkedIn, Hi5, and Ning) for interpersonal boundaries regulation. They conducted a qualitative study using semi-structured interviews to investigate how SNS users control the provided tools or features such as friending and unfriending and censor their personal information disclosure. They identified five categories comprised of ten different types of interpersonal boundaries to control privacy preferences. The five categories include disclosure, relationship, network, territorial, and interactional privacy boundaries. The ***disclosure boundary*** is a mechanism that is utilized to avoid disclosing private information and consists of two interpersonal boundaries: self-disclosure (employing the provided privacy settings to manage their own profiles) and confidant-disclosure boundaries (controlling the type of information that can be shared and who – from the audience – can view the shared information). The users were not confident about their ability to use the privacy settings properly and they indicated a lack of understanding about the settings. The ***relationship boundary*** comprises relationship-connection and relationship-context boundaries. The relationship-connection boundary is a strategy employed by SNS users to manage the membership in the network and the type of content allowed to be disclosed based on the member's relationship. For example, users' interactions with family members differed considerably from that of strangers. The researchers found that the users accept friends most easily, but it became a challenge to remove them. Thus, the relationship-connection boundary is not effectively employed to control interpersonal boundaries. In addition, when users decided to use friends or group lists – in the relationship-context boundary – to manage their interactions, they had difficulties properly creating and categorizing the lists. The ***network boundary*** is a mechanism used to limit the interactions between members or friends. It consists of network-discovery boundaries (controlling SNS users – in other profiles – from requesting a friendship or interactions with other members or friends) and network-intersection boundaries (managing the communications between members of the same profile or network). All SNSs do not provide a feature for fully preventing the discovery of others in different profiles or networks. Also, a feature that is only provided by Facebook permits

friends lists or groups to partially allow interactions between members of a profile. The results showed that the users are more concerned about the network-intersection than the network-discovery boundaries because of disputes between members and the lack of control of the lists. The ***territorial boundaries*** are employed to personalize SNSs' activities and content. They are comprised of inward-facing boundaries (managing the incoming content from members or friends such as photos, videos, and links in spaces such as "News Feeds" in Facebook) and outward-facing boundaries (managing the content posted on the timeline or wall). For example, users have options they can leverage such as filtering and hiding posted content. Interestingly, most of the users found these boundaries not significant and saw them as a waste of time to control, thus they instead created coping mechanisms such as skimming or ignoring content. The lack of control when using the boundaries and the lack of awareness of the audience's reaction also caused frustration with the boundary management processes. Lastly, ***interactional privacy boundaries*** are mechanisms that completely prevent connection and communication with oneself or others such as disabling features or blocking members. A lack of awareness about such features and controls limits the use of these interactional privacy boundaries. Overall, the researchers suggested more explorations of the challenges discovered in this study such as a lack of awareness of features and difficult-to-use controls or settings in order to enhance SNS users' abilities to manage their interpersonal privacy boundaries.

Wisniewski et al. [78] concentrated on two aspects of SNSs' privacy, which are *privacy behaviours* and *features awareness*. The privacy behaviours are mechanisms (i.e. features or settings provided by Facebook such as friending, unfriending, or changing the timeline/wall) that Facebook users employ for controlling interpersonal information boundaries. However, feature awareness is Facebook users' ability to recognize the existence of Facebook's features and know the features' functions and outcomes. In the privacy behaviours, the results showed that the users often change the privacy settings of the News Feed more than altering the posts in Timeline/Wall. The users also created friends lists to manage information disclosure, whereas the use of these lists was minimal. Remarkably, the users exhibited diverse behavioural patterns. For instance, the users who frequently leverage friends lists disclosed their basic and contact information. In contrast, the users who censor their personal information disclosure infrequently employed existing

features such as friends lists. In feature awareness, the results indicated that the users do not understand and utilize all the provided features; instead, they tended to learn the basic features and postpone the advanced features. To assure the full benefits of the provided features are gained and to enhance privacy behaviours, the researcher suggested improving the design of the layout or the way Facebook delivers features and settings. Firstly, Facebook should capitalize on privacy synergies. To illustrate this, grouping Facebook features and settings according to the privacy functionality would simultaneously enhance privacy behavior and feature awareness. Secondly, Facebook should manage awareness. For instance, Facebook can reassess the features or settings that are not frequently employed by users and redesign them as well as increase users' awareness about the existing features or settings. The results proved that there is a link between privacy behavior and feature awareness and users who know about a feature are more likely to employ it. Lastly, Facebook can personalize privacy education, specifically with regard to the settings or features that users want. For example, Facebook provides a "Privacy Checkup" as a shortcut to privacy settings, but this should be based on features users prefer instead of general settings.

Wisniewski et al. [79] conducted semi-structured interviews to examine how SNS users control their interactions such as friending, defriending, and conflicts with other users. The researchers found that the users developed defensive and offensive coping mechanisms to manage interpersonal boundaries such as filtering, ignoring, blocking, withdrawal, aggression, compliance, and compromise. ***Filtering*** is a defensive mechanism that SNS users leverage to make a decision to accept or deny others' requests. For instance, SNS users may decide to accept or deny a friend request based on the person's profile picture. They often will accept the request if they know the person who requests a friendship; otherwise, they will reject the request. In addition, some users preferred to have separate profiles or accounts to divide friends between them based on the level of their relationship. For example, the SNS users would have a profile or an account for intimate friends and another profile or account for coworkers. Another type of filtering occurred when users accepted friendship based on the SNS itself. To illustrate this, SNS users would accept certain friends on Facebook, but may deny the same people in LinkedIn. Using filtering as a coping mechanism impacted users' awareness of the filtering mechanisms that are

provided inside the SNSs. It also forced the users to specify a time to control these filtering mechanisms. ***Ignoring*** is another defensive coping mechanism that SNS users employ to avoid checking overwhelming received content or interactions. For instance, the SNS users will sometimes skim or ignore received content because it is either disturbing or excessive. ***Blocking*** is also a defensive coping mechanism that SNS users utilize to hide their identity when connected to SNSs. For example, SNS users would use pseudonyms instead of using real names or connect to SNSs via others' accounts such as a wife or husband's account. This way of connection does not show the user's identity and blocks interactions between each other. Another coping mechanism that users consider when controlling their own behaviours is ***withdrawal***. The users may withdraw to avoid risks via self-censorship or detachment and retreat. They censor sharing activities that might be used against them in the future, thus they may only share positive content and avoid involvement in conflicts between others. A different group of users detaches and retreats by not accessing their accounts or by entirely deactivating their accounts. On the other hand, ***aggression*** is an offensive coping mechanism that users intentionally adopt to threaten other users who may cause harm or to force others to pay attention to their social interactions. The SNS users utilized the "status update" in SNS profiles to either cause conflicts or seek sympathy from others. For instance, a user changed the visibility of his profile to Friends of Friends to punish his ex-girlfriend because she broke up with him. Another example is generating dialogue about topics that may cause disputes such as politics or religion. ***Compliance*** is a coping mechanism that SNS users leverage to avoid disputes or risks by satisfying others' requests. For instance, users would accept all friends' requests without considering the unfriending option. This coping mechanism may lead to a serious issue, which is the inability to control the interactions in SNSs. Lastly, ***compromise*** is a coping mechanism that usually occurs outside SNSs by using email messages, phone calls, or face-to-face conversation. It is employed to either decide upon a new activity such as tagging a friend in a photo after getting permission or disagreeing about an activity that has already been published. In general, SNS users adopt various ways to mitigate risks by negotiating with others to solve an issue in SNSs. In addition, SNSs do not react quickly to accommodate their users' needs.

Lampinen et al. [40] investigated SNS users' concerns regarding online information disclosure and how they cope with this issue individually and collaboratively. They conducted qualitative interviews to discuss users' experiences when publishing their content and the strategies they follow or consider using to protect this published information. In addition, they conducted focus groups to broadly clarify the findings discovered in the interviews. They found that SNS users are not usually aware of all the friends in their accounts. Meanwhile, they are not able to predict how their friends will interpret their comments or shared content. Therefore, the users are still concerned about their privacy and how to compromisingly keep their relationships with others positive. The researchers also discovered that SNS users depend on trusting other members and expect that they will behave. For instance, the users indicated that their friends might post a negative comment about them but will do so without indicating their names. The interpretation of this comment can be different from one person to another and the outcomes of the comment depend on how it is comprehended. Furthermore, SNS users' concerns might be increased if the published or shared content is not appropriate because of cultural or generational differences. As a result, the users indicated that it is important to be careful when publishing content, even though it is hard to know when to be careful. Further, the SNS users leveraged preventive and corrective strategies to protect their privacy while ensuring that their relationships with their friends are not affected. The preventive strategies included targeted sharing with different audiences, deciding not to publish and ensuring collaborative negotiation, and controlling offline behaviour. The first preventive strategy concentrated on assuring that shared content will be received and checked by the right audience. For instance, shared content can be sent via private messages. Another example is sharing particular content with friends and family in their native country and other content with friends in the current country of residence. The second preventive strategy focused on how SNS users compromisingly generate a rule with their friends to not publish content that might cause issues. Instead, the users assumed that their friends should realize that the content may or may not cause a problem. The last preventive strategy mainly avoids sharing content that might be difficult to control once it is public. SNS users found it beneficial to limit their actions offline, so that they will not be forced later to compromise disturbing shared content. In contrast, corrective strategies

included deleting content and interpreting content to be non-serious. There are ways to compromise or reconsider when controlling undesired situations. The first corrective strategy is to either delete the unwanted content or ask others to delete that content in case it was published on their account such as being tagged in a photo on Facebook. If SNS users were not able to delete the content and the negotiation with others failed, they would report the unsuitable content and request that the content be deleted. The second corrective strategy is to consider the inappropriate content published by others as non-serious. The users actually found that this unsuitable content would not affect their reputation; instead, it affected the one who published it. However, there are weaknesses in applying corrective strategies. First, the corrective strategies might not be beneficial because there is a chance that others have already seen the inappropriate content. Moreover, taking action to correct the negative situation may emphasize that an issue has occurred. Also, taking action to correct an inappropriate situation may confirm that there was a failure to control the situation from the beginning. In general, the lack of tools that can assist users to control information disclosures in SNSs forces users to create coping mechanisms or strategies, whether individually or collaboratively.

Zurita and Pombar [83] conducted a systematic literature review (Neuman's guidance) regarding how teenagers' privacy behaviours are impacted on social media and specified recommendations for parents, education systems, and SNSs to enhance teenagers' privacy protection. The researchers found that there are two types of teenagers' behaviours toward risks, which are privacy risk-taking behaviours and privacy risk-coping behaviours. The privacy risk-taking behaviours include basic information disclosures (photos, full name, date of birth, and relationship status), sensitive information disclosures (personal videos, mobile number, and email address), and risk interactions (interactions with foreigners or publishing one's location). However, the privacy risk-coping behaviours involve advice-seeking behavior (request advice about what to share) and remedy/corrective behaviours (elucidate and solve the problems). Furthermore, teenagers' behaviours on SNSs are influenced by fundamental factors such as recognition of privacy's significance, perception of their capabilities to achieve a level of protection, learning from past bad experiences, establishing safe environments, and gender. If teenagers understand the importance of privacy and become self-confident about managing privacy settings, they will be more

likely to practice safer behaviours. Moreover, learning from past bad experiences and paying attention to parents, teachers, and peers' advice will assist teenagers in enhancing their privacy behaviours. The researcher found that the female teenagers perceived the significance of privacy as greater than the male teenagers, thus gender is an essential factor that influences teenagers' privacy behaviours. The teenagers and their parents apply coping mechanisms to safeguard the teenagers' privacy. The coping strategies that teenagers employ consisted of two dimensions: structural and social strategies. In structural strategies, they leverage features such as blocking and deleting to prevent inappropriate content. They also use different social contexts such as using Facebook for personal connections and Twitter for the public. In social strategies, the teenagers post content that is not clear to all their audiences, and only the targeted audience understands the meaning of the posted content. However, the coping strategies the parents use are either direct parental intervention (preventive) or active personal mediation (reactive). The direct parental intervention includes reading the teenagers' messages and controlling their privacy settings, while the active personal mediation focuses on educating the teenagers about privacy behaviour such as only sharing suitable content. Eventually, the researcher recommended the teenagers, parents, and SNSs to focus on three significant categories that would enhance the teenagers' behaviours. The first category is improving the teenagers' education via developing programs that can enhance their behaviours to safeguard their privacy such as offering clear information about current privacy threats and comparing it with previous bad experiences. The second category is including the parents, teachers, and peers in the education process about privacy. For instance, they can show the teenagers how to acquire knowledge about privacy and then how to employ effective mechanisms to enhance their privacy. However, the parents should take into consideration finding a balance between directive intervention and active mediation in their parental strategies. The last category is the importance of designing and implementing software and leveraging the new technologies to enhance teenagers' privacy. For example, SNSs should create an innovative environment such as monitoring software (tools to block or delete inappropriate content or alarms to display possible threats) to show that teenagers at this stage of life are safe by default.

SNSs frequently update their settings and features and the new updates may positively or negatively influence users' performance in these SNSs. Wisniewski et al. [80] investigated users' approaches to adapt to new updates of SNS interfaces, specifically Facebook Timeline changes. They qualitatively examined users' comments published on Facebook between September 2011 and April 2012. The researchers concentrated on how the alteration of the Facebook Timeline impacted the users (Primary Appraisal) and what the users could do about the new changes (Secondary Appraisal). The results showed that the majority of the users were affected by the new changes to Facebook Timeline and that these changes increased users' stress and anxiety. For instance, the users had reduced familiarity and demanded to bring back the old Timeline. The users indicated that they do not want to use the new updated interface because it is not like the old interface. In addition, the users lost control because they did not have a choice and Facebook enforced the new release of alterations. Also, the users lost the intended use because they felt that the use of Facebook has been entirely changed and some features have been removed. Consequently, the users found the new Facebook Timeline more complex, which led to the loss of satisfaction and the need for learning and adaption. However, there are users who were fundamentally concerned about threats to their privacy. For example, the users were discussing threats they may encounter due to the invasion of their privacy or aggregation and accessibility of their personal information. In general, the users who had a low level of control over the new changes were more stressed and anxious.

The new alterations to Facebook's Timeline created coping mechanisms that the users leveraged to mitigate risks. The coping mechanisms comprise emotion-environment-focused coping, emotion-user-focused coping, problem-environment-focused coping, and problem-user-focused coping. In the emotion-environment-focused coping, the users were straightforwardly commenting and complaining about the new alterations to the Timeline and shared their annoyance with Facebook and other Facebook users. However, in the emotion-user-focused coping, the users were divided into either accepting the new changes and attempting to adapt to them or to entirely leaving Facebook and using other SNSs. In the problem-environment-focused coping, the users customized the features they did not prefer to use by disabling them. They also requested to bring back the old Facebook Timeline and suggested recommendations that Facebook should take into consideration to

improve the Timeline. Furthermore, a few users did not totally rely on Facebook to socially communicate with others because they have accounts with other SNSs such as Google+, thus they would switch if Facebook did not bring back the old Timeline. Nonetheless, the users who depended on Facebook to connect with others would work around and use various strategies to bring back the old version such as utilizing browsers' extensions that force the browser to display the older version. In problem-user-focused coping, the users found that Facebook has the right to change their application and it is their responsibility (self-censorship) to assure that no private information is published. In addition, the users indicated that it is common sense to not accept friendships or follow others if they are going to publish personal information. Interestingly, a few users were irritated with their friends who complained about the new Timeline alterations and thought they should put some effort into learning the new changes. In sum, the majority (67%) of the stress appraisal were considered maladaptive coping strategies such as complaining, self-censoring, quitting, switching, and workarounds. On the other hand, adaptive coping mechanisms such as learning, customizing, sensing, requesting, and accepting require more investigation to assist SNS users to be able to handle the new updates.

Wisniewski et al. [76] indicated that SNS users' performance was enhanced when they had the privacy they wanted. Initially, they assumed that there is a relationship between privacy fit (desired privacy level), Facebook usage intensity (users' emotions and daily activities on Facebook), social connectedness (level of communication with others), and social capital (benefits acquired from weak ties such as acquaintances or strong ties such as intimate friends and family). In addition, they referred to the lack of privacy fit as "privacy mismatch". The researchers conducted a web-based questionnaire to collect data and used structural equation modeling to validate the assumptions. They broadly studied the concept of privacy in terms of identifying SNS users' desires compared to the attained privacy level. The researchers found that privacy fit is significantly more related to social connectedness than privacy mismatch and SNSs should encourage users to achieve privacy fit instead of regularly supporting sharing. The results also emphasized designing privacy (i.e. privacy fit) for each user rather than designing privacy for all users since it is possible to anticipate SNSs' personal privacy preferences. This study also showed contributions in the privacy field in terms of proving that privacy fit can provide more social benefits than

privacy mismatch. Consequently, SNS users will not be forced to jeopardize their privacy to get the benefits of using the SNSs. Further, the study recommended designing tools that assist SNS users to personally control privacy based on the users' needs and actual experiences.

2.4 SNS Users' Behaviours Toward Privacy Settings

Madejski et al. [43] investigated whether users' privacy settings match their sharing attention by conducting a survey to measure privacy attitudes and gather sharing intentions. The researchers discussed violations of Facebook privacy settings to show inconsistencies between users' sharing intentions and privacy settings. Most of the participants (97% of the 65 participants) had at least one sharing violation and only 58% decided to solve that issue. The investigators overwhelmingly found that privacy settings do not match sharing intentions (inconsistency), which caused difficulties for users when attempting to fix any problems. The researchers indicated that the usability and current methods of controlling privacy settings are limited. New approaches are required to improve the management and maintaining of privacy settings and to reduce privacy risks. In addition, the users required improvements in the recommended privacy settings to match their expectations about privacy setting outcomes.

Onuma et al. [50] conducted a survey to examine usage habits, actual account settings, risk perception, and social cognition related to Twitter. The study showed that there are contradictions between privacy concerns, usage habits, and privacy settings on Twitter. Although the participants specified that private information should not be disclosed on Twitter, 81% of the 79 participants used public settings, which expose personal details such as posts, photos, biography, and residential area. Also, participants stated that they are aware of only about 25.6% of their followers, and they accepted followers (strangers) mostly based on "user stereotypes". There are positive and negative stereotypes that respondents used to judge other Twitter accounts. Positive stereotypes indicated that users who have many followers are influential and outgoing. However, negative stereotypes meant that users who are protective are not sociable. Furthermore, the researchers showed that the participants have optimistic cognition toward privacy settings because they judged themselves to be less vulnerable than others to privacy risks. Thus, this negative cognition toward SNSs may lead users to be negligent of privacy settings.

Stutzman and Kramer-Duffield [63] explored the behaviour of choosing the privacy setting "Friends-only" on Facebook. The researchers showed that a lack of comprehension, awareness, and control of privacy settings led to inconsistencies in privacy setting behaviours. Studying privacy behaviours exposed the need for privacy cognition and education. Although users have options for choosing and customizing their privacy settings, the behaviour of choosing "Friends-only" status is notable. Permanently choosing a particular setting such as "Friends-only" may prevent users from recognizing the benefits of new privacy settings. Therefore, designing models or systems that establish conversations about privacy behaviours will reduce the complexities associated with applying privacy settings or choosing only one status.

Strater and Lipford [62] examined user strategies for maintaining privacy settings and revealed the failures of these strategies by conducting a qualitative study. SNS privacy mechanisms were designed to be purposefully weak in order to encourage more users to join and more easily share information. However, even though the participants were conscious of privacy concerns in Online Social Networking (OSN), their strategies for solving or changing privacy settings failed (i.e., did not match user expectations) due to a lack of knowledge about privacy settings and confusion about the interface (usability issues). In addition, the participants indicated that they applied privacy settings only when they created their profiles and rarely changed them. This behaviour significantly affected the participants' ability to adjust and remember their basic privacy settings. Some users indicated that they modified their profile status instead of changing their privacy settings. For example, three female participants altered their relationship status to "married" or "engaged" to avoid receiving messages from strangers. Consequently, there is a need for new mechanisms that can enhance user cognition about privacy issues. Also, designers should discover ways to help SNS users protect their privacy while still being able to socially interact.

King et al. [34] employed a survey to measure interactions between Facebook users and Facebook third-party applications, the comprehension of Facebook app access and exchange of profile information, and the relationship between Facebook apps and privacy concerns. One issue the researchers noticed about Facebook apps is that users had difficulties understanding and controlling privacy issues caused by these apps. The users'

knowledge of Facebook apps and their privacy behaviours toward the apps were inconsistent, which increased privacy concerns. More than half of the respondents were not assured that Facebook checks its running apps. The study suggested that users should experience various educational privacy events on SNSs because encouraging users to review and change their privacy practices without assistance is not sufficient. The users were able to improve their approach by experiencing first-hand an unwanted information disclosure event. Showing users examples of how Facebook apps could use their information unsuitably instead of sending warning messages and forcing users to read privacy policies can enhance user behaviour toward Facebook apps.

Netter et al. [47] conducted a questionnaire to examine differences between users' intended (desired), perceived, and actual privacy settings on an online social network (OSN). The study results showed a disparity between perceived, preferred, and actual settings because users had a lack of awareness and control of the privacy settings. In particular, a lack of knowledge was the reason for inconsistencies between perceived and actual settings. Likewise, a lack of control was the cause for discrepancies between preferred and actual settings. Users were more concerned about their shared items because of the gap between the preferred and actual settings (lack of control). Another issue that increased users' privacy concerns was a lack of memorization. More than half of the participants were astonished at the number of shared items. Users rely on default settings and expect them to be restrictive. Therefore, users indicated a need for more help and support to reduce the risks associated with vulnerable settings and to keep shared items safe. Such assistance would increase users' awareness, even if Facebook frequently changes its privacy settings.

Liu et al. [42] measured the disparity between desired and actual privacy settings. They found that many users have incidences such as incorrect privacy settings that disclosed content to unexpected users. Apparently, some users have not changed their default settings and the settings that were adjusted did not match users' expectations. Moreover, the authors discovered that poor HCI affected user performance when managing settings, which led to an increased effort on the part of users to control their privacy settings. As a result, the users are demanding easy-of-use privacy settings and tools that can help them enhance and maintain their privacy settings.

2.5 Interfaces and Simulators of Privacy Settings

In general, online privacy applications concentrate on educating users about current privacy issues [21][66]. However, the tools or applications that can assist SNS users to learn about features and settings are limited. Researchers have introduced alternative privacy settings interfaces for SNSs. Junior et al. [31] investigated how a simulator (PrivSim) supports users in anticipating the impact of their decisions on privacy settings. Changing or modifying privacy settings without understanding the effects of these changes might impact users' privacy because the results of the alteration may not match users' expectations. To solve such an issue, users need to simulate the process of changing privacy settings and notice the changes immediately. On the other hand, using worded language to explain all the privacy settings is not effective because users tend to not read the settings. Consequently, the simulator improved users' comprehension about privacy setting outputs and enabled them to discover previous issues relating to interface visibility. Users recognized that their expectations of Facebook's interface outputs before using PrivSim were incorrect. The researchers computed the mean (M) and standard deviation (SD) values of the correct answers and discovered that they had greater values of correct answers when using PrivSim than when using Facebook. Simulators help users to understand various scenarios related to different privacy settings but do not end the social-technical gap. They only assist users in solving current privacy setting issues.

Lipford et al. [41] designed and examined a new interface on Facebook that concentrated on the audience's point of view. They found that users are struggling to manage their privacy settings because these settings are confusing and time consuming. Also, Facebook and other SNSs sometimes update their privacy settings and make them more difficult to understand and remember. Therefore, they focused on designing a better mental model (visual privacy settings) than the existing Facebook interface. This new design can improve users' understanding of their privacy settings; however, it does not provide information about the features, settings, and new updates and how to change them. It relies on users' experience to figure out the entire process.

Paul et al. [52][53] developed a mockup for privacy settings in Facebook by applying color-coding for different privacy visibilities. The interface highlights each attribute in the profile with a particular color. The colors used in the interface are red, which indicates the

status ‘visible to nobody’, blue specifies the status ‘visible to selected friends’, yellow indicates the status ‘visible to all friends’, and green designates the status ‘visible to everyone’. The investigators evaluated the interface by using a System Usability Scale (SUS) questionnaire to measure effectiveness, efficiency, and user satisfaction with the interface. They found that the usage of the interface was acceptable because the score was 82.6 out 100 (i.e. over 70), which is the acceptable value in the SUS approach. The improved interface provided easy access to settings and enhanced users’ usability and management of privacy settings. It also reduced the time it took to locate a particular privacy setting for both novice and expert users. In contrast, the interface presumably depends on users’ awareness of the features and settings, which has been proven to still be a challenge. Thus, visualizing or highlighting the settings may enhance users’ performance toward the settings, but it does not improve users’ awareness of the majority of the settings. The users may keep using the basic settings and avoid using the advanced settings even if they are highlighted because they have not previously learned about the features or settings.

The prior researches’ findings showed the demand for models and tools that can assist SNS users to learn about the settings and inline features controls, which may enhance users’ behaviours. They identified that users are still having issues understanding and controlling their privacy settings and features. Until now, there has been no specific model or tool that can support SNS users to employ proper privacy settings and regularly be informed about new updates. Finding a way to make SNS privacy settings and features more understandable and usable may hold promise for users’ privacy and behaviours.

2.6 Summary

This chapter has described related privacy research, which includes online privacy, the privacy paradox in SNSs, SNS users’ interpersonal privacy boundary management, SNS users’ behaviours toward privacy settings, and interfaces and simulators of privacy settings. I presented the previous researches, contributions, and limitations in each of these areas.

Privacy education is essential to overcome online privacy obstacles such as a lack of understanding and insufficient content. Individuals usually use online applications to disclose information without understanding the consequences and become frustrated when they have to deal with the outcome of their behaviours. Exploring users’ online privacy behaviours may assist designers to provide more secure applications and enhance users’

privacy behaviours. Likewise, it is significant to distinguish between users' personal and sensitive information and how social web users control this information in terms of applying mild or sensitive restrictions [21][24][65].

Various factors might impact SNS users' privacy, whether consciously or unconsciously. These factors also differ based on numerous causes such as other users' experiences and social norms. Privacy is still a concern for SNS users and SNSs should enhance their privacy settings instead of forcing their users to disclose more information. Younger SNS users are more concerned about privacy than older users, and SNSs should provide sufficient privacy controls [2][56].

Understanding how SNS users manage the features and settings in SNSs (i.e. coping mechanisms) can help to identify various methods to use to enhance privacy behaviours. Currently, SNS users adapt various privacy strategies to mitigate privacy risks such as negotiating with others to solve an issue in the SNSs. In addition, SNSs do not react quickly to accommodate their users' needs. Moreover, SNSs frequently update their settings and features and these changes may positively or negatively influence users' performance in these SNSs. Thus, there is still a need for tools that can assist SNS users to enhance their performance when employing privacy strategies. The research studies examined in this chapter suggested more exploration of challenges such as a lack of awareness of features and difficult-to-use controls or settings in order to enhance SNS users' abilities to manage their interpersonal privacy boundaries. There is a link between privacy behavior and feature awareness and when users know about a feature they are much more likely to employ it. Furthermore, personalizing privacy education, specifically the settings or features that users need, is significant. Users need to learn proper strategies to understand and change the desired settings and features. The lack of tools to assist users in controlling disclosures in SNSs forced them to create coping mechanisms or strategies, whether individually or collaboratively with others. Designing privacy (Privacy Fit) for each user rather than privacy for all users is more effective, since it is possible to anticipate SNS personal privacy preferences [40][71][76][77][78][79][80][83].

The prior research overwhelmingly found that privacy settings do not match sharing intentions (inconsistency), which caused difficulties for users when attempting to fix problems. A lack of comprehension, awareness, knowledge, and control of privacy settings

led to inconsistencies in privacy setting behaviour. The usability and current methods of controlling privacy settings are insufficient, and new approaches are required to improve the managing and maintaining of privacy settings. Designing models or systems that establish conversations about privacy behaviours will reduce the complexities of applying privacy settings or choosing only one status. There is still a need for new mechanisms that can enhance user cognition about privacy issues. Also, designers should discover ways to help SNS users protect their privacy while still being able to socially interact [34][42][43][47][50][62][63].

In general, online privacy applications concentrate on educating users about current privacy issues. However, the tools or applications that can specifically assist SNS users to learn about and manage features and settings are limited. Simulators would help users to figure out the scenarios of different privacy settings, but they would not eliminate the users' social-technical gap [31][41][52][53].

Chapter 3 Methodology

3.1 Conceptual Model

Taddicken [65], Egelman et al [21], and Wisniewski et al. [76] emphasized that social web users – all ages and genders – should be educated about online privacy in order to help them obtain the privacy they want, learn about online privacy matters, gain knowledge from adequate information, and apply proper mechanisms to solve the online privacy issues. Privacy education is essential for overcoming online privacy obstacles, such as lack of understanding and insufficient content. In approaching our research topic, I anticipate that learning properly about the desired SNS settings and inline features controls (i.e., assist users to manage the settings and inline features controls that they want) is a key factor that would enhance SNS users' privacy behaviours. The conceptual model – Privacy Settings Model (PSM) – of our research is derived from prior research and it is a combination of three primary components: user cognition, user control, and user update (Figure 3.1).

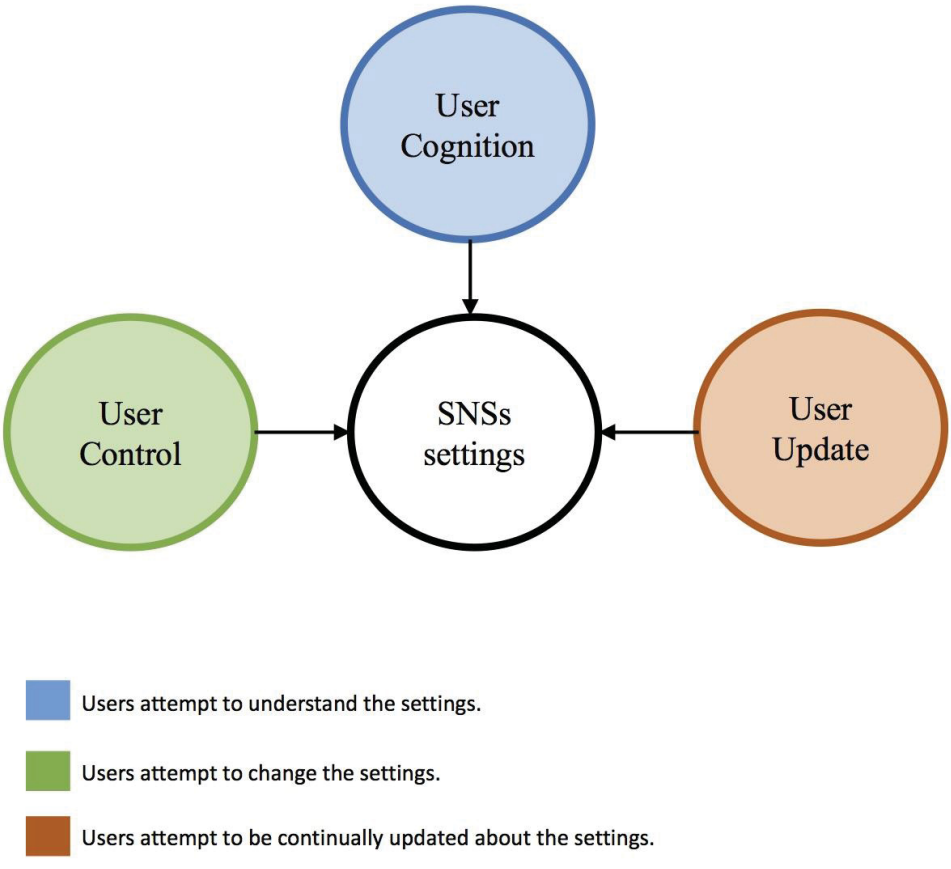


Figure 3.1: Conceptual Privacy Settings Model (PSM) of SNS users' behaviours toward SNS settings

3.1.1 User's Cognition Component

It is essential to enhance users' understanding and awareness of the settings' terminologies, descriptions, and functions. Improving users' knowledge about the settings' meanings would help users to determine or properly anticipate the outcomes when changing the settings. It will also assist users in overcoming any complexities and confusions associated with privacy settings and inline features controls' meanings. Several studies thus far have linked confusion of SNS settings and inline features controls with lack of understanding. Stutzman and Kramer-Duffield [63], Spottswood and Hancock [56], and Wisniewski et al. [78] emphasized that lack of understanding compels SNS users to follow improper attitudes. For instance, if the newcomers noticed that the majority of SNS users provided their phone number in the profile, they will most likely expect that they should provide their phone number in their profiles. Similarly, the users tended to understand the basic features and postpone the advanced features or only choose the most limited privacy setting's option, such as "Friends-only" on Facebook, because they do not understand or have knowledge about the other options.

Users' lack of understanding of the online systems or applications also increased users' apprehensions regarding the disclosure of their information [24]. Prior studies have reported that SNS users are not confident that they understand SNS settings and inline features controls. Wisniewski et al. [77] and Wisniewski et al. [79] indicated that losing confidence to understand the settings and inline features controls led to establishing various interpersonal privacy boundaries. For example, the users avoid disclosing private information, filter based on the person's profile picture whether they know the person to accept or reject, have separate profiles or accounts to divide friends, and accept friendship based on the SNS itself, such as accepting friends on Facebook but not on LinkedIn. These personal coping mechanisms verified that the users are not confident in whether they can use the privacy settings properly because of the lack of understanding of the settings.

Furthermore, their strategies for solving or changing privacy settings failed due to lack of knowledge. In particular, lack of knowledge was the reason for the inconsistencies between perceived and actual settings. Thus, recent evidence suggests that SNSs should personalize privacy education specifically to the settings or features that users want. Also,

showing users examples rather than forcing users to read long privacy policies can enhance users' knowledge of the SNS settings and inline features controls [34][47][62][78].

3.1.2 User's Control Component

SNS users should be able to confidently and properly change their privacy settings and inline features controls after understanding their meanings. Also, the results of the privacy settings and the inline features controls must match user expectations. Strater and Lipford [62] and Taddicken [65] emphasized that SNS users tend to disclose more factual and sensitive information without applying access restrictions. They also applied privacy settings when they created their profiles and rarely changed them. In addition, several studies emphasized that losing confidence and wrongly controlling the settings and inline features controls led to users establishing various coping mechanisms. For instance, SNS users may use the "hiding a friend" option to block or defriend a person and consider that a proper control for the audience. In fact, they wrongly assume that this person will be unable to view all of their content. Likewise, SNS users would create various boundaries to manage their accounts and profiles instead of using the provided settings and inline features controls. To illustrate this, SNS users may create various SNSs accounts or separate profiles in the same account to divide the audience based on their relationships. This strategy was not effective because it requires resources and time. Furthermore, there are users who decided not to disclose private information because they were not confident they could use the privacy settings properly. Similarly, the users showed that using inline features controls such as filtering and hiding posted content is not effective; thus they created their own coping strategies such as skimming or ignoring the content. Consequently, lack of control was the cause for discrepancies between preferred and actual settings. SNS users were more concerned about their shared information because of the gap between the preferred and actual settings [34][47][71][77].

There is still a need for mechanisms or tools that can assist SNS users to enhance their performance when employing privacy settings and inline features controls. Stutzman and Kramer-Duffield [63], Blank et al. [2], Vitak et al. [71], and Lampinen et al. [40] deduced that SNS users do not have proper mechanisms or tools to assist them with controlling their privacy settings, especially inside SNSs. It was apparent that younger SNS users were able to control their privacy settings because they are more content and familiar with using the

Internet than older users. In this case, the Internet was a mechanism that helps younger users to employ the settings, even though the Internet includes lots of information about the settings which might be outdated and inaccurate. Likewise, the lack of tools to assist users controlling the disclosures in SNSs enforce them to create preventive and corrective coping strategies. For instance, SNS users started using preventive mechanisms such as assuring that the shared content is received and checked by the right audience. They also generated a rule with their friends to not publish content that might cause issues, and avoid sharing the content that might be difficult to control once it is public. However, SNS users attempted to employ corrective mechanisms such as deleting published content or interpreting published content to be non-serious because the latter content will not affect their reputations, instead it will affect the one who published it. Therefore, designing models or systems that assist SNS users to manage settings and inline features controls will reduce the inaccurate coping mechanisms and assist users to properly control the provided settings. Conducting more explorations about the settings and inline features controls' challenges would gradually reduce users' various boundaries or coping mechanisms and allow them to concentrate on using the settings and inline features' controls provided by SNSs. New approaches are required to improve the managing and maintaining of privacy settings in order to reduce privacy risks [2][43][63][77][83].

3.1.3 User's Updates Component

SNS users should be instantaneously and properly notified about changes in settings and inline features controls. Notifying users about newly updated settings and inline controls, as well as assisting them to understand and change the settings, may assure proper outcomes. In fact, SNSs frequently update their settings and inline features controls which may positively or negatively influence users' performance in SNSs. Previous research investigated the users' approaches to adapt to the new updates of SNSs. For instance, Gambino et al [24] and Wisniewski et al. [80] indicated that SNS users may not trust SNSs because of the enormous number of received updates via emails and notifications. The new updates also increased users' stress and anxiety; for example, they lost the familiarity and demanded to bring back the old version; they lost control because they did not have the choice to reject the new updates, and SNSs enforced the new release of alterations; and they lost the intended use because they felt that the use of SNSs has been entirely changed,

or some features have been removed. Thus, these issues caused loss of satisfaction and emphasized the need for learning and adaption. On the other hand, Madejski et al. [43] and King et al. [34] denoted that SNS users get feedback about privacy settings from general news resources, whereas these resources may not reflect users' needs. Therefore, instructing users properly about how SNS new updates work rather than sending warning messages and forcing users to adapt to the changes can enhance users' behaviours and attitudes toward SNSs.

In sum, ensuring a proper managing process of SNS settings and inline feature controls, according to the PSM components, would enhance users' privacy behaviours and attitudes, and reduce privacy risks in SNSs.

3.2 Research Methodology

3.2.1 User Studies

I conducted an exploratory sequential design, which is a mixed-method approach for collecting various types of data to explore our research objectives. In general, Mixed-method research consists of both qualitative and quantitative approaches to expand the understanding of research problems and overcome the limitations of using a single method. A combination of both approaches provides more accurate analysis of topics or research objectives. The exploratory sequential design is a two-phase sequential design; it starts by studying a qualitative topic or research objective in order to build to the second stage, which is the quantitative study, ultimately leading to the summarization and interpretation of the results of both studies (Figure 3.2).

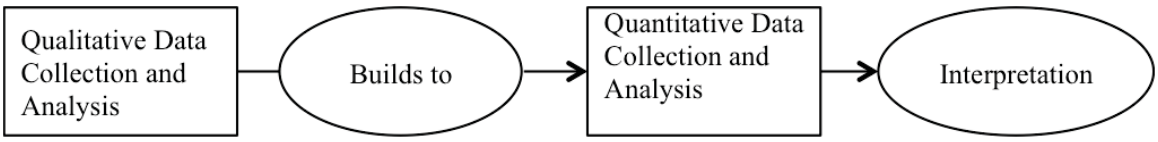


Figure 3.2: Exploratory Sequential Design [12]

I chose an exploratory sequential design because I need to explore in-depth users' concerns and the factors that impact their learning of privacy settings and inline features controls according to PSM components. Creswell and Clark [12] recommended using thematic analysis in this type of mixed method because the initial study – qualitative approach – consists of quotes, sentences, codes and themes. In fact, I decided to conduct a

mixed-method research for the following reasons: triangulation or greater validity, offset, different research objectives, explanation, instrument development, illustration, and confirm and discover. These reasons are part of the 16 reasons that Bryman [5] indicated to justify why mixing methods are significant.

- **Triangulation or greater validity**

This approach corroborates and confirms one of the mixed-methods results if the other method found the same results. The combination of methods can lead to greater validation of collected data.

- **Offset**

The combination of the two methods will offset the weaknesses of the two methods and concentrate on the strengths of both methods.

- **Different research objectives**

Each method of the study has its own research objectives, so mixing the methods will help compare the two methods in terms of interpreting the similarities and differences between the two methods' findings.

- **Explanation**

Using mixed methods helps to study one method and compare its results to the findings of the other method. It provides solid arguments when tasked with explaining or discussing the results.

- **Instrument development**

Most quantitative approaches are limited to studying the data received from the users without discussing the contexts. However, qualitative approaches allow researchers to improve the inconsistencies of the quantitative approaches by giving participants a chance to express and explain their feelings and thoughts.

- **Illustration**

In this study, qualitative data will support the results of the quantitative approach. It will help illustrate data meaning in depth compared to quantitative findings.

- **Confirm and discover**

By using mixed methods, I will be able to study qualitative research objectives and use quantitative findings to confirm qualitative results.

Our study begins with an observation and a semi-structured interview to collect detailed data about users' concerns over privacy settings in SNSs and find the factors that impact users learning according to the PSM components. After completing the qualitative study, I will start the quantitative study by preparing an online survey to generalize or test the qualitative results. The qualitative and quantitative strands will be mixed during the interpretation phase. In other words, the qualitative and quantitative strands will be mixed in the final phase of the research process after collecting and analyzing the data. In the interpretation phase, I will be able to show the benefits of combining the two approaches, particularly when discussing how PSM helps to explain why SNS users became vulnerable when managing their privacy settings. The only phase that can explicitly show where the two mixed-methods approaches are merged is the interpretation phase (chapter 6) [10][11][12].

Qualitative Approach

A qualitative research is usually conducted when an issue needs to be explored and discussed. There are many definitions of qualitative research, but the following definition is clearly including the process of research:

> *"Qualitative research begins with assumptions, a worldview, the possible use of a theoretical lens, and the study of research problems inquiring into the meaning individuals or groups ascribe to a social or human problem. To study this problem, qualitative researchers use an emerging qualitative approach to inquiry, the collection of data in a natural setting sensitive to the people and places under study, and data analysis that is inductive and establishes patterns or themes. The final written report or presentation includes the voice of participants, the reflexivity of the researcher, and a complex description and interpretation of the problem, and it extends the literature or signals a call for action."* (Creswell, 2007, p. 37 [10])

Although using information from literature reviews or other quantitative research studies is applicable, qualitative research provides more detailed information about the problem because it allows researchers to speak directly to respondents. The participants will be able to express their thoughts and feelings within contexts such as home, family or work, which is difficult to identify when applying quantitative research. Researchers will be able to

collate data through different types of studies, such as interviews and observations. Researchers can then create themes or patterns after organizing and coding the collected data in order to find detailed answers to their research questions.

Thematic Analysis is a qualitative research approach that depends on obtaining themes or patterns from the collected data. The themes categorize the analysis based on the description of a specific topic or research objectives. The thematic analysis provides researchers with more details about a topic or research objectives than individual experience. Most researchers indicated that thematic analysis is useful because it provides details of explanations from the data set. In fact, thematic analysis is related to qualitative approaches such as grounded theory and phenomenology. In grounded theory, themes or patterns obtained from the data are used to build theoretical models. In the phenomenology approach, participants' feelings and experiences are discussed in their own words and contexts, such as home, family or work. This is related to thematic analysis because they concentrate on human experience and feelings.

The two levels used to identify themes are semantic themes and latent themes. Semantic themes cover only the data without thinking of the reasons or interpretations about why the participants said or wrote their comments. On the other hand, latent themes require interpretation of the data in order to find ideas and assumptions. This may force researchers to collect most of the data from only one area due to the need for more details and clarifications. Coding is the technique that can be used to detect patterns from particular data and interpret the relationships between various themes. The complexity of coding varies according to data size and type. For example, if researchers are analyzing a transcribed 2-hour interview, they may have numerous pages of transcribed data per participant [3][8][75].

In order to apply thematic analysis, six phases should be followed to prepare suitable patterns or themes. These phases are familiarization with data, generating initial codes, searching for themes among codes, reviewing themes, defining and naming themes, and producing the final report.

Phase 1: familiarization with data

It is necessary to become deeply involved in the collected data in order to be familiar and satisfied with the content. Researchers can achieve this depth of familiarity by repetitively

reading and attempting to understand the meaning of the data. This phase gives researchers a solid foundation and facilitates the coding in the next phase. Although transcribing is time-consuming and challenging, data transcription can also help researchers interpret the collected data. If researchers get the data transcribed for them, they should compare the transcribed data with the original recordings to ensure accuracy. In addition, researchers should avoid any discrepancies in the transcription because this might be considered bias, which will be challenging to recognize in the next phases. At the end of this phase, researchers should be satisfied with the data and clearly identify which data represents their research questions.

Phase 2: generating initial codes

After completing phase 1 and understanding the data's meaning, researchers can start generating initial codes from the data. When generating the initial codes, researchers can code either the entire content or just specific parts. Researchers also have the option to code manually by writing notes on the text and using highlighters to initially recognize the codes. After that, they can gather the extracted data for each code. Another option is to use computer software to automatically add tags and names in the text.

It is recommended to obtain as many themes or patterns as possible from the coding process because researchers might find some of these patterns useful in later phases. In the coding process, researchers should explicate the meaning of the data in order to be able to accurately explain user examples in the data. Furthermore, researchers can take notes to assist them in subsequent phases (when they review their codes) in terms of why and where to include the code within the themes.

Phase 3: searching for themes among codes

After generating initial codes in phase 2, phase 3 concentrates on finding suitable themes from the codes and assembling the codes within relevant themes. Visual representations are useful here to assist researchers in combining the various codes into themes. For example, researchers can use tables and mind-maps or write descriptive codes to help arrange the codes into patterns or themes. Researchers should note that not all codes would fit into a particular theme. Some codes fit better under sub-themes, and some might not be related to any of the themes. It is advisable to create new themes only for those codes that do not fit into any existing themes. It is imperative that researchers not reject any themes

in this phase because these "odd" themes might be useful in subsequent phases, where researchers will be able to arrange, change and reject themes and patterns.

Phase 4: reviewing themes

After creating and preparing a list of themes in phase 3, phase 4 allows researchers to adjust, re-arrange, and discard themes. Researchers might find that some themes need to be separated into two or more themes, while other themes may not be relevant because there is insufficient data to support them. The meaning of the data must represent the theme in order to be accepted as a theme; otherwise, the theme will be unclear and unrelated. There are two levels that researchers can follow to review and improve their themes:

- ***Review the coded data extracts***

In this level, researchers will read all gathered extracts within each theme and decide if the coded data extracts are compatible with the theme. If they are not compatible, researchers must refine other themes or discard them. When this level is completed, researchers can move to the next level.

- ***Review the entire data set***

In this level, researchers will check to ensure that each theme is compatible with the entire data set. The main purpose of this level is to make sure that any missing coded data is included in one of the themes. It is important for researchers to recognize when to stop coding and searching for themes. It is recommended that when researchers are satisfied with the codes and themes, they should stop immediately and move to the next phase.

Phase 5: defining and naming themes

After reviewing and improving the themes in phase 4, phase 5 allows researchers to define and name their themes or patterns. For each theme, researchers should write in detail how the themes represent the collected data or the research objectives and explain how each theme is different from the others and is not interfering. At the end of this phase, researchers can name each theme and ensure that the names accurately represent the theme's definition.

Phase 6: producing the final report

After defining and naming the themes in phase 5, researchers write the final report in phase 6. In this phase, researchers can write about the collected data in a way that emphasizes the significance of the collated themes and analysis. In addition, researchers should prove how the collected data are compatible with the themes by providing examples from the study.

At the end of the report, researchers can clarify how the thematic analysis study contributes to the research objectives.

A researcher's main decision is to determine which data patterns are important. Researchers must pay attention to how the interpretation of the collected data may affect the study's reliability. Another issue that may affect generating themes is using research objectives to code instead of creating code from the collected data. The themes must represent the data collected from the participants and show the participants' perceptions and experiences. In addition, researchers might get confused about 'theme' and 'code' because they have different meanings. A code is a label given to some words or specific words indicated in the data set that can lead to identifying a theme. Thus, coding is the process of finding a specific theme. Another issue that might influence interpretations in a qualitative study is researcher bias and judgment. Reflexivity journals or analytic memos can be used during the study to document all the researchers' interpretations and findings, which will assist the researchers in the final phase to understand why certain decisions were made in previous phases. The researchers' notes (i.e., words or phrases of participants' thoughts during the data analysis) may assist in the future analysis if there is any missing information during thematic analysis phases. The number of participants or sample size in thematic analysis approach differs depending on the type of data collected and the size of the research. In this approach, researchers tend to include more observations and interviews until they obtain most of the applicable themes or patterns (data saturation), and then they can specify the sample size as the research proceeds [3][75].

In our research, I used thematic analysis to examine the qualitative research objectives in order to find themes that exhibit users' concerns and the factors that impact SNS users' learning of privacy settings and inline features controls according to PSM components. I conducted an observation and a semi-structured interview to collect data about the qualitative research objectives. The observation and the semi-structured interview helped to follow a set of prepared questions and also allowed a two-way of communication in case there is a need to change the way I ask a particular question. I ensure that the interviewees discuss their thoughts and point of views openly, and guide them to explain their in-depth experiences. To participate in this study, respondents should have at least an account in any SNSs and personally manage their privacy settings. The sample size will be 20-30 SNS

users. The number is recommended in thematic analysis approaches to provide adequate codes and themes of the issue under study [10][12]. I believe that the sample size is suitable to generate qualitative data in a short time. However, the number of interviews may be affected by data saturation. In other words, I continue interviewing participants until I find that the codes and themes are repeating, and then I stop. Observation and Semi-structured interviews allow participants not only to answer a specific question but also to clarify and explain why they choose a specific answer. I can also take notes about the respondents' feelings when they answered a question, which is difficult to note in other types of studies [32].

After gathering and recording the data from the participants, I started phase 1 of the thematic analysis phases to find the study themes or patterns. In phase 1, I read and re-read all the data to understand the content meaning and compared the transcription of the data to the original recorded data. I started reading all the data related to users' concerns about privacy settings and inline features controls according to PSM components. In addition, I concentrated on the data that cover users' issues regarding understanding, changing, and finding updates about specific privacy setting or inline features controls. In order to have accurate codes in the next phase, I ensured complete understanding to avoid bias.

Next, I started coding according to the research objectives. I focused first on generating codes related to user concerns, after which I looked for the factors that impact users learning according to PSM components. Some codes were written in detail (descriptive codes) because this approach helped me properly assign codes within the right themes. Meanwhile, I took notes to clarify why and where I create codes to fit them within the right themes in subsequent phases.

After generating all the codes, I searched for appropriate themes that represent the generated codes. Similar to the coding process, the themes were organized according to the research objectives and PSM components. In this phase, I did not discard any themes because I might need them in subsequent phases. Some of the generated codes were not compatible with the themes, thus I created separated themes that has all the unrelated codes. Reviewing the themes was a very significant phase because I compared the coded data of the research objectives to the themes.

Proper names were created to represent the themes according to the research objectives. For example, the themes have terms that signify users' concerns and the factors that impact the users learning of privacy settings and inline features controls according to PSM components. Lastly, I analyzed how the codes and themes fit each other and how these themes represent the research objectives. In addition, I emphasized how the thematic analysis approach contributes to the study.

Quantitative Approach

In general, quantitative research provides statistical findings via online surveys that can be received by a large group of people without considering contexts such as home or work. It is faster than the qualitative approach because there are no meetings to set up in order to collect and record data from the respondents. However, it is essential to prepare questions that are well-defined and easy to understand. There are three types of questionnaires that can help researchers adapt their approach to their topic or research questions: closed-ended questionnaires, open-ended questionnaires, and combinations of both questionnaires [16][18][35][37][57].

Closed-ended questionnaire

This is the most common type of questionnaire. It allows participants to choose only one option from a set of prepared answers (multiple-choice format). Another way of designing closed-ended questionnaires is to provide many options, from which respondents can check all applicable choices.

Open-ended questionnaire

In this type of questionnaires, researchers need more detailed data, so they invite respondents to write in a blank section. There are no multiple choices or boxes to check; instead, participants write their thoughts and opinions in a box specified for each question. It is slower than the previous type of questionnaire because participants have to type their answers and researchers have to spend more time in data analysis compared to closed-ended questionnaires.

Combination of both questionnaires

This type of questionnaire combines both the closed-ended and open-ended approaches. Most researchers start with closed-ended questions to collect background data and ask direct questions about a particular service or product to find statistical results. Then, they

change to open-ended questions to collate more detailed data about the services or products.

If surveys are not designed properly, the questions will provide wrong and inaccurate results. Online surveys are particularly vulnerable because there is no direct contact with the participants when they answer the questions, which might lead to inaccurate data. Researchers must check characteristics such as error-checking, functionality, usability, mortality, and response rate. Error-checking will assist the participants if they did not choose any of the options. It will show them a red-colored note indicating that a specific question has not yet been answered. The functionality of the survey webpage should load quickly and be compatible with most common web browsers in order to achieve high performance. Usability is significant because all features must work in order to match user expectations. Some participants will start the survey and then quit, so researchers should be able to indicate this event under mortality and response rate discussions [26]. On the other hand, the main purpose of statistics in quantitative studies is to corroborate or contradict the findings of the analyzed data and to show the influence of various variables. The most common computing software to analyze quantitative data is SPSS (Statistical Package for the Social Sciences) [16][23][74].

In this research, I designed an online survey that combines both types of questionnaires (closed-ended and open-ended questionnaires) to validate the qualitative results. The survey was conducted through ***Dal Opinio*** software and the survey link was sent via email to all Dalhousie University Community, through SNSs, and classified website Kijiji Research Study to the public. The responses were analyzed based on statistical hypothesis test which is testing the sample proportions with the estimated or hypothesized population proportions using z-test.

Proof of Concept and Usability Testing

According to "the cone of experience" introduced by Edgar Dale [13], people mostly learn by “direct participation.” Based on the factors and the designed guidelines, I developed a website and a plug-in (PrivSet) that can help users to learn about privacy settings and inline features controls according to PSM components. The application enhances user’s behaviour and performance when attempting to understand and change SNS settings, and find and new updates. Participants were recruited from the general Dalhousie University

community via e-mail and the public through a classified local website - Kijiji Research Study - and social networking sites such as Facebook and Twitter. I conducted a within-subject design study to examine the efficiency (time to complete the tasks) and the effectiveness (completion of the tasks with the least number of wrong clicks) when using PrivSet application and without using it. In addition, I investigated usability measures such as ease of use and usefulness using a post-task questionnaire. Lastly, a short semi-structured interview was conducted to explicitly show the strengths and weakness of the PrivSet application. The sample size will be at least 20 SNS users and I believe that the sample size is suitable to generate qualitative and quantitative data in a short time. The number is recommended in thematic analysis approaches to provide adequate quotes, codes, and themes of the issue under study [10]. In addition, Jakob Nielsen [48] indicated that at least 20 users should be tested if a usability testing includes a quantitative method. The study was one-on-one and took approximately 60-90 minutes in total.

Data Collection

The participants applied the tasks without using the PrivSet application and then apply the same tasks while using the PrivSet application. The tasks gave the participants the chance to experience all of the features in the PrivSet application and exposed its weaknesses and strength. Following the completion of the tasks, the participants were asked to fill out a post-task questionnaire. It includes demographic questions, general questions, and a modified TAM (technology acceptance model) questions. TAM, which was introduced by Davis [14], is one of the most commonly employed models to evaluate technology acceptance. I adjusted and customized its questionnaires to study the PU (Perceived Usefulness) and PEOU (Perceived Ease of Use) of the PrivSet applications. ***Dal Opinio*** survey software was used to collect the data. After the completion of the post-task questionnaire, the participants were asked to answer short interview questions. The main goal was to identify the weaknesses and strengths of the PrivSet application and to gather descriptive recommendations for improvements.

Data Analysis

I calculated the time to complete the tasks in order to measure the PrivSet application's efficiency. Moreover, I counted the numbers of errors (wrong clicks) that occur while performing the tasks and examined the successful completion of performing the tasks in

order to measure the PrivSet application's effectiveness. The time taken to complete the tasks are summarized with descriptive statistics (mean and SD; Standard Deviation). I used one-way between-subject ANOVA analysis to examine the time of completion between the tasks when using PrivSet and without using PrivSet. The two test statistics assisted to statistically discuss the significant differences between the means. Text or descriptive explanations were included to interpret the quantitative results. In the post-task questionnaire, the data comprised 7 Likert scales (Strongly Agree, Agree, Somewhat Agree, Neither Agree or Disagree, Somewhat Disagree, Disagree, Strongly Disagree). Responses to each item were summarized with descriptive statistical analysis (mean and SD). In the semi-structured interview, the type of data is a qualitative and mainly focused on identifying users' general perceptions and opinions of the PrivSet application. I analyzed the interview scripts and generate categories that represent the strengths, weaknesses, enhancements, and challenges of the PrivSet application.

Table 3.1: Research methodology, data collection, and data analysis

Phases	Methods	Data Collection	Data Analysis Tools
Phase 1: Mixed Method (Exploratory sequential design).	Qualitative	• Observations. • Semi-structured interviews.	Thematic analysis
Phase 2: Mixed Method (Exploratory sequential design).	Quantitative	An Online Survey using Dal Opinio tool.	Hypothesis testing: • Test of proportions (z-test).
Phase 3: Proof of concept (PrivSet) application	• Tasks. • Post-task. Questionnaire • Semi-Structured Interview.	• Performing the Tasks ***with*** and ***without*** using PrivSet application. • Dal Opinio tool is used for post-task questionnaire.	• A one-way between-subject ANOVA. • A Chi-Square test.

Chapter 4 Phase 1: Qualitative Study

I am exploring how PSM components influence SNS users' behaviours when managing SNS settings and inline features controls. I conducted a qualitative study to investigate users' concerns and the factors that impact users when applying a particular setting or inline feature control. It is significant to indicate that SNSs such as Facebook and Twitter updated their settings' descriptions, categorizations, and interfaces after I completed the recruitment. The data and figures included in this section are based on data collected before the new updates.

4.1 Procedures

I conducted observations followed by semi-structured interviews. I recruited participants through emails sent to the general Dalhousie University community and the public via a classified local website. Initially, I met the participants and explained the purpose of the study, which is exploring their concerns and the factors that may influence their behaviours when attempting to understand and change the settings as well as find new updates. Then, I asked the participants to give consent to participate in the study. As an incentive for participation, each of the participants received $10 compensation. The observations were screen recorded and the interviews were audio recorded. I asked the participants several questions about their understanding, changing, and finding or receiving of new updates on specific settings. For instance, I asked the participants how they understand, change, and find or receive new updates about Facebook settings such as activity logs, timeline and tagging, search engines, friend requests, sharing, and apps. In addition, I asked the participants who preferred to use Twitter questions about the settings for the locations, advertisements, tweets for teams, and direct messages settings. Likewise, I asked the participants who preferred to use Instagram questions about likes, comments, tagging, and sharing settings (Appendix B2). All the participants also discussed their experience when attempting to manage the settings via the SNS's help center. Focusing on the types of conflicts that SNS users experienced helped me to distinguish the different types of factors that SNS users encounter when handling SNS settings. I transcribed the collected data using Atlas.ti 1.6.0.

Creswell and Clark [12] recommended leveraging thematic analysis because qualitative approaches are comprised of quotes, sentences, codes and themes. In our research, I used thematic analysis to find themes that exhibit the factors that impact SNS users according to the PSM components. I ensured that the interviewees discussed their thoughts and points of view openly, and I guided them to explain their in-depth experiences. After completing all the transcripts and codes, I developed a codebook (Appendix B3) that includes the themes (factors) and guaranteed the consistency of the themes. Quotes are presented using the participants' acronym IDs (i.e. P1, P2, P3, etc. where P stands for "Participant") for anonymity.

4.2 Participants

According to Creswell and Clark [12] and Creswell [10], the recommended sample size in thematic analysis approaches is 20-30 users to provide adequate codes and themes of the issues under study. Twenty-two SNS users registered for this study, and the average age of our participants was 33 years old, with participants' ages ranging from 21 to 70. Anyone who has an account with at least one SNS (e.g. Facebook, Twitter, or Instagram) and personally manages their settings was eligible to participate in this study. 14 participants were male and 8 were female. 15 participants used Facebook, 5 participants used Twitter, and 2 participants used Instagram. The participants were active on Facebook and in other SNSs to varying degrees, whereas most of the participants had used the SNSs regularly enough to have experience using the features and settings. The participants' educational and occupational backgrounds include: Nursing, Journalism, Business Administration and ecommerce, Health Informatics, Education Administration Professional, Animal Ethics, Art, Retired, and Computer Science.

4.3 Results

After collecting, transcribing, and analyzing the data, I identified 15 themes (Factors) and codes (Appendix B4) that influence SNS users when managing the settings, inline features controls, and new updates (Figure 4.1).

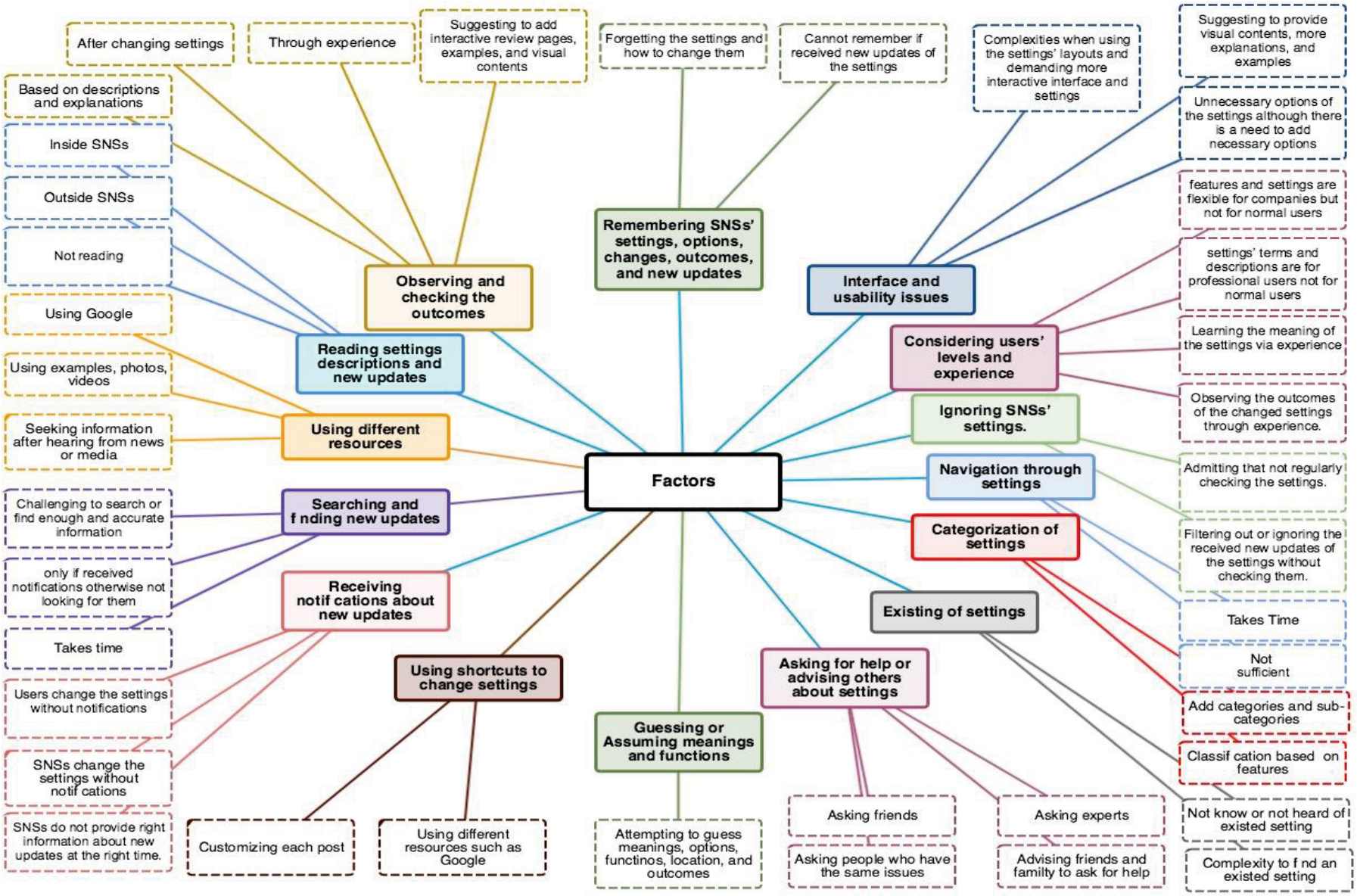


Figure 4.1: Themes (Factors) and Codes

4.3.1 Influencing Factors of SNS Users' Behaviours Toward SNS Setting

In this sub-section, I discuss the obtained factors that influence SNS users' behaviours when managing SNS settings and inline features controls according to the PSM components. In addition, I explain the obtained problems associated with each factor and the solutions for some of these problems (i.e., SNS users did not have solutions for all the discussed problems) the users utilized when managing SNS settings and inline features controls.

Navigating through SNS settings

Our results identified two major issues faced by SNS users with respect to navigating the settings. First, users found navigating through the settings inefficient and time consuming. Second, they found that navigating through the settings was not always effective and did not provide the desired or intended outcome. For example, when users go through (navigate) SNS settings to understand and change the settings, they frequently take a long time to find the desired settings. P2 stated:

> *"I think it is difficult to go through all the options and the settings. They have general, security, privacy, timeline and tagging and I am just going to waste my time."* (P2)

In addition, the outcome of the navigation is not effective because the participants usually go through all possible paths to get to the settings page in order to manage the settings. One of the reasons identified that cause navigation issues is a large number of settings and options. Providing many settings and options can be positive in terms of privacy improvements; however, it can also be negative because the participants found it boring to go through and read all the settings' descriptions and options. Another navigation issue is not being familiar with the settings and there being no proper way of guidance to reach the right setting. P3 indicated:

> *"It can be kind of clunky and it is like not a very straightforward system and it seems like they throw a bit over the place to try to find. When you actually go into your privacy section it is kind of inconvenient."* (P3)

Moreover, providing shortcuts symbols or links may confuse SNS users while navigating the settings. In the observation session, it was obvious that the lock icon (Figure 4.2) diverted P20's attention in a wrong direction:

"So should I go to this one [Lock icon]. Privacy basics or it looks like they did a shortcut here. It looks like it a shortcut so I do not know if it is the entire thing." (P20)

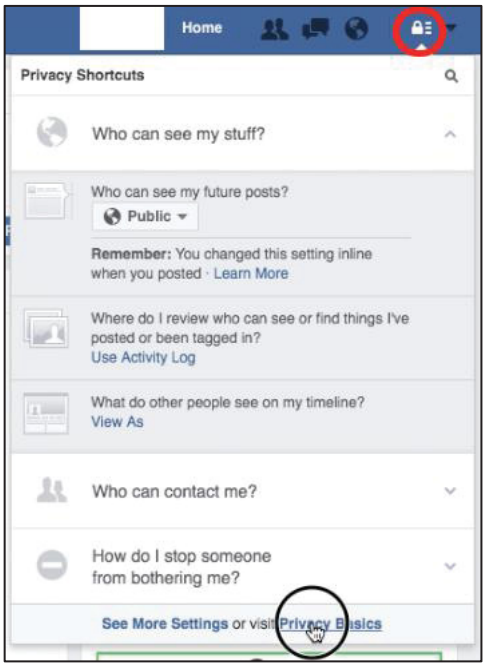


Figure 4.2: Lock icon in the navigation bar of Facebook

The only solution that most participants implemented to avoid navigating the settings is searching outside the SNSs. They would search on Google to find the steps or paths that lead to a desired setting even though the information provided on Google may not necessarily be accurate. For instance, I asked about a common setting such as [Who sees tag suggestions when photos that look like you are uploaded?] on Facebook and if Facebook uses a facial recognition system. P5 attempted to navigate the settings and then decided to search on Google. In fact, he found an inaccurate image that is pointing to a different setting, and he considered that a correct answer to the question (Figure 4.3).

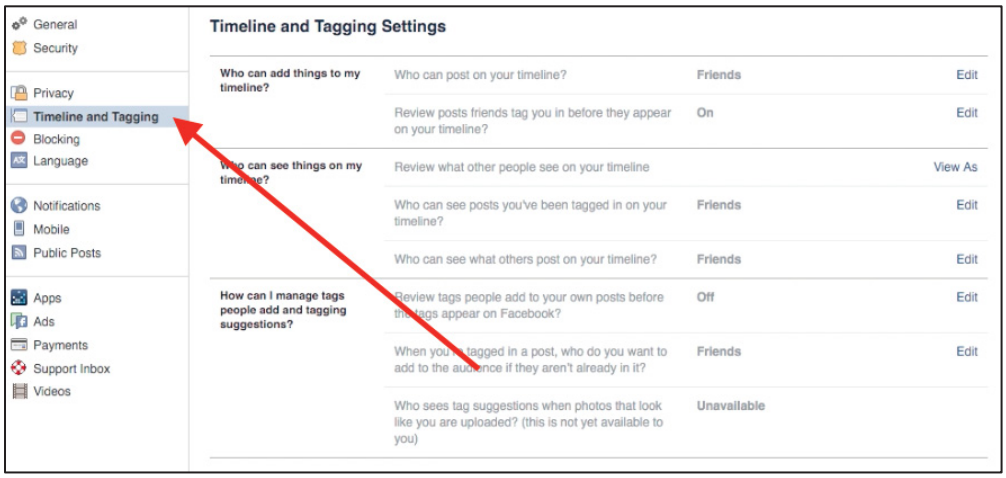


Figure 4.3: Inaccurate outcome found on Google

Interestingly, the majority of the participants admitted that navigation issues are not only SNSs' responsibilities to enhance; however, the users should spend enough time to look at the settings and their options. For instance, P21 declared that difficulty with navigating the settings is an issue caused by both the SNSs and the users:

> *"Both because sometimes I do not spend enough time looking at it. In other cases, what is happening here is that they spin like sort of fairly tight menu and then people who want to make changes like people who run Facebook they want to add things and they do not know exactly where to add it so they know where it is but I do not."* (P21)

Categorizing SNS settings

The results showed that the participants encountered complexities when attempting to identify how SNSs categorize and group the settings. One of the categorization issues identified is that SNS users cannot differentiate between settings in the same category. For instance, there are tagging settings for posts and tagging settings for photos on Facebook, and most of the participants did not recognize that they have different and separate settings. P14 clarified:

> *"I do not have time to really read each option which one is what tag so when I see tag I just went to that section immediately. It is kind of confusing"* (P14)

Another challenge when attempting to change a setting is a lack of understanding of the categories. For example, P12 stated:

"Maybe the users' understanding of the settings because sometimes ok is it under security? or is it under privacy? because different users have different understanding. Sometimes you see a setting that supposed to be under privacy or under security and they did that for a reason but the user does not know under which category these settings will be." (P12)

P17 also considered the complete list of settings under "privacy" in Facebook:

"I have kind of considered all of this (Figure 4.4) like the privacy area. My mom uses Facebook now and she would not be able to do this. She would be too afraid to click around and she would not know how to change things and it might be make more sense to have tagging within privacy" (P17)

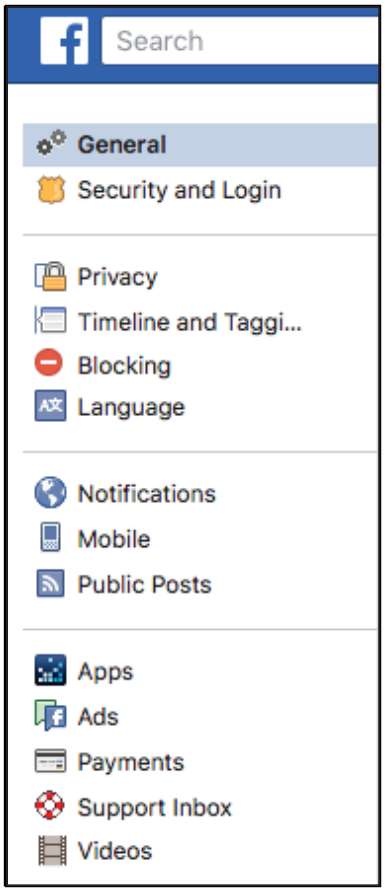


Figure 4.4: Main categories of Facebook settings

Similar to the first factor, the only solution the users took into consideration to solve the categorization issues is using Google. They would search for any resource that could show in which category a desired setting is located. To solve the categorization issues, the settings should be classified based on the provided features to facilitate navigation,

understanding, and the changing of the settings. Providing classified settings based on the available features may effectively assist SNS users to manage the settings.

Questioning the existence of SNS's settings, options, and explanations

The results demonstrated that the participants do not know about most of the settings, options, and inline feature controls that exist in SNSs. They also have to deal with complexities in understanding and finding explanations for the settings after learning that specific settings exist in SNSs. For example, the participants were asked about a common setting such as [Who sees tag suggestions when photos that look like you are uploaded?] on Facebook and if Facebook uses a facial recognition system. P3 indicated that the user cannot control such features even though it is available in the settings.

> *"I do not think it is under a setting. I think Facebook just naturally have a program into it and the user cannot really control it."* (P3)

The same issue was observed in other SNSs such as Twitter. The following participant was not able to differentiate between the main location of the account and the setting [Tweets' Location] and she did not know that the setting exists.

> *"I do not know but I know if we show our location but not the tweets."* (P6)

Interestingly, Instagram provided a new update - new features and settings - just a few days before the study and it was widely covered in the media. The new update was related to adding Stories and taking screenshots of the stories. P22 was not informed that the new settings exist:

> *"Really. I never knew. I do not know. I never knew I think I was not updated or I never searched it."* (P22)

In fact, the majority of the participants were able to identify general settings that related to their permanent activities such as timeline and tagging, whereas the other settings were mostly ignored.

> *"I know that my timeline and these stuff but I do not even know that the activity log existed until right now maybe I am not being just aware enough about what I am doing on Facebook"* (P8)

On the other hand, when the participants know a specific setting exists, they attempt to find the setting in two ways: searching the features inside the SNSs (Tag, Location, Apps, etc.) or utilizing Google to be redirected to the SNSs for further information (i.e. using

Google to search and then clicking only on the SNS's help center via Google's results). For example, P7 attempted to find an explanation of the setting [Twitter for teams (TweetDeck)] on Twitter and then decided to search it on Google. Then, Google redirected the participant to the Twitter help center.

> *"No I do not have any information. I do not know what Twitter call it. Wow there are so many things that I do not know. I only go to Twitter page."* (P7)

After searching on Google and being redirected:

> *"Oh they call it TweetDeck. TweetDeck is for profile management so usually I take it for individual but I do not know how to use it for group. My thoughts that it is for individual and I have no thought of it about teams."* (P7)

In general, the reaction of the participants once they knew the settings existed and they could manage them was encouraging. For instance, P6 was asked about the setting [Twitter for teams (TweetDeck)] and she found it later in the observation session.

> *"This is your question at the beginning; Ok Good. Good to learn." (P6)*

P8 was also able to understand the meaning of the setting [Review what other people see on your timeline (View As)] on Facebook and he was excited about using such a setting.

> *"I do not even know you can do this, that is very cool actually. Yah this is what I expected. I have my stuff set to friends only so if I tried to put a name that I am not a friend with, they would not see anything I guess or they might see only my profile picture I guess."* (P8)

Another participant was asked in the observation session about how they can remove posts or photos they are tagged in. The reaction was encouraging because the participant immediately removed a tagged photo.

> *"I do not think you can. Can you? Oh Remove tag. there you go. I will do it right now I have not known this before. I thought that if you are tagged in something that you are kind of tagged forever because somebody else tagged you"* (P18)

Asking for help or advising others about SNS's settings

The results demonstrated that friends, family, and experts often get involved when attempting to manage SNS settings and inline feature controls. Asking for help involves requesting assistance from friends or experts to try to understand and change the settings

as well as find new updates about SNS settings. However, advising others involves informing friends or family about the settings' meanings, options, and new updates.

The participants emphasized that asking friends to help them understand and change the settings is more effective than going through the descriptions. For instance, P8 found it more practical to ask friends to understand and change the new updated settings even before searching on Google.

> *"Google or ask friends like hey have you seen this update have you used it like what it is and what does it do. I would probably ask before I Google honestly just because if one of my friends had done it like asking have you done this and they go oh yes then cool I will do it too just I mean I would trust my friends more something like that."* (P8)

In fact, a bad experience can compel SNS users to change their way of checking or testing the settings. For example, P21 previously had a bad experience when attempting to understand and change a setting, thus the participant was forced to ask people to evaluate the outcomes of the changed settings.

> *"I have been tricked before so and we just did one right here [Search Engines] and the privacy settings did not work. I think when I see it I would understand what is the intent of the privacy setting is but to evaluate whether or not it works I have to rely on other people to do that."* (P21)

Other participants were more precise and insisted on asking experts because people who have experience may have learned in detail about the settings. When P6 was asked about the setting [Twitter for teams (TweetDeck)] on Twitter, she indicated the needs to ask experts:

> *"Well. I cannot see these options there to control their distribution to the account I cannot see it and I do not know what is the technique that they use but I think if I am using this I will read more I will try to find more information about it. I may find someone expert to tell me what to do if I use something with a team."* (P6)

Noticeably, the participants would also ask people who have experienced the same issues. For example, P2 indicated that he would act based on the issues presented in the media or people who have had the same issues.

"If I hear anything in the media or one of my friends they have specific issue with Facebook, then maybe I will act upon that." (P2)

Similarly, P1 was asked to delete a post on Facebook, and the participant decided to ask someone who has deleted a post before.

"I will ask someone whoever deleted any post; I did remember if you click in an arrow you get an option to delete that post but I think they just removed that; that is why I am like that is weird." (P1)

In contrast, the results showed that SNS users may also advise others to manage SNS settings or issues related to the settings. The most common advice was to keep everything private and then only change the settings based on the user's needs. P8 stated:

"Set everything as tight as it can be and go back if you really want to change something." (P8)

Likewise, P9 suggested keeping the settings private until the users are assured about the outcomes of the settings they desire to manage.

"First of all, I actually use that with my family or use new email address different than my real email address until I understand about privacy and how people know about me and go from there. Keep yourself private until you learn and teach yourself about their SNS and settings. Sometimes we make a fake name that is not real name and open fake account and see how their settings work and then go from there." (P9)

Guessing or assuming SNS settings' meanings and functions

The results indicated that participants would attempt to guess or assume the meaning of a setting even though they had read the settings' descriptions and searched them on Google. For example, P11 attempted to understand the setting [Review what other people see on your timeline (View As)] on Facebook and he admitted that his response was an assumption, even though he read the descriptions.

"That is an assumption now and it is not a fact even after I read. It means view it as I am posting it so whatever I post it is going to appear as it is." (P11)

The same issue also occurred when attempting to test or check the outcomes of changing a setting. P4 reported a tagged photo on Facebook, and she assumed that the reported photo had to be removed if it was not found.

> *"I do not remember the outcome of when I did that and I do not know how Facebook handle these requests whether they force the person. I would not know how I am looking to it; I would not know how to ask or follow up; I would probably go and try to find out that picture again and if I could not find the picture I would assume it is been removed."* (P4)

The participants usually assumed the meanings and outcomes of the settings because they usually depended on their own judgment and self-learning. For instance, P1 indicated that he did not use Google because he knows the meaning of the word "log" in the setting [Review all your posts and things you're tagged in (Use Activity Log)]:

> *"If you talk about resources it is like if you read the word itself use activity log will tell you like ok because log will have a content which you already done activity means whatever you have clicked whatever you have posted so for sure those all things will be in that log so that brings me a complete knowledge so it is like I did not like Googled it I did not like ask the help for Facebook itself for the activity log so it is like something which I have an inner perception; you can say self-learn."* (P1)

On the other hand, participants' guesses or assumptions c and that may cause issues when attempting to understand, change, and test the outcomes of the settings. For instance, P2 was asked about how Facebook identifies people in photos specifically using the facial recognition concept. The participant thought that it is similar to using a passcode for a phone without using numbers so the face can be used to open the account. After reading on Google:

> *"Ooh Facial recognition maybe it is related to my pictures itself; it is different than what I am thinking of. It is something about the pictures that you post because it is like confusing even when I read here."* (P2)

The same issue exists when attempting to find a setting. P4 was attempting to guess the location of the setting [Who sees tag suggestions when photos that look like you are uploaded?] on Facebook in order to change it, and their assumption was inaccurate.

> *"Probably under tagging and photos. I have never actually trying looking to it. I would not know actually; maybe under security."* (P4)

Using shortcuts to change SNS settings

The results exhibited that SNS users utilize shortcuts when managing the SNS settings in two ways: customizing each post individually (i.e., using the inline features' controls) and using different resources such as Google. Firstly, the participants distinguished between the shortcuts options and the entire settings page. They found that the shortcuts options such as using Privacy Checkup and Privacy Shortcuts (Figure 4.5) or changing each post individually are more practical than going through the settings. For instance, P4 emphasized that she preferred to apply settings for each post instead of going through all of the settings.

> *"I actually do not find going through the privacy settings to be the most efficient; so for instance what I would do let's say this friend I have recently added I would go to that person that I am thinking of and I would go here (Figure 4.6) and say acquaintances. Another way that I most commonly adjust my privacy is I will take whatever I am about to post I would go here (Figure 4.7) and I would say who immediately so to me it is more practical to adjust my privacy this way than it is to go through my privacy settings."* (P4)

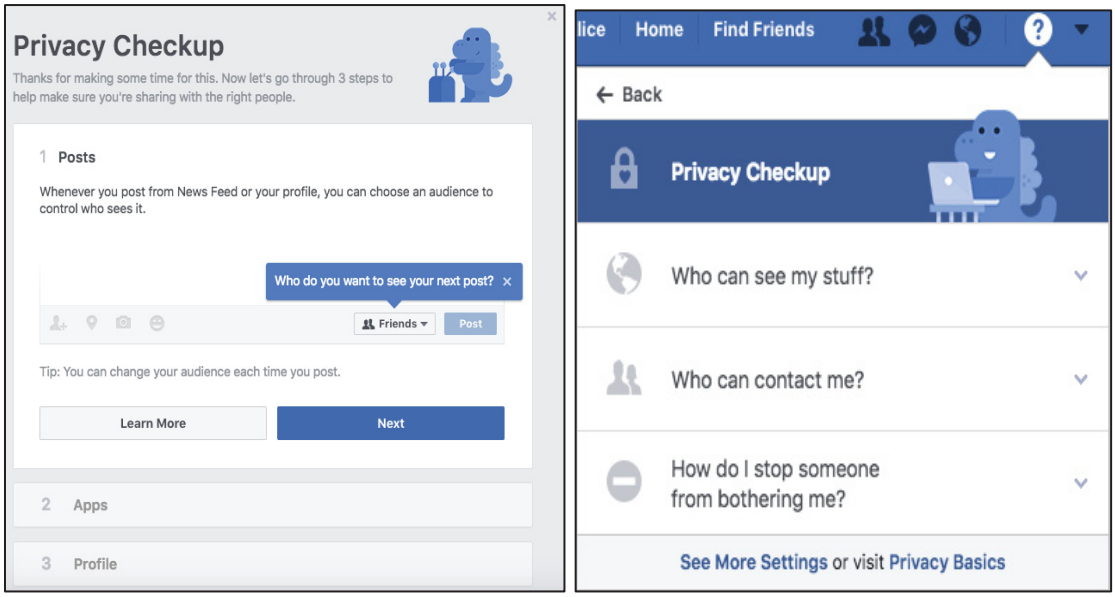


Figure 4.5: Privacy Checkup and Privacy Shortcuts in Facebook

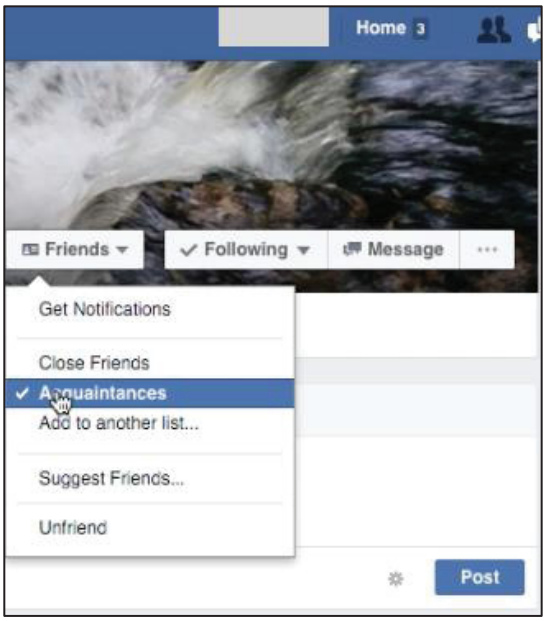


Figure 4.6: Using Friends tab as a shortcut

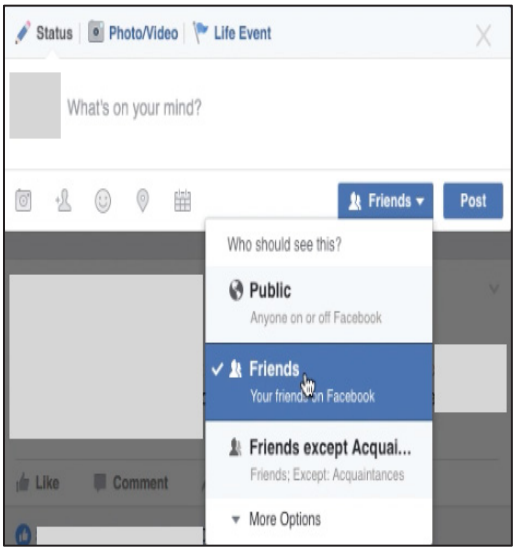


Figure 4.7: Choose an inline feature control in each post as a shortcut

Likewise, other participants would use any option that seemed to be related to privacy or settings. For instance, P20 did not check the setting [Review all your posts and things you're tagged in (Use Activity Log)] on Facebook through the settings page; however, the participant noticed a red flag in the profile and clicked on it instead of using the settings page (Figure 4.8).

> "*When I was in my personal page there was the little red flag that came up it said activity log. You can do the shortcut thing"* (P20)

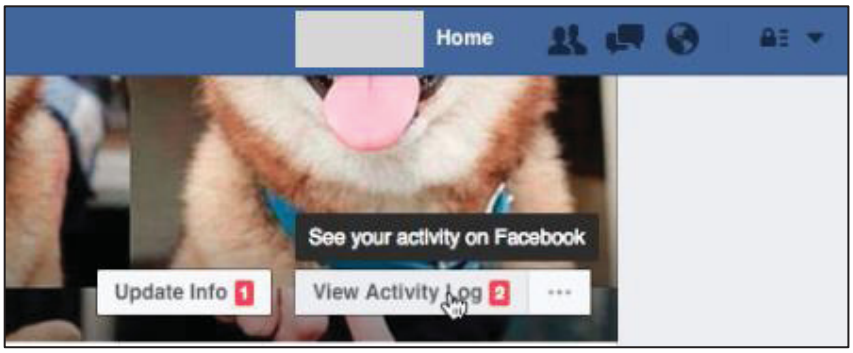


Figure 4.8: Red flag for activity log in Facebook

Secondly, the results also showed that the participants would use shortcuts to search for a setting in SNSs. To illustrate this, they rarely searched about the settings inside SNSs; instead, they used different resources or options outside the SNSs such as Google as a shortcut in the searching process. For example, P4 clearly emphasized that Google can directly navigate the participant to the setting [Who sees tag suggestions when photos that look like you are uploaded?] instead of attempting to find it on Facebook.

> *"Instead of me trying to find where it is, Google will take me directly to the page I need. It is just a shortcut like If I had to search the website [Facebook website] myself, I probably would not be able to find it."* (P4)

Another participant declared that it became a habit for them to use shortcuts when searching about a specific setting rather than using the SNS settings pages.

> *"Maybe that is a habit like whenever you are stuck; just Google it. It is the top towards feelings to help you get the right answer."* (P16)

Similarly, in other SNSs, P13 preferred to use Google to search tagging options in Instagram, and Google redirected the participant to the Instagram help center.

> *"Usually when I Google it and find the help center, I will go to that and read what is there but I will not go from inside the app. If it comes as a result from Google, I will do that because that means Google found a match to what I am looking for. I will not waste my time to see and Google will not waste my time looking into the help center and find an answer to my question."* (P13)

Receiving notifications about new updates of SNS settings

The results exposed how SNS users usually receive notifications about SNS settings and whether they pay attention and read them to understand and change the settings or filter

them out. The users would read the notifications to understand and take action toward the settings, use different resources to clarify the received notifications, or ignore the notifications. First, the results showed that the participants would read the notifications of the new updates just in case they included crucial updates, and based on their self-decision, they would take action and change the settings. P9 stated:

> *"Sometimes I get notifications in Facebook when I login about privacy and security settings updates. I just read about them in general. I read about the alert and some alerts for example for security they add more verification steps such as phone numbers and something like that."* (P9)

The only concern that may discourage the users from reading the notifications is receiving a large number of notifications. For instance, P21 used the term "overload" to express the way SNSs present or provide their notifications of the new updates on Facebook and how it impacts their reading.

> *"Facebook sends them out but I do not know how to read them. It is like so much information is coming across in Facebook and I do not think It is physically possible to read it all so that becomes the challenge. I guess it is information overload if you want to use that term."* (P21)

Likewise, in other SNSs, P22 emphasized that SNSs should provide notifications of the new updates in the easiest way.

> *"I hate the updates lately because it is constant updates and I do not have time to read everything. It is kind of frustrating because if you are using three or more social media and there are constant updates, you cannot really read every single update. I do not read and I do not receive them in a proper way of explaining the updates. They should provide me as a user the updates in the easiest way. They might think all users know about the updates and all users know about the settings but they are kind of missing the fact that they do not"* (P22)

In contrast, the majority of the participants emphasized that using different resources, whether inside or outside SNSs (e.g., public news, friends, vlogs, and blogs) helps to properly and effectively understand the notifications of the new updates. For instance, P15 described using all the resources possible inside or outside SNSs:

"Actually, it is through by email or that kind of things. I usually do not see that emails properly. I usually hear about that from friends or from any news or technical news or sometimes I may find notifications in the notifications bar like we have new settings you can change the settings from here so that kind of thing." (P15)

Similarly, P5 emphasized that it is easier to get notifications of updates from vloggers (i.e., outside SNSs).

"It is easy when the vlogger I am following is talking about it because they already search there and gave me very specific information." (P5)

However, using untrusted resources outside SNSs may provide inaccurate information about the notifications of the new updates. For example, P13 realized that outside resources are untrustworthy even though they explain that the notifications of the new updates are presented more attractively than in the actual SNSs.

"I think they [SNSs] are not doing their job very well and they do not push any notifications about their updates especially for the settings. They do not explain very well what is happening and that is the issue that make me looking to the untrusted resources because they explain it better by experiment and by testing but in SNSs they give you a text and you have to figure it out." (P13)

The last strategy that SNS users take into consideration whenever they receive notifications about new updates is completely ignoring the notifications. Interestingly, the participants who received notifications from SNSs pay attention only to filtering the notifications out. For instance, P3 was asked to check for some of the updates on Facebook, and the participants found that they had been filtered out (Figure 4.9).

"It looks like I may have received some updates but it was filtered out." (P3)

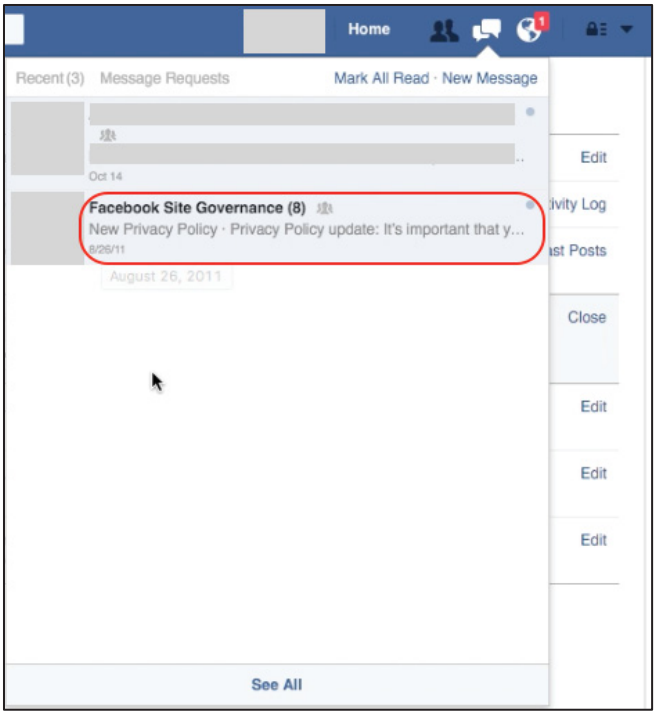


Figure 4.9: Filtered out updates on Facebook

Similarly, P12 received the notifications through email and ignored them:

> *"Well I do receive messages like emails but I just ignore them. Honestly, when I see it is privacy settings. I just ignore them. I have a problem with the long descriptions of that. it has a lot of stuff and I am not like in the mood to go through all these things and I am just like forget about them"* (P12)

In fact, the participants justified the reasons for ignoring the notifications of the new updates. First, they would only change the settings based on their needs and desires; thus, they would not pay attention to the notifications of the new updates because they were satisfied with their current settings. P14 stated:

> *"I think I got privacy update from Facebook but I really did not look into it so I am not sure what was that. I change the privacy according to my needs and I thought that what I wanted and is already working so I really do not have to read what Facebook is providing now as a new update."* (P14)

Second, the large number of notifications sent by SNSs to users negatively influenced users' experience with the new updates. Therefore, they would simply ignore the notifications. P21 indicated:

"I would prefer to see updates maybe twice or three times a year. If they were arriving like every week, I would get really annoyed saying ok guys make up your mind here." (P21)

On the other hand, there are two indirect problems found with this factor: the SNSs may directly change the settings without sending notifications, and they may not provide the right information about the new updated settings at the right time. Firstly, the participants expressed how changing the settings through SNSs without any notifications about the new updates is unacceptable because it may affect their privacy. For example, some of the settings that were private were changed to public without notifications being sent to the users. The following participant indicated that Facebook did not send notifications about the new updates and they would reset the settings without informing the users.

"let us say from the first time until this year it was nothing [No notifications]; so they will change it without notifying me." (P5)

Similarly, P22 found that updating the settings without sending notifications to the users is the action they were most afraid may occur:

"My most fear is when there is an update, they sometimes change the settings for me and they are expecting me to know that they have changed them so this is might not be accidently changed but this is a change because of an update. For example, on Snapchat, they provided or made an update to "ON" which is everybody can see your snap without adding you. This thing is not good because they are going just to search you up and see your snap without adding you. When Snapchat did that, they did not add this feature and make it "OFF" but they made it "ON" and my account was private so basically this is kind of compromising my privacy because of the new update." (P22)

Secondly, SNS users may hear about the new updates only a long time after the new updates' publication or later from others. For instance, P6 indicated that Twitter does not provide information on new updates at the right time.

"They do not provide the right information in the right time. If you want to announce for an update or something, you have to give it in the right time I mean at the moment of what is going on not after two or three weeks." (P6)

Another participant preferred to get new updates from Facebook rather than hearing about the new updates later from friends.

> *"I feel like I would rather get an email from Facebook telling me that there is a privacy updates and then I want them to explain exactly oh we are introducing this and here is exactly what it does as opposed to my friends being that oh yah I got this and it does that and I am like ok yah I would rather get that from Facebook."* (P8)

Searching about SNS settings and new updates

The results disclosed that SNS users were compelled to search about the settings and new updates to find enough accurate information. In addition, searching about the settings and new updates takes time. The participants complained about SNSs' presentation of the settings and new updates, which forced them to search in order to understand and change the settings. For example, P9 found that having to search to learn about the settings and new updates is a common action in all SNSs.

> *"As in any social media I guess, I have to look for it myself. I have to look to privacy settings once in a while."* (P9)

P2 also indicated that there is no direct way to clearly show the new updated settings without searching:

> *"There is no clear way that maybe when they update something they can show directly on your account. We change that from this setting to this setting; no clear statements but if there is something when I log in to my account, we change that and give me a brief what they change, I can get it right away without wasting my time looking everywhere to find this piece of information"* (P2)

Likewise, the participants indicated that they often do not immediately understand the meaning of the settings and new updates, so they often have to search more about the unknown words or terms in the settings or the new updates.

> *"I need to search about all the kind of settings because they make a lot of stuff so I do not know each of them."* (P10)

In some cases, English is a second language for SNS users and that may cause issues when attempting to understand the complex terms in the descriptions. The following participant

declared that the participant's native language is not English, and the participant needs to search to comprehend the terms included in the descriptions.

> *"My English is a second language and I am using Facebook in English and that maybe an issue but I think they still need to go down with that and provide basic terms to understand the settings instead of going back and forth to search for them."* (P12)

Another reason that caused issues in understanding the new updated settings and forced users to search is not showing users how to apply them in practice. For instance, P22 was confused about an explanation of Instagram's new updates in the Apps store. Thus, the participant emphasized that she should has to search and practice in order to understand them (Figure 4.10).

> *"All these stuff I do not really understand, I have to practice them. These stuff is just telling me this in a written way or like in words. It does not give me a clear idea of the update. I can get update like for example here bookmark but you do not know what is the bookmark for or what can I do with this bookmark. It does not really explain enough for me what are the updates unless I practice them and go search for them and practice them"* (P22)

Figure 4.10: Instagram new updates

In fact, SNS users are not always certain if they are going to obtain the proper outcomes with the new updated settings. For example, P5 would search to assure that the new updated settings match his expectations.

> *"It depends on who talked about it or what I read about it. I would go and search about these things or try it. For example, the post I read is talking about what is the issue with this updates, then it will make it very easy for me to decide."* (P5)

On the other hand, the results also showed that searching to find settings or new updates takes time. In fact, SNS users may need to allocate time to search, understand, and then change the settings and new updates. For instance, P21 declared that allocating time is the biggest challenge when attempting to search for and find the new updated settings.

> *"So I am aware that there are changes now I want to find out more about them. The biggest challenge actually is to find the time to do it or allocate the time to do it. I think that is the biggest thing. That applies to me and I think probably applies to a lot of people."* (P21)

P9 also indicated:

> *"It is kind of waste of time and it does not worth it to search about new updates because the general things are already in place. I did my privacy settings already and I think the new update is going to be tiny things or something that not really bother or something."* (P9)

The users would cope with the challenges of searching about SNS settings and new updates using two strategies: using external resources such as Google, vlogs, or blogs, and searching about the new updated settings only after receiving notifications. First, the results exposed that SNS users would check official and nonofficial resources to search about the settings and new updates. However, since there are challenges associated with searching and finding new updates inside SNSs, the participants would use nonofficial resources to assist them in finding new updated settings. P13 stated:

> *"The challenges usually are an official declaration or resources that will explain what is going on and I usually get information from nonofficial resources."* (P13)

Based on the findings, Google is the first choice for most SNS users when they quickly want to search about the new updated settings. Remarkably, the participants preferred using the official resources, such as the SNS help center, after being redirected from Google. P4 indicated that asking questions in Google would provide direct results such as conversations between Facebook's users and the Facebook Help Team. The participant was asked to find the most secure option in the setting [Who can send you friend requests?] and she found the proper settings after searching on Google.

> *"I do not remember; so I will look it up. Again if I were not sure because it is not clear to me from the Facebook Interface that I am using, I will go to Google. So finally I found how but I defiantly could not find it just from browsing all the Facebook pages. Here we go it is actually under who can contact me which I would not have expected; I would have expected it to be grouped with blocking."* (P4)

One of the other resources that SNS users utilize for new updates is vlogs or blogs. The participants would use these nonofficial resources because they may properly explain the new updated settings with examples and in visual forms. For example, P5 indicated:

> *"It is easy when the vlogger I am following is talking about it because already search there and gave me very specific information."* (P5)

P19 also emphasized:

> *"If anyone has been blogging about it or like brought it up in a question form or something. I think you will learn more from like other users who are talking about on the Internet. People will talk about their experience with the update rather than Facebook will be just like here is the basics."* (P19)

The main issue associated with using external resources is that they are still nonofficial resources. For instance, P6 was concerned about who was providing the new updates on Google and whether users can trust such resources:

> *"There is no enough information mostly and sometimes it is just some people they give their opinion of the new updates and their thoughts but sometimes they are not accurate so that is why I am not sure of all or everything that could be published in Google or if the website is right. I think it must come from the*

expert or from people who make the website and they know how to deal with it." (P6)

On the other hand, I found that the participants usually search about the settings and new updates once they hear or are notified about them. For example, P10 would not pay attention to the new updated settings unless he heard about them.

"I search when I hear about it or when I discover there is something changed in Facebook so I would like to know what is the new thing and what are the new updates." (P10)

The participants denoted that the reason for not searching for new updates is that the new updated settings are not properly advertised, and the users have to go through all the settings to find the updated settings. For example, P3 stated:

"They are not really widely mentioned, so it is kind of like you have to go through tons of stuff just to find Facebook's update log and then from there you can see the changes. I guess it would just be Facebook's poor advertising of changes." (P3)

This issue of searching about new updated settings only once receiving notifications was also noticed in the observation session. As an illustration of this, P22 did not know that Instagram has a full section about the new updates under a clear title called "What's New" because she did not receive notifications about it.

"I think here it says What's New. I never knew that in help center I can know what is new because first I have never searched it. Second, no body have ever told me about it. No notifications and I think this is something that the App should tell me the first time I downloaded the App there should be like at least a short video that tells me if you want an update you need to go to the help center" (P22)

Using different resources

The results showed that SNS users utilize resources inside and outside SNSs to manage SNS settings and new updates. The participants rarely use resources inside SNSs. They only check conversations included in the SNS help center or posts received from others in case of any issue occurring. However, they mostly use resources outside SNSs such as Google, blogs, vlogs, friends and experts, and news in various media.

The main resource used to manage settings and new updates is Google. The participants frequently use Google to find resources that help in understanding and changing the settings as well as checking the settings' outcomes (i.e., the expected outcomes). For instance, P3 indicated:

"If it is something that I cannot understand then I typically try Google it." (P3)

Similarly, P2 attempted to change the setting [Limit the audience for posts you have shared with friends of friends or public? (Limit Past Post)] on Facebook and had only two options: either to confirm or cancel (Figure 4.11). Thus, the participant decided to learn more about this on Google.

"I do not want to change that maybe it is going to change some stuff I do not know. Still with that information I think it is not enough, I have to go google and learn more about it." (P2)

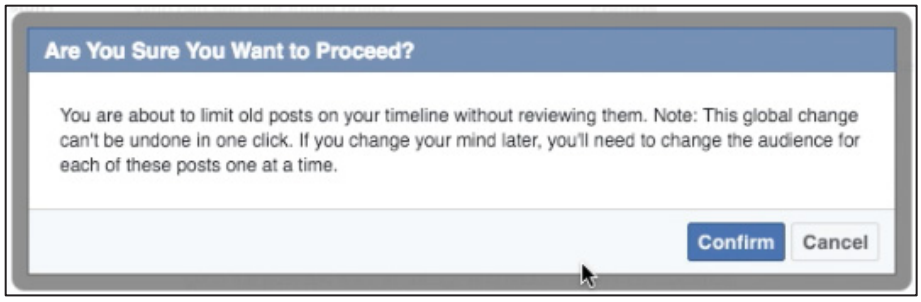


Figure 4.11: Limit Past Post Options in [Limit the audience for posts you have shared with friends of friends or public?] setting

Furthermore, Google was utilized to check if the outcomes of the changed settings are accurate. For instance, P6 declared that Google is the only way – on the Internet - to find about the outcomes when she changes settings on Twitter.

"Maybe I will find something in Google to see if this is accurate or this is really providing the privacy that I want. I think Google is the only way." (P6)

Likewise, the participants indicated that the reasons for using Google as a first choice is that Google has become the most popular and informative search engine and provides short descriptions in comparison to the long descriptions provided in the SNS help center. For example, P4 declared that Google is a better search engine than the SNS searching tools.

"All this time when I am looking for an answer and I cannot find it by navigating on Facebook I have never thought to put it in the search bar

Facebook, I have always referred to Google because my perception of Google is that it is a better search engine." (P4)

P15 also indicated:

"I go to Google. When we search on Google from Wikipedia or that kind of thing they give very brief information; shortcut." (P15)

However, there was hesitation to use Google shown by a few participants because they were concerned about the accuracy and trustworthiness of the results provided by Google. For example, P7 stated:

"The challenge is also trust because you do not trust the source of information that can give you the update." (P7)

Remarkably, using Google has become a habit for most SNS users. The participants constantly used Google if they had an issue when attempting to manage the settings and new updates. For instance, P16 was attempting to understand the setting [Review all your posts and things you're tagged in (Use Activity Log)] and admitted that she had the habit of using Google to find an answer.

"Maybe that is a habit like whenever you are stuck; just Google it. Mostly like it is the top towards feelings to help you get the right answer." (P16)

On the other hand, there are other resources the users take into consideration when attempting to manage settings and new updates including using visual content with examples, asking people (e.g., friends, family, and experts), and hearing about them in the media. The results showed that the participant would use other resources such as examples, photos, and videos instead of long text descriptions. For example, P22 emphasized that new updates on Instagram should be explained using visual content with examples.

"I would love to know but not notifying me like in a text way. I do not want texts. I know that I can go and find the texts updates. I want visual and proper way for me to understand without spending a lot of times trying just to make sure that I have understood whatever written. I need a visual way and I need before and after and I need an example like a visual example not a written example." (P22)

Moreover, the results exhibited that SNS users often seek information by asking friends, experts, and family members. They considered them as resources for

understanding and changing settings and new updates. They would either hear about the settings and new updates from friends or ask them to test the settings to assure proper outcomes. For instance, P21 emphasized that he relies on other people to gain assurance about the outcome of a changed setting on Facebook.

> *"I think when I see it I would understand what is the intent of the privacy setting is but to evaluate whether or not it works I have to rely on other people to do that." (P21)*

P8 also indicated:

> *"I would probably ask before I Google honestly just because if one of my friends had done it. I mean I would trust my friends more something like that."* (P8)

Furthermore, the results showed that SNS users often seek information about settings and new updates after hearing about them in the news or media. For example, P9 disabled the setting [Direct Messages (Send/Receive read receipts)] when there was news coverage of the issue of fake links being sent to people on Twitter.

> *"There is an option here and I already unchecked that. I think I unchecked it when I heard about that there is a fake links sent out to people and be careful of that so I just unchecked it."* (P9)

Reading SNS settings' descriptions and new updates

The results showed that participants attempted to manage the settings and new updates via reading the settings' descriptions inside SNSs and reading various resources outside SNSs. However, there are users who do not read and simply disregard the settings and new updates. Inside SNSs, the participants read the settings' descriptions to make sure they have an understanding of the settings' meaning and proper outcomes when changing the settings and new updates. For example, P10 emphasized the need for further reading to guarantee that they had a full understanding before taking any action.

> *"I need to read each word carefully like what do they mean about that and why they say and put this word maybe there is something behind this word I do not know it."* (P10)

The majority of the participants found that reading inside SNSs is a challenge because of unfamiliar terminology, long descriptions, and time consumption. For instance, P21

indicated that reading to understand could be a challenge when SNSs use unfamiliar terminology and long descriptions.

> *"Some of it is jargon from the discipline itself and these words were used they even made up or they are existing words that are used in a certain way in that discipline and people would use them and might not be aware of that other people interpret that same word to mean something different. There is also sometimes the explanation used to be very long and like anybody else I would have very short attentions when it comes to read that kind of stuff."* (P21)

Similarly, P14 emphasized that reading the settings' descriptions is a challenge because all the texts look similar and take a lot of time to read.

> *"All the texts look the same like whether I am tagging someone or someone is tagging me. It is like I really need to focus on that text and I need to understand that text and then change it and usually we do not really have that much time and patient to read everything and change the privacy settings."* (P14)

In fact, the participants use various coping mechanisms to avoid reading the settings' descriptions and information inside SNSs, such as comparing settings' meanings among different SNSs based on experience, guessing or assuming the meaning, and skimming for the feature's term (Tag, Location, Apps, etc.). Remarkably, the participants would compare settings' meanings in various SNSs; for instance, a setting on Facebook can have the same meaning on Twitter or Instagram. P15 declared that if the settings were common among SNSs, it would be easy to figure them out without doing much reading.

> *"If it is common privacy setting, then I can quickly understand. If it is new feature so I have to read a bit description of that and then I have to apply the setting. Some features are common in Facebook and Twitter and all things so we do not have to read each and every setting."* (P15)

Furthermore, when the participant read the settings' descriptions, I found that they quickly attempted to guess the meaning based on their general understanding and experience. For example, on Twitter, P7 read the setting [Promoted content (Tailor ads based on information shared by ad partner)] and then started guessing the meaning based on the general category, which was "Promoted Content".

"This is under promoted content so the meaning of promoted content can mean that this is the content that I am subscribing. The content that I want to be part of. So tailor ads based on information shared by ad partners is the information or the tweets that I send out and people are following this kind of tweets so they now want to send ads based on those tweets to my page. This is according to my understanding. This is according to my own understanding and based on what I see here [the setting's descriptions]." (P7)

Noticeably, SNS users sometimes choose the wrong setting after reading the descriptions, especially when attempting to change the settings. For example, P14 was asked to change the setting [Review posts friends tag you in before they appear on your Timeline?] on Facebook's timeline, and he was confused about another setting, which is [Review tags people add to your own posts before the tags appear on Facebook?]. The reason was that the participant skimmed for the word "tag" and directly decided to change the setting (Figure 4.12).

"I do not have time to really read each option which one is what tag so when I see tag I just went to that section immediately so that is the reason. I mean this is like textual information and it is really difficult to visualize." (P14)

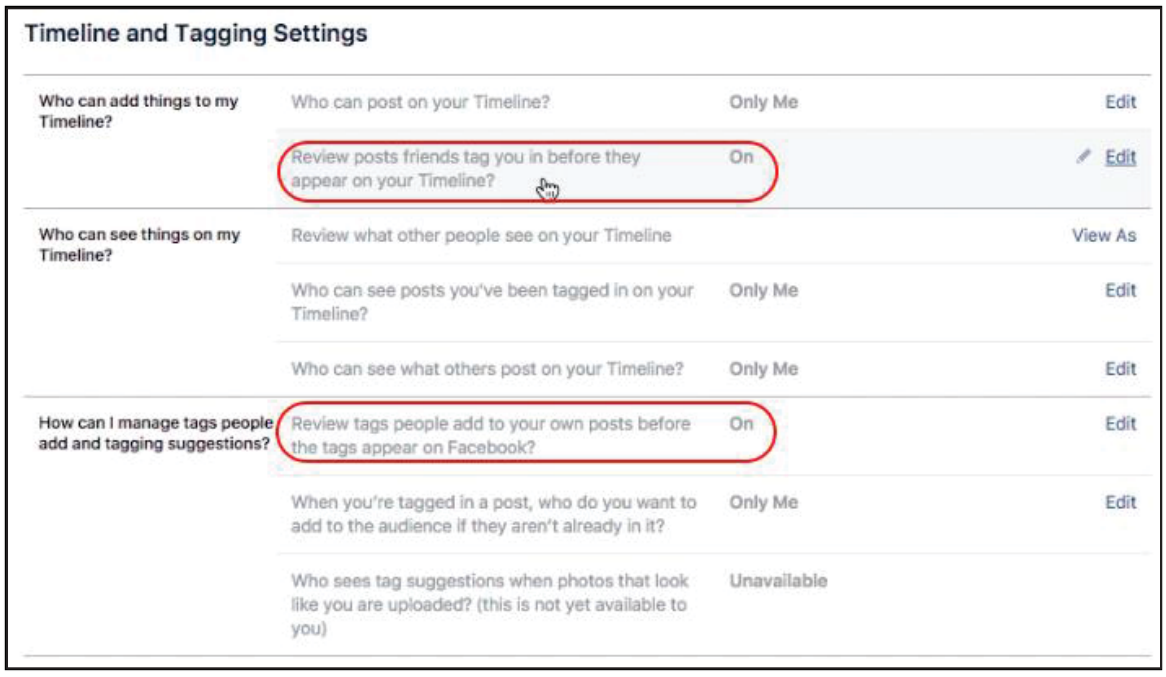


Figure 4.12: Two settings represent tagging feature before they appear in the Timeline.

On the other hand, outside SNSs, the results showed that SNS users attempted to read about the settings and new updates using online resources such as Google and blogs. For example, P9 indicated using Google when attempting to understand the settings and new updates.

> *"I just Google it. Read there and learn more options and see how they explained it."* (P9)

Further, P14 comprehended the setting [Review what other people see on your timeline (View As)] on Facebook because the participant read about it in blogs.

> *"I was reading some blogs and from there I got this information."* (P14)

However, it was not guaranteed that reading material outside SNSs would assist the users to understand the settings and new updates. For instance, in Twitter, P6 did not understand the setting [Twitter for teams (TweetDeck)] from the settings page, and she was also not able to understand it after reading about it on Google.

> *"I do not know. It is not there. Also, it is not in the list of the settings' categories. Still it is not clear to me so yah I can read it but I do not know how to do it."* (P6)

There are a few participants who do not read the settings' descriptions and the new updates and totally disregard them. If the settings are not straightforward and easy to check and choose, they will not read the descriptions of the settings. Instead, the participants will agree to anything without reading because they believe that reading is not going to change the limitations of the settings. For instance, P19 agreed to any setting because he thought reading the settings' descriptions is boring.

> *"No, I usually I am just like agree because it is just like boring and I do not think it really matters because I do not think that me reading it carefully it is going to change because it is either like I read it carefully and just got discourage and just delete Facebook or I just say whatever ok agree."* (P19)

Not reading the settings' descriptions was also observed in the observation session. P11 did not read the description of the setting [Limit the audience for posts you have shared with friends of friends or public? (Limit Past Post)]; however, he clicked on it and confirmed without reading the descriptions. The participant clarified that as long as it is the only option, then it is going to match his expectations.

"I am going to confirm and close. I did not read because it is the only option. As you noticed that there are no multiple options. I am confident that it is going to match my expectations. If there are no more options it means that this is the only solution so I am forced to go with this setting." (P11)

On the other hand, there are participants who do not read the new settings updates. They indicated that they would either read the subjects of the received emails and disregard them or filter them out without skimming or reading them. For example, P4 admitted that she only pays attention when attempting to filter them out.

"I only pay attention when I can get rid of it. If it is just a big thing that comes in my face and it is a long paragraph, there is no way of reading it. I will not read a paragraph of text." (P4)

The two main reasons for not reading the new updates are that the participants usually receive a large number of updates and the strategy used to explain to the new updates such as using texts is unsuitable. For instance, P18 admitted that sending many notifications about the new updates does not encourage the user to read them.

"I have never looked for them before. I have to admit that if they send me that many notifications, I probably would do not read them." (P18)

Likewise, explaining the settings using a lot of texts discourages SNS users to read the new settings updates.

"Usually, they will say that we updated your Instagram to a newer version and if you want to see more or read more about the update, go and click that thing. When you click that thing, you will find a lot of texts and when you see it ok this is technical things so I am not going through it." (P13)

Observing and checking the SNS settings' outcomes to match users' expectations

This factor is used to check if the results of changing the SNS settings are exactly what SNS users are looking for and expecting. The results showed that the participants would be assured of the proper outcomes of the settings via checking or testing the settings ***after*** changing them, waiting to experience the new changes, or comparing between the descriptions provided by different SNSs.

The participants employed different mechanisms to guarantee the outcomes ***after*** changing the settings, which included saving the changed settings and using different

resources such as Google, blogs, friends, experts, or family members. Noticeably, the participants consider the simplest and most common way of configuring settings, which is saving the changes (i.e., clicking the "Save changes" button) and expecting that the outcomes would match their expectations. They would also trust SNSs to apply these changes. For example, P6 stated:

> *"The only option is to return back to the same page and check if it is changed [saved] or not. When I change it I will try to see my account page [settings]."* (P6)

P7 also considered saving the changes to make sure the outcomes are effective:

> *"To make sure it is effective; I will just save it; meaning save the changes. Make sure the changes that I am making are saved."* (P7)

In contrast, the results also showed that the participants consider using different resources - inside and outside SNSs - such as Google, blogs, friends, and family members to ensure that the outcomes of the changed settings are accurate. The most surprising results in the observation sessions were observing and checking the outcomes of the setting [Do you want search engines outside of Facebook to link to your profile?] on Facebook. None of the participants previously checked the outcomes of this setting. Moreover, they were astonished by the outcomes they observed. For instance, P5 found that this setting is useless because the setting was configured to "NO" and Google found results about his Facebook account (Figure 4.13).

> *"It is not showing my profile directly but it is showing some well all my posts because my posts already have my name there so yah maybe the setting is useless. So typically does not work really or it is not going to work at all."* (P5)

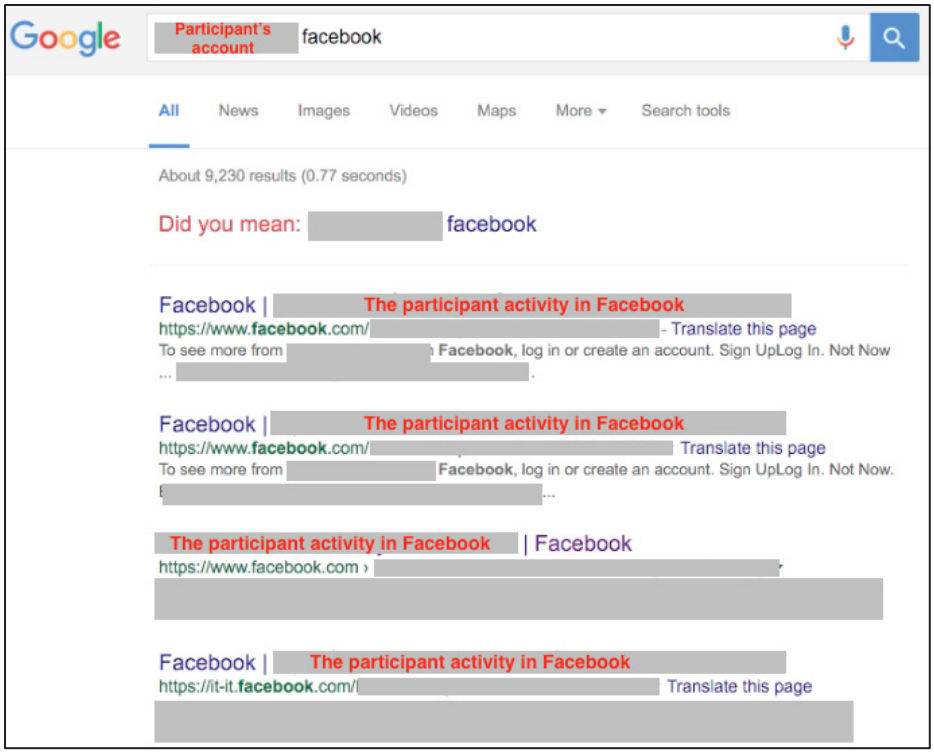


Figure 4.13: Search engine results for Participant 5

Similarly, P10 was astonished by the account's username being listed in Google's results and that Google revealed a comment he made a year ago on Facebook (Figure 4.14).

> *"I choose NO. That means no one can search in Google or any other pages. Oh that is me. Ok. I am surprised. Yah, they showed me a comment for this coffee shop. My expectation that I will not see anything at all and that was really a surprising for me. The setting is not what I expected and it is not enough. If I say NO that means no anyone can search also my comments they will not see it so that was really surprising for me. It does not work; it does not work like really I was surprised and that was a comment in 2015. I was not thinking that they can see my comment after like maybe one year."* (P10)

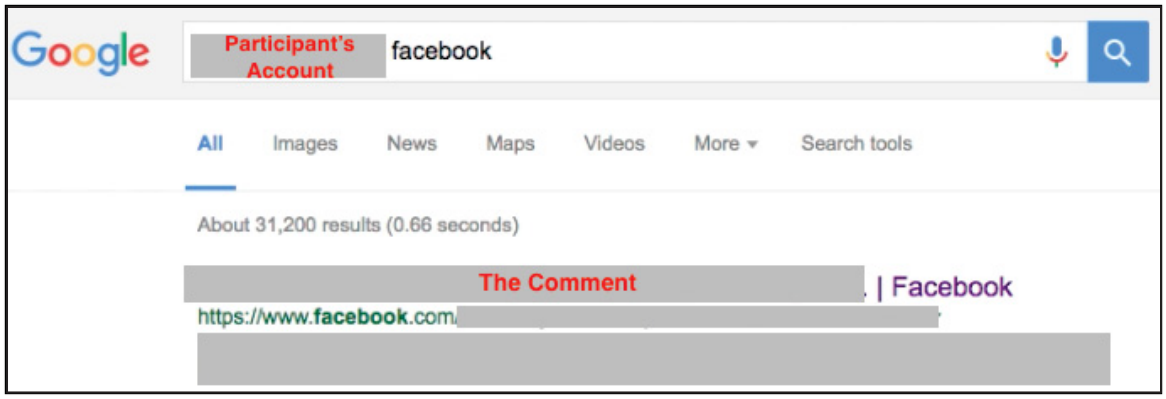


Figure 4.14: Search engine results for Participant 10

P16 also commented:

> *"I will search on Google. Oh my God. Even my photo and everything and whatever posts that I made. It is showing everything. It does not work. Oh my God it is still showing me; at least my profile picture."* (P16)

P14 found that this issue is a privacy violation because the setting was not working as it was presented.

> *"So it is really does not work. It is not possible I mean if I changed the privacy setting and it is not working, that is a privacy violation because I have changed the setting but it is still not working. Very much surprised."* (P14)

In fact, Facebook has explained that the changes may take some time to come into effect. Also, the profiles can still be found if people search for others' accounts. It was apparent that the participants did not previously check the outcomes of this setting (Figure 4.15).

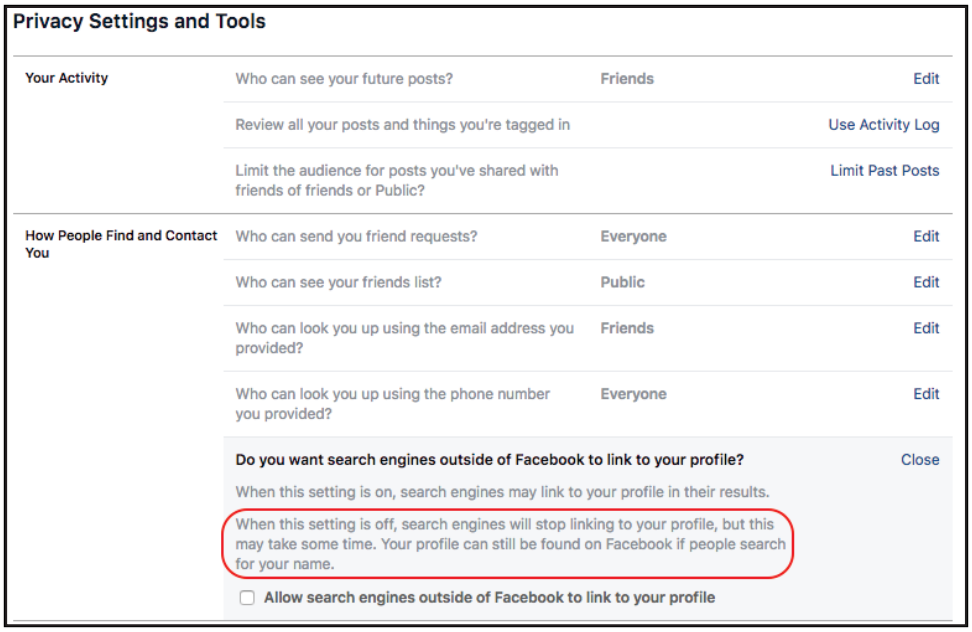


Figure 4.15: Search engine Setting's description

The reasons that discourage the participants from checking the outcomes ***after*** changing the settings are there being no instantaneous outcomes after changing the settings, and it is a time-consuming, long process. For example, P7 indicated:

> *"When I change a specific one, I cannot quickly verify that change if it is effective. I cannot see this change is already working. There is no way by which I can know immediately. It will take two or three times of checking my tweets before I note the changes."* (P7)

Further, observing and checking the results of the changed settings takes time. For instance, P19 admitted not checking the results when changing new updated settings because it is too time consuming.

> *"I guess by changing the settings and doing whatever the update is and then going into like the thing that where you can see how someone else could see your profile and see if it is actually worked maybe but I do not think I would ever do that it is like taking so much time."* (P19)

Similarly, in Instagram, P13 asserted that it is a long process to check the outcomes of the settings.

"I would say that it is difficult and long process because I have to look to that information and do experiments to make sure that the changes that I did is the change that I want. It is tedious and difficult." (P13)

On the other hand, the results showed that the participants check and ensure the outcomes of the changed settings via experience. They declared that they would wait and test the changed settings to validate the results. P16 indicated that experiencing the changes is the key to being confident about obtaining accurate outcomes of the changed settings.

"When you change your privacy settings the first thing you are not confident whether you change it perfectly, properly or will it work in the desired manner or not and as things go and as you experience and this maybe you will find confidence on a particular setting." (P16)

Likewise, in Twitter, P9 ensured the results of the setting [Tweet location] via experience.

"If the location is gone from my tweets, that means it is working; via experience." (P9)

Similarly, in Instagram, P8 changed the setting [Likes and Comments Notification] and observed the results via experience.

"The fact that I have not gotten likes and comments from people I do not know anymore; via experience." (P8)

Another strategy the participants take into consideration is ensuring that the changed settings and the new settings updates match their expectations based on the settings' descriptions and explanations. I found that if SNSs properly describe or explain the settings and the new updates, the participants could determine whether the changes match their expectations. However, some participants encountered issues when attempting to change the settings because the descriptions did not clearly specify the outcomes. For instance, P3 had an issue with the setting [Limit the audience for posts you have shared with friends of friends or public? (Limit Past Post)] in Facebook because it provided two options: either to confirm or cancel.

"It does not really specify. It just says it going to generally change it and if I click this [Limit Old Posts] It just changes and it does not actually ask me anything really it just asking for my permission to change it." (P3)

The participants correspondingly suggested that the outcomes of changing the settings can be presented most effectively by using interactive resources. For instance, P11 suggested providing real-life examples as reflections of the changed settings' outcomes, especially before and after changing the settings.

> *"I suggest to list an example a real life example. If I change a setting by saying no, I wish if there is an option that allows me to see the page before and after applying this setting. By this way, I will make sure that this is the exact meaning behind this description."* (P11)

Likewise, the participants suggested providing visual content such as photos and videos to demonstrate the results when changing the settings. For example, P13 insisted that SNSs should change the textual information and provide visual content that presents feedback when changing the settings.

> *"Making the information easy to be accessible; Just done with the text and start visually forcing people to see what are the privacy settings or what are the consequences of that privacy setting or new feature and what will do and what will not do."* (P13)

Noticeably, P14 preferred to use visual resources when changing the setting [Limit the audience for posts you have shared with friends of friends or public? (Limit Past Post)] on Facebook because the texts did not properly explain the expected outcomes.

> *"If there are two images which shows if you choose this option, you will see this because just with this text it is just not very clear. I really need to read and then change and then again experience that whether it is really working or not."* (P14)

Remembering SNS's settings, outcomes, and new updates

The results demonstrated that SNS users frequently forget settings and how to change them. In addition, they cannot recall if they have received new updates about the settings. Initially, the results showed that the participants were not able to remember how they changed the settings. For example, P3 was asked if it is possible to prevent Facebook users from searching about him, and he indicated that it is possible; however, the participant was not able to recall how to do so.

"You can limit it; I just do not remember; I saw it somewhere before; hah; I saw it somewhere; hah; weird; I thought I saw it somewhere that you could have it." (P3)

Moreover, the following participant had previously checked the setting [Review all your posts and things you're tagged in (Use Activity Log)] on Facebook but he could not recall the specific setting.

"I clicked on it once and I have seen everything. I cannot really remember but I think I have read it somewhere." (P5)

In fact, the participants specified two reasons that caused this issue, which are providing a lot of features and checking the settings a long time ago. Providing many features caused challenges in remembering the previously changed settings. P16 stated:

"Being frank Facebook has so many features that we sometime forget what you have changed." (P16)

The other reason that caused the participant to forget a specific setting is that she checked that setting a long time ago. P19 admitted that she had not visited the category of settings [Apps] on Facebook for a long time and she needed to check and clean them.

"A long time ago but I do not even have these apps anymore most of them. I forgot about them like I feel like I need to do some cleaning in here because it not easy to access it." (P19)

Interestingly, a few participants admitted that they would forget the next time if they change a setting because they have to go through the settings and find out how they did it beforehand. For example, P5 indicated:

"I will forget the next time very sure, so I have to go through the whole thing again. Like I just did with you the first time [in the observation session]. For example, if you told me how to change the tagging privacy then yah if you explain it to me, it should be very easy for me to do so, but the next time you might not be with me or I cannot call you." (P5)

On the other hand, the participants indicated that they cannot remember if they receive new updates about the settings in all the SNSs (Facebook, Twitter, and Instagram). For instance, P21 admitted that he is not able to remember receiving new updates.

"I do not remember. I am not saying that they did not but I do not remember." (P21)

Likewise, in Twitter, P6 said that changing the settings was a self-decision and she does not remember if Twitter sent new updates about the settings.

"No it is just me I decided to do some changes. If there is a lot of things that I was not aware about, I may change it but they did not send me I mean Twitter something saying you have to change this otherwise this will be exposed to others. I do not remember that" (P6)

Similarly, in Instagram, P13 was not able to remember receiving new updates about the settings, and he criticized the way Instagram updates their settings because it does not help him to recall receiving updates.

"My experience is very bad because I do not remember that I have received any new updates. I might receive that but the way I received it, it does not stick to my mind because I do not remember seeing anything that they say we change privacy settings and you should look to that." (P13)

Dealing with Interface and usability issues

The results showed that the participants encountered complexities when using SNS settings' interfaces. Remarkably, the participants noticed and emphasized how SNSs generally pay attention to enhancing the timeline and the profiles' pages, while they keep the settings and help center pages very basic. For instance, P4 observed how the general Facebook layout looks much better than the Facebook help center.

"This help page [Facebook help center Page], it does not look like the traditional Facebook layout and so now that I have been on enough of these pages, I know what its face look, but the first time I landed on them I cannot follow because I was like this is not a Facebook site it is just some scam. So certainly having a consistency, it will be good." (P4)

There are various problems that impact SNS users' performance when managing the SNS settings and inline features controls. Firstly, providing "Learn More" links and multiple paths to finding explanations for the settings was complex. For instance, P11 indicated:

"When I want to know more, it takes me to a different page with multiple questions and answers and usually I do not find my answers there. It is challenging to find descriptions on the same page. The interface is not that clear and there are multiple paths that take you to the same option that you want to change which I do not like." (P11)

Noticeably, this participant also encountered the same issue of having multiple paths when attempting to change the "Likes" page on Facebook because there are many pages and paths to reach the targeted settings.

"I have to go to my main page or main profile and Home and I think it is somewhere on the left. It is supposed to be here. It is in the edit profile and here I can change everything. Maybe in Overview that shows me everything. Am I right? I do not know." (P11)

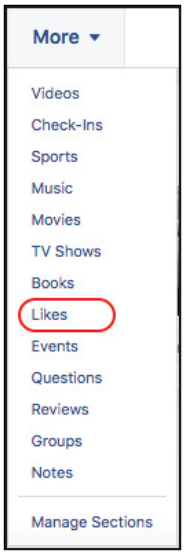


Figure 4.16: More options in Facebook profile

After I showed him a different path to the same Likes page on Facebook (Figure 4.16):

"Ok different routes that takes me to the same page. I do not like it and I do not like this approach at all. I prefer if there is one path where I can go there and do it because now I am hesitant about every single action I make. The first path where I said I am going to Home, that matched my expectations. It makes sense Home or Profile or whatever but you just showed me the More options and this does not make any sense. Why under More why there is a drop down menu under more that show the Likes." (P11)

Secondly, grouping the settings in vague categories caused issues with locating a specific setting. For instance, the main settings categories did not assist the participants in finding the settings; instead, the participants attempted to guess and navigate to find the desired setting. P1 criticized the merging of settings under "Privacy" as a group in the main settings category on Facebook (Figure 4.17).

> *"They are putting all these things into a box that is they call like Privacy box that what actually causing me a problem to like get through these privacy settings. So first go and search where the privacy setting is in this box then put that. So, that is what the way they are actually making people to interact with their privacy settings."* (P1)

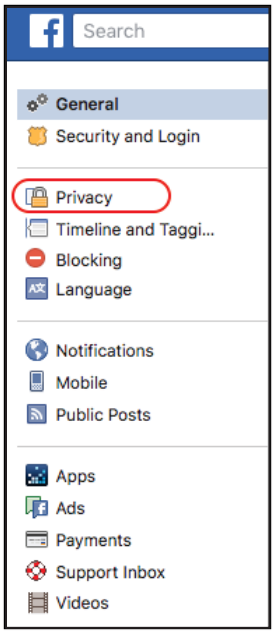


Figure 4.17: Settings grouped under Privacy

P4 was also unable to find the setting [Friends Request] on Facebook, and then she found it under the setting [Who can contact me] after searching on Google. Interestingly, she indicated that she expected it to be under the wrong category, which was the [Blocking] category.

> *"I found how but I defiantly could not find it just from browsing all the Facebook pages. Here we go it is actually under [Who Can Contact Me] which I would not have expected; I would have expected it to be grouped with Blocking."* (P4)

Remarkably, P20 considered the [App] setting in Facebook as unimportant, even though it may cause major issues that can violate privacy.

> *"I saw this Apps setting I thought it was like games and silliness but you explained to me that if I have Twitter or Instagram I would go there to enable the sharing feature like I have never clicked on Apps before because I thought it is all Candy Crush Saga and all these games. I think if it is better organized it would be just more user-friendly and it would not allow people to see like this is the main piece and here is like some pieces within the security and privacy settings because this is not arranged very well."* (P20)

Lastly, the participants were asked about the available options in the settings and they emphasized that SNSs provide redundant options, while there is a demand to add essential options. For instance, the participants were asked about the most secure option in the setting [Who can send you friend requests?] on Facebook and the majority assumed it was either "Friends Only" or "No one", while the most secure option was "Friends of Friends". Thus, the participants emphasized that SNSs should consider changing and adding more significant options. P16 believed that "Friends Only" should be included because the participant wanted to only be added by close friends:

> *"Ok it does not have that [friends only option]. I think yes because sometimes you have a dedicated network of friends and you do not want anyone else to be invited."* (P16)

P14 also insisted that there must be a change in the settings options because the users will still be forced to receive requests from public users:

> *"I mean one option could be like no one can send so I do not want any more friends' requests so that could be the most secure option and maybe friends of some particular friends like friends of some customized friends' list. There must be a change because these two options ["Everyone" and "Friends of Friends"] it is kind of restrict Facebook users like for me I do not like these two options so I need something more very specific like friends of certain number of friends. I choose friends of friends because there are no other options."* (P14)

Significantly, the participants suggested that the basic settings pages, the categorization of the settings, and the interaction techniques such as pop-up messages must be improved. They also emphasized that the settings pages and categories must be professionally designed, similar to the main Facebook timeline or profile. Adding review messages as feedback and appropriate notifications or alerts may enhance the interaction between SNS users and the settings. For example, P7 specified that appending a pop-up effect when hovering over the password reset setting's description (Figure 4.18) on Twitter would assist to improve the interaction between the users and the settings:

> *"Increase the eligibility for example the explanation on this privacy setting; the password reset. You may not want to read this one so when you move your mouse up here [in the explanation] probably this [the description] should pop up so I will be able to read it bold rather than text like this. I want kind of interaction when it comes to privacy settings."* (P7)

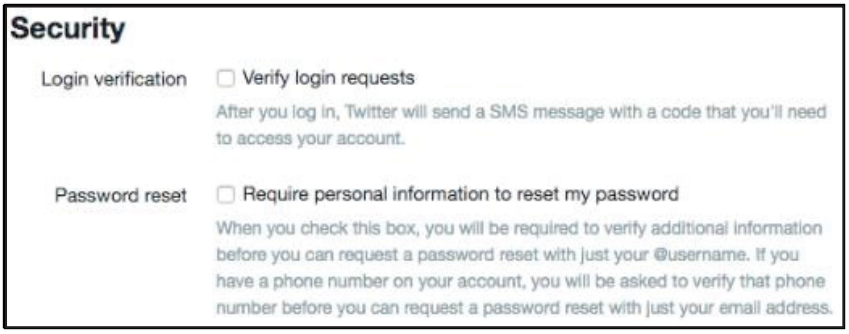


Figure 4.18: Password reset description in Twitter

However, an example of an unsuitable pop-up message is the feedback message provided by Facebook when changing the setting [Limit the audience for posts you have shared with friends of friends or public? (Limit Past Post)]. P19 indicated that this was intense because this setting provides a pop-up window that allows the user to only confirm or cancel (Figure 4.11).

> *"It is like intense. It makes you not want to do it. I would want to cancel because it makes it scary because it sounds like permanent that you have to go and do it. Just cancel I think always. It would be cool of they did it in chunks like all your photo posts or all your shared videos or maybe categorize it or by years like posts from 2015 or posts from 2014."* (P19)

The participants also suggested using visual content (e.g., photos, videos, highlights, and animations), more explanations, and examples to enhance SNS settings and their usability. One of the types of visual content the participants mentioned and considered as a useful technique is animation. For example, P1 insisted that animating Facebook settings could more clearly convey the information.

> *"What if they just animate the meaning. Suppose If it is an animated format if the seeing meaning is in animated video format. This doing this you will get this in your timeline or you will not get this in your timeline. It will make more sense and will convey more information for that particular stuff."* (P1)

P15 also suggested using animations such as GIF images that can provide visual content in a short time.

> *"They should have some GIF or some kind of animations to show settings so it is too long to see any video and it is too descriptive to read all these things so instead of that they should show some animations how we can apply this; about 5-10 seconds and not more than that."* (P15)

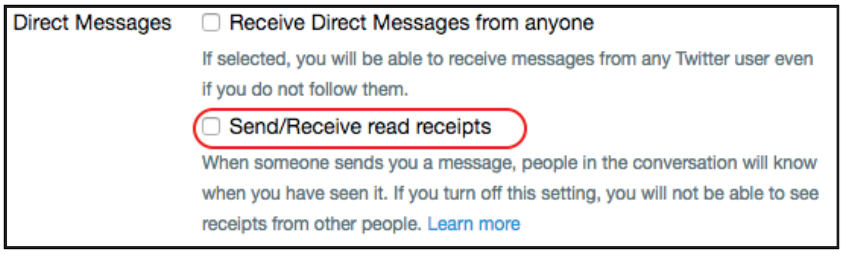


Figure 4.19: Send/Receive Read Receipts option in Direct Messages setting in Twitter

Another participant gave an example of how photos or icons may improve users' understanding of the settings. P9 suggested adding an icon in the setting [Direct Messages (Send/Receive read receipts)] on Twitter to represent the receipt or read effect (Figure 4.19).

> *"The readability is not that good. If they just put under each section kind of icon for example here (Figure 4.19) if they show you icon from the real message that the message is received or read or something; just a picture. It is going to be more easy instead of reading all the settings."* (P9)

Furthermore, highlighting new settings or updates is another way to improve the interaction between the users and the settings. For instance, P14 indicated that highlighting the setting would help the users to quickly understand the settings.

> *"My main focus is understanding the privacy settings. In the present scenario, it is really very difficult and not everyone follows the step by step procedures provided in the help center so everyone is using a particular app or any social media sites without looking into the privacy settings so they really need to provide the privacy settings like highlight the privacy settings in somehow to the users so that the users get it. It is like the privacy awareness kind of thing."* (P14)

Additionally, using examples that show the outcomes of the changed settings would enhance the usability of the settings. For instance, P19 declared that Facebook provided a useful setting, which is [Review what other people see on your timeline (View As)], that allows users to identify how a specific audience sees their profiles. However, checking the outcomes is not applicable for all the settings. Thus, the participant suggested providing examples to show the results when changing all the settings.

> *"I think it would be cool if they show examples of how to do things like the features on Facebook where you can go in and see how someone specifically would see your profile like a specific way of seeing whether or not it is working whereas a lot of the other settings there is no specific way of really telling what is going on. So it would be interesting if there is like a bit more of specific examples when you actually settings your privacy settings."* (P19)

Influencing of users' levels and experience

The results showed that users' levels are diverse because there are novices, experts, and organizations or companies in SNSs. Meanwhile, their experience should be considered separately, since each of them utilizes SNSs for their own purposes and needs a different set of settings. In fact, the participants tended to manage the settings and inline features controls in two ways: waiting to experience the changed settings and comparing the meaning of the settings with their experience of the settings provided in other SNSs. First, the participants emphasized that waiting to observe the outcomes of the changed settings is a strategy that confirms their full understanding of the settings. For instance, on

Facebook, P18 learned the meaning of the setting [Review tags people add to your posts before the tags appear on Facebook?] by receiving many annoying tags from friends.

> *"A friend likes to tag me in a lot of things and I do not want them to appear in my timeline."* (P18)

Likewise, in Twitter, P7 denoted that he fully understands how the [Password] setting works because of previous experience.

> *"The one that I fully understand has to do with password. I understand that very well. This is my password it is my key. It is like a key to my house. So whatever I am making as my password should be something that I am going to remember and that is hard for the other person to guess. So those rules will guide me to setting my password. I do not understand it from Twitter. I understand it from using the password for very long time. So it is from my previous experience.* (P7)

The results also showed that the participants observed and checked the outcomes of the changed settings via experience. For example, P16 admitted that she cannot be confident about the results of the changed setting until experiencing the setting.

> *"When you change your privacy settings the first thing you are not confident whether you change it perfectly properly or will it work in the desired manner or not and as things go and as you experience and maybe you will find confidence on a particular setting."* (P16)

In addition, in Facebook, P18 was assured about the outcomes of the setting [Review tags people add to your posts before the tags appear on Facebook?] because none of the tagged photos had been posted directly on their timeline.

> *"Well just from experience because nothing has been posted in my timeline. It seems that it is working"* (P18)

In contrast, the participants compared the meaning of the settings they wanted to learn and manage with their experience of the settings provided in other SNSs they used. For example, P22 compared the meaning of the setting [Protect Account] on Instagram with the meaning of the setting on Facebook. However, she admitted that it is not necessary that the settings and their options to be alike.

"Making an account private that means only the people I follow or the people who are following me can see my pictures or can see my posts. I have an experience with other apps but not necessarily is the case. For example, with Facebook when you say I want my account private, they give you options who do you want to see your posts so they give me a lot of options that make me confused so I decide not to post anything. I make it private but I decided to not post anything because I am not sure about that so it depends on the options." (P22)

Similarly, the influence of experience and comparing the settings that the users want to learn and manage with the other SNS settings used may impact users' behaviours. For instance, P6 did not add their phone number on Twitter because people on Facebook can easily search for other Facebook users by their phone numbers:

"I usually think that they are the same so I apply what I know from the first social website but actually they are different and they have different way of dealing with your information so it is so tricky. It is not easy. Let's say using the phone number, so from Facebook it is so easy to find the users or people from their phone numbers; but I was thinking that this is the same thing with Twitter. Twitter is different; so I am not sure how but I know that it is easy in Facebook so I prefer to not use my phone number in Twitter because of my experience on Facebook." (P6)

After discussing the strategies that users take into consideration to check the settings, the results also showed that there are issues that may influence the management of the settings. In terms of users' levels, the participants declared that terms and descriptions in SNS settings are complicated and not suitable for all users. For instance, P11 stated that there is a huge gap between the novice users and the interface developers and this may cause issues when defining privacy.

"There is a huge gap between novice users and user interface developers. I think that is the main problem here. Also, the perception of privacy; it is different from person to another. I see privacy in a specific way and you see it in a different way so there are no common grounds about privacy between people. That is my assumption." (P11)

In Facebook, there are participants who showed a good impression about how Facebook defines the description in the setting [Who sees tag suggestions when photos that look like you are uploaded?]; however, other participants found that including the term "Facial Recognition" in the description is informative and acts as a warning. For example, P14 has knowledge about the term "Facial Recognition", but he also pointed out that Facebook uses this description for others who do not know the term (Figure 4.20).

> *"Facial Recognition is much known term than this [the setting's descriptions]. It is not very clear. Maybe this is like a kind of description which tells exactly what is the meaning of it but with Facial Recognition for many people who maybe do not use computer that much they are not familiar with the term. It is like almost a description than just like keyword such as Facial Recognition so people who are not familiar with computer, they can also understand what is this"* (P14)

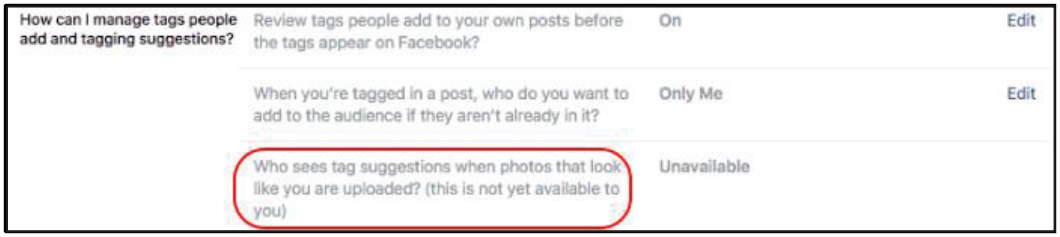


Figure 4.20: Description of [How can I manage tags people add and tagging suggestions?] setting

Meanwhile, in Twitter, the same issue of providing vague terms and descriptions in settings exists. For instance, P6 declared that the language used in settings is practical for younger generations but not for all generations.

> *"They think this is the easy language that they use but it is not easy for everybody. If you come from different culture and from different generation, some of the social media language I think it is more for young generation who use the social media language. Social media language is not easy for everybody."* (P6)

In terms of users' experience, the participants who tested the setting [Do you want search engines outside of Facebook to link to your profile?] on Facebook (i.e., experience the setting) declared that it was a bad experience. For example, P11 expressed that he will

not be confident about his experience with the other settings after testing the search engine setting:

> *"I just had a bad experience with it. I thought nobody can find me in search engines and it is the opposite situation and now I just say I am not confident now."* (P11)

Consequently, the participants emphasized that SNSs should not consider their settings to be practical for all users because the users have various levels of knowledge of the settings. For instance, P14 was asked about the setting [Review all your posts and things you're tagged in (Use Activity Log)] and he considered his answer based on an intermediate level and not an advanced level.

> *"I would say from an intermediate user's point of view not like very advanced user because I am not. I have understood by looking into it I would say it is not too deep like in the very basic level. So I am not sure whether Facebook will set this privacy setting for me."* (P14)

Likewise, in Twitter, P6 was asked about the setting [Twitter for teams (TweetDeck)] and emphasized that the setting is for professional users and not for normal users.

> *"This is so professional so maybe It is not for normal users. I am not sure if this is suitable for me or just it is another level that I will not reach like using it as a company."* (P6)

Another participant declared that he is not an expert in being able to identify whether the messages sent to other followers are received and read because he does not know about the existence of the setting [Direct Messages (Send/Receive read receipts)] on Twitter.

> *"I am not that expert and I never do that so I do not know if there is an option. It looks there is no option for that thing to know. I am not sure yet."* (P9)

Furthermore, the participants insisted that the settings' terms and descriptions should be more transparent. For example, P12 stated that settings' terms and descriptions should be simple since SNSs are meant to be used by the public.

> *"I think social media in general it meant to be used by public and you have different levels of understanding and different levels of education so since it is for the public, it has to be as basic as possible. My English is a second language*

and I am using Facebook in English and that maybe an issue but I think they still need to go down with that and provide basic terms." (P12)

Ignoring SNS settings and new updates

The results exhibited that SNS users do not regularly check the SNS settings. In addition, the participants filter out or ignore the new updated settings received inside SNSs (e.g. notifications) or outside SNSs (e.g. emails). In terms of ignoring the settings, P19 stated that she surrendered and stopped controlling Facebook settings because it is impossible to hide everything from the Internet.

"I feel like maybe like a year ago Facebook is going to take over the world no matter what so I just gave in and stop trying to control it because I know that no matter what I put my settings as there is like information about me being recorded all the time even if I put it private it is not really private. If I want to hide anything from like Internet, that is impossible so why try." (P19)

P21 also indicated:

"I suppose I can tell and contact Facebook and tell them that it is not working but I come across this all the times so I do not really care I just assume that the whole world can find me and if they cannot find me today they would be able to do it tomorrow" (P21)

Another participant decided to leave the setting [Do you want search engines outside of Facebook to link to your profile?] as it is even though she was not satisfied about the outcome of the setting.

"I probably will leave it as it is. It looks like I can change a couple of things but it looks like no I probably would not bother contacting Facebook because I am just a small fish in a big pond and they have a bigger fish to fry and they are like a billion-dollar company and why would they care. I do not even know how to contact Facebook I mean I have reported posts before that were derogatory and inappropriate no one has gotten back to me and said yes you are right we removed it thanks for letting us know" (P20)

On the other hand, a few participants who received notifications about the new updated settings via email either skim the content and then ignore the updates or directly ignore

them without reading. For instance, P18 would only read about the new updated settings and pay attention when there are potential concerns.

> *"I skim them to see if it is something that I am worried about. If it is something that I am worried about, I read them in depth but otherwise I pretty much ignore them."* (P18)

Another participant indicated that new updates that have been received via email are ignored because the user was unenthusiastic.

> *"I do receive number of emails but I just ignore them. Sometimes it has a lot of stuff and I am not like in the mood to go through all these things and I am just like forget about them" (P12)*

Meanwhile, the following participant found new updates while searching on Google about the Facebook setting [Who can see your future post] whereas he ignored them because they take time to manage.

> *"I saw some in Google I saw some about privacy checkup but I do not have time to do it"* (P8)

Table 4.1: Summary of the qualitative study results demonstrating the factors that influence users' behaviours according to the PSM components and their coping strategies

Findings (Factors)	Users Coping Strategies and Suggestions
Navigating through SNS settings takes time and it is not effective. The participants usually go through all possible paths to get to the settings.	The participants search outside SNSs (e.g. Google) to find the proper path to the desired setting.
The settings are not properly categorized because SNSs use general terms such as Account, Privacy, and Security instead of using the features' terms such as Tag, Post, or Location, which cause lack of understanding.	The participants search outside SNSs (e.g. Google) to find in which category a desired setting is located.
The participants do not know about most of the settings, options, and inline feature controls that exist.	The participants search about the features inside SNSs or use Google to be redirected to the SNSs (i.e. using the SNS's help center via Google's results).
Asking for help via requesting assistance from friends or experts about PSM components. Also, advising others via informing friends or family about the settings' meanings, options, and new updates.	The participants mostly ask people who have experienced the same issues.
The participants attempt to guess or assume the meaning of a setting even though they had read the settings' descriptions and searched them.	The participants depend on their own judgment and self-learning even though that is not necessarily accurate.
The participants customize each post individually (i.e., using the inline features' controls) and use different resources such as Google to shortcut the changing process.	The participants use any option that seem to be related to privacy or settings and it became a habit to use shortcuts when searching about a specific setting.
The participants receive a large number of notifications about new updates.	The participants read the notifications to understand and take action toward the settings, use different resources to clarify the received notifications, or ignore the notifications.
Searching about the settings and new updates takes time and there is no direct way to clearly show the new updated settings without searching.	The participants use external resources such as Google, vlogs, or blogs, and search about the new updated settings only after receiving notifications.
The participants rarely use resources inside SNSs such as conversations included in the SNS help center. However, they mostly use resources outside SNSs such as blogs and vlogs.	The participants use nonofficial resources outside SNSs and it becomes a habit.
The participants manage the settings and new updates via reading the settings' descriptions	Inside SNSs, the participants compare settings' meanings among different SNSs

Findings (Factors)	Users Coping Strategies and Suggestions
inside SNSs and reading various resources outside SNSs.	based on experience, guess or assume the meaning, and skim for the feature's term (Tag, Location, Apps, etc.). Outside SNSs, they use online resources such as Google and blogs.
Observing and checking the outcomes of the changed settings.	The participants would assure that the outcomes match expectations via saving the new changes, use different resources such as Google, waiting to experience the new changes, and comparing between the descriptions provided by different SNSs.
The participants were not able to remember how to change the settings, and recall if they have received new updates.	The participants suggested highlighting the new updates with proper guidance.
The participants deal with interface and usability issues.	The participants suggested improving the basic settings' pages, the categorization of the settings, and the interaction techniques such as pop-up messages.
Terms and descriptions are complicated and not suitable for all users. The participants understand, change, and test the settings via experience.	The participants suggested enhancements based on users' levels (i.e. separate settings for each level). Also, the participants wait to experience the changed settings and compare the meaning of the settings with their experience of the other settings provided by different SNSs.
The participants ignore the settings and new updates because they do not care about them and they waste their time.	The participants filter out the received new updates of SNS settings without checking them.

Chapter 5 Phase 2: Quantitative Study

Our study objective is to obtain a holistic view of SNS users' opinions and experiences based on the factors that cause complexities when attempting to understand and change settings as well as find new updates (as identified in Chapter 4). I conducted a largescale quantitative study to validate the factors that impact SNS users' behaviours toward privacy settings and features in SNSs. The data collected from the Likert scale questions were quantitatively analyzed and the open-ended questions' responses were coded and explored to gain insights. In general, the results showed that SNS users are influenced by the majority of the discovered factors.

5.1 Procedures

In the previous chapter, I identified 15 themes (factors) that influence SNS users when attempting to manage the settings and the new updates. In this study, the questionnaire was divided into three sections. Section one contained questions on the participants' demographic and background information, such as gender, age, education, and occupation. In section two, I asked the participants general questions regarding their concerns about privacy and the usage of SNSs and settings. A sample question is [Have you ever seen any windows that explain how to use the settings in the SNSs that you use (e.g. Facebook, Twitter, Instagram, etc.)?]. Section three covered questions that assess the participants' agreements on the factors (obtained in Chapter 4) that influence SNS users when managing SNS settings and inline features controls (as shown in Appendix C2). I utilized a 5-Likert scale (ranging from 1: Strongly Agree to 5: Strongly Disagree), a 4- Likert scale (ranging from 1: Frequently to 4: Never), and a few open-ended questions.

5.2 Participants' Demographic Information and Background

In this study, 101 SNS users participated and completed all the survey questions. The distribution of the sample means is definitely going to be normally distributed because our sample size is greater than 30. The survey researchers usually accept a margin of error between 5% and 10% at the confidence level of 95% [64]. I calculated the sample size at 50% for the proportion success and failure using the following formula:

$$n= ((z_{\alpha/2}) * (0.25))/E^2$$

I considered the margin of error 10% at a 95% confidence level; therefore, the acceptable sample size is 97. Our participants (N = 101) have an account in at least one SNS (e.g. Facebook, Twitter, or Instagram) and personally manage their privacy settings. The top four most frequently used social networking sites among the participants were YouTube, Twitter, Facebook, and Instagram; however, a few participants used other social media platforms such as Snapchat, Google Plus, WhatsApp, Tumbler, LinkedIn, and Skype. Our participants leveraged SNSs regularly enough to have experience with the settings and inline features controls. The majority of the participants are highly educated. The average number of hours the participants spend daily on SNSs is four (Table 5.1). The participants' education and occupation backgrounds include: Medical Science, Health Management, Biology, Pharmacy, Dentistry, Nursing, Clinical Nutrition, Commerce and Administration, Ergonomics, Sociology, Languages and Translations, Art, Software Systems Engineering, Immunology, Computer Science, and undecided.

Table 5.1: Participants' Demographic Information

Total participants = 101			
Gender	• Males (54, 54.5%). • Females (46, 46.4%). • Other (1, 1%).	**Age**	Range from 16 – 54; Average age is 28 years old.
Education	• High school (13, 12.9%). • Some college credit (no degree) (11,10.9%). • Bachelor's degree (35, 34.6%). • Master's degree (32, 31.7%). • Ph.D.'s degree (8, 7.9%).	**Frequency of SNSs usage (in years)**	• 3-4 (12,11.8%). • 5-6 (36,35.6%). • 7-8 (32,31.7%). • 9-10 (16,15.8%). • More than 10 years (5,4.9%).
Used SNSs	• Facebook (72,71.3%). • Twitter (74, 73.3%). • Instagram (69, 68.3%). • YouTube (79, 78.2%). • Google Plus (20, 19.8%). • Others (29, 28.7%).	**Time spent daily on SNSs (in hours)**	• Less than an hour (7, 6.9%). • 1-2 (29,28.7%). • 3-4 (33, 32.7%). • 5-6 (22, 21.8%). • 7-8 (3, 2.9%). • 9-10 (2, 1.9%). • More than 10 hours (5, 4.9%)

5.3 General Information

The majority of the participants were moderately to extremely concerned about privacy in general (Table 5.2). Moreover, the participants indicated various reasons that encourage

them to use SNSs. For instance, the majority of the participants used SNSs to connect and communicate with others and share information. However, a few participants used SNSs for other reasons such as checking for news, recreational purposes, learning from the available resources, seeking job posts, and promoting their work. Although the majority of the participants have changed the default settings in their SNS accounts, they have only changed the basic settings such as changing the account from public mode to private mode, selecting the "Friends Only" option, turning off the location, disabling notification settings, deleting personal information and managing contact settings, and blocking people.

Table 5.2: General Information

Total participants = 101	
SNS users' concerns about Privacy	• Extremely Concerned (37,36.6%). • Moderately Concerned (40, 39.6%). • Somewhat Concerned (20, 19.8%). • Slightly Concerned (4, 3.9%).
Reasons of using SNS	• Creating awareness (29, 28.7%). • Helping people (21, 20.8%). • SNSs are indispensable and you have to be on them (16, 15.8%). • Sharing information (74, 73.3%). • Connection and communication with others (87, 86.1%). • Other (8, 7.9%).
Users' levels with SNS settings	• Expert (professional user) of SNS settings (24, 23.8%) • Novice (67,66.3%) • I am not sure (7,6.9) • Other (3.2.9%) (**Comments:** between expert and novices)
Users' changes of the default settings	• Yes (77,76.2%). • No (24, 23.8%).
Checking settings' status after new updates	• Yes (44,43.6%) • No (37,36.6%) • I am not sure (20, 19.8%)

5.4 Results

5.3.1 Influencing Factors of SNS Users' Behaviours Toward SNS Settings

In this sub-section, I presented the findings of the general descriptive statistics and the analysis of the sample proportions with the hypothesized population proportions using z-test (i.e., a hypothesis testing approach).

Navigating through SNS settings

Initially, I labeled each of the Likert scale's rates to a specific value. To illustrate this, I assigned 1=Strongly Agree, 2=Agree, 3=Neither Agree nor Disagree, 4=Disagree, 5=Strongly Disagree; respectively.

Table 5.3: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes in the factor "Navigating through SNS settings".

	Strongly Agree ← Rating → Strongly Disagree					Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	**5 (%)**	***M***	***SD***
Navigating through SNS settings takes time.	31 (30.7)	52 (51.5)	9 (8.9)	8 (7.9)	1 (1)	1.97	0.9
Going through SNS settings is not effective.	15 (14.5)	53 (52.5)	25 (24.7)	5 (4.9)	3 (3)	2.29	0.89

The results demonstrated that SNS users usually navigate through SNS settings to understand and change the settings as well as find new updates. 82% of the participants (Strongly Agree and Agree) indicated that navigation through SNS settings and their options to manage the settings and new updates takes time (*M*=1.97, *SD*=0.9) (Table 5.3). 67% of the participants (Strongly Agree and Agree) found that going through SNS settings is not always effective because they are forced to use various paths and resources to find the settings without guidance (*M*=2.29, *SD*=0.89) (Figure 5.1).

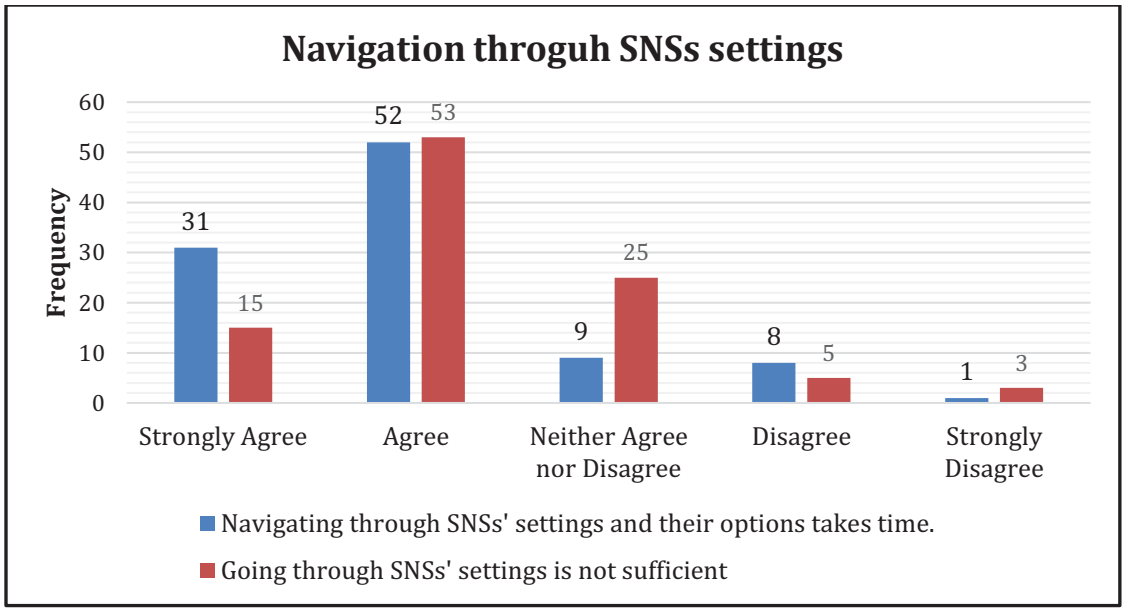


Figure 5.1: A bar graph showing the frequency of the participants and the responses to the obtained codes in the factor "Navigation through SNS settings".

Test of Proportions (z-test)

The point estimate or the sample proportion of success ($\hat{p}$) of the participants who were agree that navigation through the settings takes time cannot accurately represent the population proportion. Thus, we must find the confidence intervals, which indicate that the actual population proportion of SNSs users who take time to navigate through SNSs settings falls in a specific range at a certain level of confidence (0.05). In order to calculate the confidence intervals, we should calculate the sample proportion of success ($\hat{p}$), find the critical value ($z_{\alpha/2}$) using the confidence level (0.05) in the z table (Standard Normal Probabilities for z-scores), and calculate the margin of errors (E) using the following formula:

$$E = z_{\alpha/2}.\sqrt{(\hat{p}.\hat{q})/n}$$

Lastly, the confidence intervals can be determined using the following formula and (Table 2) showed the confidence intervals or the ranges of the actual population proportions of our sample.

$$\hat{p} - E < P < \hat{p} + E$$

Table 5.4: The Confidence Intervals for z-test (Navigating through SNS settings)

Codes	$\hat{p}$	$\hat{q}$	$z_{\alpha/2}$	E	Confidence Intervals
Navigating through SNSs' settings and their options to understand, change, and find new updates takes time.	0.8217	0.1783	1.96	0.0744	0.7473 < P < 0.8961
Going through SNSs' settings to understand, change, and find new updates is not sufficient.	0.6732	0.3267	1.96	0.0914	0.5818 < P < 0.7646

According to the presented results in (Table 5.4), we are 95% confident that the actual population proportions of SNSs users who takes time to navigate through SNSs settings falls between 75% and 90%. In addition, we are 95% confident that the actual population proportion of SNSs user who find that going through SNSs settings is not sufficient falls between 58% and 76%.

In terms of data analysis, I conducted a hypothesis testing approach based on the sample proportions and the hypothesized population proportions. There are two methods that can be used to analyze the sample data in the hypothesis testing approach which are the

traditional test statistic or the P-value. In the traditional test statistic method, I obtain the critical value according the significance level (0.05) and separate the rejection regions (right, left, or two tails). Then, I calculate the test statistic (z-score) to specify if it falls in the rejection region or the fail to reject region. Based on the region that includes the z score, I draw the conclusion. In the P-value method, I only need to find the area of the z-score in the z table according to the significance level (0.05). If ($P \leq 0.05$), I reject the null hypothesis H0; otherwise, I fail to reject the null hypothesis.

Table 5.5: The z-scores of the obtained codes in the factor "Navigation through SNS setting".

Codes	$\hat{p}$	z-score
Navigating through SNS settings takes time.	0.8217	6.4386
Going through SNS settings is not effective.	0.6732	3.2405

- ***Test statistic Method***

I claim that ***most*** SNS users take time to navigate through SNS settings to understand and change the setting as well as find new updates (i.e., the population proportion $P>0.50$). Thus, I stated the null hypothesis H_0 is $P = 0.50$ and the alternative hypothesis H_1 is $P>0.50$. The critical value according to the significance level ($z_\alpha = 0.05$) is 1.645. To calculate the test statistic (z-test), I used the following formula; where $\hat{p} = 0.8217$, $p = 0.50$, $q = 0.50$, and $n=101$ (Table 5.5):

$$z = (\hat{p} - p)/(\sqrt{((p.q)}/n)$$

The test statistic (z-score) is 6.4386 which falls in the rejection region (Figure 5.2). Thus, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users take time to navigate through SNS settings to understand and change the settings as well as find new updates.

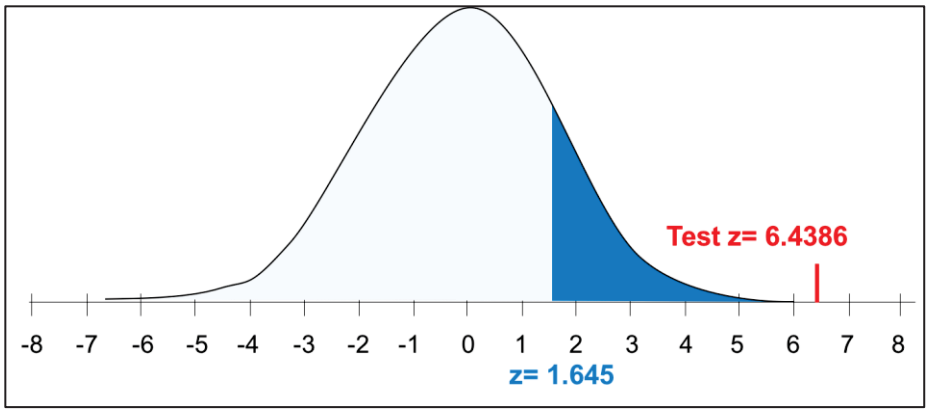


Figure 5.2: Hypothesis testing graph of the z-score for SNS users who takes time to navigate through SNSs

In addition, I claim that ***most*** of SNS users find that going through SNS settings to understand and change the setting, and find new updates is not effective. Thus, I stated the null hypothesis H_0 is P = 0.50 and the alternative hypothesis H_1 is P>0.50. The critical value according to the significance level (0.05) is 1.645. The test statistic (z-score) is 3.4205 which falls in the rejection region (Figure 5.3). Thus, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that going through SNS settings to understand and change the settings, and find new updates is not effective.

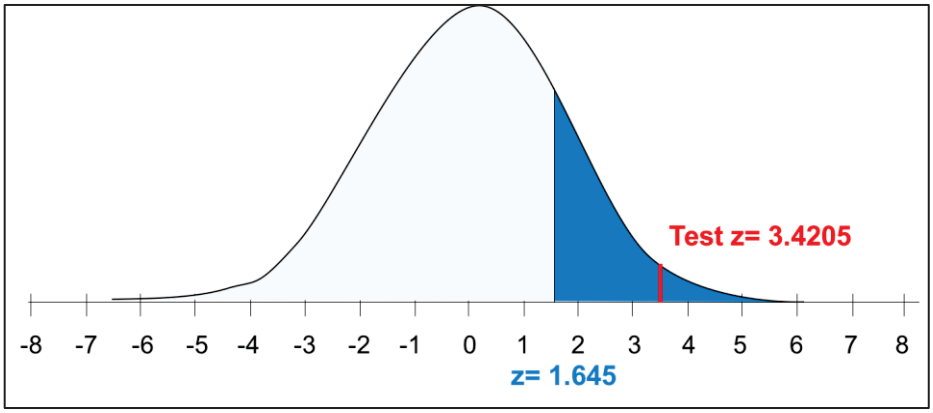


Figure 5.3: Hypothesis testing graph of the z-score for SNS users who find going through SNS settings is not effective

- ***P-value Method***

I used the same process applied in the test statistic method to get the z-score and then I find the area for that particular value in the z table based on the significance level (0.05). According to the z table (i.e., the Standard Normal Probabilities for z-scores), the area for z=6.4386 is 0.9999 and the P-value is (P<0.0001). Therefore, I reject the null hypothesis

H_0. There is sufficient evidence to support the claim that ***most*** of SNS users take time to navigate through SNS settings to manage the settings and new updates. Furthermore, the area for z= 3.4205 is 0.9997 and the P-value is (P<0.0003). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that going through SNS settings to manage the settings and new updates is not effective.

On the other hand, the participants provided comments and feedback regarding each factor in the open-ended question (Provide any additional comments?).

P41 commented:

> *"It is not that easy to deal with privacy settings in SNS. It might be easy for technical users, but non-technical users don't have the skills or abilities to navigate through privacy interface. Basically, there is individual differences between users which means user can be technical or non-technical user, so they all should be able and aware how to deal with settings. I believe that a lot of users, especially non-technical users don't know much about social networks privacy."* (P41)

Categorizing SNS settings

The participants faced complexities when attempting to identify how SNSs place the settings in groups. 83% of the participants (Strongly Agree and Agree) emphasized that the settings should be grouped in categories and subcategories to facilitate navigation, understanding, and changing of the settings (M= 1.84, SD= 0.72) (Table 5.6). Moreover, 71% of the participants (Strongly Agree and Agree) find that some features or settings are not categorized under privacy settings (M= 2.14, SD= 0.79). For example, in Facebook, "Timeline and Tagging" settings are not under the category "Privacy". Further, 81% of the participants (Strongly Agree and Agree) find that classifying the settings based on features such as posts, photos, tags is more practical (M= 1.83, SD=0.81) (Figure 5.4).

Table 5.6: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes in the factor "Categorizing SNS settings".

	Strongly Agree ← Rating → Strongly Disagree					Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	**5 (%)**	***M***	***SD***
Some features or settings are not categorized under privacy settings. For example, Timeline and Tagging settings in Facebook are not under privacy settings.	20 (19.8)	52 (51.5)	24 (23.8)	5 (4.9)	0 (0)	2.14	0.79
Adding categories and sub-categories to facilitate navigation, understanding, changing of SNS settings is necessary.	34 (33.7)	50 (49.5)	16 (15.8)	1 (1)	0 (0)	1.84	0.72
Classifying the settings based on features such as posts, photos, tags is more practical.	39 (38.6)	43 (42.6)	17 (16.8)	1 (1)	1 (1)	1.83	0.81

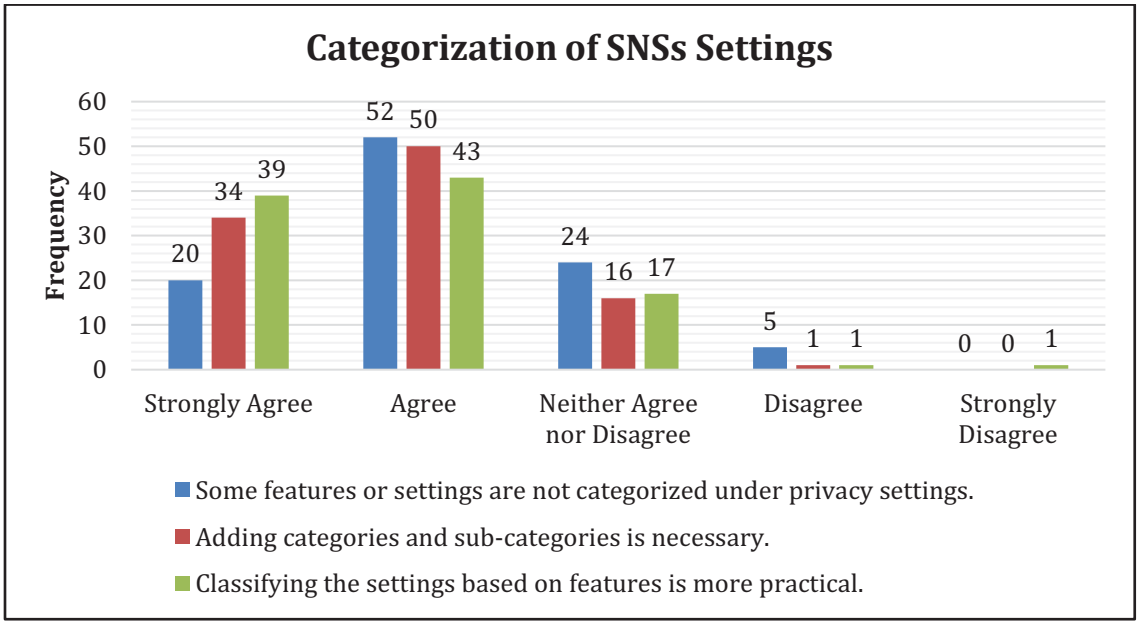


Figure 5.4: A bar graph showing the frequency of the participants and the responses to the obtained codes in the factor "Categorizing SNS settings".

Test of Proportions (z-test)

Table 5.7: The Confidence Intervals for z-test (Categorizing SNS settings)

Codes	$\hat{p}$	$\hat{q}$	E	Confidence Intervals
Some features or settings are not categorized under privacy settings.	0.7128	0.2872	0.0882	$0.6246 < P < 0.801$
Adding categories and sub-categories is necessary.	0.8316	0.1683	0.0729	$0.7587 < P < 0.9045$
Classifying the settings based on	0.8118	0.1881	0.0762	$0.7356 < P < 0.888$

Codes	$\hat{p}$	$\hat{q}$	E	Confidence Intervals
features such as posts, photos, tags is more practical.				

According to the presented results in (Table 5.7), we are 95% confident that the actual population proportions of SNSs users who find that some features or settings are not categorized under privacy settings falls between 62% and 80%. In addition, we are 95% confident that the actual population proportion of SNSs user who find that adding categories and sub-categories is necessary falls between 76% and 90%. We are also 95% confident that the actual population proportion of SNSs user who find that classifying the settings based on features such as posts, photos, and tags is more practical falls between 74% and 89%.

- ***Test statistic Method***

Table 5.8: The z-scores of the obtained codes in the factor "Categorizing SNS setting".

Codes	$\hat{p}$	z-score
Some features or settings are not categorized under privacy settings.	0.7128	4.2816
Adding categories and sub-categories is necessary.	0.8316	6.6720
Classifying the settings based on features is more practical.	0.8118	6.2736

I claim that ***most*** of SNS users find some features or settings are not categorized under "Privacy". Thus, I stated the null hypothesis H_0 is P = 0.50 and the alternative hypothesis H_1 is P>0.50. The critical value according to the significance level (0.05) is 1.645. The test statistic (z-score) is 4.2816 (Table 5.8) which falls in the rejection region (Figure 5.5). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find some features or settings are not categorized under privacy settings.

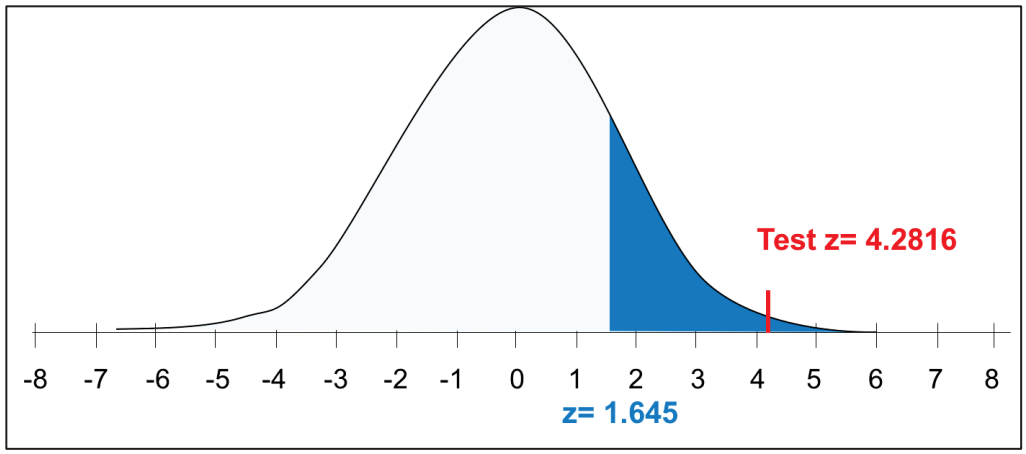


Figure 5.5: Hypothesis testing graph of the z-score for SNS users who find that some features are not categorized under privacy settings

In addition, I claim that ***most*** of SNS users find that adding categories and sub-categories is necessary. The test statistic (z-score) is 6.6720 which falls in the rejection region (Figure 5.6). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that adding categories and sub-categories is necessary.

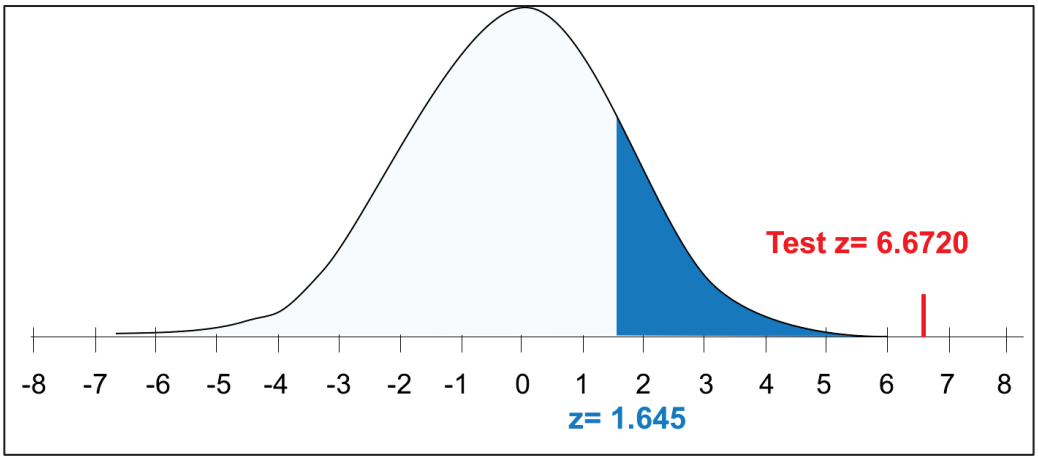


Figure 5.6: Hypothesis testing graph of the z-score for SNS users who find that adding categories and sub-categories is necessary

I also claim that ***most*** of SNS users find that classifying the settings based on features such as posts, photos, and tags is more practical than the current way of classification. The test statistic (z-score) is 6.2736 which falls in the rejection region (Figure 5.7). Thus, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find classifying the settings based on features such as posts, photos, and tags is more practical.

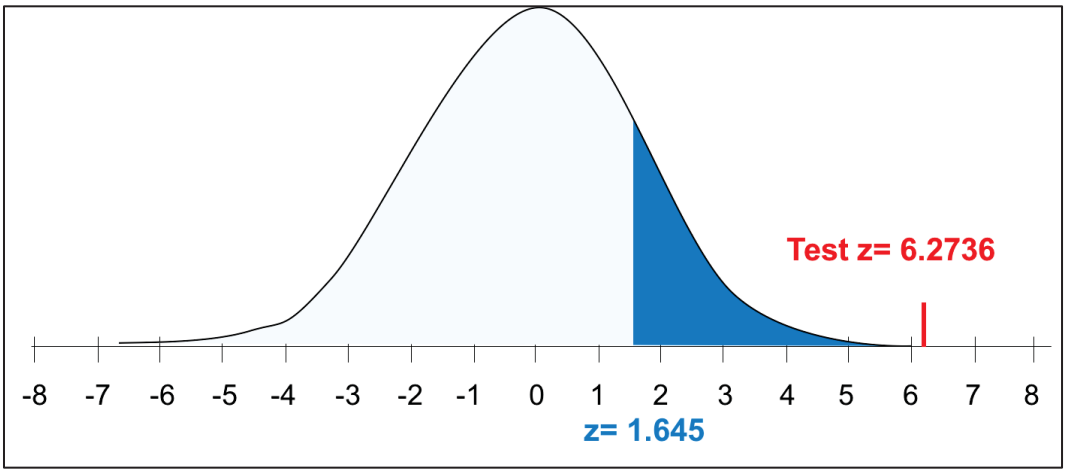


Figure 5.7: Hypothesis testing graph of the z-score for SNS users who find classifying the settings based on features such as posts, photos, and tags is more practical

- ***P-value Method***

According to the z table, the area for z=4.2816 is 0.9999 and the P-value is (P<0.0001). Thus, I reject the null hypothesis H_0. There is enough evidence to support the claim that ***most*** of SNS users find some features or settings are not categorized under privacy settings. Furthermore, the area for z= 6.6720 is 0.9999 and the P-value is (P<0.0001). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find adding categories and sub-categories is necessary. In addition, the area for z= 6.2736 is 0.9999 and the P-value is (P<0.0001). Consequently, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find classifying the settings based on features such as posts, photos, and tags is more practical than the current way of settings' classification.

Questioning the existence of SNS's settings, options, and explanations

Initially, I labeled each of the Likert scale's rates to a specific value. To illustrate this, I assigned 1=Frequently, 2=Occasionally, 3=Rarely, 4=Never; respectively. 65% of the participants (Occasionally to Frequently) learn about the existence of SNS settings and their options from other resources such as friends or news (M= 2.22, SD= 0.74) (Table 5.9). Further, 70% of the participants (Occasionally to Frequently) also indicated that they have difficulties finding out if an explanation of a setting exists in SNSs (M= 2.16, SD= 0.83) (Figure 5.8).

Table 5.9: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes in the factor "Questioning the existence of SNS's settings, options, and explanation".

	Frequently ← Rating → Never				Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	***M***	***SD***
Learning about the existence of SNS settings and their options from other resources such as friends or news.	16 (15.8)	50 (49.5)	32 (31.7)	3 (3)	2.22	0.74
Having difficulties finding out if an explanation of a setting exists in the SNSs.	21 (20.8)	50 (49.5)	23 (22.8)	7 (7)	2.16	0.83

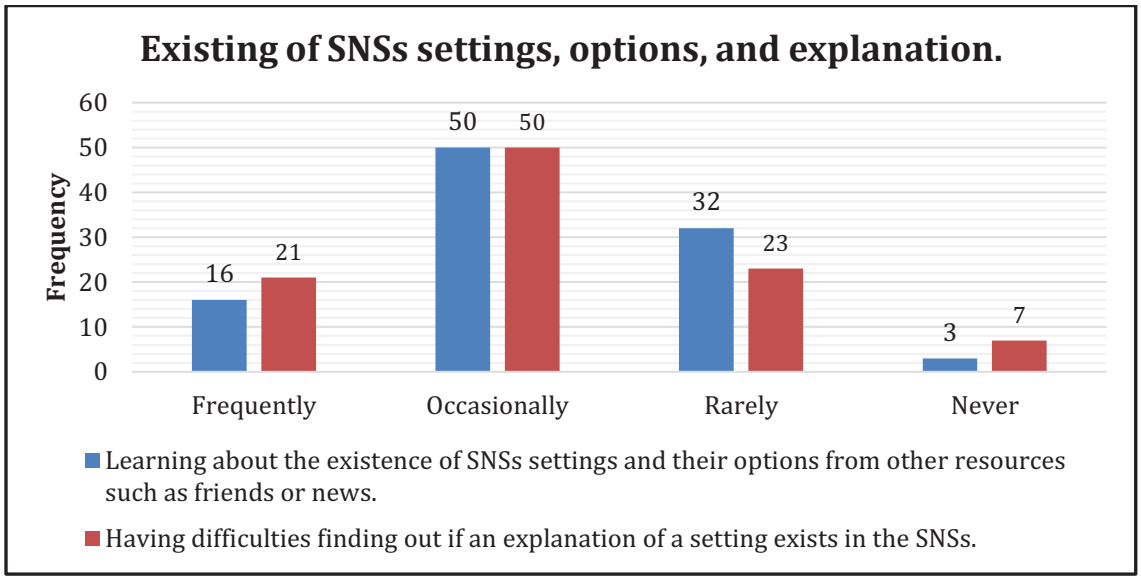


Figure 5.8: A bar graph showing the frequency of the participants and the responses to the obtained codes in the factor "Questioning the existence of SNS settings, options, and explanation".

Test of Proportions (z-test)

Table 5.10: The Confidence Intervals for z-test (Questioning the existence of SNSs' settings, options, and explanation)

Codes	$\hat{p}$	$\hat{q}$	E	Confidence Intervals
Learning about the existence of SNSs settings and their options from other resources such as friends or news.	0.6534	0.3466	0.0928	$0.5606 < P < 0.7462$
Having difficulties finding out if an explanation of a setting exists in the SNSs.	0.7029	0.2970	0.0891	$0.6138 < P < 0.792$

According to the presented results in (Table 5.10), we are 95% confident that the actual population proportions of SNSs users who learn about the existence of SNSs settings and their options from other resources such as friends or news falls between 56% and 75%. In addition, we are 95% confident that the actual population proportion of SNSs user who

have difficulties finding out if an explanation of a setting exists in the SNSs falls between 61% and 79%.

- ***Test statistic Method***

Table 5.11: The z-scores of the obtained codes in the factor "Questioning the existence of SNS's settings, options, and explanation".

Codes	$\hat{p}$	z-score
Learning about the existence of SNS settings and their options from other resources such as friends or news.	0.6534	3.0865
Having difficulties finding out if an explanation of a setting exists in the SNSs.	0.7029	4.082

I claim that ***most*** of SNS users learn about the existence of SNS settings and their options from other resources such as friends or news (P>0.50). Thus, I stated the null hypothesis H_0 is P = 0.50 and the alternative hypothesis H_1 is P>0.50. The critical value according to the significance level (0.05) is 1.645. The test statistic (z-score) is 3.0865 (Table 5.11) which falls in the rejection region (Figure 5.9). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users learn about the existence of SNS settings and their options from other resources such as friends or news.

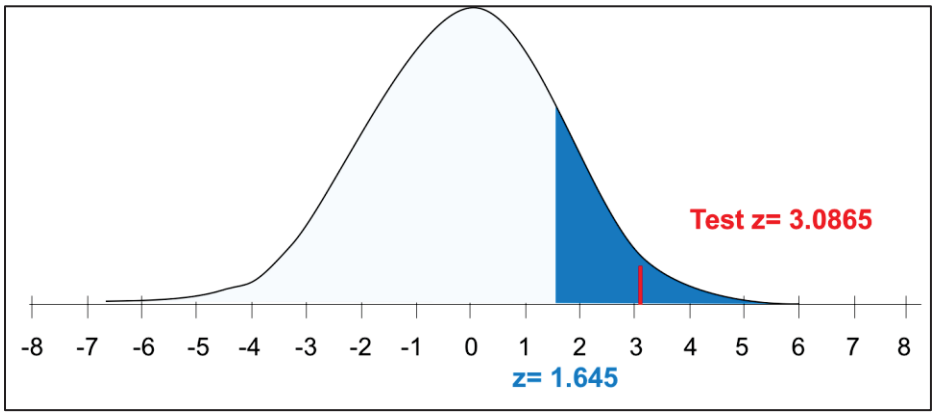


Figure 5.9: Hypothesis testing graph of the z-score for SNS users who learn about the existence of SNS settings and their options from other resources such as friends or news

In addition, I claim that ***most*** of SNS users have difficulties finding out if an explanation of a setting exists in the SNSs (P>0.50). The test statistic (z-score) is 4.082 which falls in the rejection region (Figure 5.10). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users have difficulties finding out if an explanation of a setting exists in the SNSs.

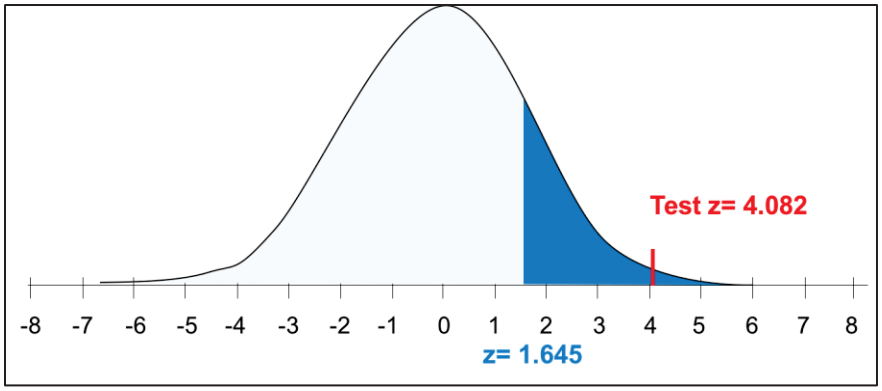


Figure 5.10: Hypothesis testing graph of the z-score for SNS users who have difficulties finding out if an explanation of a setting exists in the SNSs.

- ***P-value Method***

According to the z table, the area for z=3.0865 is 0.9991 and the P-value is (P<0.0009). Thus, I reject the null hypothesis H_0. There is enough evidence to support the claim that ***most*** of SNS users learn about the existence of SNS settings and their options from other resources such as friends or news. Also, the area for z= 4.082 is 0.9999 and the P-value is (P<0.0001). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users have difficulties finding out if an explanation of a setting exists in the SNSs.

The following are quotes that the participants wrote in response to the open-ended question (Provide any additional comments?):

> *"I ask my son"* (P81)
>
> *"Sometimes warnings about privacy are passed along by users, but the majority of these are hoaxes, so I don't tend to actually learn anything new about settings from these sources."* (P97)

Asking for help or advising others about SNS settings

47% of the participants (Occasionally to Frequently) asked friends to help them understand, change, and test SNS settings or activities (M=2.64, SD=1.03) (Table 5.12). Similarly, 36% of the participants (Occasionally to Frequently) asked an expert to help them understand, change, and test SNS settings (M= 2.88, SD= 1.09). In addition, 59% of the participants (Occasionally to Frequently) asked people who have the same issues with SNS settings to help them understand, change, and test the settings (M=2.35, SD=0.93) (Figure 5.11). In contrast, 62% (Occasionally to Frequently) of the participants advised friends and family

to ask for help or support to understand and change the settings as well as find new updates (*M*= 2.34, *SD*= 0.97). Also, 57% (Occasionally to Frequently) of the participants advise friends and family to use the most limited SNS settings' options (M= 2.37, SD= 1.09) (Figure 5.12).

Table 5.12: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes in the factor "Questioning the existence of SNS's settings, options, and explanation".

	Frequently ← Rating → Never				Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	***M***	***SD***
Asking friends to help me understand, change, and test SNS settings or activities.	15 (14.8)	32 (31.9)	28 (27.7)	26 (25.7)	2.64	1.03
Asking an expert to help me understand, change, and test SNS settings.	15 (14.8)	21 (20.8)	26 (25.7)	39 (38.6)	2.88	1.09
Asking people who have the same issue with SNS settings.	19 (18.8)	41 (40.6)	28 (27.7)	13 (12.9)	2.35	0.93
Advising friends and family to ask for help or support in order to understand, change, and find new updates of SNS settings.	20 (19.8)	43 (42.6)	22 (21.8)	16 (15.8)	2.34	0.97
Advising friends and family to use the most limited SNS settings options.	27 (26.7)	31 (30.7)	22 (21.8)	21 (20.8)	2.37	1.09

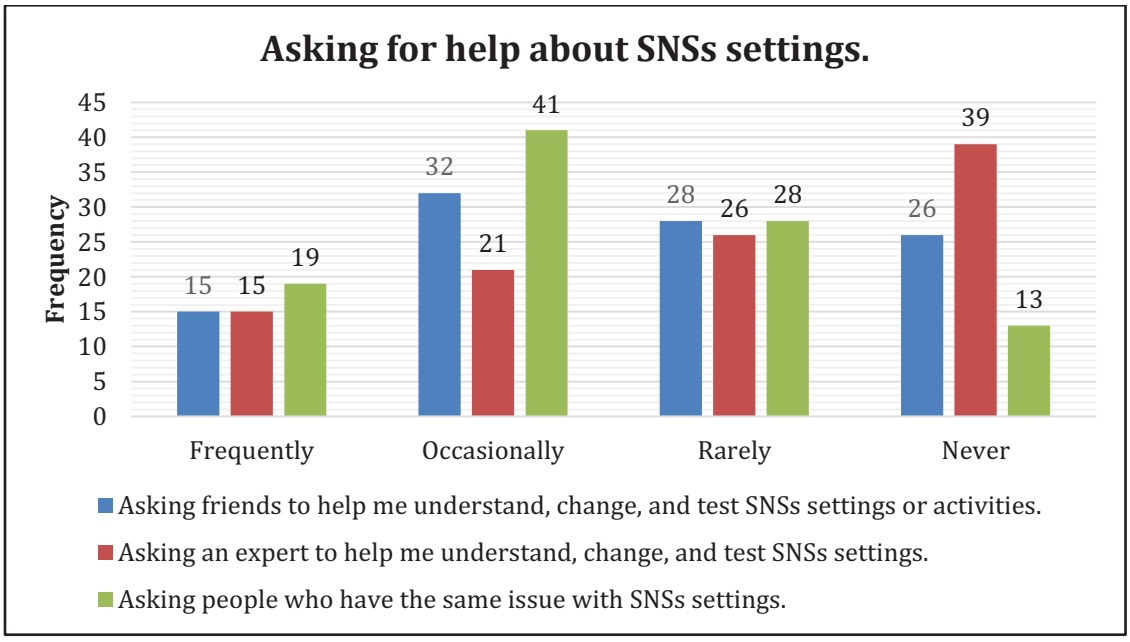


Figure 5.11: A bar graph showing the frequency of the participants and the responses to the obtained code "Asking for help about SNS Settings".

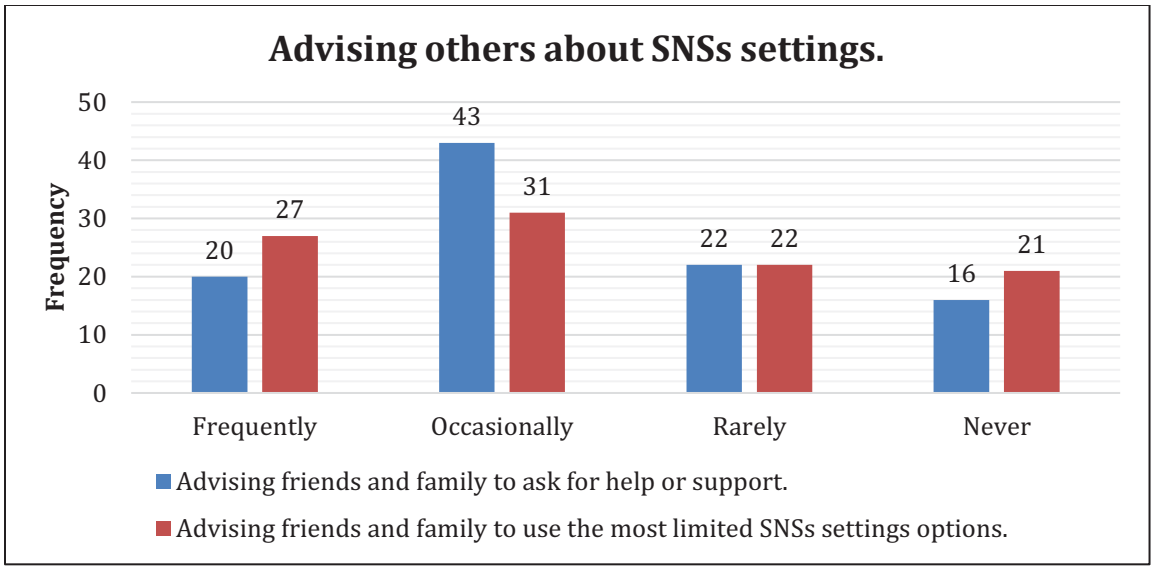


Figure 5.12: A bar graph showing the frequency of the participants and the responses to the obtained code "Advising others about SNS Settings".

Test of Proportions (z-test)

Table 5.13: The Confidence Intervals for z-test (Asking for help or advising others about SNSs' settings)

Codes	$\hat{p}$	$\hat{q}$	E	Confidence Intervals
Asking friends to help me understand, change, and test SNSs settings or activities.	0.4653	0.5346	0.0972	$0.3681 < P < 0.5625$
Asking an expert to help me understand, change, and test SNSs settings.	0.3564	0.6435	0.0933	$0.2631 < P < 0.4497$
Asking people who have the same issue with SNSs settings.	0.5940	0.4059	0.0957	$0.4983 < P < 0.6897$
Advising friends and family to ask for help or support in order to understand, change, and find new updates of SNSs settings.	0.6237	0.3762	0.0944	$0.5293 < P < 0.7181$
Advising friends and family to use the most limited SNSs settings options.	0.5742	0.4257	0.0964	$0.4778 < P < 0.6706$

According to the presented results in (Table 5.13), we are 95% confident that the actual population proportions of SNSs users who ask friends to help them understand, change, and test SNSs settings or activities falls between 37% and 56%. In addition, we are 95% confident that the actual population proportion of SNSs user who ask an expert to help them understand, change, and test SNSs settings falls between 26% and 45%. We are also 95% sure that the actual population proportion of SNSs user who ask people who have the same issue with SNSs settings falls between 50% and 69%. In terms of advising others, we

are 95% confident that the actual population proportions of SNSs users who advise friends and family to ask for help or support to understand, change, and find new updates of SNSs settings falls between 53% and 72%. Moreover, we are 95% confident that the actual population proportions of SNSs users who advise friends and family to use the most limited SNSs settings options falls between 48% and 67%.

- ***Test statistic Method***

Table 5.14: The z-scores of the obtained codes in the factor "Asking for help or advising others about SNS settings".

Codes	$\hat{p}$	z-score
Asking friends to help me understand, change, and test SNS settings or activities.	0.4653	-0.6981
Asking an expert to help me understand, change, and test SNS settings.	0.3564	-2.8893
Asking people who have the same issue with SNS settings.	0.5940	1.8913
Advising friends and family to ask for help or support in order to understand, change, and find new updates of SNS settings.	0.6237	2.4889
Advising friends and family to use the most limited SNS settings options.	0.5742	1.4929

I claim that ***most*** of SNS users ask friends to help them understand, change, and test SNS settings or activities (P>0.50). Thus, I stated the null hypothesis H_0 is P = 0.50 and the alternative hypothesis H_1 is P>0.50. The critical value according to the significance level (0.05) is 1.645. The test statistic (z-score) is -0.6981 (Table 5.14) which falls in the fail to reject region (Figure 5.13). Therefore, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users ask friends to help me understand, change, and test SNS settings or activities.

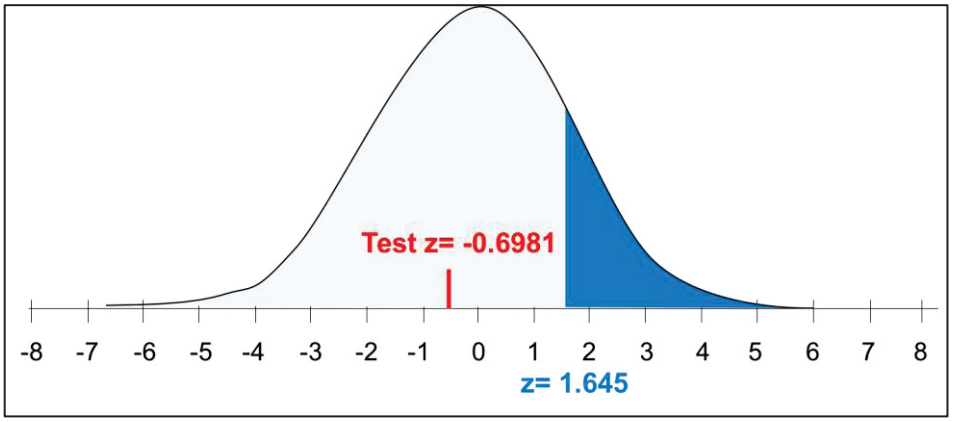


Figure 5.13: Hypothesis testing graph of the z-score for SNS users who ask friends to help them understand, change, and test SNS settings or activities

In addition, I claim that ***most*** of SNS users ask an expert to help them understand, change, and test SNS settings (P>0.50). The test statistic (z-score) is -2.8893 which falls in the fail to reject region (Figure 5.14). Therefore, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users ask an expert to help them understand, change, and test SNS settings.

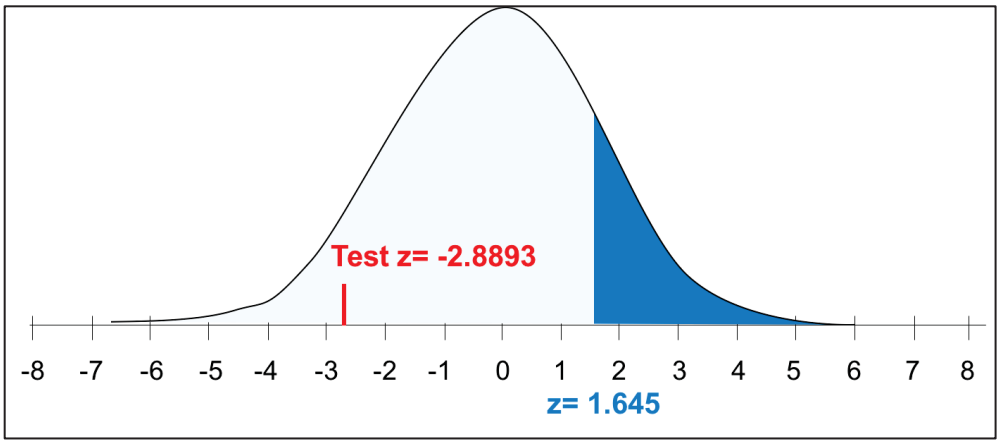


Figure 5.14: Hypothesis testing graph of the z-score for SNS users who ask an expert to help them understand, change, and test SNS settings

Furthermore, I claim that ***most*** of SNS users ask people who have the same issue with SNS settings (P>0.50). The test statistic (z-score) is 1.8913 which falls in the rejection region (Figure 5.15). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users ask people who have the same issue with SNS settings.

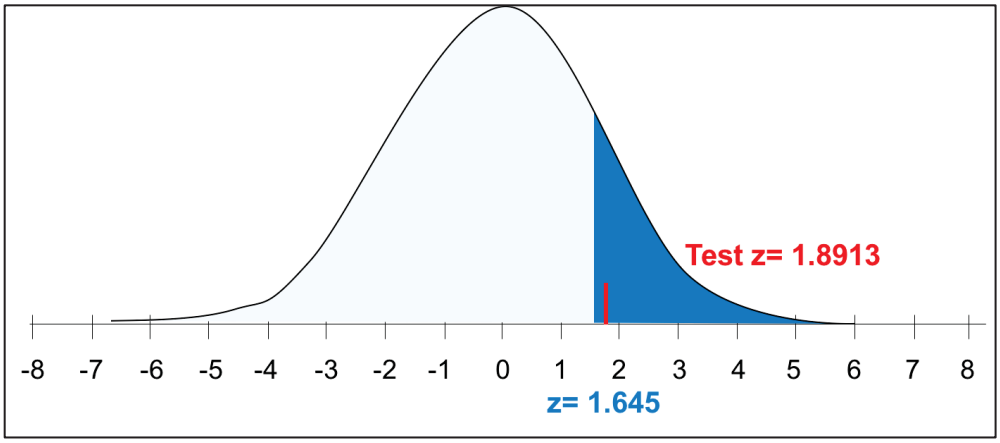


Figure 5.15: Hypothesis testing graph of the z-score for SNS users who ask people who have the same issue with SNS settings

In terms of advising others, I claim that ***most*** of SNS users advise friends and family to ask for help or support in order to understand and change the settings, and find new updates (P>0.50). The test statistic (z-score) is 2.4889 which falls in the rejection region (Figure 5.16). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users advise friends and family to ask for help or support in order to understand and change the settings, as well as find new updates.

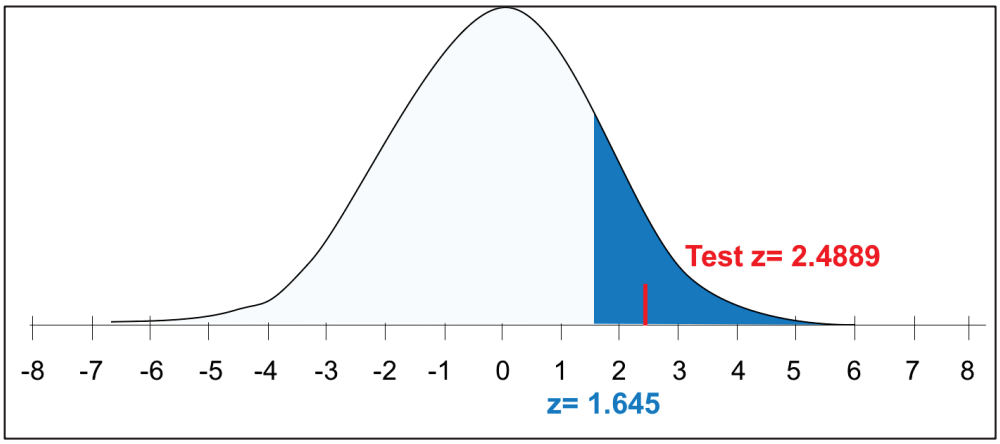


Figure 5.16: Hypothesis testing graph of the z-score for SNS users who advise friends and family to ask for help or support in order to understand and change the settings, and find new updates.

I also claim that ***most*** of SNS users advise friends and family to use the most limited SNS settings options (P>0.50). The test statistic (z-score) is 1.4929 which falls in the fail to reject region (Figure 5.17). Therefore, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users advise friends and family to use the most limited SNS settings options.

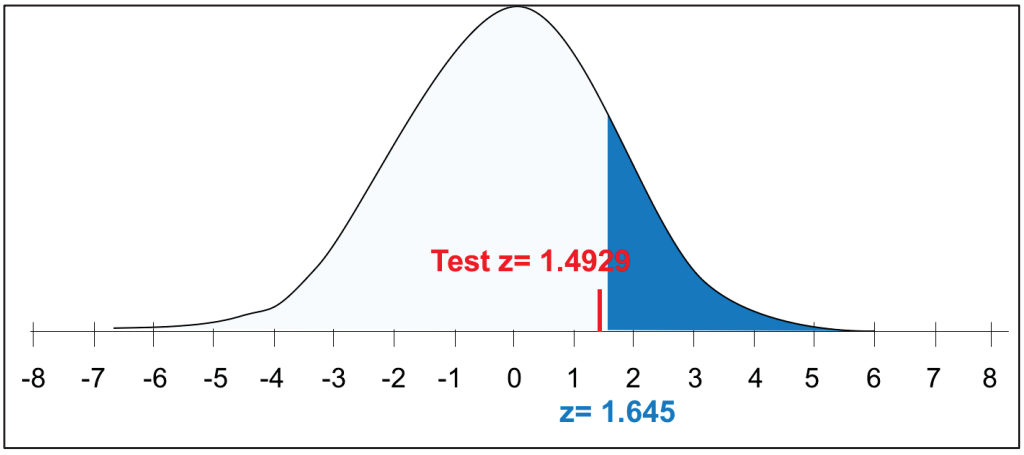


Figure 5.17: Hypothesis testing graph of the z-score for SNS users who advise friends and family to use the most limited SNS settings options.

- ***P-value Method***

According to the z table, the area for z=-0.6981 is 0.2266 and the P-value is (P>0.7734). Therefore, I fail to reject the null hypothesis H_0. There is not enough evidence to support the claim that ***most*** of SNS users ask friends to help me understand, change, and test SNS settings or activities. Also, the area for z=-2.8893 is 0.0016 and the P-value is (P>0.9984). Thus, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users ask an expert to help me understand, change, and test SNS settings. In contrast, the area for z=1.8913 is 0.9744 and the P-value is (P<0.0256). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users ask people who have the same issue with SNS settings.

In terms of advising others, the area for z=2.4889 is 0.9946 and the P-value is (P<0.0054). Thus, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users advise friends and family to ask for help or support in order to understand and change the settings, and find new updates. However, the area for z=1.4929 is 0.9394 and the P-value is (P>0.0606). Consequently, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users advise friends and family to use the most limited SNS settings options.

The following are quotes that the participants wrote in response to the open-ended question (Provide any additional comments?):

> *"I wish there were easier ways to ask experts. Help lines for websites are often too busy or it takes weeks to get an email reply."* (P28)
>
> *"I like the idea of live support chat. I really recommend to have this feature. I haven't seen live chat in SNS and not sure if it is exist, but it would be a great idea. I had an experience with live chat but not in SNS, it was a website and really helpful."* (P41)
>
> *"SNSs use help page or FAQ, sometimes it doesn't provide the answers someone needs, or they use the long answers, or sometimes very short and not sufficient answer. Every time I have to type my question on Google and check the answers in different pages."* (P53)
>
> *"I advise friends and family to use the most limited SNS settings options. I assumed most restrictive."* (P97)

Guessing or assuming SNS settings' meanings and functions

68% of the participants (Occasionally to Frequently) guess or assume the meaning of SNS settings and new updates instead of reading it (*M*= 2.19, *SD*=1.03) (Table 5.15). Similarly, 68% of the participants (Occasionally to Frequently) guess or assume the options and how to change SNS settings or features instead of reading it (*M*= 2.23, *SD*= 1.02). Also, 71% of the participants (Occasionally to Frequently) guess or assume the location of SNS settings instead of asking for help (*M*=2.13, *SD*= 0.98) (Figure 5.18). In terms of the settings' outcomes, 68% of the participants (Occasionally to Frequently) guess or assume the outcomes of SNS settings instead of searching about them (*M*= 2.13, *SD*= 0.97). Further, 61% of the participants (Occasionally to Frequently) found that the meanings and the outcomes of SNS settings is different than what they think or assume (*M*= 2.21, *SD*= 0.83) (Figure 5.19).

Table 5.15: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes in the factor "Guessing or assuming SNS settings' meanings and functions".

	Frequently ← Rating → Never				Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	***M***	***SD***
Guessing the meaning of SNS settings and new updates instead of reading it.	29 (28.7)	40 (39.6)	16 (15.8)	16 (15.8)	2.19	1.03
Guessing the options and how to change SNS settings or features instead of reading it.	26 (25.7)	43 (42.6)	15 (14.8)	17 (16.8)	2.23	1.02
Guessing the location of SNS settings instead of asking for help.	29 (28.7)	43 (42.6)	16 (15.8)	13 (12.9)	2.13	0.98
Guessing or assuming the outcomes of SNS settings instead of searching about them.	30 (29.7)	39 (38.6)	21 (20.8)	11 (10.9)	2.13	0.97
The meaning and the outcomes of SNS settings is different than what I think or assume.	22 (21.8)	40 (39.6)	35 (34.6)	4 (4)	2.21	0.83

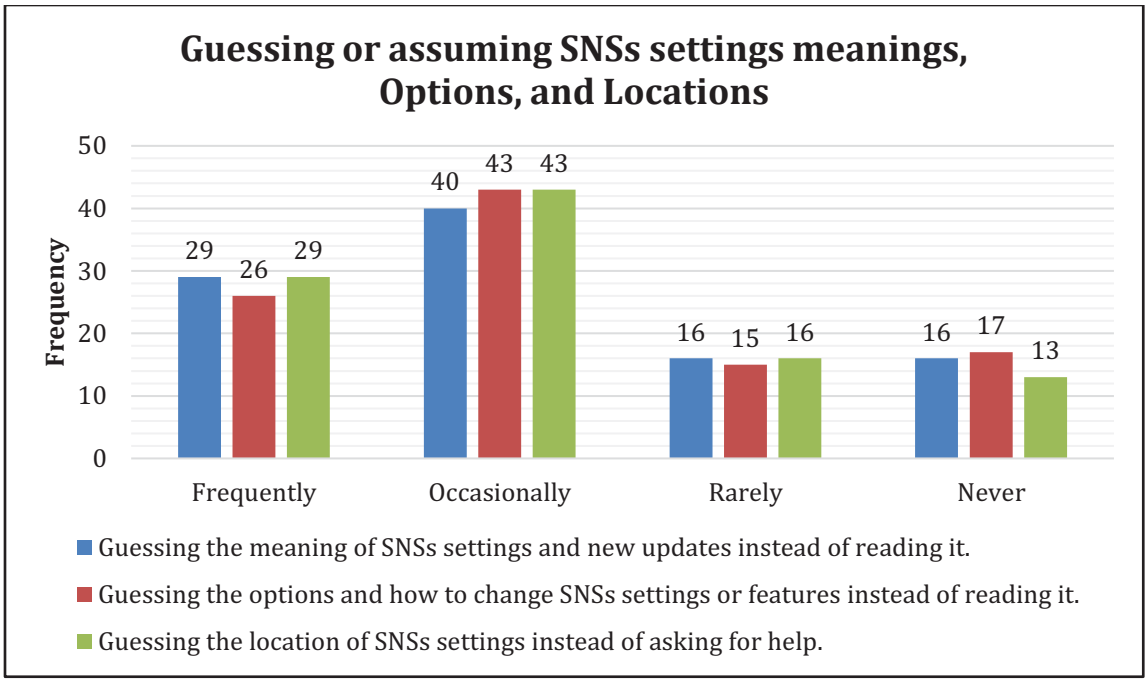


Figure 5.18: A bar graph showing the frequency of the participants and the responses to the obtained code "Guessing or assuming SNS Settings meanings, options, and location".

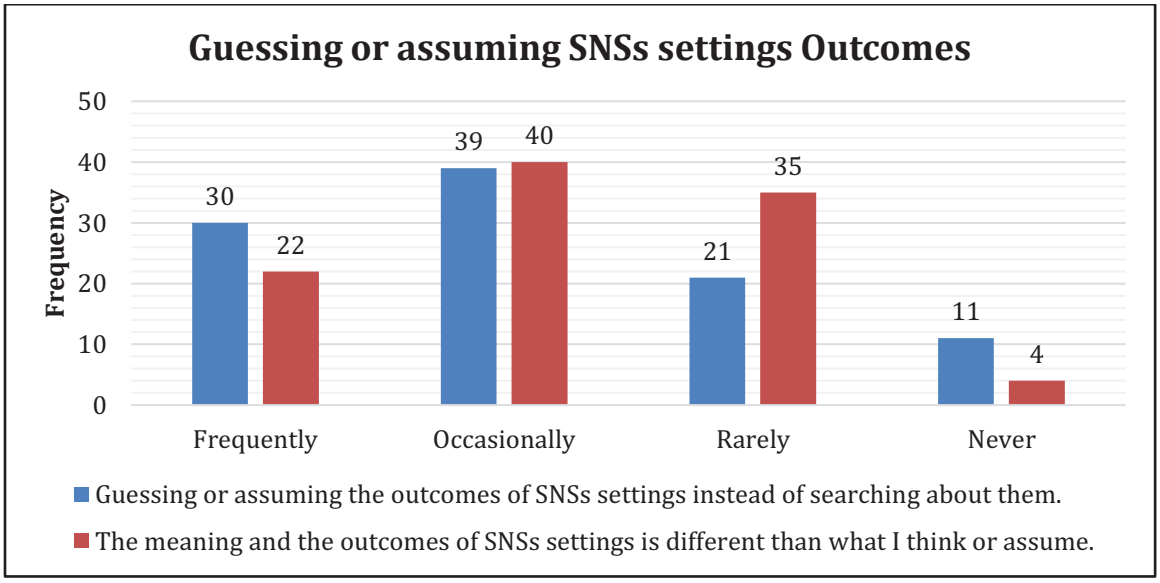


Figure 5.19: A bar graph showing the frequency of the participants and the responses to the obtained code "Guessing or assuming SNS settings' outcomes".

Test of Proportions (z-test)

Table 5.16: The Confidence Intervals for z-test (Guessing or assuming SNSs settings' meanings and functions)

Codes	$\hat{p}$	$\hat{q}$	E	Confidence Intervals
Guessing the meaning of SNSs settings and new updates instead of reading it.	0.6831	0.3168	0.0907	0.5924 < P < 0.7738
Guessing the options and how to change SNSs settings or features instead of reading it.	0.6831	0.3168	0.0907	0.5924 < P < 0.7738
Guessing the location of SNSs settings instead of asking for help.	0.7128	0.2871	0.0882	0.6246 < P < 0.801
Guessing or assuming the outcomes of SNSs settings instead of searching about them.	0.6831	0.3168	0.0907	0.5924 < P < 0.7738
The meaning and the outcomes of SNSs settings is different than what I think or assume.	0.6138	0.3861	0.0949	0.5189 < P < 0.7087

According to the presented results in (Table 5.16), we are 95% confident that the actual population proportions of SNSs users who guess the meaning of SNSs settings and new updates instead of reading it falls between 59% and 77%. In addition, we are 95% confident that the actual population proportion of SNSs user who guess the options and how to change SNSs settings or features instead of reading it falls between 59% and 77%. We are also 95% sure that the actual population proportion of SNSs user who guess the location of SNSs settings instead of asking for help falls between 62% and 80%.

In terms of the settings' outcomes, we are 95% confident that the actual population proportions of SNSs users who guess or assume the outcomes of SNSs settings instead of searching about them falls between 59% and 77%. Moreover, we are 95% confident that the actual population proportions of SNSs users who found that the meaning and the outcomes of SNSs settings is different than what they think or assume falls between 52% and 71%.

- ***Test statistic Method***

Table 5.17: The z-scores of the obtained codes in the factor "Guessing or assuming SNS settings' meanings and functions".

Codes	$\hat{p}$	z-score
Guessing the meaning of SNS settings and new updates instead of reading it.	0.6831	3.6841
Guessing the options and how to change SNS settings or features instead of reading it.	0.6831	3.6841
Guessing the location of SNS settings instead of asking for help.	0.7128	4.2816

Codes	$\hat{p}$	z-score
Guessing or assuming the outcomes of SNS settings instead of searching about them.	0.6831	3.6841
The meaning and the outcomes of SNS settings is different than what I think or assume.	0.6138	2.2897

I claim that ***most*** of SNS users guess the meaning of SNS settings and new updates instead of reading it (P>0.50). Thus, I stated the null hypothesis H_0 is P = 0.50 and the alternative hypothesis H_1 is P>0.50. The critical value according to the significance level (0.05) is 1.645. The test statistic (z-score) is 3.6841 (Table 5.17) which falls in the rejection region (Figure 5.20). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users guess the meaning of SNS settings and new updates instead of reading it.

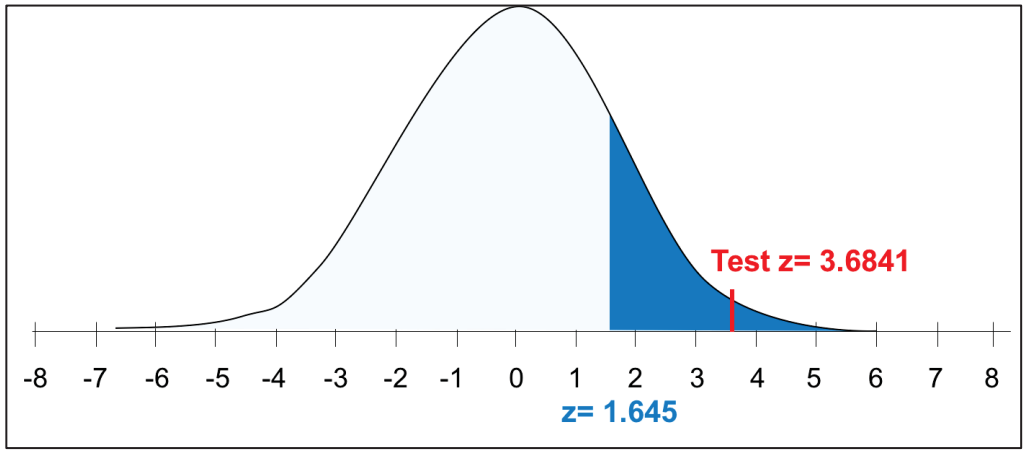


Figure 5.20: Hypothesis testing graph of the z-score for SNS users who guess the meaning of SNS settings and new updates instead of reading it

In addition, I claim that ***most*** of SNS users guess the options and how to change SNS settings or features instead of reading it (P>0.50). The test statistic (z-score) is 3.6841 which falls in the rejection region (Figure 5.21). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users guess the options and how to change SNS settings or features instead of reading it.

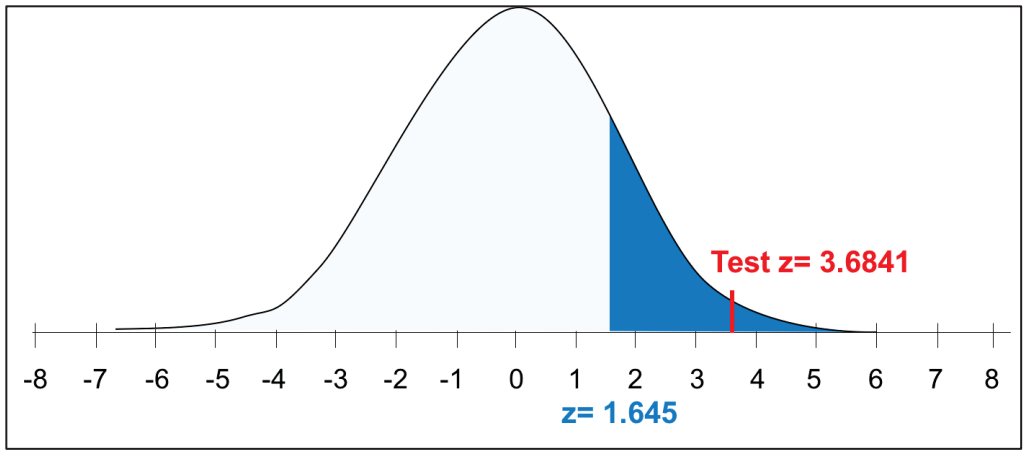


Figure 5.21: Hypothesis testing graph of the z-score for SNS users who guess the options and how to change SNS settings or features instead of reading it

Furthermore, I claim that most of SNS user guess the location of SNS settings instead of asking for help (P>0.50). The test statistic (z-score) is 4.2816 which falls in the rejection region (Figure 5.22). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users guess the location of SNS settings instead of asking for help.

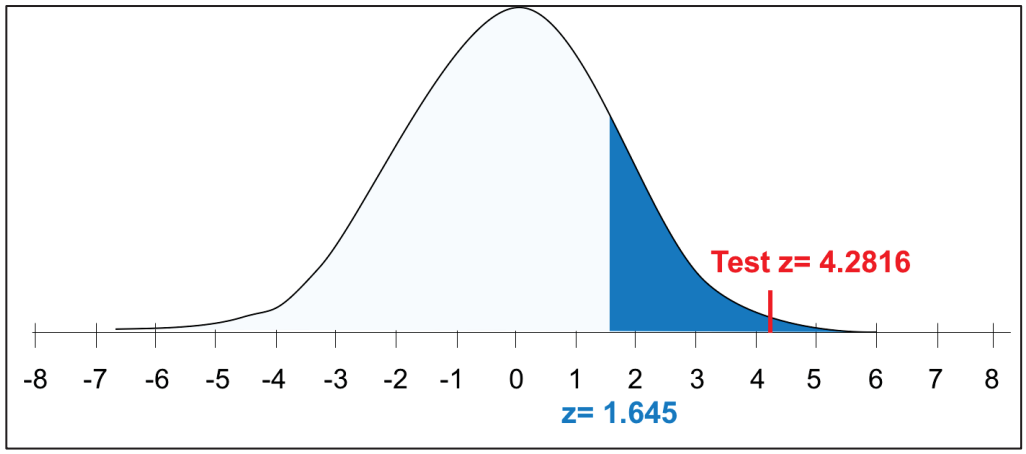


Figure 5.22: Hypothesis testing graph of the z-score for SNS users who guess the location of SNS settings instead of asking for help

In terms of the settings' outcomes, I claim that ***most*** of SNS users guess or assume the outcomes of SNS settings instead of searching about them (P>0.50). The test statistic (z-score) is 3.6841 which falls in the rejection region (Figure 5.23). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users guess or assume the outcomes of SNS settings instead of searching about them.

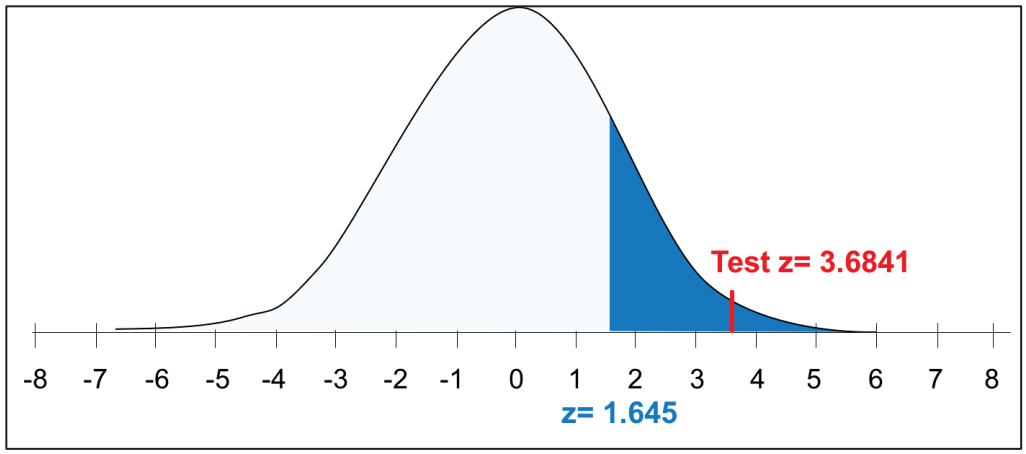


Figure 5.23: Hypothesis testing graph of the z-score for SNS users who guess or assume the outcomes of SNS settings instead of searching about them

I also claim that ***most*** of SNS users found that the meaning and the outcomes of SNS settings is different than what I think or assume (P>0.50). The test statistic (z-score) is 2.2897 which falls in the rejection region (Figure 5.24). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users found that the meaning and the outcomes of SNS settings is different than what they think or assume.

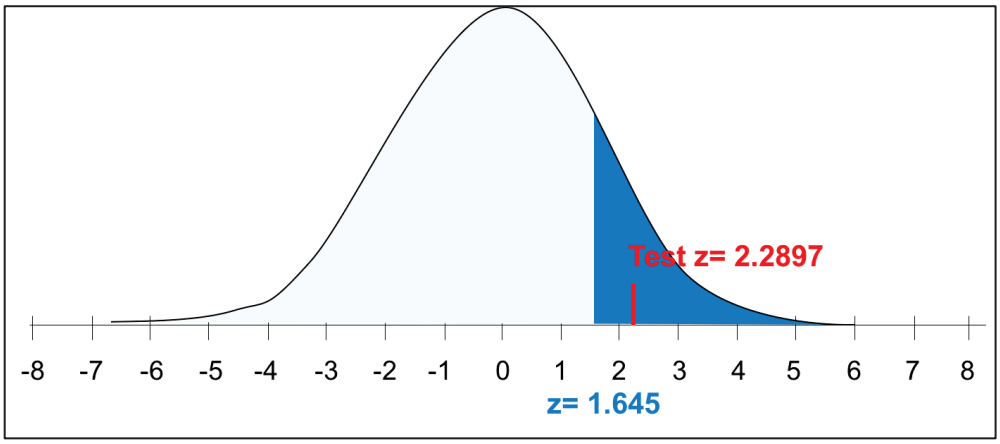


Figure 5.24: Hypothesis testing graph of the z-score for SNS users who found that the meaning and the outcomes of SNS settings is different than what I think or assume

- ***P-value Method***

According to the z table, the area for z=3.6841 is 0.9999 and the P-value is (P<0.0001). Therefore, I reject the null hypothesis H_0. There is enough evidence to support the claim that ***most*** of SNS users guess the meaning of SNS settings and new updates instead of reading it. Furthermore, the area for z=3.6841 is 0.9999 and the P-value is (P<0.0001).

Thus, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users guess the options and how to change SNS settings or features instead of reading it. Also, the area for z=4.2816 is 0.9999 and the P-value is (P<0.0001). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users guess the location of SNS settings instead of asking for help.

In terms of the settings outcomes, the area for z=3.6841 is 0.9999 and the P-value is (P<0.0001). Therefore, I reject the null hypothesis H0. There is sufficient evidence to support the claim that ***most*** of SNS users Guessing or assuming the outcomes of SNS settings instead of searching about them. Moreover, the area for z=2.2897 is 0.9906 and the P-value is (P<0.0094). Consequently, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users found that the meaning and the outcomes of SNS settings is different than what they think or assume.

Using shortcuts to change SNS settings

The results showed that 57% of the participants (Occasionally to Frequently) use shortcuts to change the timeline or SNS settings (M= 2.38, SD=1.08) (Table 5.18). For example, in Facebook, the users can change each post's settings or use Privacy Checkup (the shortcut way) instead of doing the changes through the settings page. Moreover, 70% of the participants (Occasionally to Frequently) use different resources such as Google to search for shortcut regarding how to accomplish specific setting and shortcut the changing processes (M= 2.13, SD= 1.06) (Figure 5.25).

Table 5.18: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained code "Using shortcuts to change the SNS settings and inline features controls".

	Frequently ← Rating → Never				Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	***M***	***SD***
Using shortcuts to change the timeline or SNS settings.	26 (25.7)	32 (31.7)	22 (21.8)	21 (20.8)	2.38	1.08
Using different resources such as Google to search for shortcut on how to achieve specific setting.	34 (33.7)	37 (36.6)	13 (12.9)	17 (16.8)	2.13	1.06

Similarly, 67% of the participants (Strongly Agree and Agree) consider using shortcuts to change SNS settings is more practical than going through all the settings (M= 2.17, SD= 0.92) (Table 5.19). Also, 66% of the participants (Strongly Agree and Agree) consider

customizing individual post is more practical (easier, faster) than going through global SNS settings to change (*M*= 2.24, *SD*= 0.96) (Figure 5.26).

Table 5.19: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained code "Using shortcuts to change SNS settings or customizing individual posts is more practical than going through global settings".

	Strongly Agree ← Rating → Strongly Disagree					Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	**5 (%)**	***M***	***SD***
Using shortcuts to change SNS settings is more practical than going through all the settings.	24 (23.8)	44 (43.6)	28 (27.7)	2 (2)	3 (3)	2.17	0.92
Customizing individual post is more practical (easier, faster) than going through global SNS settings to change.	22 (21.8)	45 (44.6)	25 (24.8)	6 (5.9)	3 (3)	2.24	0.96

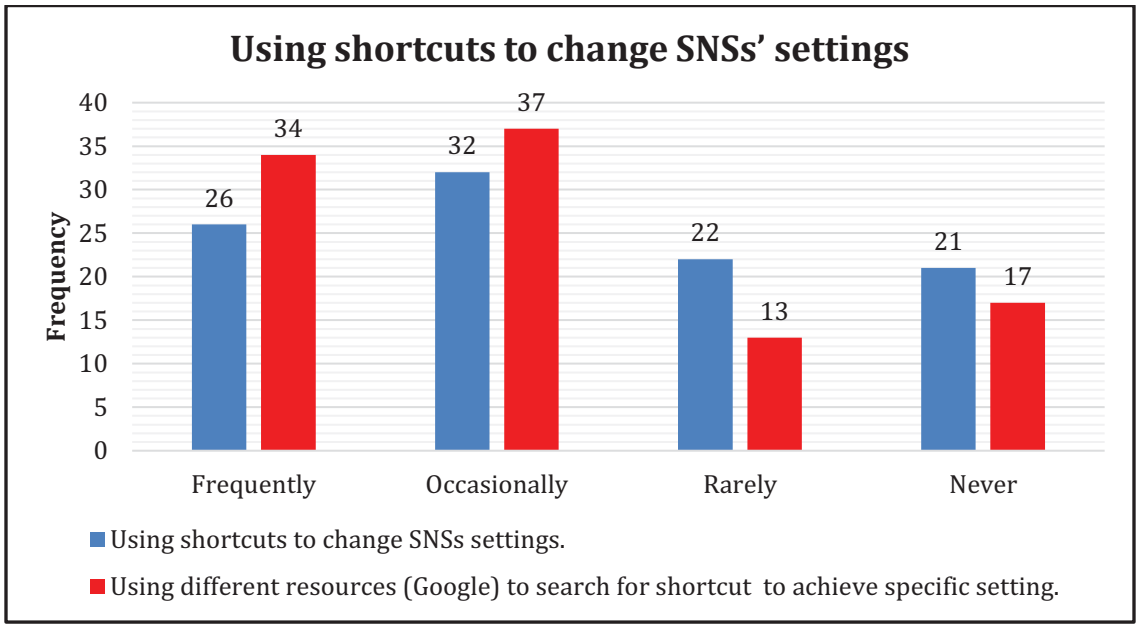


Figure 5.25: A bar graph showing the frequency of the participants and the responses to the obtained code "Using shortcuts and different resources to change SNS settings".

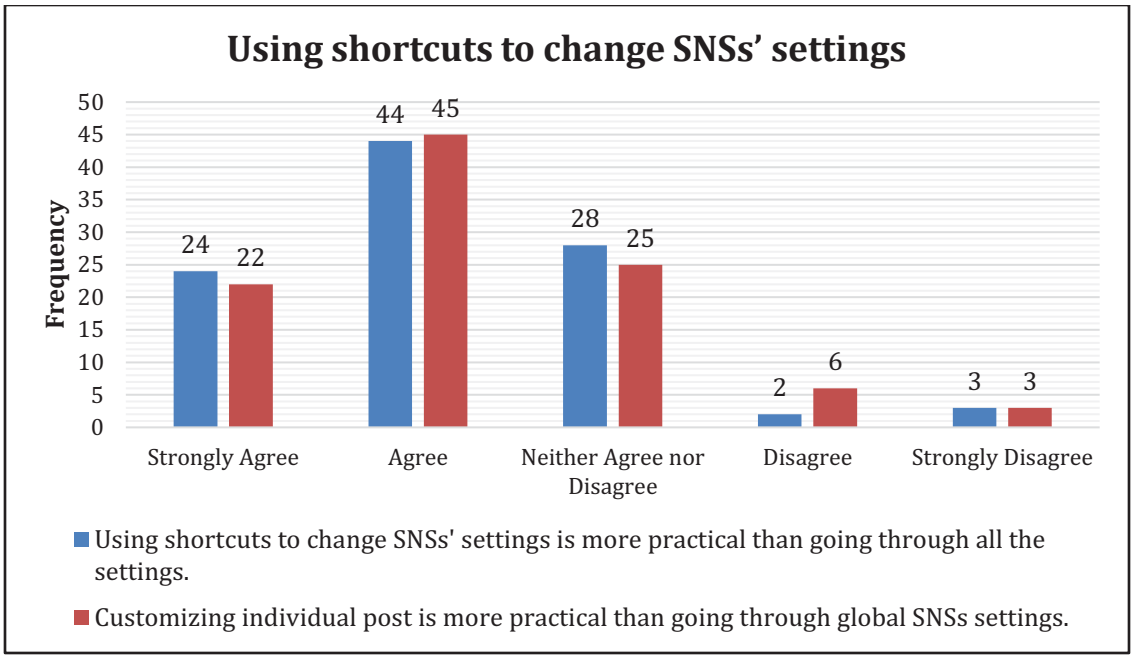


Figure 5.26: A bar graph showing the frequency of the participants and the responses to the obtained codes "Using shortcuts to change SNS Settings or customizing individual posts is more practical than going through global settings".

Test of Proportions (z-test)

Table 5.20: The Confidence Intervals for z-test (Using shortcuts to change SNS settings)

Codes	$\hat{p}$	$\hat{q}$	E	Confidence Intervals
Using shortcuts to change the timeline or SNSs' settings.	0.5742	0.4257	0.0964	$0.4778 < P < 0.6706$
Using different resources such as Google to search for shortcut on how to achieve specific setting.	0.7029	0.2970	0.0891	$0.6138 < P < 0.792$
Using shortcuts to change SNSs' settings is more practical than going through all the settings.	0.6732	0.3267	0.0914	$0.5818 < P < 0.7646$
Customizing individual post is more practical (easier, faster) than going through global SNSs' settings to change.	0.6633	0.3366	0.0921	$0.5712 < P < 0.7554$

According to the presented results in (Table 5.20), we are 95% confident that the actual population proportions of SNSs users who use shortcuts to change the timeline or SNSs' settings falls between 48% and 67%. In addition, we are 95% confident that the actual population proportion of SNSs user who use different resources such as Google to search for shortcut on how to achieve specific setting falls between 61% and 79%. We are also 95% sure that the actual population proportion of SNSs user who find using shortcuts to

change SNSs' settings is more practical than going through all the settings falls between 58% and 76%. Furthermore, we are 95% confident that the actual population proportions of SNSs users who find customizing individual post is more practical (easier, faster) than going through global SNSs' settings to change falls between 57% and 75%.

- ***Test statistic Method***

Table 5.21: The z-scores of the obtained codes in the factor "Using shortcuts to change SNS settings".

Codes	$\hat{p}$	z-score
Using shortcuts to change the timeline or SNS settings.	0.5742	1.4929
Using different resources such as Google to search for shortcut on how to achieve specific setting.	0.7029	4.0824
Using shortcuts to change SNS settings is more practical than going through all the settings.	0.6732	3.4849
Customizing individual post is more practical (easier, faster) than going through global SNS settings to change.	0.6633	3.2857

I claim that ***most*** of SNS users use shortcuts to change the timeline or SNS settings (P>0.50). Thus, I stated the null hypothesis H_0 is P = 0.50 and the alternative hypothesis H_1 is P>0.50. The critical value according to the significance level (0.05) is 1.645. The test statistic (z-score) is 1.4929 (Table 5.21) which falls in the fail to reject region (Figure 5.27). Therefore, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users use shortcuts to change the timeline or SNS settings.

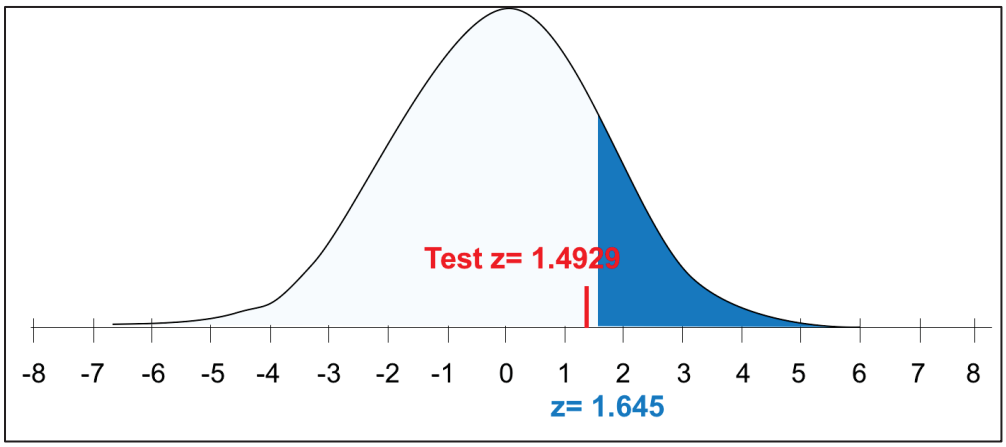


Figure 5.27: Hypothesis testing graph of the z-score for SNS users who use shortcuts to change the timeline or SNS settings.

In addition, I claim that ***most*** of SNS users use different resources such as Google to search for shortcut on how to achieve specific setting (P>0.50) The test statistic (z-score) is 4.0824 which falls in the rejection region (Figure 5.28). Therefore, I reject the null

hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users use different resources such as Google to search for shortcut on how to accomplish specific setting.

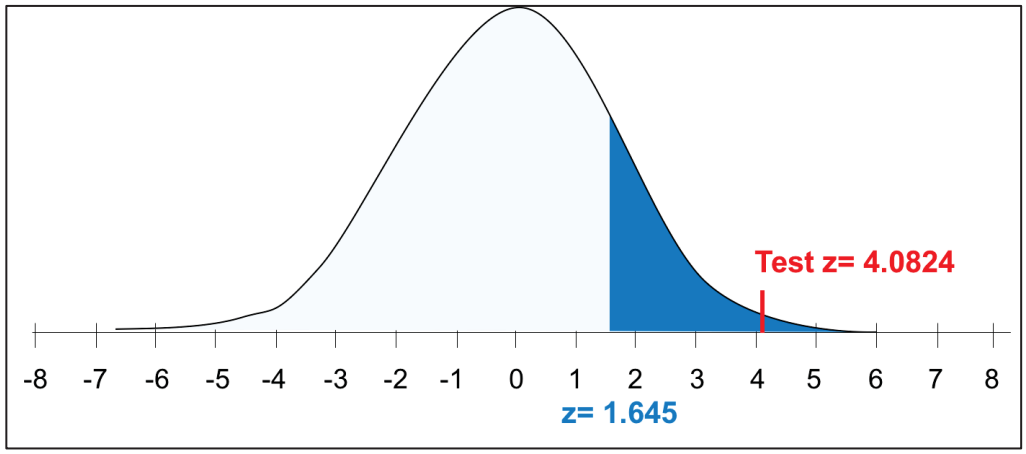


Figure 5.28: Hypothesis testing graph of the z-score for SNS users who use different resources such as Google to search for shortcut on how to achieve specific setting

Furthermore, I claim that ***most*** of SNS users find that using shortcuts to change SNS settings is more practical than going through all the settings (P>0.50). The test statistic (z-score) is 3.4849 which falls in the rejection region (Figure 5.29). Thus, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that using shortcuts to change SNS settings is more practical than going through all the settings.

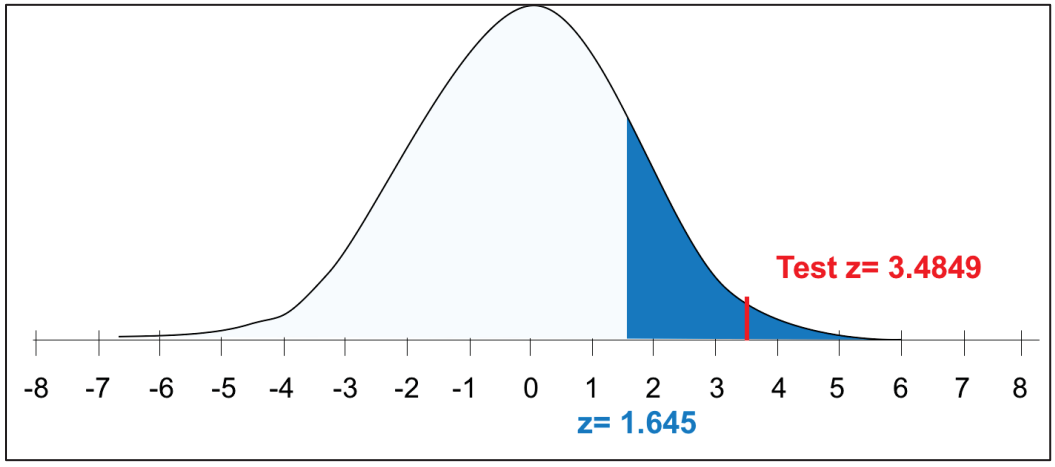


Figure 5.29: Hypothesis testing graph of the z-score for SNS users who find that using shortcuts to change SNS settings is more practical than going through all the settings.

I also claim that ***most*** of SNS users find that customizing individual post is more practical (easier, faster) than going through global SNS settings to change (P>0.50). The

test statistic (z-score) is 3.2857 which falls in the rejection region (Figure 5.30). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that customizing individual post is more practical (easier, faster) than going through global SNS settings to change.

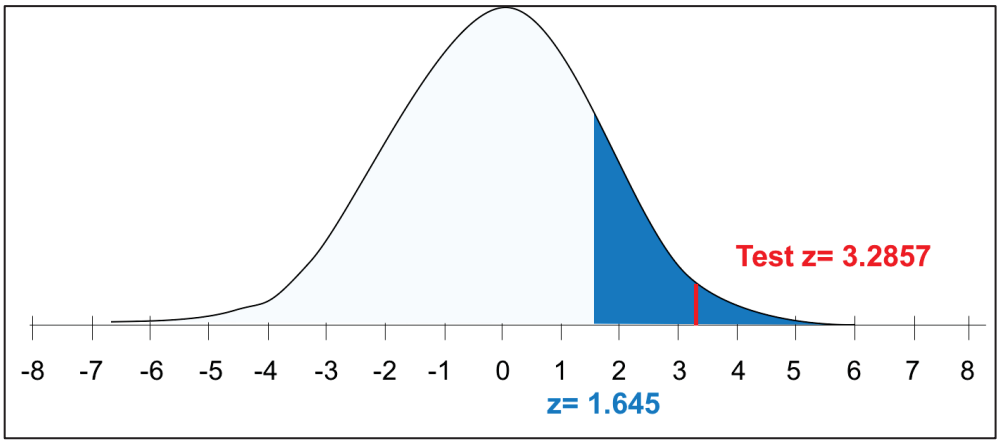


Figure 5.30: Hypothesis testing graph of the z-score for SNS users who find that customizing individual post is more practical (easier, faster) than going through global SNS settings to change.

- ***P-value Method***

According to the z table, the area for z=1.4929 is 0.9394 and the P-value is (P>0.0606). Thus, I fail to reject the null hypothesis H_0. There is enough evidence to support the claim that ***most*** of SNS users use shortcuts to change the timeline or SNS settings. In addition, the area for z=4.0824 is 0.9999 and the P-value is (P<0.0001). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users use different resources such as Google to search for shortcut on how to achieve specific setting. Also, the area for z=3.4849 is 0.9999 and the P-value is (P<0.0001). Thus, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find using shortcuts to change SNS settings is more practical than going through all the settings. Lastly, the area for z=3.2857 is 0.9996 and the P-value is (P<0.0004). Consequently, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find customizing individual post is more practical (easier, faster) than going through global SNS settings to change.

The following are quotes that the participants wrote in response to the open-ended question (Provide any additional comments?):

P21 and P24 indicated that they were not aware or never thought of shortcut settings.

"I wasn't aware of these shortcuts" (P21)

"I never thought of shortcuts" (P24)

Moreover, P28 emphasized that customizing each post settings are beneficial.

"Most sites I use don't have the option to set privacy settings for each post, but that sounds useful." (P28)

Furthermore, P16 found that both options [Using shortcuts and customizing individual posts compared to the global or general settings] should be available.

"I believe both options should be available. People who aren't concerned about their security will most likely want an easy shortcut to deal with their settings. However, others that are concerned will want to be able to manually change their settings to something they're comfortable with." (P16)

P97 also stated:

"Customizing individual post is more practical than going through global SNS settings. I agree and disagree. Both have major pros/cons. Its preferred to customize individual posts if a user doesn't want all previous/future posts affected. At the same time, if one uses the same option for all posts, its faster to use general settings rather than change each post. In an emergency, one can faster utilize general settings to limit/expand how much info is visible." (P97)

Receiving notifications about new updates of SNS settings

66% of the participants (Occasionally to Frequently) indicated that SNSs provide new updates of the settings without sending notifications to them (*M*= 2.21, *SD*= 0.97) (Table 5.22). In addition, 57% of the participants (Occasionally to Frequently) admitted that they read to understand and take action to change only after receiving notifications about the settings' new updates (*M*= 2.41, *SD*= 0.92) (Figure 5.31).

Table 5.22: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes "Receiving and reading the notifications of SNS settings' new updates".

	Frequently ← Rating → Never				Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	***M***	***SD***
SNSs provide new updates of their settings without sending notifications.	26 (25.7)	41 (40.6)	21 (20.8)	13 (12.9)	2.21	0.97
Reading to understand and take action to change only after I get a notification about the new updates of SNS settings.	16 (15.8)	42 (41.6)	29 (28.7)	14 (13.9)	2.41	0.92

Likewise, 69% of the participants (Strongly Agree and Agree) confirmed that receiving notifications about SNS settings new updates from an accurate resource with accurate information will change their behaviours toward the SNS settings (*M*= 2.08, *SD*= 0.89) (Table 5.23). Also, 74% of the participants (Strongly Agree and Agree) emphasized that presenting and advertising the notifications of SNS settings new updates in an easy manner will help them to understand and change the SNS settings (*M*= 2.03, *SD*= 0.92) (Figure 5.32). However, 43% of the participants (Strongly Agree and Agree) confirmed that SNSs do not provide the right information about SNS settings' new updates at the right time and 44% were neither agree nor disagree (*M*= 2.58, *SD*= 0.96).

Table 5.23: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes "Receiving and presenting the notifications of SNS settings' new updates from an accurate resource and at the right time".

	Strongly Agree ← Rating → Strongly Disagree					**Descriptive Statistics**	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	**5 (%)**	***M***	***SD***
Receiving notifications about SNS settings new updates from an accurate resource with accurate information will change my feelings and attitude toward the SNS settings.	29 (28.7)	41 (40.6)	26 (25.7)	4 (4)	1 (1)	2.08	0.89
Presenting and advertising the notifications of SNS settings new updates in an easy manner will help me to understand and change SNS settings.	31 (30.7)	44 (43.6)	20 (19.8)	4 (4)	2 (2)	2.03	0.92
SNSs do not provide the right information about SNS settings new updates at the right time.	14 (13.9)	30 (29.7)	45 (44.6)	8 (7.9)	4 (4)	2.58	0.96

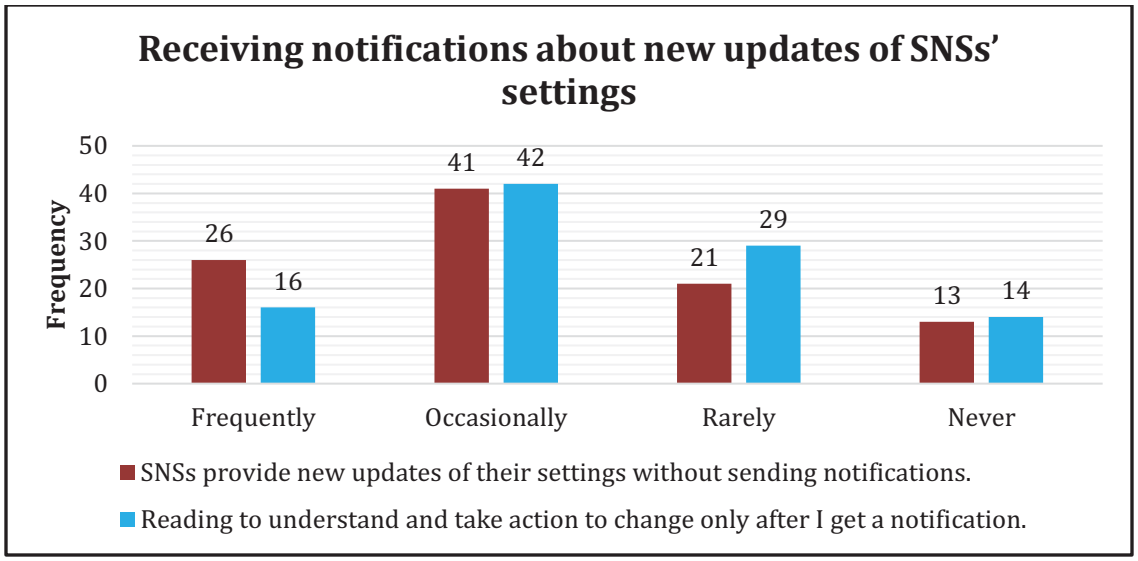


Figure 5.31: A bar graph showing the frequency of the participants and the responses to the obtained codes "Receiving and reading the notifications of SNS settings' new updates".

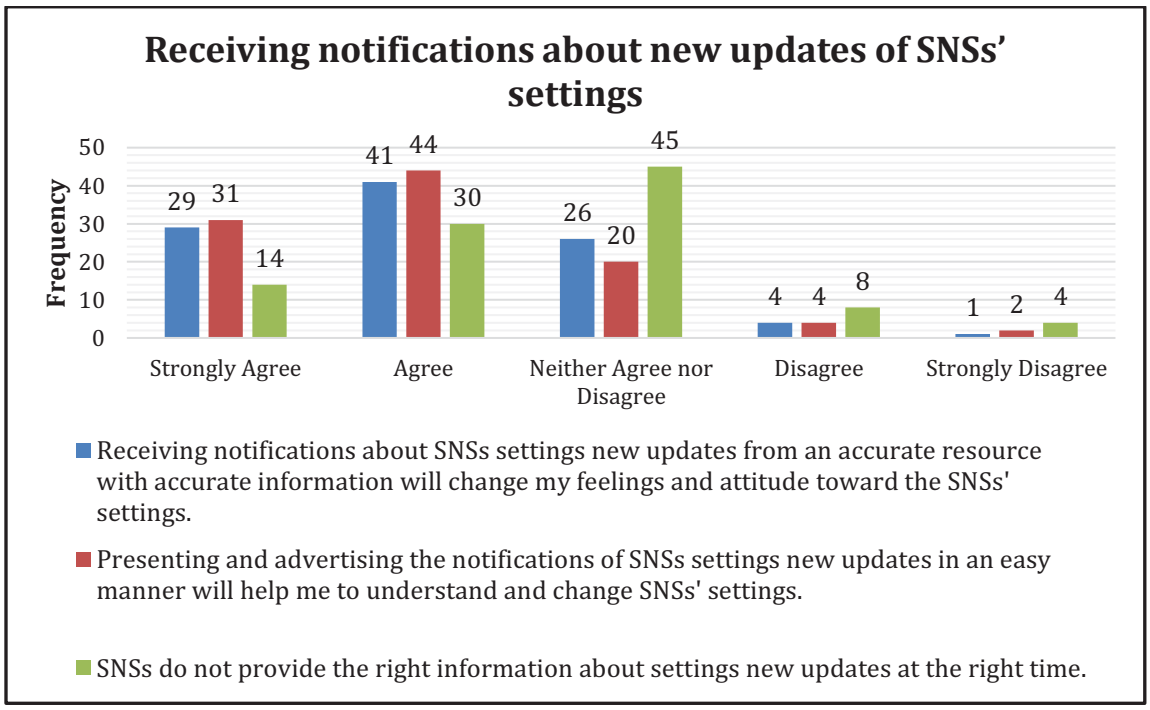


Figure 5.32: A bar graph showing the frequency of the participants and the responses to the obtained codes "Receiving and presenting the notifications of SNS settings' new updates from an accurate resource and at the right time".

Test of Proportions (z-test)

Table 5.24: The Confidence Intervals for z-test (Receiving notifications about new updates of SNS settings)

Codes	$\hat{p}$	$\hat{q}$	E	Confidence Intervals
SNSs provide new updates of their settings without sending notifications.	0.6633	0.3366	0.0921	0.5712 < P < 0.7554
Reading to understand and take action to change only after I get a notification about the new updates of SNSs' settings.	0.5742	0.4257	0.0964	0.4778 < P < 0.6706
Receiving notifications about SNSs settings new updates from an accurate resource with accurate information will change my feelings and attitude toward the SNSs' settings.	0.6930	0.3069	0.0899	0.6031 < P < 0.7829
Presenting and advertising the notifications of SNSs settings new updates in an easy manner will help me to understand and change SNSs' settings.	0.7425	0.2574	0.0852	0.6573 < P < 0.8277
SNSs do not provide the right information about SNSs settings new updates at the right time.	0.4356	0.5643	0.0966	0.339 < P < 0.5322

According to the presented results in (Table 5.24), we are 95% confident that the actual population proportions of SNSs users who find that SNSs provide new updates of their settings without sending notifications falls between 57% and 75%. In addition, we are 95% confident that the actual population proportion of SNSs user who read to understand and take action to change only after being notified about the new updates of SNSs' settings falls between 48% and 67%. We are also 95% sure that the actual population proportion of SNSs user who find that receiving notifications about SNSs settings new updates from an accurate resource with accurate information will change their feelings and attitude toward the SNSs' settings falls between 60% and 78%. Moreover, we are 95% confident that the actual population proportions of SNSs users who find that presenting and advertising the notifications of SNSs settings new updates in an easy manner will help to understand and change SNSs' settings falls between 66% and 83%. Lastly, we are 95% confident that the actual population proportions of SNSs users who find that SNSs do not provide the right information about SNSs settings new updates at the right time falls between 34% and 53%.

- ***Test statistic Method***

Table 5.25: The z-scores of the obtained codes in the factor "Receiving notifications about new updates of SNS settings".

Codes	$\hat{p}$	z-score
SNSs provide new updates of their settings without sending notifications.	0.6633	3.2857
Reading to understand and take action to change only after I get a notification about the new updates of SNS settings.	0.5742	1.4929
Receiving notifications about SNS settings new updates from an accurate resource with accurate information will change my feelings and attitude toward the SNS settings.	0.6930	3.8832
Presenting and advertising the notifications of SNS settings new updates in an easy manner will help me to understand and change SNS settings.	0.7425	4.8792
SNSs do not provide the right information about SNS settings new updates at the right time.	0.4356	-1.2957

I claim that ***most*** of SNS users find that SNSs provide new updates of their settings without sending notifications (P>0.50). Thus, I stated the null hypothesis H_0 is P = 0.50 and the alternative hypothesis H_1 is P>0.50. The critical value according to the significance level (0.05) is 1.645. The test statistic (z-score) is 3.2857 (Table 5.25) which falls in the rejection region (Figure 5.33). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that SNSs provide new updates of their settings without sending notifications.

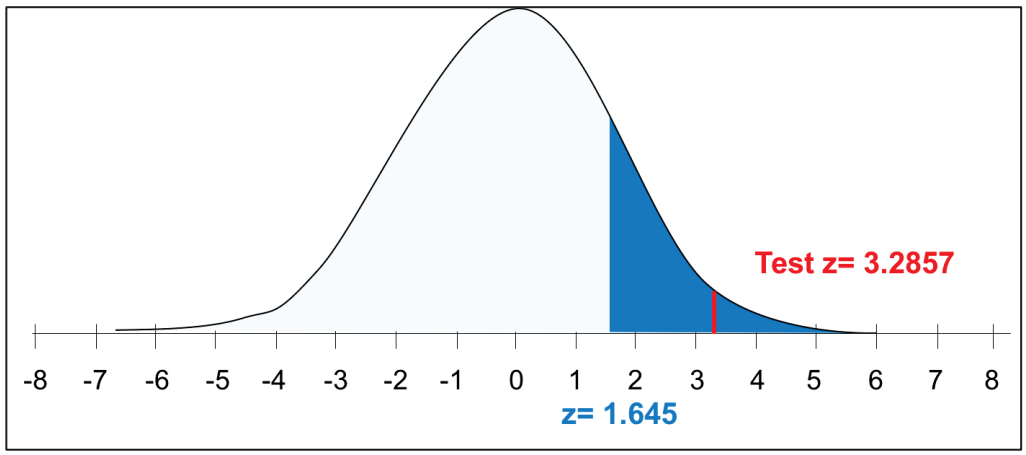


Figure 5.33: Hypothesis testing graph of the z-score for SNS users who find that SNSs provide new updates of their settings without sending notifications.

In addition, I claim that ***most*** of SNS users read to understand and take action to change only after getting a notification about the new updates of SNS settings (P>0.50). The test

statistic (z-score) is 1.4929 which falls in the fail to reject region (Figure 5.34). Therefore, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users read to understand and take action to change only after getting a notification about the new updates of SNS settings.

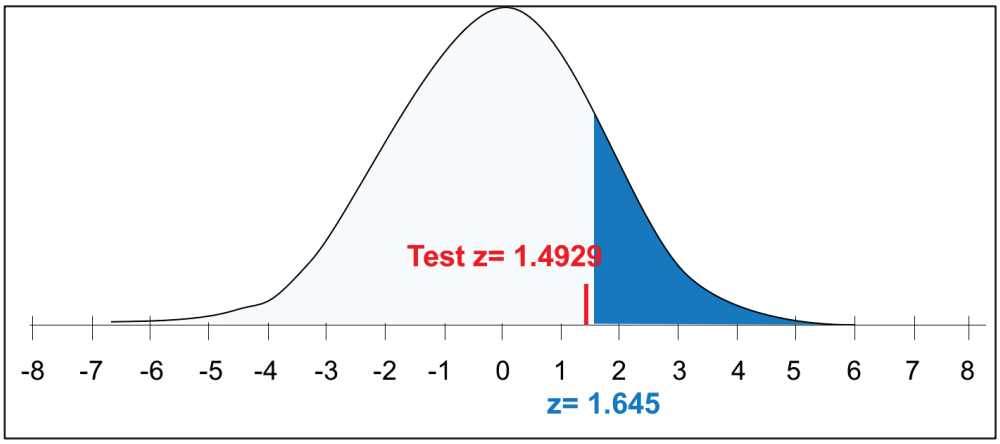


Figure 5.34: Hypothesis testing graph of the z-score for SNS users who read to understand and take action to change only after getting a notification about the new updates of SNS settings

Furthermore, I claim that ***most*** of SNS users find receiving notifications about SNS settings new updates from an accurate resource with accurate information will change their feelings and attitude toward the SNS settings (P>0.50). The test statistic (z-score) is 3.8832 which falls in the rejection region (Figure 5.35). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that receiving notifications about SNS settings new updates from an accurate resource with accurate information will change their feelings and attitude toward the SNS settings.

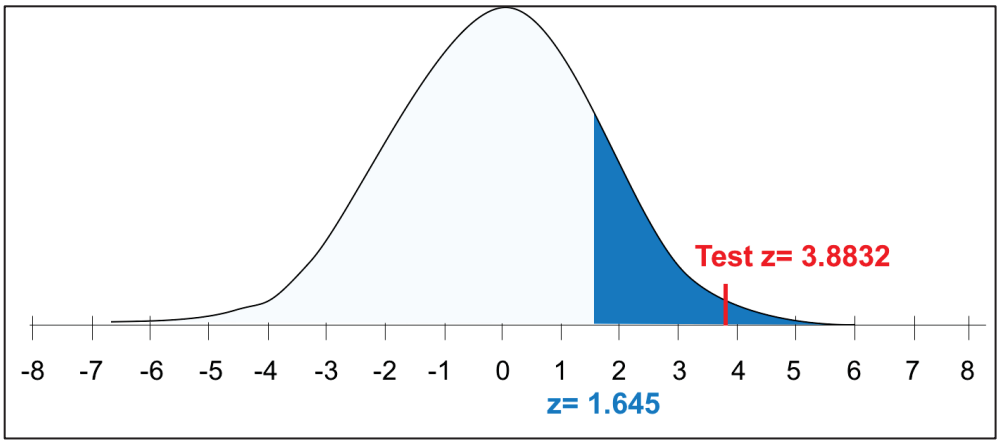


Figure 5.35: Hypothesis testing graph of the z-score for SNS users who find that receiving notifications about SNS settings new updates from an accurate resource with accurate information will change their feelings and attitude toward the SNS settings

Moreover, I claim that ***most*** of SNS users find that presenting and advertising the notifications of SNS settings new updates in an easy manner will help to understand and change SNS settings (P>0.50). The test statistic (z-score) is 4.8792 which falls in the rejection region (Figure 5.36). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that presenting and advertising the notifications of SNS settings new updates in an easy manner will help to understand and change SNS settings.

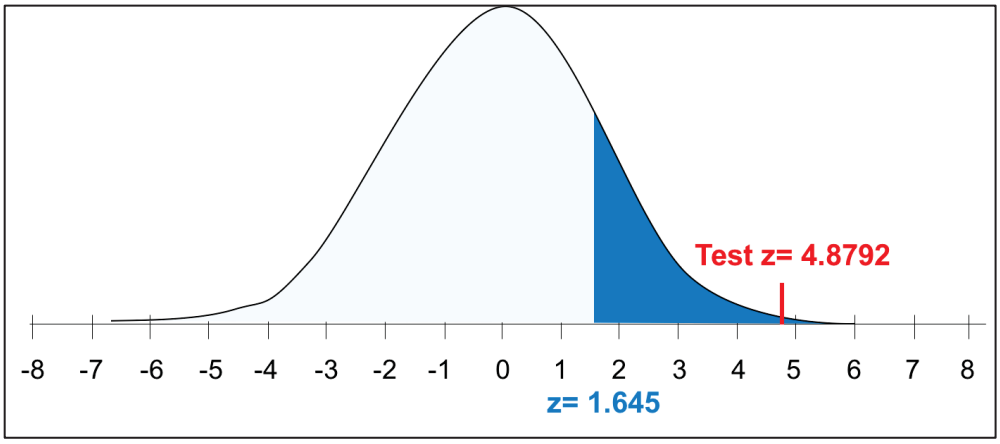


Figure 5.36: Hypothesis testing graph of the z-score for SNS users who find that presenting and advertising the notifications of SNS settings new updates in an easy manner will help to understand and change SNS settings

Lastly, I claim that ***most*** of SNS users find that SNSs do not provide the right information about SNS settings new updates at the right time (P>0.50). The test statistic

(z-score) is -1.2957 which falls in the fail to reject region (Figure 5.37). Therefore, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users find that SNSs do not provide the right information about SNS settings new updates at the right time.

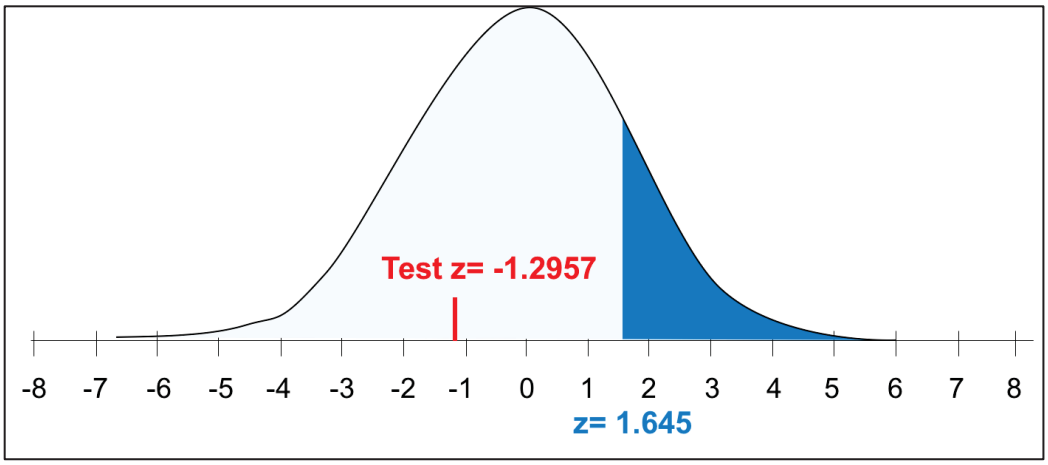


Figure 5.37: Hypothesis testing graph of the z-score for SNS users who find that SNSs do not provide the right information about SNS settings new updates at the right time

- ***P-value Method***

According to the z table, the area for z=3.2857 is 0.9996 and the P-value is (P<0.0004). Therefore, I reject the null hypothesis H_0. There is enough evidence to support the claim that ***most*** of SNS users find that SNSs provide new updates of their settings without sending notifications. Furthermore, the area for z=1.4929 is 0.9394 and the P-value is (P>0.0606). Thus, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users read to understand and take action to change only after getting a notification about the new updates of SNS settings.

Also, the area for z=3.8832 is 0.9999 and the P-value is (P<0.0001). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that receiving notifications about SNS settings new updates from an accurate resource with accurate information will change their feelings and attitude toward the SNS settings. Moreover, the area for z=4.8792 is 0.9999 and the P-value is (P<0.0001). Thus, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that presenting and advertising the notifications of SNS settings new updates in an easy manner will help them to understand and change SNS settings. Lastly,

the area for z=-1.2957 is 0.0885 and the P-value is (P>0.9115). Consequently, I fail to reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that SNSs do not provide the right information about SNS settings new updates at the right time.

The following are quotes that the participants wrote in response to the open-ended question (Provide any additional comments?):

P24 and P81 indicated that the new updates notifications should be simple and sent as visual content.

> *"If there was a video on the updates with easy language, it could help getting the updates clearly"* (P24)
>
> *"Info needs to be kept simple, I find it easier if the instructions are visual, as in a presentation with notes"* (P81)

On the other hand, P97 emphasized that some of the new updates information sent by other users are inaccurate.

> *"Some resources that are posted by other users are inaccurate so I don't always find out new information from others, or rely heavily on it without doing my own research. Facebook settings have been changing over the years to make things easier and simpler for users but doing this simultaneously limits how much in-depth control advanced users have over specific aspects of their SNSs."* (P97)

Searching about SNS settings and new updates

62% of the participants (Occasionally to Frequently) find that attempting to search about adequate and accurate information regarding SNS settings' new updates is challenging (M= 2.32, SD= 0.90) (Table 5.26). In addition, 71% of the participants (Occasionally to Frequently) indicated that looking for new updates only if receiving notifications; otherwise, they do not look for them (M= 2.17, SD= 0.93) (Figure 5.38). The results also showed that 64% of the participants take time to search, understand, and then change the settings' new updates (M= 2.25, SD= 0.95) (Figure 5.39).

Table 5.26: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes "Searching and finding SNS settings new updates".

	Frequently ← Rating → Never				Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	***M***	***SD***
Challenging when attempting to search and find enough and accurate information about SNS settings new updates.	18 (17.8)	45 (44.6)	26 (25.7)	12 (11.9)	2.32	0.90
Looking for new updates of SNS settings only if I receive notifications otherwise I do not look for them.	24 (23.8)	48 (47.5)	17 (16.8)	12 (11.9)	2.17	0.93

Table 5.27: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes "Looking for and finding new updates of the SNS settings take time."

	Strongly Agree ← Rating → Strongly Disagree					Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	**5 (%)**	***M***	***SD***
Looking for and finding new updates of the SNS settings take time.	23 (22.8)	42 (41.6)	25 (24.7)	10 (10)	1 (1)	2.25	0.95

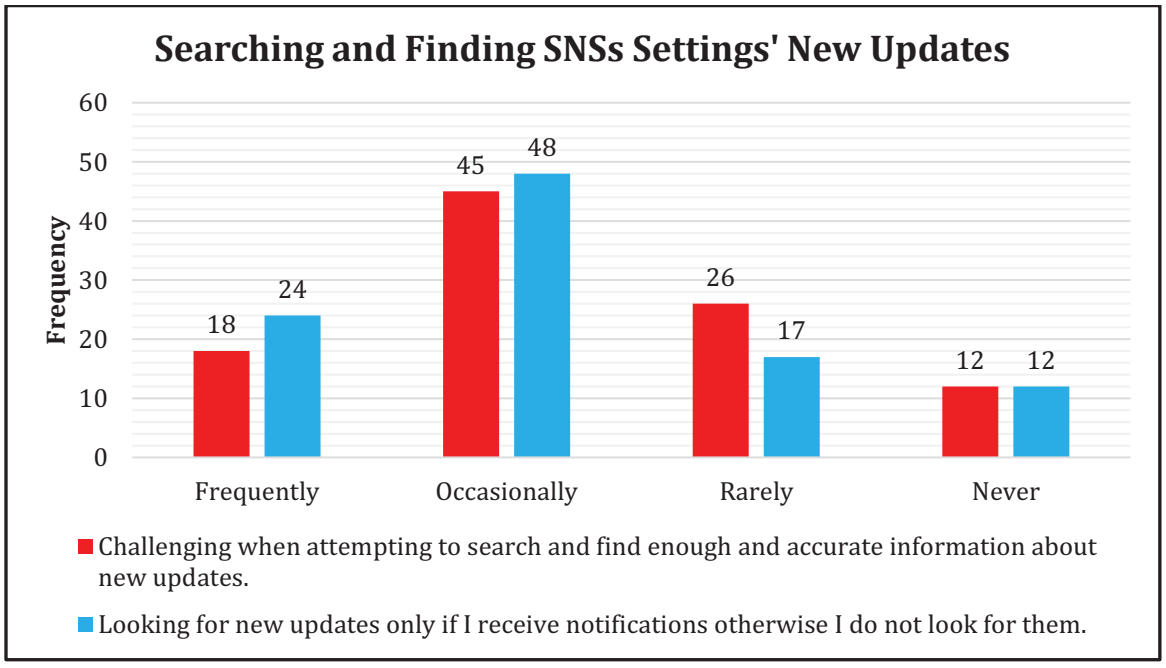


Figure 5.38: A bar graph showing the frequency of the participants and the responses to the obtained codes "Searching and finding SNS settings new updates".

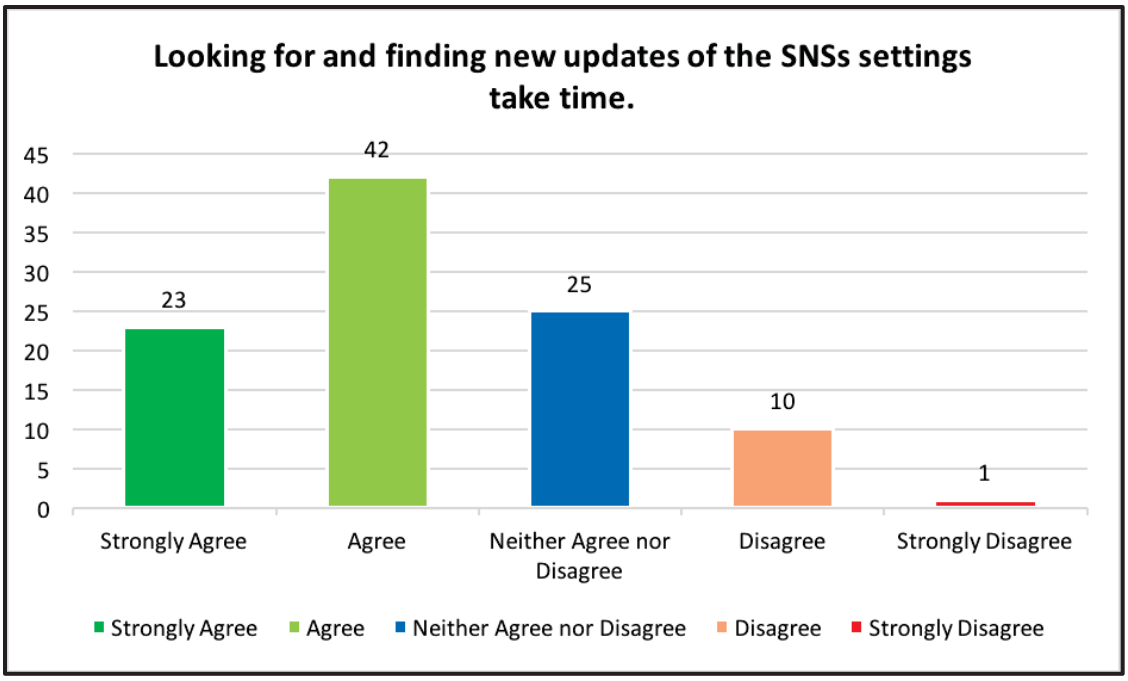


Figure 5.39: A bar graph showing the frequency of the participants and the responses to the obtained codes "Looking for and finding new updates of the SNS settings take time".

Test of Proportions (z-test)

Table 5.28: The Confidence Intervals for z-test (Searching SNS settings and new updates)

Codes	$\hat{p}$	$\hat{q}$	E	Confidence Intervals
Challenging when attempting to search and find enough and accurate information about SNSs settings new updates.	0.6237	0.3762	0.0944	$0.5293 < P < 0.7181$
Looking for new updates of SNSs' settings only if I receive notifications otherwise I do not look for them.	0.7128	0.2871	0.0882	$0.6246 < P < 0.801$
Looking for and finding new updates of the SNSs settings take time.	0.6435	0.3564	0.0933	$0.5502 < P < 0.7368$

According to the presented results in (Table 5.28), we are 95% confident that the actual population proportions of SNSs users who find that attempting to search and find enough and accurate information about SNSs settings new updates is challenging falls between 53% and 72%. In addition, we are 95% confident that the actual population proportion of SNSs user who look for new updates of SNSs' settings only if they receive notifications otherwise they do not look for them falls between 62% and 80%. Lastly, we are 95% confident that the actual population proportion of SNSs user who find looking for and finding new updates of the SNSs settings take time falls between 74% and 89%.

- ***Test statistic Method***

Table 5.29: The z-scores of the obtained codes in the factor "Searching and findings SNS settings and new updates".

Codes	$\hat{p}$	z-score
Challenging when attempting to search and find enough and accurate information about SNS settings new updates.	0.6237	2.4889
Looking for new updates of SNS settings only if I receive notifications otherwise I do not look for them.	0.7128	4.2816
Looking for and finding new updates of the SNS settings take time.	0.6435	2.8873

I claim that ***most*** of SNS users find that attempting to search and find enough and accurate information about SNS settings new updates is challenging (P>0.50). Thus, I stated the null hypothesis H_0 is P = 0.50 and the alternative hypothesis H_1 is P>0.50. The critical value according to the significance level (0.05) is 1.645. The test statistic (z-score) is 2.4889 (Table 5.29) which falls in the rejection region (Figure 5.40). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that attempting to search and find enough and accurate information about SNS settings new updates is challenging.

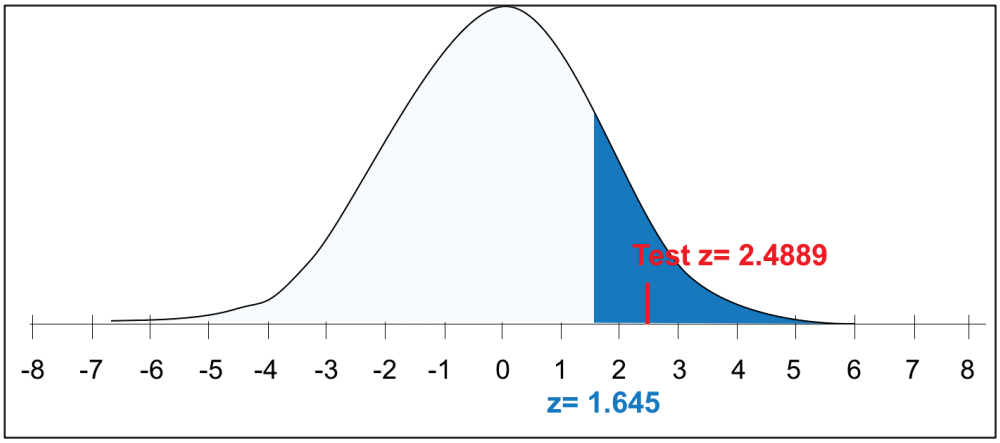


Figure 5.40: Hypothesis testing graph of the z-score for SNS users who find that attempting to search and find enough and accurate information about SNS settings new updates is challenging

In addition, I claim that ***most*** of SNS users look for new updates of SNS settings only if they receive notifications otherwise they do not look for them (P>0.50). The test statistic (z-score) is 4.2816 which falls in the rejection region (Figure 5.41). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users look for new updates of SNS settings only if they receive notifications otherwise they do not look for them.

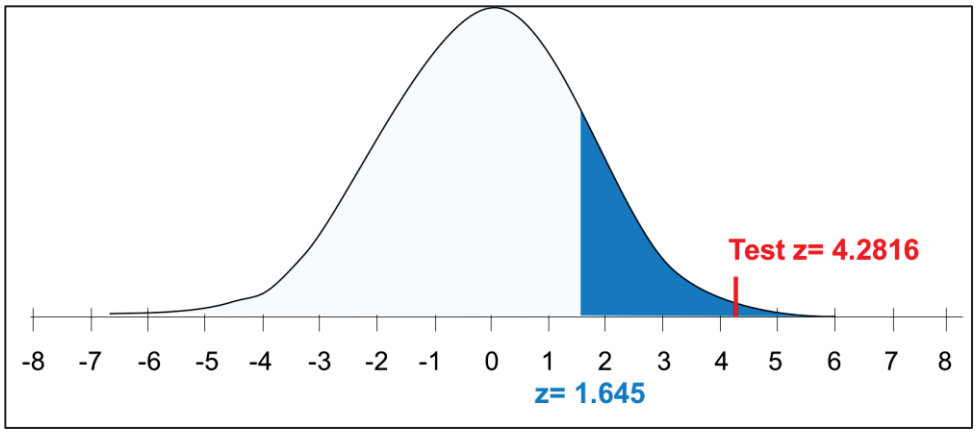


Figure 5.41: Hypothesis testing graph of the z-score for SNS users who look for new updates of SNS settings only if they receive notifications otherwise they do not look for them

I also claim that ***most*** of SNS users find that looking for and finding new updates of the SNS settings take time (P>0.50). The test statistic (z-score) is 2.8873 which falls in the rejection region (Figure 5.42). Thus, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that looking for and finding new updates of the SNS settings take time.

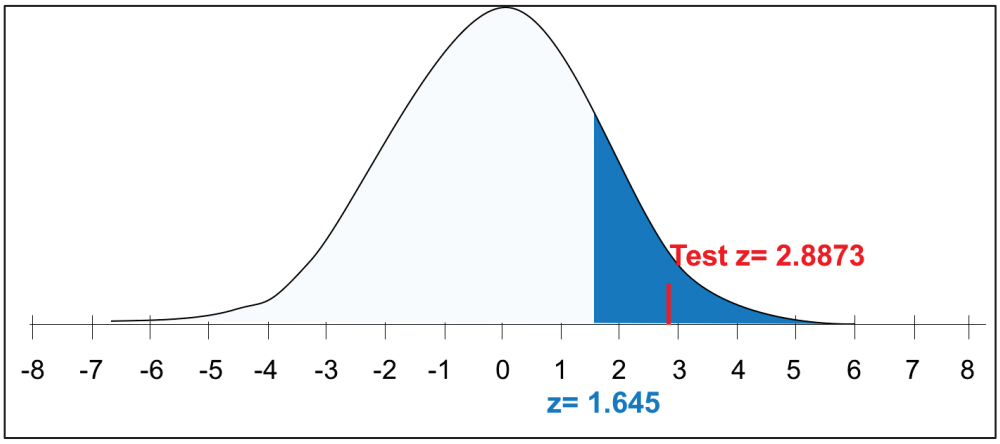


Figure 5.42: Hypothesis Testing Graph of the z-score for SNS users who find that looking for and finding new updates of the SNS settings take time

- ***P-value Method***

According to the z table, the area for z=2.4889 is 0.9946 and the P-value is (P<0.0054). Thus, I reject the null hypothesis H_0. There is enough evidence to support the claim that ***most*** of SNS users find attempting to search and find enough and accurate information about SNS settings new updates is challenging. Furthermore, the area for z= 4.2816 is

0.9999 and the P-value is (P<0.0001). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users look for new updates of SNS settings only if they receive notifications otherwise they do not look for them. Lastly, the area for z= 2.8873 is 0.9984 and the P-value is (P<0.0016). Consequently, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find looking for and finding new updates of the SNS settings take time.

Using different resources

67% of the participants (Occasionally to Frequently) use Google to understand, change, and test SNS settings (M= 2.04, SD= 1.03) (Table 5.30). In addition, 55% of the participants (Occasionally to Frequently) use Google to search and find new updates of SNS settings (M= 2.39, SD= 1.02). Also, 77% of the participants (Occasionally to Frequently) use Google to find a solution from people who have the same issue with the settings (M= 1.83, SD= 0.98) (Figure 5.43).

Table 5.30: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes "Using Google, visual content, and people to manage and solve issues with SNS settings".

	Frequently ← Rating → Never				Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	***M***	***SD***
Using Google to understand, change, and test SNS settings.	40 (39.6)	28 (27.7)	22 (21.8)	11 (10.9)	2.04	1.03
Using Google to search and find new updates of SNS settings.	23 (22.8)	33 (32.7)	28 (27.7)	17 (16.8)	2.39	1.02
Using Google to find a solution from people who have the same issues that I have with my SNS settings.	49 (48.5)	29 (28.7)	14 (13.9)	9 (8.9)	1.83	0.98
Using videos to help me understand, change, and test SNS settings.	28 (27.7)	40 (39.6)	14 (13.9)	19 (18.8)	2.24	1.06
Using photos to understand and change SNS settings.	23 (22.8)	40 (39.6)	23 (22.8)	15 (14.8)	2.30	0.99
Hearing about SNS settings and new updates from experts, friends, or family members.	23 (22.8)	43 (42.6)	24 (23.8)	11 (10.9)	2.23	0.93
Hearing about SNS settings and new updates from the news or media.	20 (19.8)	32 (31.7)	31 (30.7)	18 (17.8)	2.47	1.01

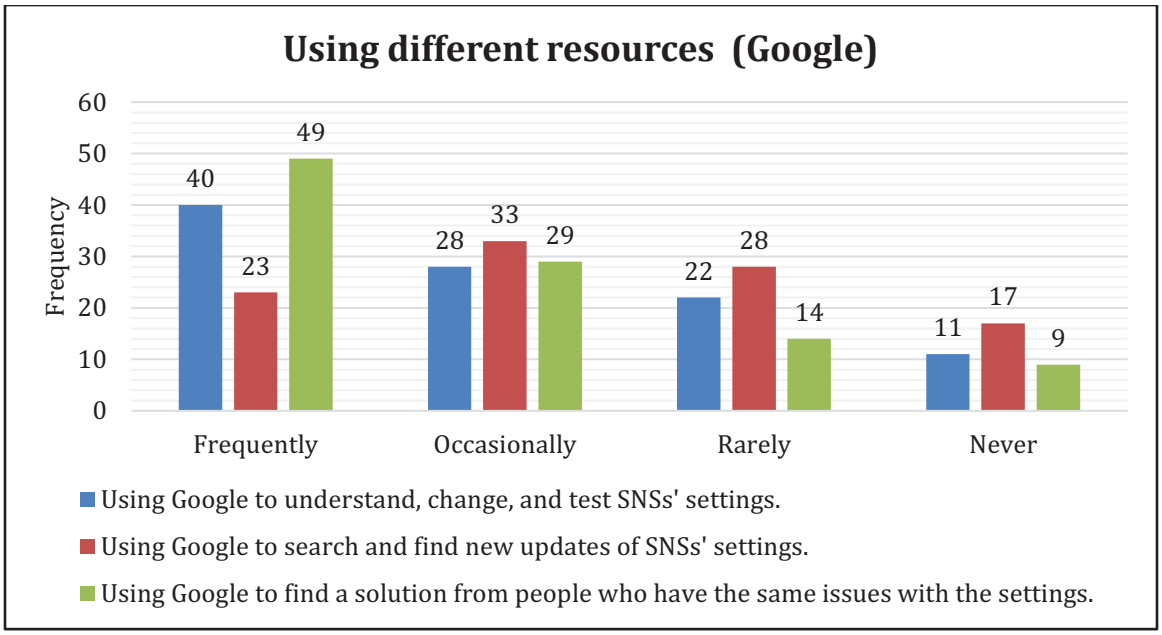


Figure 5.43: A bar graph showing the frequency of the participants and the responses to the obtained codes "Using different resources (Google)".

Furthermore, 67% of the participants (Occasionally to Frequently) use videos or vlogs to help them understand, change, and test SNS settings (*M*= 2.24, *SD*= 1.06). Likewise, 62% of the participants (Occasionally to Frequently) use photos to help them understand, change, and test SNS settings (*M*= 2.30, *SD*= 0.99) (Figure 5.44).

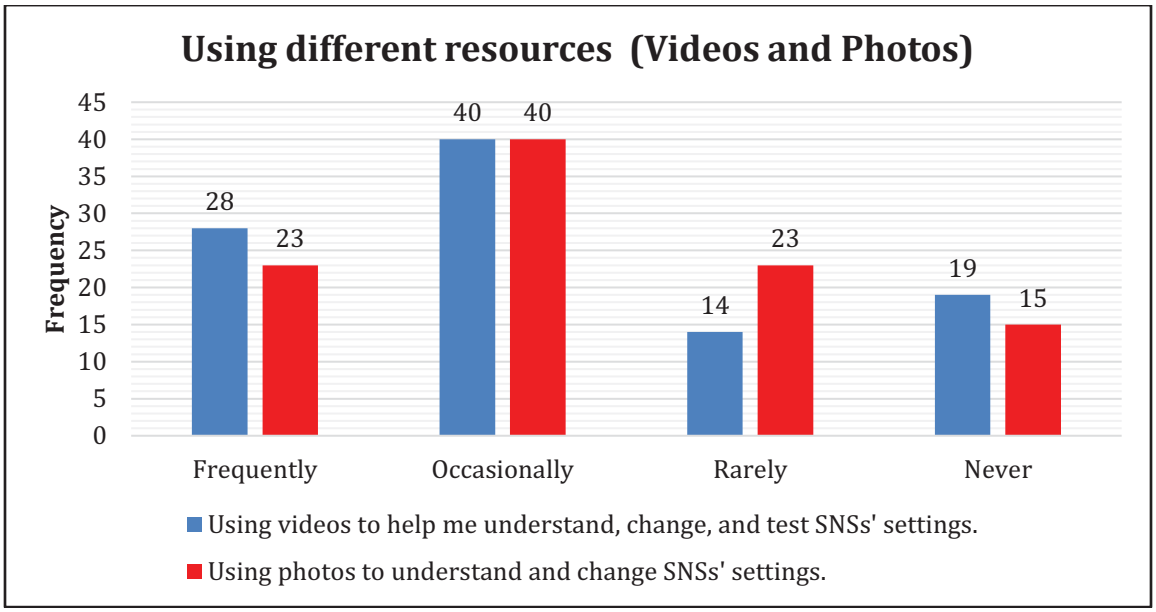


Figure 5.44: A bar graph showing the frequency of the participants and the responses to the obtained codes "Using different resources (Videos and Photos)".

Nevertheless, using different resources can be in a form of hearing about the settings and new updates. 65% of the participants (Occasionally to Frequently) hear about SNS settings

and new updates from experts, friends, or family member (*M*= 2.23, *SD*= 0.93). Likewise, 51 of the participants (Occasionally to Frequently) hear about SNS settings and new updates from the news or media (*M*= 2.47, *SD*= 1.01) (Figure 5.45).

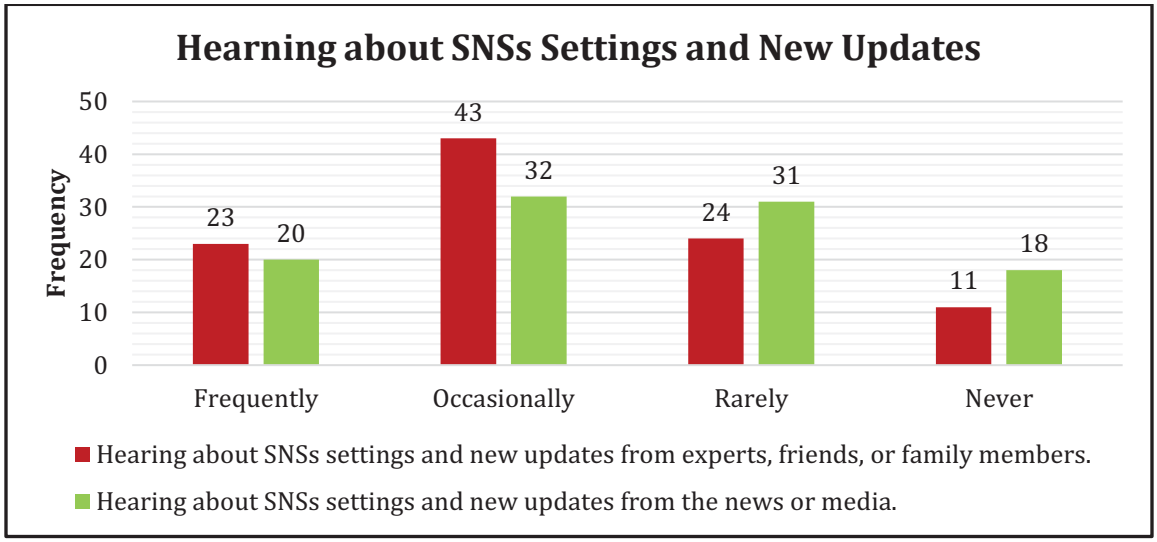


Figure 5.45: A bar graph showing the frequency of the participants and the responses to the obtained codes "Hearing about SNS settings and new updates".

Remarkably, 81% of the participants confirmed that providing resources about the SNS settings and new updates such as photos, short videos, or animations would enhance their understanding and ability to change the settings (*M*= 1.86, *SD*= 0.88) (Figure 5.46).

Table 5.31: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes "Looking for and finding new updates of the SNS settings take time.".

	Strongly Agree ← Rating → Strongly Disagree					Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	**5 (%)**	***M***	***SD***
Providing different resources about the SNS settings and new updates - inside SNSs - such as photos, short videos, or animations would enhance my understanding and ability to change them.	39 (38.6)	43 (42.6)	15 (14.8)	2 (2)	2 (2)	1.86	0.88

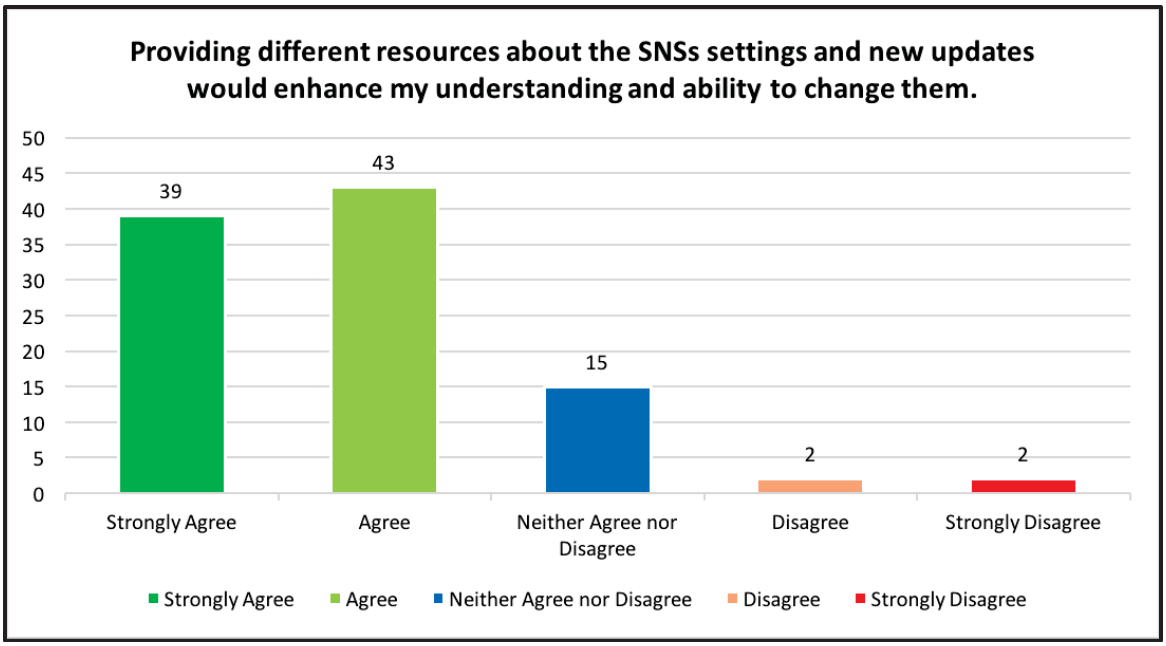


Figure 5.46: A bar graph showing the frequency of the participants and the responses to the obtained codes "Providing different resources about SNS settings and new updates would enhance users' understanding and ability to change them".

Test of Proportions (z-test)

Table 5.32: The Confidence Intervals for z-test (Using different resources)

Codes	$\hat{p}$	$\hat{q}$	E	Confidence Intervals
Using Google to understand, change, and test SNSs' settings.	0.6732	0.3267	0.0914	$0.5818 < P < 0.7646$
Using Google to search and find new updates of SNSs' settings.	0.5544	0.4455	0.0969	$0.4575 < P < 0.6513$
Using Google to find a solution from people who have the same issues that I have with my SNSs' settings.	0.7722	0.2277	0.0817	$0.6905 < P < 0.8539$
Using videos to help me understand, change, and test SNSs' settings.	0.6732	0.3267	0.0914	$0.5818 < P < 0.7646$
Using photos to understand and change SNSs' settings.	0.6237	0.3762	0.0944	$0.5293 < P < 0.7181$
Hearing about SNSs settings and new updates from experts, friends, or family members.	0.6534	0.3465	0.0927	$0.5607 < P < 0.7461$
Hearing about SNSs settings and new updates from the news or media.	0.5148	0.4851	0.0974	$0.4174 < P < 0.6122$
Providing different resources about the SNSs settings and new updates - inside SNSs - such as photos, short videos, or animations would enhance my understanding and ability to change them.	0.8118	0.1881	0.0762	$0.7356 < P < 0.888$

According to the presented results in (Table 5.32), we are 95% confident that the actual population proportions of SNSs users who use Google to understand, change, and test SNSs' settings falls between 58% and 76%. In addition, we are 95% confident that the

actual population proportion of SNSs user who use Google to search and find new updates of SNSs' settings falls between 46% and 65%. We are also 95% sure that the actual population proportion of SNSs user who use Google to find a solution from people who have the same issues that they have with my SNSs' settings falls between 69% and 85%.

In terms of using videos and photos, we are 95% confident that the actual population proportions of SNSs users who use videos to help them understand, change, and test SNSs' settings falls between 58% and 76%. Moreover, we are 95% confident that the actual population proportions of SNSs users who use photos to understand and change SNSs' settings falls between 53% and 72%.

In contrast, we are 95% confident that the actual population proportions of SNSs users who hear about SNSs settings and new updates from experts, friends, or family members falls between 56% and 75%. Further, we are 95% confident that the actual population proportions of SNSs users who hear about SNSs settings and new updates from the news or media falls between 42% and 61%. Lastly, we are 95% confident that the actual population proportions of SNSs users who find providing different resources about the SNSs settings and new updates - inside SNSs - such as photos, short videos, or animations would enhance their understanding and ability to change them falls between 74% and 89%.

- ***Test statistic Method***

Table 5.33: The z-scores of the obtained codes in the factor "Using different resources".

Codes	$\hat{p}$	z-score
Using Google to understand, change, and test SNS settings.	0.6732	3.4849
Using Google to search and find new updates of SNS settings.	0.5544	1.0945
Using Google to find a solution from people who have the same issues that I have with my SNS settings.	0.7722	5.4768
Using videos to help me understand, change, and test SNS settings.	0.6732	3.4849
Using photos to understand and change SNS settings.	0.6237	2.0865
Hearing about SNS settings and new updates from experts, friends, or family members.	0.6534	3.0865
Hearing about SNS settings and new updates from the news or media.	0.5148	0.2977
Providing different resources about the SNS settings and new updates - inside SNSs - such as photos, short videos, or animations would enhance my understanding and ability to change them.	0.8118	6.2736

I claim that ***most*** of SNS users use Google to understand, change, and test SNS settings ($P>0.50$). Thus, I stated the null hypothesis H_0 is $P = 0.50$ and the alternative hypothesis

H_1 is P>0.50. The critical value according to the significance level (0.05) is 1.645. The test statistic (z-score) is 3.4849 (Table 5.33) which falls in the rejection region (Figure 5.47). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users use Google to understand, change, and test SNS settings.

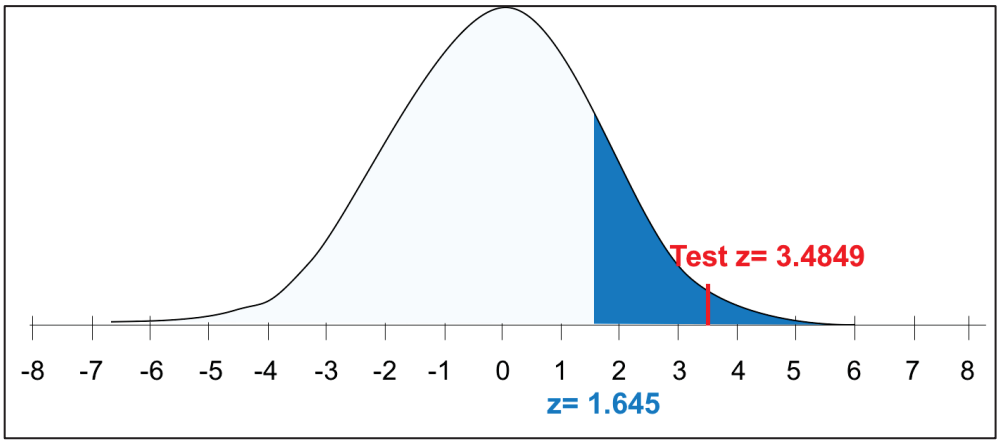


Figure 5.47: Hypothesis testing graph of the z-score for SNS users who use Google to understand, change, and test SNS settings.

In addition, I claim that ***most*** of SNS users use Google to search and find new updates of SNS settings (P>0.50). The test statistic (z-score) is 1.0945 which falls in the fail to reject region (Figure 5.48). Therefore, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users use Google to search and find new updates of SNS settings.

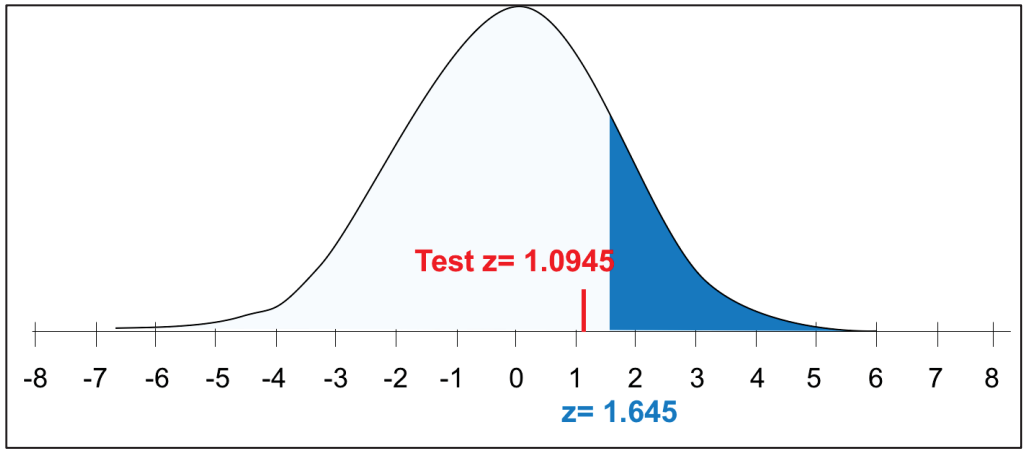


Figure 5.48: Hypothesis testing graph of the z-score for SNS users who use Google to search and find new updates of SNS settings.

Furthermore, I claim that ***most*** of SNS users use Google to find a solution from people who have the same issues that they have with SNS settings (P>0.50). The test statistic (z-score) is 5.4768 which falls in the rejection region (Figure 5.49). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users use Google to find a solution from people who have the same issues that they have with SNS settings.

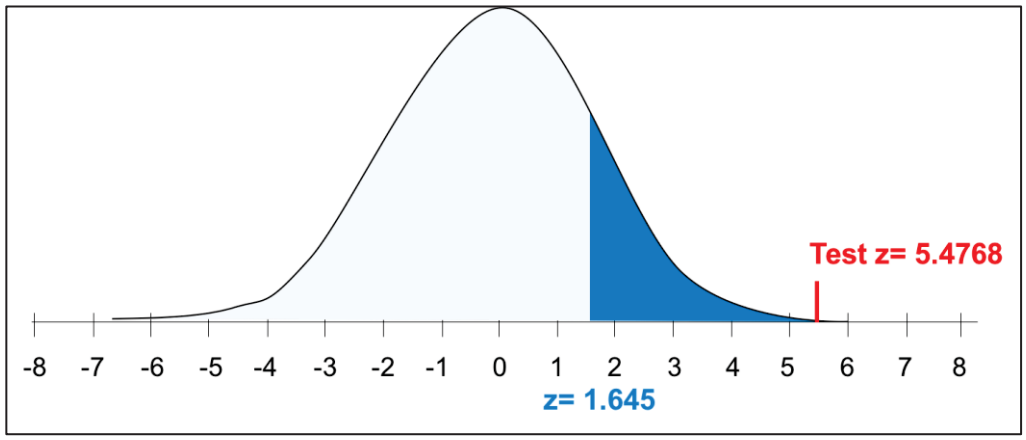


Figure 5.49: Hypothesis testing graph of the z-score for SNS users who use Google to find a solution from people who have the same issues that they have with SNS settings.

In terms of using videos and photos, I claim that ***most*** of SNS users use videos to help them understand, change, and test SNS settings (P>0.50) The test statistic (z-score) is 3.4849 which falls in the rejection region (Figure 5.50). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users use videos to help them understand, change, and test SNS settings.

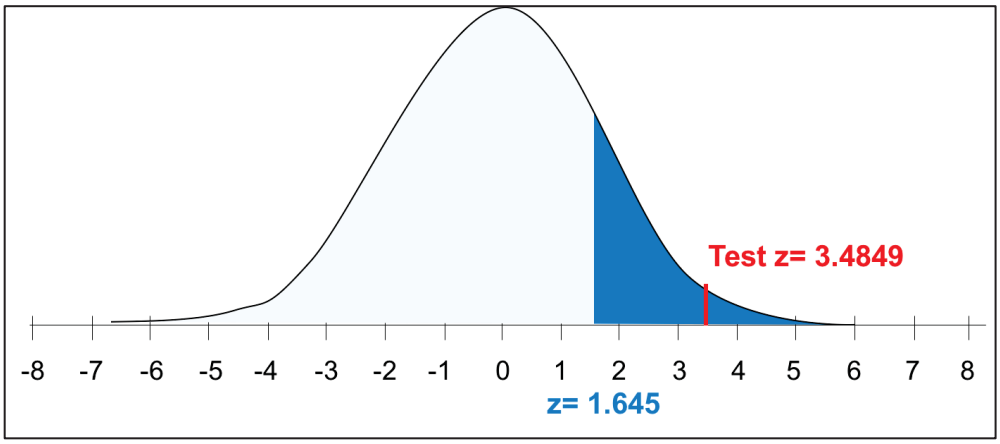


Figure 5.50: Hypothesis testing graph of the z-score for SNS users who use videos to help them understand, change, and test SNS settings.

I also claim that ***most*** of SNS users use photos to understand and change SNS settings (P>0.50). The test statistic (z-score) is 2.0865 which falls in the rejection region (Figure 5.51). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users use photos to understand and change SNS settings.

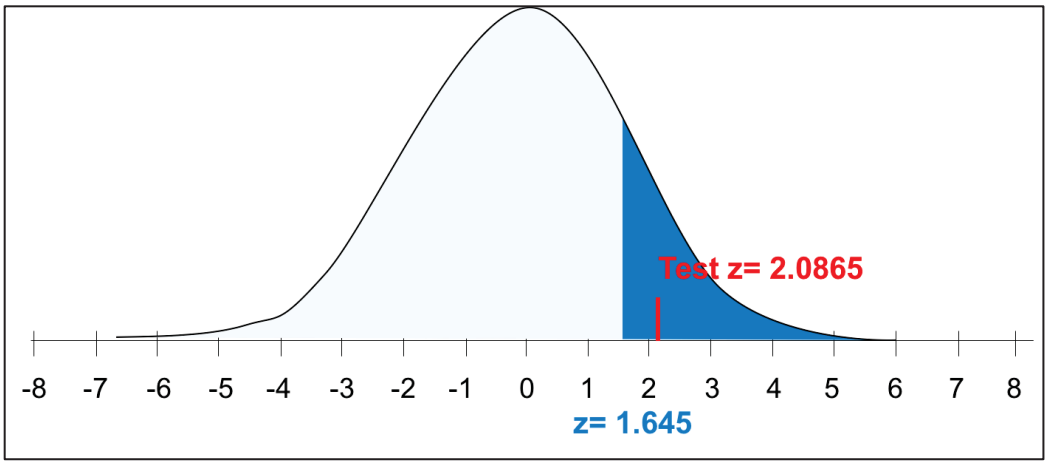


Figure 5.51: Hypothesis testing graph of the z-score for SNS users who use photos to understand and change SNS settings

On the other hand, I claim that ***most*** of SNS users hear about SNS settings and new updates from experts, friends, or family members (P>0.50). The test statistic (z-score) is 3.0865 which falls in the rejection region (Figure 5.52). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users hear about SNS settings and new updates from experts, friends, or family members.

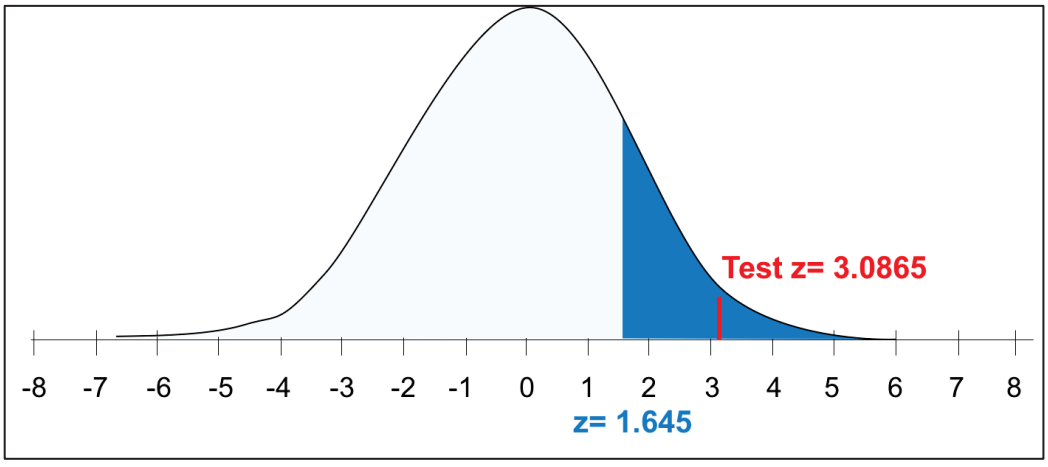


Figure 5.52: Hypothesis testing graph of the z-score for SNS users who hear about SNS settings and new updates from experts, friends, or family members.

I also claim that ***most*** of SNS users hear about SNS settings and new updates from the news or media (P>0.50). The test statistic (z-score) is 0.2977 which falls in the fail to reject region (Figure 5.53). Therefore, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users hear about SNS settings and new updates from the news or media.

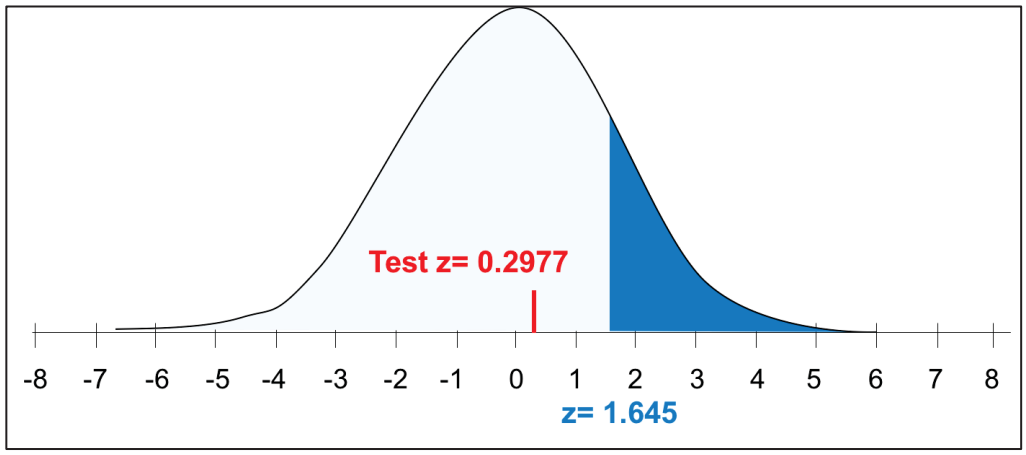


Figure 5.53: Hypothesis testing graph of the z-score for SNS users who hear about SNS settings and new updates from the news or media

Lastly, I claim that ***most*** of SNS users find providing different resources about the SNS settings and new updates - inside SNSs - such as photos, short videos, or animations would enhance my understanding and ability to change them (P>0.50). The test statistic (z-score) is 6.2736 which falls in the rejection region (Figure 5.54). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that providing different resources about the SNS settings and new updates - inside SNSs - such as photos, short videos, or animations would enhance my understanding and ability to change them.

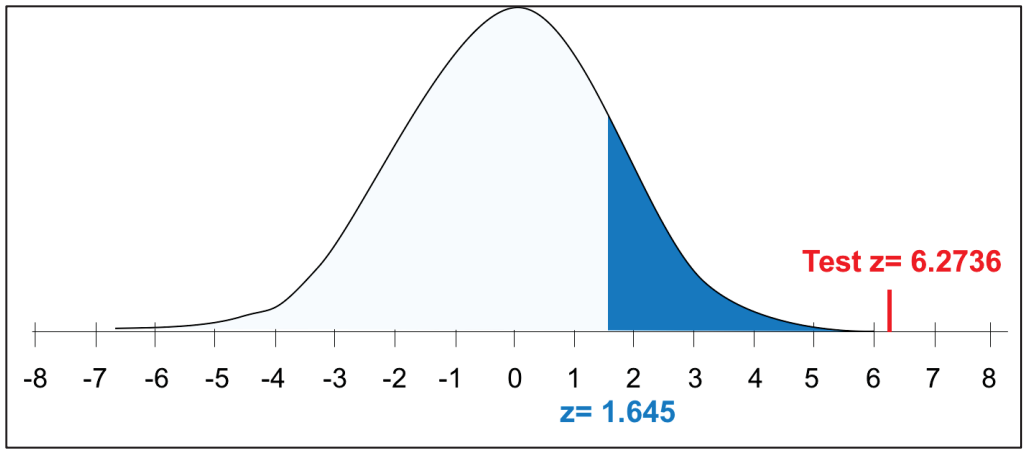


Figure 5.54: Hypothesis testing graph of the z-score for SNS users who find that providing different resources about the SNS settings and new updates would enhance my understanding and ability to change them.

- ***P-value Method***

According to the z table, the area for z=3.4849 is 0.9999 and the P-value is (P<0.0001). Therefore, I reject the null hypothesis H_0. There is enough evidence to support the claim that ***most*** of SNS users use Google to understand, change, and test SNS settings. Furthermore, the area for z=1.0945 is 0.8749 and the P-value is (P>0.1251). Thus, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users use Google to search and find new updates of SNS settings. Also, the area for z=5.4768 is 0.9999 and the P-value is (P<0.0001). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users use Google to find a solution from people who have the same issues that they have with my SNS settings.

In terms of using videos and photos, the area for z=3.4849 is 0.9999 and the P-value is (P<0.0001). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users use videos to help them understand, change, and test SNS settings. Moreover, the area for z=2.0865 is 0.9842 and the P-value is (P<0.0158). Thus, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users use photos to understand and change SNS settings.

On the other hand, the area for z=3.0865 is 0.9992 and the P-value is (P<0.0008). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users hear about SNS settings and new updates from experts, friends, or family members. Furthermore, the area for z=0.2977 is 0.6368 and the P-value is

(P>0.3632). Thus, I fail to reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users hear about SNS settings and new updates from the news or media.

Lastly, the area for z=6.2736 is 0.9999 and the P-value is (P<0.0001). Consequently, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that providing different resources about the SNS settings and new updates - inside SNSs - such as photos, short videos, or animations would enhance my understanding and ability to change them.

Reading SNS settings' descriptions and new updates

63% of the participants (Occasionally to Frequently) read SNS settings descriptions to understand the meaning of the settings (M= 2.23, SD= 0.97) (Table 5.34). In addition, 61% of the participants (Occasionally to Frequently) read SNS settings descriptions to change the settings (M= 2.31, SD= 0.92). However, 39% of the participants (Occasionally to Frequently) read online from time to time to find new updates of SNS settings (M= 2.75, SD= 0.89) (Figure 5.55).

Table 5.34: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes "Reading SNS settings descriptions and new updates".

	Frequently ← Rating → Never				Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	***M***	***SD***
Reading SNS settings descriptions to understand the meaning of the settings instead of guessing it.	26 (25.7)	38 (37.6)	25 (24.7)	12 (11.9)	2.23	0.97
Reading SNS settings descriptions to change the settings instead of guessing it.	20 (19.8)	42 (41.6)	27 (26.7)	12 (11.9)	2.31	0.92
Reading online from time to time to find new updates of SNS settings.	8 (7.92)	31 (30.7)	40 (39.6)	22 (21.8)	2.75	0.89

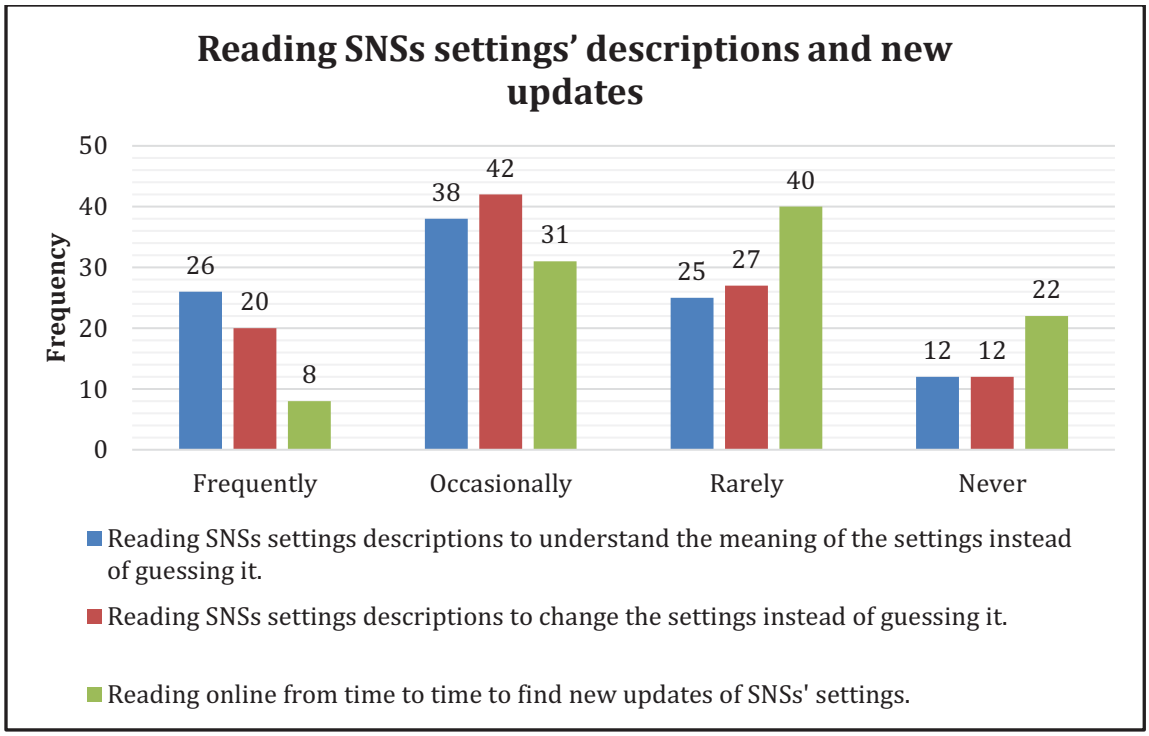


Figure 5.55: A bar graph showing the frequency of the participants and the responses to the obtained codes "Reading SNS settings descriptions and new updates".

Furthermore, 66% of the participants (Strongly Agree and Agree) emphasized that they will not read a long paragraph of texts about new updates of SNS settings (*M*= 2.20, *SD*= 1.22) (Table 5.35). Also, 79% admitted that reading the settings' descriptions is boring (*M*= 1.91, *SD*= 0.92) (Figure 5.56). Similarly, 76% of the participants (Strongly Agree and Agree) declared that reading to understand and change SNS settings options takes time because there are so many options (*M*= 1.99, *SD*= 0.91). Moreover, 64% of the participants (Strongly Agree and Agree) find that reading texts of new updates of SNS settings is time wasting (*M*= 2.34, *SD*= 1.12) (Figure 5.57).

Table 5.35: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes "Reading texts in SNS settings takes time and boring".

	Strongly Agree ← Rating → Strongly Disagree					Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	**5 (%)**	***M***	***SD***
I will not read a long paragraph of texts about new updates of SNS settings.	38 (37.6)	29 (28.7)	15 (14.8)	14 (13.9)	5 (4.9)	2.20	1.22
Reading texts of SNS settings descriptions is boring.	38 (37.6)	42 (41.6)	14 (13.9)	6 (5.9)	1 (1)	1.91	0.92
Reading to understand and change SNS settings options takes time because there are so many options.	33 (32.7)	44 (43.6)	17 (16.8)	6 (5.9)	1 (1)	1.99	0.91

	Strongly Agree ← Rating → Strongly Disagree					Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	**5 (%)**	***M***	***SD***
I waste my time when reading texts of new updates of SNS settings.	24 (23.8)	41 (40.6)	19 (18.8)	12 (11.9)	5 (4.9)	2.34	1.12

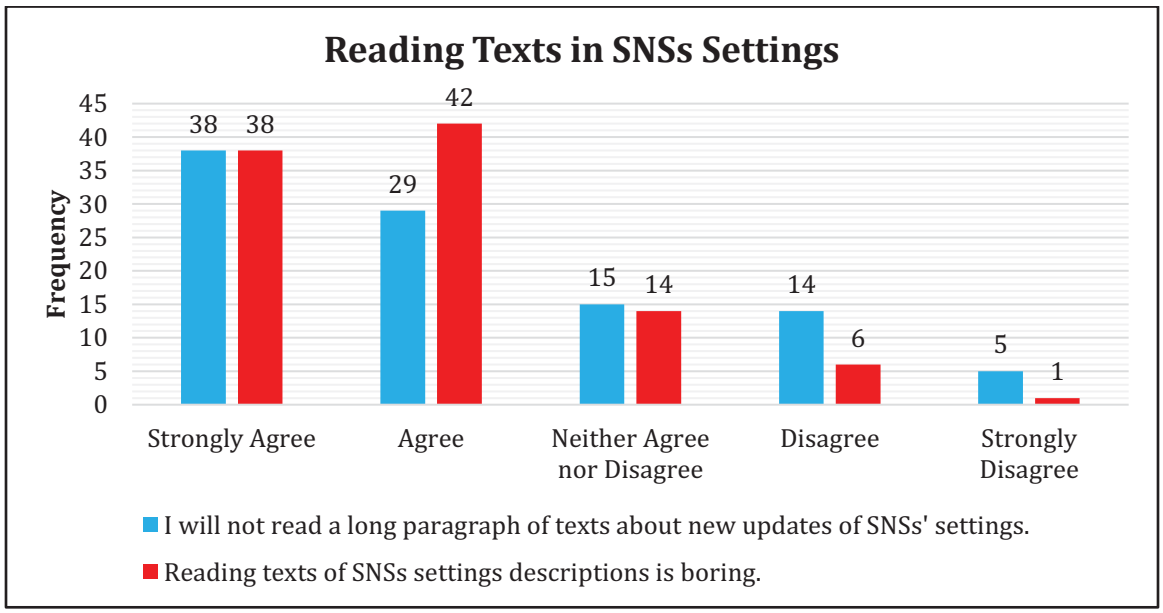


Figure 5.56: A bar graph showing the frequency of the participants and the responses to the obtained codes "Reading texts in SNS settings".

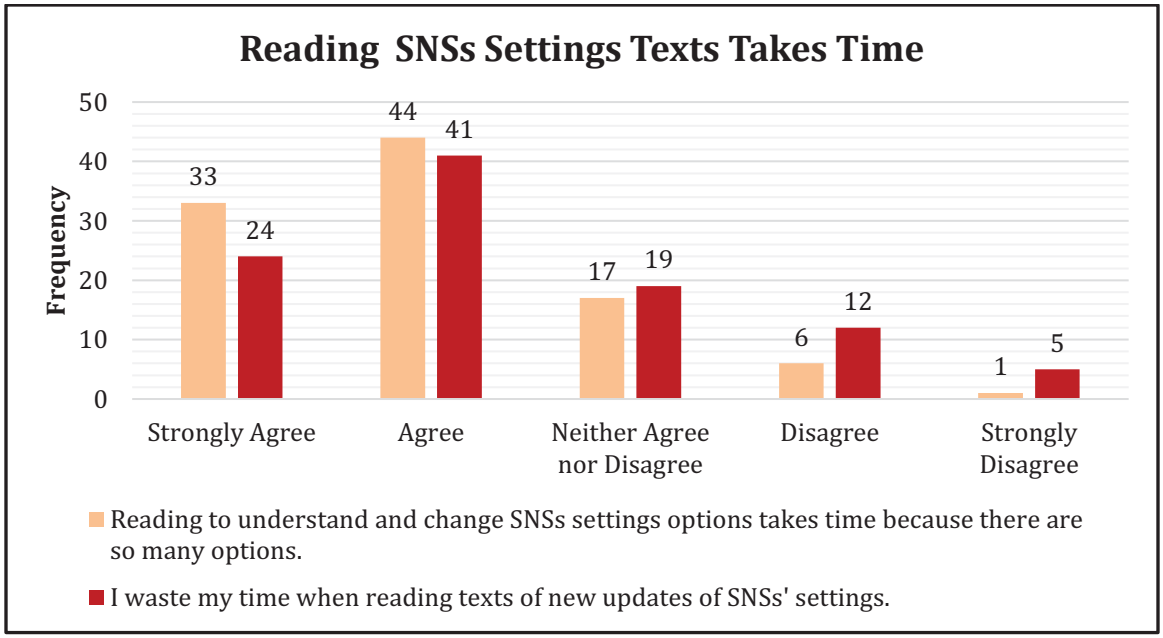


Figure 5.57: A bar graph showing the frequency of the participants and the responses to the obtained codes "Reading SNS settings texts takes time".

Test of Proportions (z-test)

Table 5.36: The Confidence Intervals for z-test (Reading SNSs settings' descriptions and new updates)

Codes	$\hat{p}$	$\hat{q}$	E	Confidence Intervals
Reading SNSs settings descriptions to understand the meaning of the settings instead of guessing it.	0.6336	0.3663	0.0939	0.5397 < P < 0.7275
Reading SNSs settings descriptions to change the settings instead of guessing it.	0.6138	0.3861	0.0949	0.5189 < P < 0.7087
Reading online from time to time to find new updates of SNSs' settings.	0.3861	0.6138	0.0949	0.2912 < P < 0.481
I will not read a long paragraph of texts about new updates of SNSs' settings.	0.6633	0.3366	0.0921	0.5712 < P < 0.7554
Reading texts of SNSs settings descriptions is boring.	0.7920	0.2079	0.0791	0.7129 < P < 0.8711
Reading to understand and change SNSs settings options takes time because there are so many options.	0.7623	0.2376	0.0830	0.6793 < P < 0.8453
I waste my time when reading texts of new updates of SNSs' settings.	0.6435	0.3564	0.0933	0.5502 < P < 0.7368

According to the presented results in (Table 5.36), we are 95% confident that the actual population proportions of SNSs users who read SNSs settings descriptions to understand the meaning of the settings falls between 54% and 73%. In addition, we are 95% confident that the actual population proportion of SNSs user who read SNSs settings descriptions to change the settings falls between 52% and 71%. We are also 95% sure that the actual population proportion of SNSs user who read online from time to time to find new updates of SNSs' settings falls between 29% and 48%.

Furthermore, we are 95% confident that the actual population proportions of SNSs users who will not read a long paragraph of texts about new updates of SNSs' settings falls between 57% and 75%. Also, we are 95% confident that the actual population proportions of SNSs users who find that reading texts of SNSs settings descriptions is boring falls between 71% and 87%.

In terms of spending time to read the settings' options and updates, we are 95% confident that the actual population proportions of SNSs users who find that reading to understand and change SNSs settings options takes time because there are so many options falls between 68% and 84%. In addition, we are 95% confident that the actual population

proportions of SNSs users who find that reading texts of new updates of SNSs settings is time wasting falls between 55% and 74%.

- ***Test statistic Method***

Table 5.37: The z-scores of the obtained codes in the factor "Reading SNS settings' descriptions and new updates".

Codes	$\hat{p}$	z-score
Reading SNS settings descriptions to understand the meaning of the settings instead of guessing it.	0.6336	2.6881
Reading SNS settings descriptions to change the settings instead of guessing it.	0.6138	2.2897
Reading online from time to time to find new updates of SNS settings.	0.3861	-2.2917
I will not read a long paragraph of texts about new updates of SNS settings.	0.6633	3.2857
Reading texts of SNS settings descriptions is boring.	0.7920	5.8752
Reading to understand and change SNS settings options takes time because there are so many options.	0.7623	5.2776
I waste my time when reading texts of new updates of SNS settings.	0.6435	2.8873

I claim that ***most*** of SNS users read SNS settings descriptions to understand the meaning of the settings (P>0.50). Thus, I stated the null hypothesis H_0 is P = 0.50 and the alternative hypothesis H_1 is P>0.50. The critical value according to the significance level (0.05) is 1.645. The test statistic (z-score) is 2.6881 (Table 5.37) which falls in the rejection region (Figure 5.58). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users read SNS settings descriptions to understand the meaning of the settings.

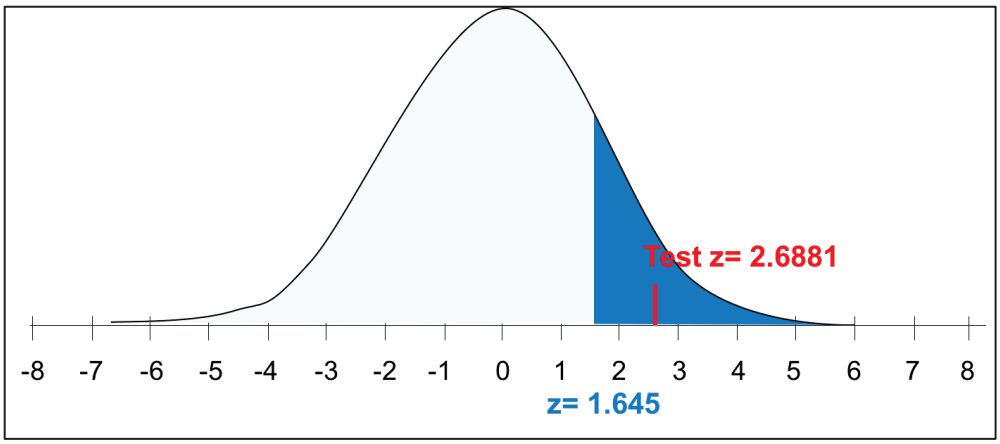


Figure 5.58: Hypothesis testing graph of the z-score for SNS users who read SNS settings descriptions to understand the meaning of the settings.

In addition, I claim that ***most*** of SNS users read SNS settings descriptions to change the settings (P>0.50). The test statistic (z-score) is 2.2897 which falls in the rejection region (Figure 5.59). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users read SNS settings descriptions to change the settings.

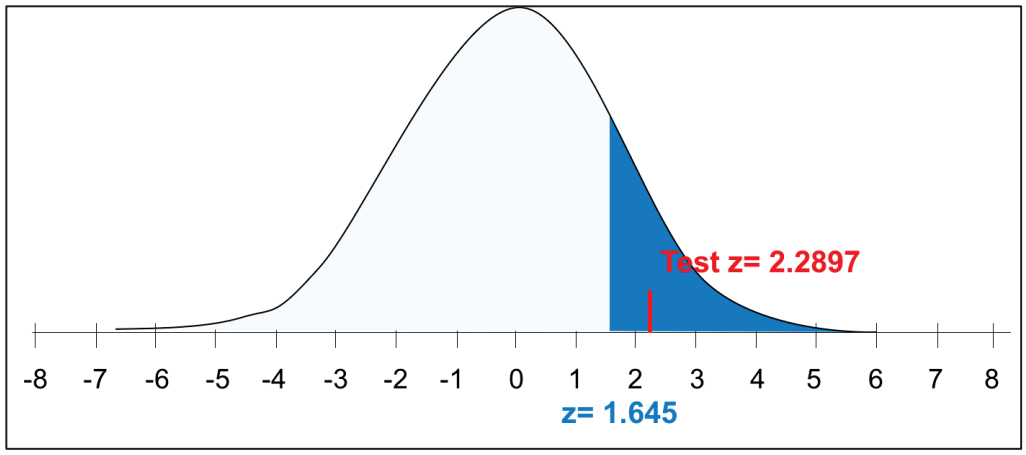


Figure 5.59: Hypothesis testing graph of the z-score for SNS users who read SNS settings descriptions to change the settings.

Furthermore, I claim that ***most*** of SNS users read online from time to time to find new updates of SNS settings (P>0.50). The test statistic (z-score) is -2.2917 which falls in the fail to reject region (Figure 5.60). Therefore, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users read online from time to time to find new updates of SNS settings.

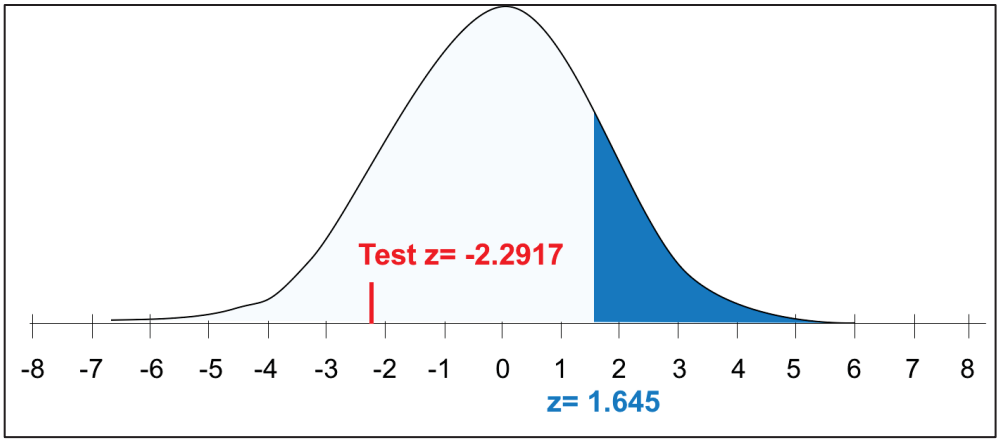


Figure 5.60: Hypothesis Testing Graph of the z-score for SNS users who read online from time to time to find new updates of SNS settings.

Moreover, I claim that ***most*** of SNS users will not read a long paragraph of texts about new updates of SNS settings (P>0.50). The test statistic (z-score) is 3.2857 which falls in the rejection region (Figure 5.61). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users will not read a long paragraph of texts about new updates of SNS settings.

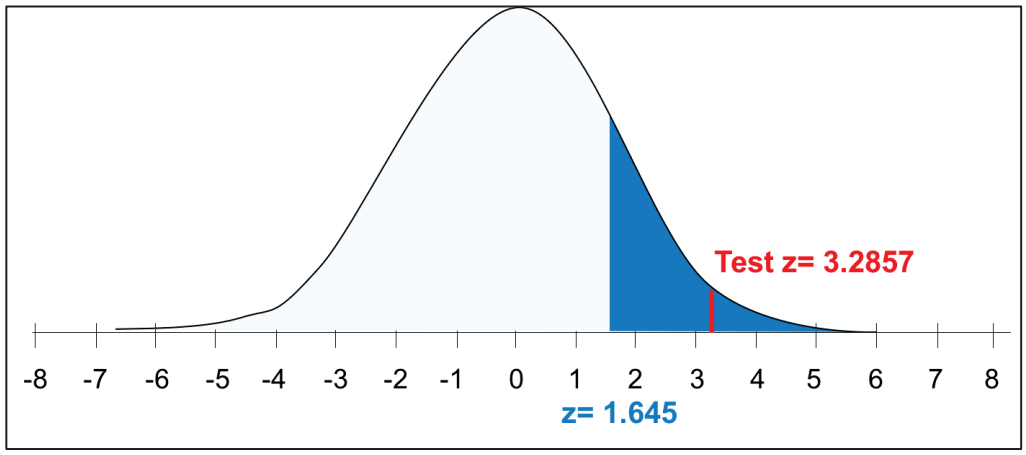


Figure 5.61: Hypothesis testing graph of the z-score for SNS users who will not read a long paragraph of texts about new updates of SNS settings.

I also claim that ***most*** of SNS users find that reading texts of SNS settings descriptions is boring (P>0.50). The test statistic (z-score) is 5.8752 which falls in the rejection region (Figure 5.62). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that reading texts of SNS settings descriptions is boring.

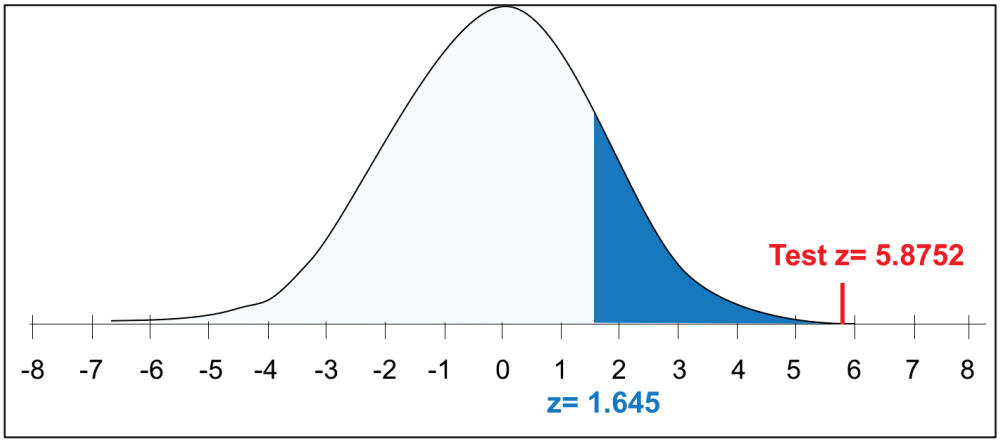


Figure 5.62: Hypothesis testing graph of the z-score for SNS users who find that reading texts of SNS settings descriptions is boring.

In terms of spending time to read the settings' options and updates, I claim that ***most*** of SNS users find that reading to understand and change SNS settings options takes time because there are so many options (P>0.50). The test statistic (z-score) is 5.2776 which falls in the rejection region (Figure 5.63). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that reading to understand and change SNS settings options takes time because there are so many options.

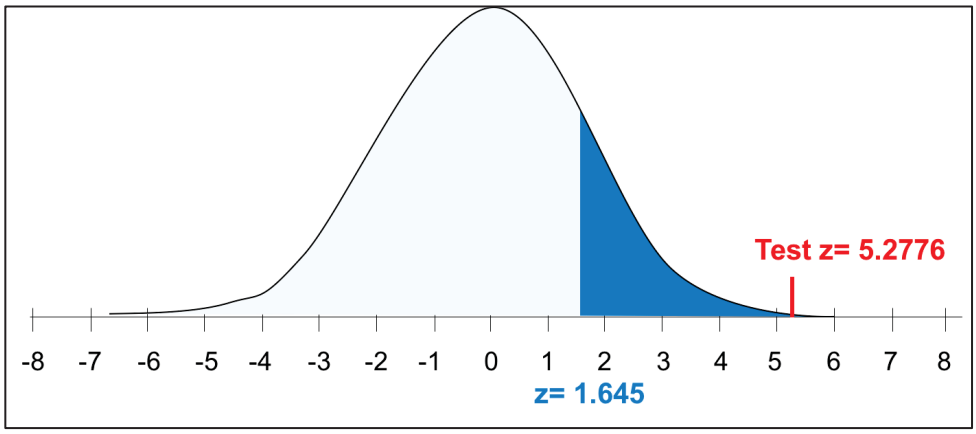


Figure 5.63: Hypothesis testing graph of the z-score for SNS users who find that reading to understand and change SNS settings options takes time because there are so many options

Also, I claim that ***most*** of SNS users find that reading texts of new updates of SNS settings is time wasting (P>0.50). The test statistic (z-score) is 2.8873 which falls in the rejection region (Figure 5.64). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that reading texts of new updates of SNS settings is time wasting.

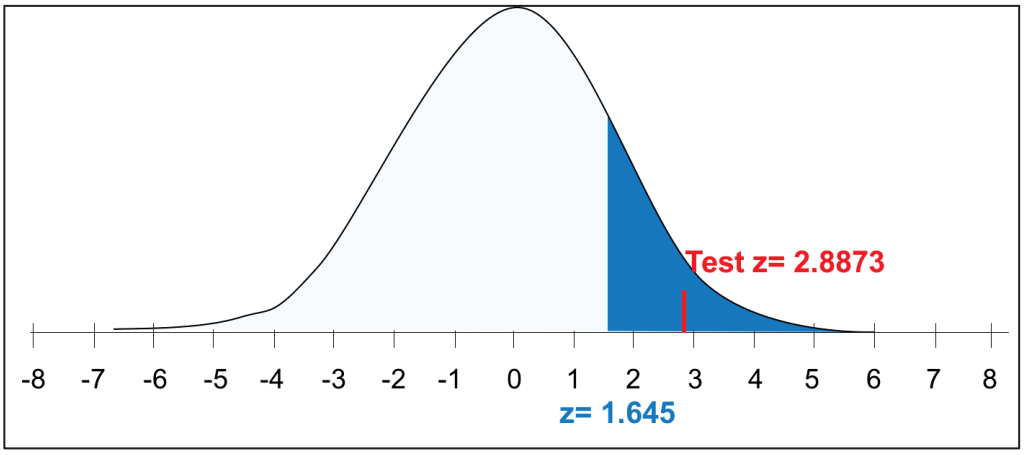


Figure 5.64: Hypothesis testing graph of the z-score for SNS users who find that reading texts of new updates of SNS settings is time wasting.

- ***P-value Method***

According to the z table, the area for z=2.6881 is 0.9970 and the P-value is (P<0.003). Thus, I reject the null hypothesis H_0. There is enough evidence to support the claim that ***most*** of SNS users read SNS settings descriptions to understand the meaning of the settings. Furthermore, the area for z=2.2897 is 0.9906 and the P-value is (P<0.0094). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users read SNS settings' descriptions to change the settings. Also, the area for z=-2.2917 is 0.0094 and the P-value is (P>0.9906). Thus, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users read online from time to time to find new updates of SNS settings.

In addition, the area for z=3.2857 is 0.9996 and the P-value is (P<0.0004). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users will not read a long paragraph of texts about new updates of SNS settings. Also, the area for z=5.8752 is 0.9999 and the P-value is (P<0.0001). Thus, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that reading texts of SNS settings descriptions is boring.

In terms of spending time to read the settings' options and updates, the area for z=5.2776 is 0.9999 and the P-value is (P<0.0001). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that most of SNS users find that reading to understand and change SNS settings options takes time because there are so many options. Also, the area for z=2.8873 is 0.9984 and the P-value is (P<0.0016). Consequently, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that reading texts of new updates of SNS settings is time wasting.

The following are quotes that the participants wrote in response to the open-ended question (Provide any additional comments?):

> *"Most settings description is written in one language, usually English. Not everyone can speak the language of the settings' description. Pictures and visual demonstration will help anybody to understand the settings. Also, since the description usually hard or complicated, it makes me "by default" ignore it, assuming that I would never understand it so waste my time!"* (P2)

"Maintaining privacy settings to the standard that I'd like often takes more time and effort than I'm willing to put into it, in large part because the documentation tends to be obtuse" (P25)

"I read about the new updates of the settings to assure that they match my expectations. This is true to me, but I know it would take many negative changes to cause most myself included to permanently leave sites, (Facebook in particular). Updates to SNS apps in are so frequent and verbose that many privacy changes go unnoticed by the public. Users are not aware that sites become less private over time more likely, fears of lack of privacy diminish over time: complacency." (P97)

Observing and checking SNS settings' outcomes to match users' expectations

61% of the participants (Occasionally to Frequently) ensure the change of settings and new updates would match expectation based on the settings' descriptions and explanations (*M*= 2.36, *SD*= 0.90) (Table 5.38). In contrast, 76% of the participants (Occasionally to Frequently) observe and check the outcomes after changing SNS settings (*M*= 1.99, *SD*= 0.98). Also, 69% of the participants observe and ensure that the outcomes of changing SNS settings are effective via experience (*M*= 2.18, *SD*= 0.96) (Figure 5.65).

Table 5.38: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes "Observing and checking the outcomes based on the descriptions or via experience".

	Frequently ← Rating → Never				Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	***M***	***SD***
Observing and check the outcomes after changing SNS settings.	37 (36.6)	40 (39.6)	12 (11.9)	12 (11.9)	1.99	0.98
Observing and ensuring that the outcomes of changing SNS settings are effective via experience.	26 (25.7)	44 (43.6)	18 (17.8)	13 (12.9)	2.18	0.96
Ensuring that the changed SNS settings and the new updates of SNS settings will match my expectations based on SNS settings descriptions and explanations.	16 (15.8)	46 (45.5)	26 (25.7)	13 (12.9)	2.36	0.90

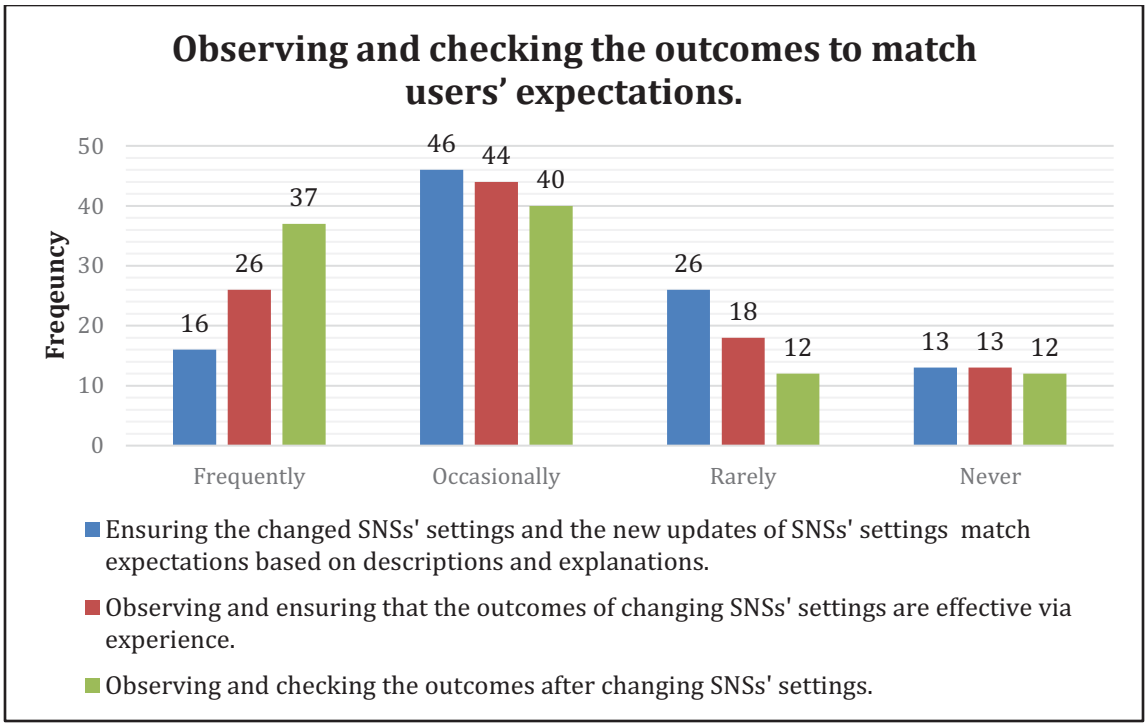


Figure 5.65: A bar graph showing the frequency of the participants and the responses to the obtained codes "Observing and checking the outcomes to match users' expectations".

On the other hand, 78% of the participants (Strongly Agree and Agree) suggested adding an interactive review page, animations videos, or examples to reflect the expected outcomes from changing SNS settings (*M*= 1.95, *SD*= 0.92) (Figure 5.66).

Table 5.39: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained code "Suggesting to add an interactive review page, animations videos, or examples to reflect the expected outcomes from changing SNS settings".

	Strongly Agree ← Rating → Strongly Disagree					Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	**5 (%)**	***M***	***SD***
Suggesting to add an interactive review page, animations videos, or examples to reflect the expected outcomes from changing SNS settings.	35 (34.6)	44 (43.6)	16 (15.8)	4 (4)	2 (2)	1.95	0.92

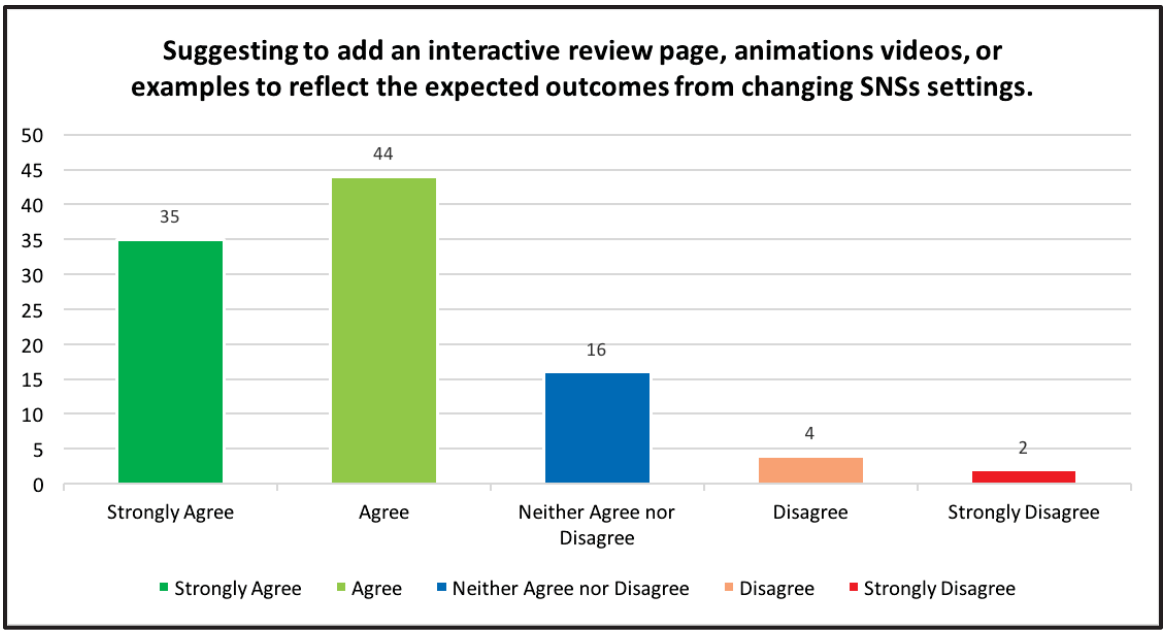


Figure 5.66: A bar graph showing the frequency of the participants and the responses to the obtained code "Suggesting to add an interactive review page, animations videos, or examples to reflect the expected outcomes from changing SNS settings".

Test of Proportions (z-test)

Table 5.40: The Confidence Intervals for z-test (Observing and checking SNS settings' outcomes to match users' expectations)

Codes	$\hat{p}$	$\hat{q}$	E	Confidence Intervals
Observing and check the outcomes after changing SNSs' settings.	0.7623	0.2376	0.0830	$0.6793 < P < 0.8453$
Observing and ensuring that the outcomes of changing SNSs' settings are effective via experience.	0.6930	0.3069	0.0899	$0.6031 < P < 0.7829$
Ensuring that the changed SNSs' settings and the new updates of SNSs' settings will match my expectations based on SNSs settings descriptions and explanations.	0.6138	0.3861	0.0949	$0.5189 < P < 0.7087$
Suggesting to add an interactive review page, animations videos, or examples to reflect the expected outcomes from changing SNSs settings.	0.7821	0.2178	0.0804	$0.7017 < P < 0.8625$

According to the presented results in (Table 5.40), we are 95% confident that the actual population proportions of SNSs users who observe and check the outcomes after changing SNSs' settings falls between 68% and 84%. In addition, we are 95% confident that the actual population proportion of SNSs user who observe and ensure that the outcomes of changing SNSs' settings are effective via experience falls between 60% and 78%. We are also 95% sure that the actual population proportion of SNSs user who ensure that the

changed SNSs' settings and the new updates of SNSs' settings will match their expectations based on SNSs settings descriptions and explanations falls between 52% and 71%. Eventually, we are 95% confident that the actual population proportions of SNSs users who suggest to add an interactive review page, animations videos, or examples to reflect the expected outcomes from changing SNSs settings falls between 70% and 86%.

- ***Test statistic Method***

Table 5.41: The z-scores of the obtained codes in the factor "Observing and checking the SNS settings' outcomes to match users' expectations".

Codes	$\hat{p}$	z-score
Observing and check the outcomes after changing SNS settings.	0.7623	5.2776
Observing and ensuring that the outcomes of changing SNS settings are effective via experience.	0.6930	3.8832
Ensuring that the changed SNS settings and the new updates of SNS settings will match my expectations based on SNS settings descriptions and explanations.	0.6138	2.2897
Suggesting to add an interactive review page, animations videos, or examples to reflect the expected outcomes from changing SNS settings.	0.7821	5.6760

I claim that ***most*** of SNS users observe and check the outcomes after changing SNS settings (P>0.50). Thus, I stated the null hypothesis H_0 is P = 0.50 and the alternative hypothesis H_1 is P>0.50. The critical value according to the significance level (0.05) is 1.645. The test statistic (z-score) is 5.2776 (Table 5.41) which falls in the rejection region (Figure 5.67). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users observe and check the outcomes after changing SNS settings.

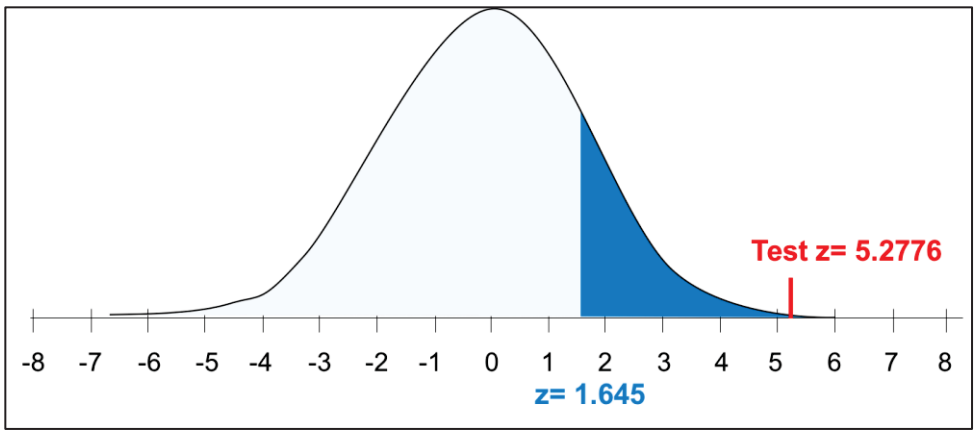


Figure 5.67: Hypothesis testing graph of the z-score for SNS users who observe and check the outcomes after changing SNS settings.

In addition, I claim that ***most*** of SNS users observe and ensure that the outcomes of changing SNS settings are effective via experience (P>0.50). The test statistic (z-score) is 3.8832 which falls in the rejection region (Figure 5.68). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users observe and ensure that the outcomes of changing SNS settings are effective via experience.

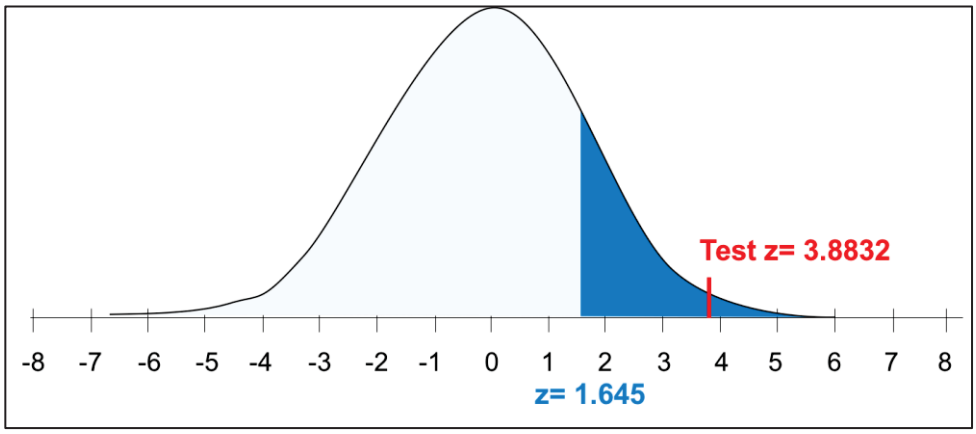


Figure 5.68: Hypothesis testing graph of the z-score for SNS users who observe and ensure that the outcomes of changing SNS settings are effective via experience.

Furthermore, I claim that ***most*** of SNS users ensure that the changed SNS settings and the new updates of SNS settings will match my expectations based on SNS settings descriptions and explanations (P>0.50). The test statistic (z-score) is 2.2897 which falls in the rejection region (Figure 5.69). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users ensure that the changed SNS settings and the new updates of SNS settings will match my expectations based on SNS settings descriptions and explanations.

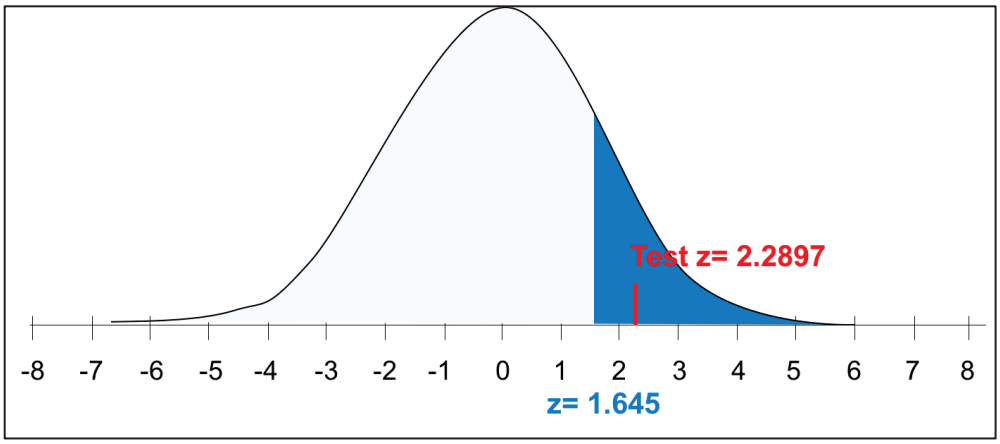


Figure 5.69: Hypothesis testing graph of the z-score for SNS users who ensure that the changed SNS settings and the new updates of SNS settings will match my expectations based on SNS settings descriptions and explanations.

Lastly, I claim that ***most*** of SNS users suggest adding an interactive review page, animations videos, or examples to reflect the expected outcomes from changing SNS settings (P>0.50). The test statistic (z-score) is 5.6760 which falls in the rejection region (Figure 5.70). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users suggest adding an interactive review page, animations videos, or examples to reflect the expected outcomes from changing SNS settings.

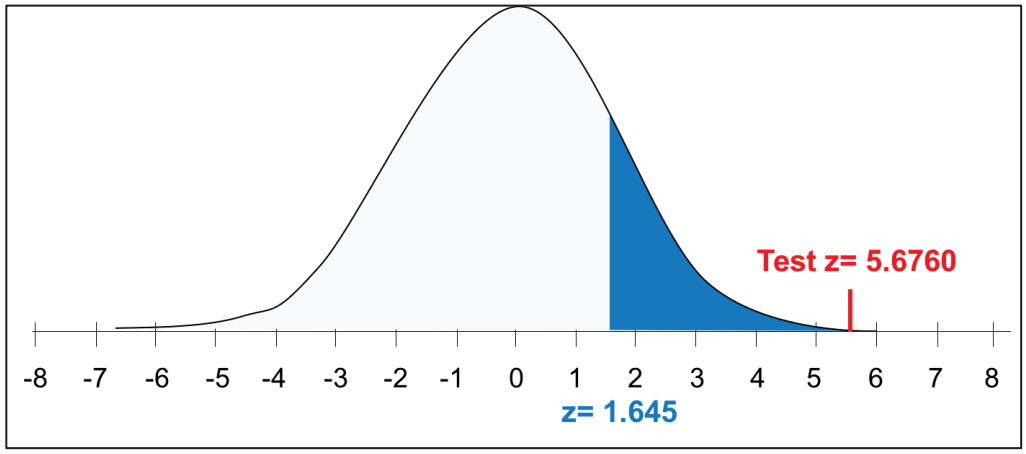


Figure 5.70: Hypothesis Testing Graph of the z-score for SNS users who suggest adding an interactive review page, animations videos, or examples to reflect the expected outcomes from changing SNS settings.

- ***P-value Method***

According to the z table, the area for z=5.2776 is 0.9999 and the P-value is (P<0.0001). Therefore, I reject the null hypothesis H_0. There is enough evidence to support the claim that ***most*** of SNS users observe and check the outcomes after changing SNS settings. Moreover, the area for z=3.8832 is 0.9999 and the P-value is (P<0.0001). Thus, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users observe and ensure that the outcomes of changing SNS settings are effective via experience. Further, the area for z=2.2897 is 0.9906 and the P-value is (P<0.0094). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users ensure that the changed SNS settings and the new updates of SNS settings will match my expectations based on SNS settings descriptions and explanations. Lastly, the area for z=5.6760 is 0.9999 and the P-value is (P<0.0001). Consequently, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users suggest adding an interactive review page, animations videos, or examples to reflect the expected outcomes from changing SNS settings.

The following are quotes that the participants wrote in response to the open-ended question (Provide any additional comments?):

> *"There is no feedback when I make changes, So I need it to make sure if I like to change or not."* (P17)
>
> *"Not all users need to utilize an interactive page but I think that things like this should be available to anyone who does need them. Everything should be as equally accessible as possible, for every type of user."* (P97)

Remembering SNS's settings, outcomes, and new updates

59% of the participants (Occasionally to Frequently) forget the SNS settings and how they changed them (M= 2.24, SD= 1) (Table 5.42). Likewise, 66% of the participants (Occasionally to Frequently) forget if they receive new updates of SNS settings (M= 2.12, SD= 0.91) (Figure 5.71).

Table 5.42: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes "Remembering SNS's settings, changes, and new updates".

	Frequently ← Rating → Never				Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	***M***	***SD***
Forgetting the SNS settings and how to change them.	29 (28.7)	31 (30.7)	29 (28.7)	12 (11.9)	2.24	1
Forgetting if I received new updates of SNS settings.	29 (28.7)	38 (37.6)	27 (26.7)	7 (6.9)	2.12	0.91

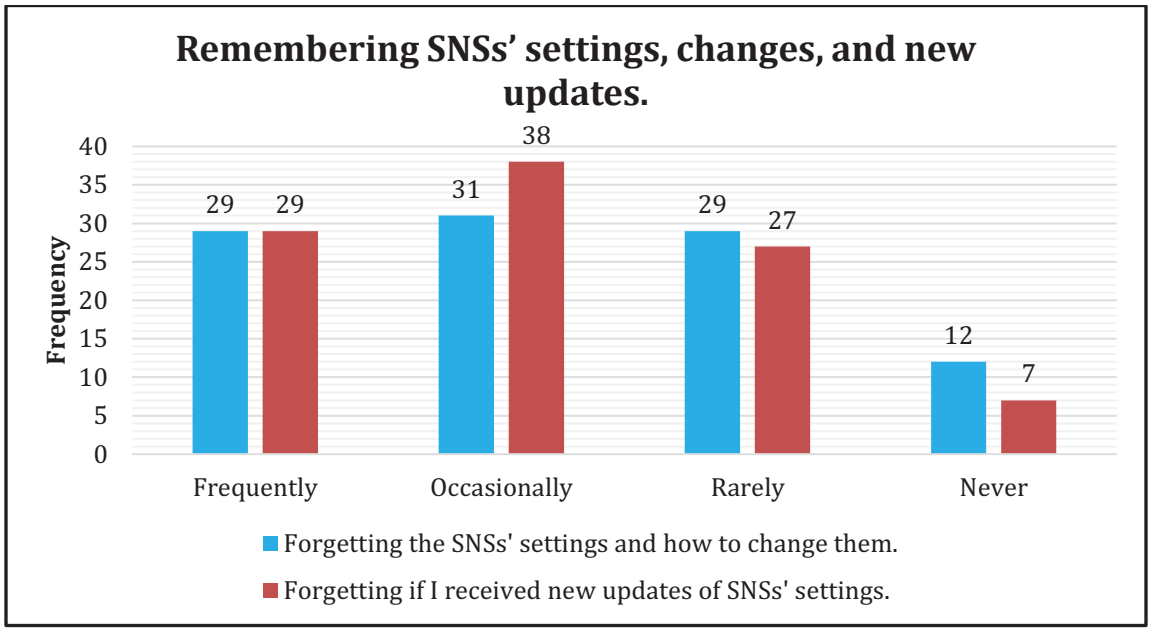


Figure 5.71: A bar graph showing the frequency of the participants and the responses to the obtained codes "Remembering SNS's settings, changes, and new updates".

On the other hand, 69% of the participants (Strongly Agree and Agree) suggest providing resources that remind them often of the need to understand and change the SNS settings in case they forgot the settings (*M*= 2.17, *SD*= 0.96) (Figure 5.72).

Table 5.43: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained code "Suggesting to provide resources that remind users often of the need to understand and change the SNS settings in case they forgot the settings".

	Strongly Agree ← Rating → Strongly Disagree					Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	**5 (%)**	***M***	***SD***
Suggesting to provide resources that remind me often of the need to understand and change the SNS settings in case I forgot the settings.	25 (24.7)	45 (44.5)	23 (22.8)	5 (4.9)	3 (3)	2.17	0.96

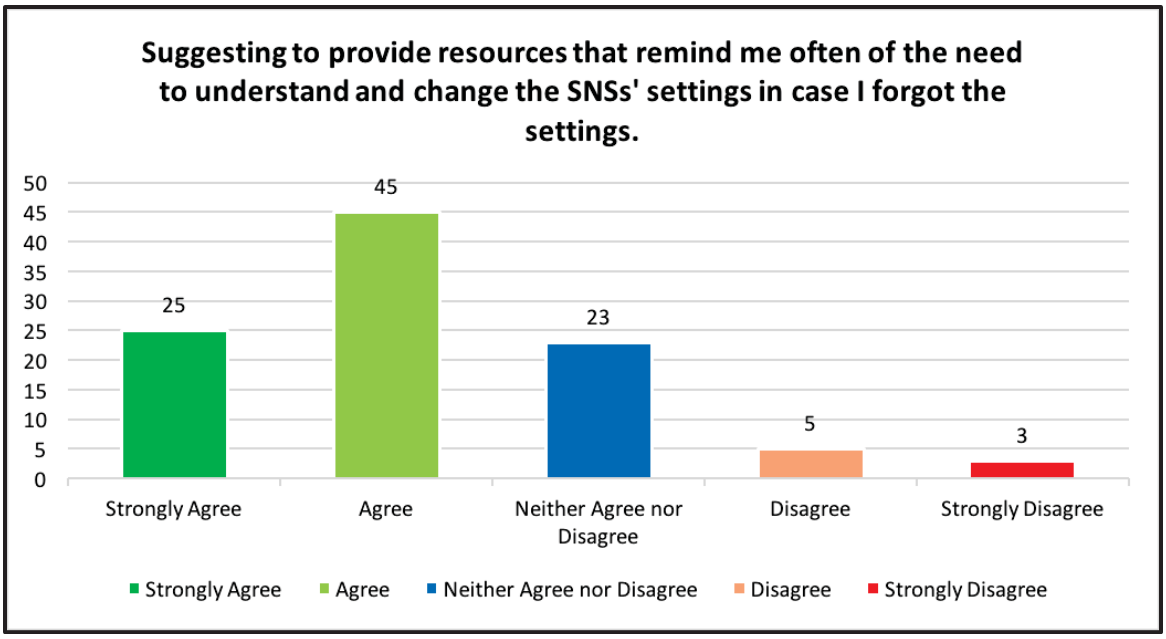


Figure 5.72: A bar graph showing the frequency of the participants and the responses to the obtained codes "Suggesting to provide resources that remind users often of the need to understand and change the SNS settings in case they forgot the settings".

Test of Proportions (z-test)

Table 5.44: The Confidence Intervals for z-test (Remembering SNSs' settings, outcomes, and new updates)

Codes	$\hat{p}$	$\hat{q}$	E	Confidence Intervals
Forgetting the SNSs' settings and how to change them.	0.5940	0.4059	0.0957	$0.4983 < P < 0.6897$
Forgetting if I received new updates of SNSs' settings.	0.6633	0.3366	0.0921	$0.5712 < P < 0.7554$
Suggesting to provide resources that remind me often of the need to understand and change the SNSs' settings in case I forgot the settings.	0.6930	0.3069	0.0899	$0.6031 < P < 0.7829$

According to the presented results in (Table 5.44), we are 95% confident that the actual population proportions of SNSs users who forget the SNSs' settings and how to change them falls between 50% and 69%. In addition, we are 95% confident that the actual population proportion of SNSs user who forget if they received new updates of SNSs' settings falls between 57% and 75%. Eventually, we are 95% confident that the actual population proportion of SNSs user suggest providing resources that remind them often of the need to understand and change the SNSs' settings in case they forgot the settings falls between 60% and 78%.

Test statistic Method

Table 5.45: The z-scores of the obtained codes in the factor "Remembering SNS's settings, outcomes, and new updates".

Codes	$\hat{p}$	z-score
Forgetting the SNS settings and how to change them.	0.5940	1.8913
Forgetting if I received new updates of SNS settings.	0.6633	3.2857
Suggesting to provide resources that remind me often of the need to understand and change the SNS settings in case I forgot the settings.	0.6930	3.8832

I claim that ***most*** of SNS users forget the SNS settings and how to change them (P>0.50). Thus, I stated the null hypothesis H_0 is P = 0.50 and the alternative hypothesis H_1 is P>0.50. The critical value according to the significance level (0.05) is 1.645. The test statistic (z-score) is 1.8913 (Table 5.45) which falls in the rejection region (Figure 5.73). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users forget the SNS settings and how to change them.

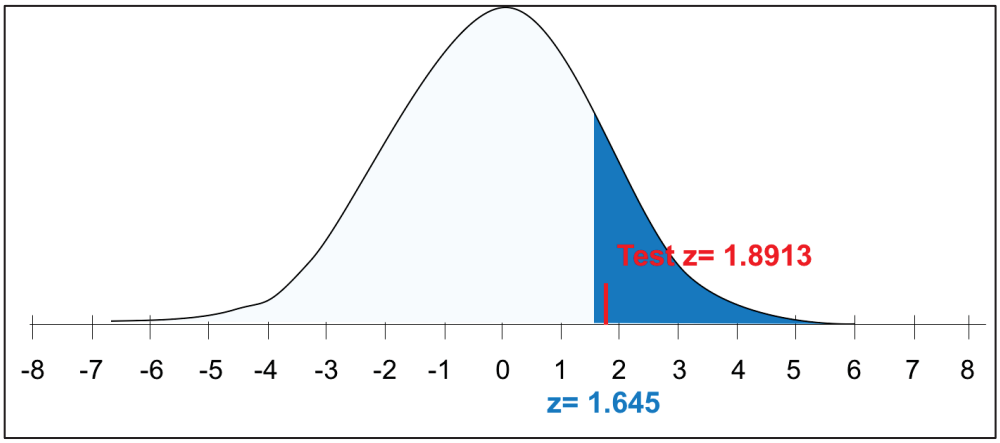


Figure 5.73: Hypothesis testing graph of the z-score for SNS users who forget the SNS settings and how to change them.

In addition, I claim that ***most*** of SNS users forget if they received new updates of SNS settings (P>0.50). The test statistic (z-score) is 3.2857 which falls in the rejection region (Figure 5.74). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users forget if they received new updates of SNS settings.

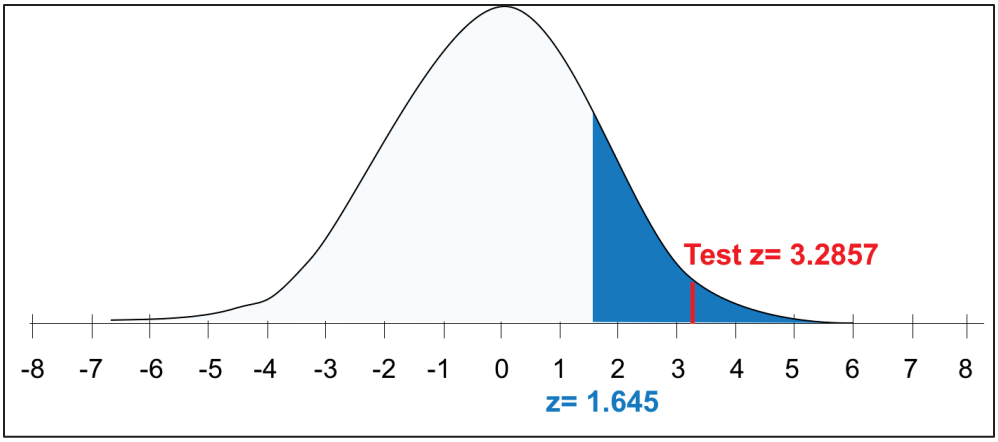


Figure 5.74: Hypothesis testing graph of the z-score for SNS users who forget if they received new updates of SNS settings.

I also claim that ***most*** of SNS users suggest to provide resources that remind them often of the need to understand and change the SNS settings in case they forgot the settings (P>0.50). The test statistic (z-score) is 3.8832 which falls in the rejection region (Figure 5.75). Thus, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users suggest to provide resources that remind them often of the need to understand and change the SNS settings in case they forgot the settings.

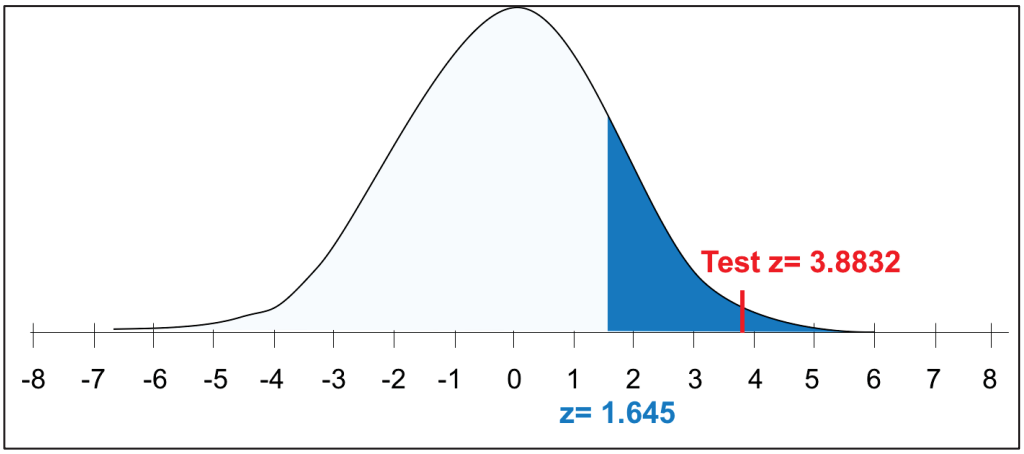


Figure 5.75: Hypothesis testing graph of the z-score for SNS users who suggest to provide resources that remind them often of the need to understand and change the SNS settings in case they forgot the settings.

- ***P-value Method***

According to the z table, the area for z=1.8913 is 0.9744 and the P-value is (P<0.0256). Therefore, I reject the null hypothesis H_0. There is enough evidence to support the claim that ***most*** of SNS users forget the SNS settings and how to change them. Furthermore, the

area for z= 3.2857 is 0.9996 and the P-value is (P<0.0004). Thus, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users forget if they received new updates of SNS settings. Lastly, the area for z= 3.8832 is 0.9999 and the P-value is (P<0.0001). Consequently, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users suggest to provide resources that remind them often of the need to understand and change the SNS settings in case they forgot the settings.

The following are quotes that the participants wrote in response to the open-ended question (Provide any additional comments?):

> *"I believe that most people will be annoyed or inconvenienced by frequent reminders about security. However, I do believe there should be an easy way to access this kind of information within the site."* (P16)
>
> *"My memory isn't very good in general. I'd like to be reminded of how to modify settings automatically when new updates are rolled out, and beyond that having a 'help' button or something to bring up relevant tutorials would be useful."* (P25)
>
> *"Are used to deal with a lot of application so yes I will forget"* (P95)

Dealing with interface and usability issues

75% of the participants (Strongly Agree and Agree) demand more interactive SNS settings and sleek pages or layouts (M= 1.95, SD= 0.92) (Table 5.46). To illustrate this, 80% of the participants (Strongly Agree and Agree) suggested to provide more visual content (e.g. photos and videos), explanations, and examples (M= 1.82, SD= 0.89). Likewise, 71% of the participants (Strongly Agree and Agree) suggested to provide a tutorial when creating an account to facilitate SNS settings' descriptions and terms (M= 2.09, SD= 1.02) (Figure 5.76).

Table 5.46: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes in the factor "Dealing with interface and usability issues".

	Strongly Agree ← Rating → Strongly Disagree					Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	**5 (%)**	***M***	***SD***
Demanding more open and interactive SNS settings and sleek pages or layouts.	37 (36.6)	39 (38.6)	19 (18.8)	5 (4.9)	1 (1)	1.95	0.92

Codes	Strongly Agree ← Rating → Strongly Disagree					Descriptive Statistics	
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	*M*	*SD*
Suggesting to provide more visual content, explanations, and examples to understand and change SNS settings and ensure that the outcomes match my expectations.	43 (42.6)	38 (37.6)	17 (16.8)	1 (1)	2 (2)	1.82	0.89
Suggesting to provide a tutorial when creating an account to facilitate SNS settings' descriptions and terms.	32 (31.7)	40 (39.6)	21 (20.8)	4 (4)	4 (4)	2.09	1.02

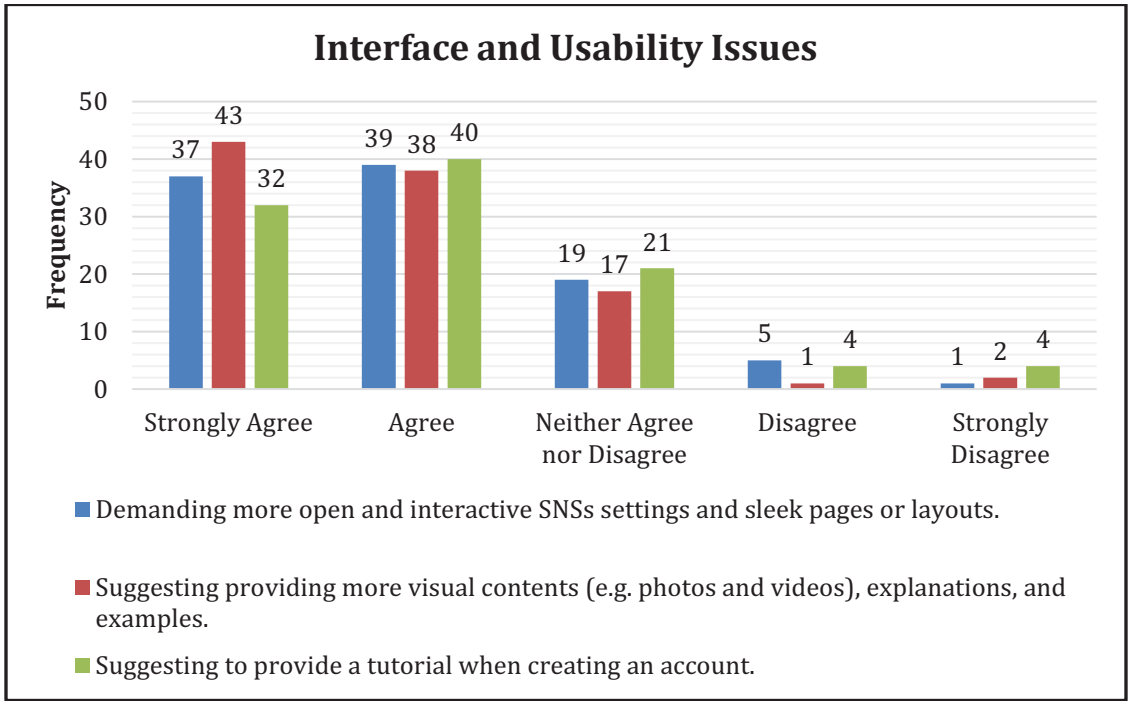


Figure 5.76: A bar graph showing the frequency of the participants and the responses to the obtained codes "Interface and usability issues".

Test of Proportions (z-test)

Table 5.47: The Confidence Intervals for z-test (Dealing with interface and usability issues)

Codes	$\hat{p}$	$\hat{q}$	E	Confidence Intervals
Demanding more open and interactive SNSs settings and sleek pages or layouts.	0.7524	0.2475	0.0841	$0.6683 < P < 0.8365$
Suggesting to provide more visual contents and examples to help me understand and change SNSs' settings and ensure that the outcomes match my expectations.	0.8019	0.1980	0.0777	$0.7242 < P < 0.8796$
Suggesting to provide a tutorial when creating an account to facilitate SNSs settings' descriptions and terms.	0.7128	0.2871	0.0882	$0.6246 < P < 0.801$

According to the presented results in (Table 5.47), we are 95% confident that the actual population proportions of SNSs users who demand more open and interactive SNSs settings and sleek pages or layouts falls between 67% and 84%. In addition, we are 95% confident that the actual population proportion of SNSs user who suggest providing more visual contents (e.g. photos and videos), explanations, and examples to help them understand and change SNSs' settings and ensure that the outcomes match my expectations falls between 72% and 88%. Lastly, we are 95% confident that the actual population proportion of SNSs user suggest providing a tutorial when creating an account to facilitate SNSs settings' descriptions and terms falls between 62% and 80%.

- ***Test statistic Method***

Table 5.48: The z-scores of the obtained codes in the factor "Dealing with interface and usability issues".

Codes	$\hat{p}$	z-score
Demanding more open and interactive SNS settings and sleek pages or layouts.	0.7524	5.0784
Suggesting to provide more visual content (e.g. photos and videos), explanations, and examples to help me understand and change SNS settings and ensure that the outcomes match my expectations.	0.8019	6.0744
Suggesting to provide a tutorial when creating an account to facilitate SNS settings' descriptions and terms.	0.7128	4.2816

I claim that ***most*** of SNS users demand more open and interactive SNS settings and sleek pages or layouts (P>0.50). Thus, I stated the null hypothesis H_0 is P = 0.50 and the alternative hypothesis H_1 is P>0.50. The critical value according to the significance level (0.05) is 1.645. The test statistic (z-score) is 5.0784 (Table 5.48) which falls in the rejection region (Figure 5.77). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users demand more open and interactive SNS settings and sleek pages or layouts.

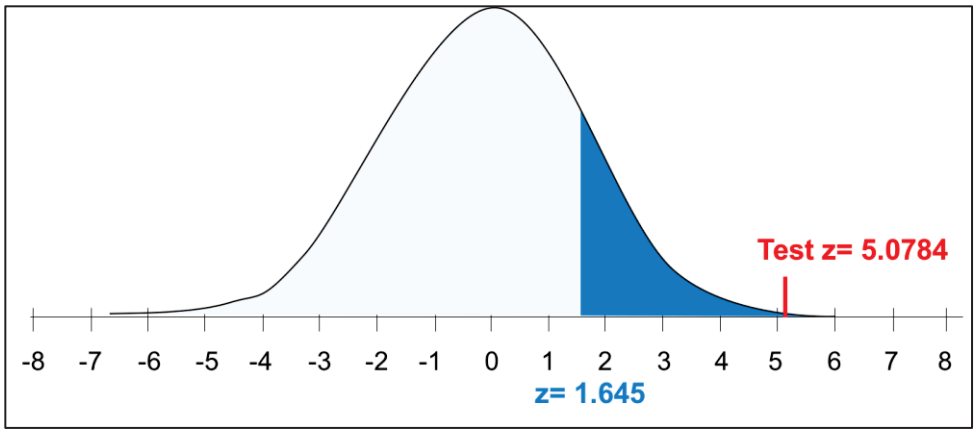


Figure 5.77: Hypothesis testing graph of the z-score for SNS users who demand more open and interactive SNS settings and sleek pages or layouts.

In addition, I claim that ***most*** of SNS users suggest providing more visual content (e.g. photos and videos), explanations, and examples to help them understand and change SNS settings and ensure that the outcomes match my expectations (P>0.50). The test statistic (z-score) is 6.0744 which falls in the rejection region (Figure 5.78). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users suggest providing more visual content (e.g. photos and videos), explanations, and examples to help them understand and change SNS settings and ensure that the outcomes match my expectations.

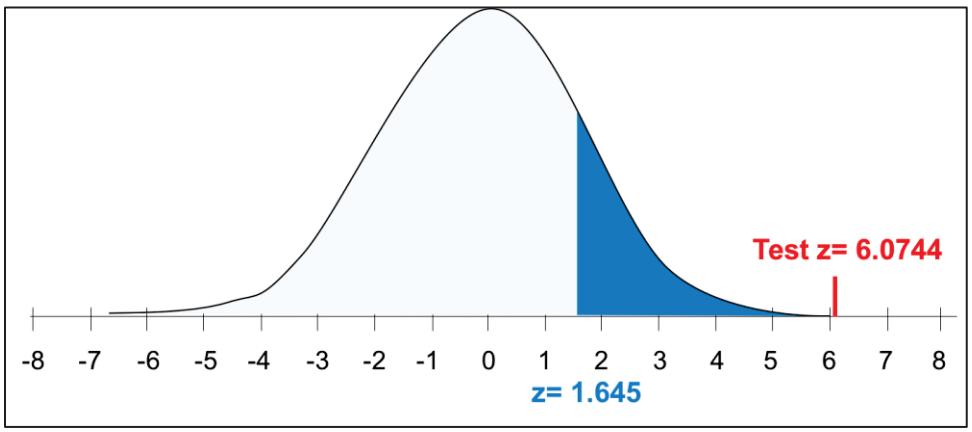


Figure 5.78: Hypothesis testing graph of the z-score for SNS users who suggest providing more visual content (e.g. photos and videos), explanations, and examples to help them understand and change SNS settings and ensure that the outcomes match their expectations.

Eventually, I claim that ***most*** of SNS users suggest providing a tutorial when creating an account to facilitate SNS settings' descriptions and terms (P>0.50). The test statistic (z-

score) is 4.2816 which falls in the rejection region (Figure 5.79). Thus, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users suggest providing a tutorial when creating an account to facilitate SNS settings' descriptions and terms.

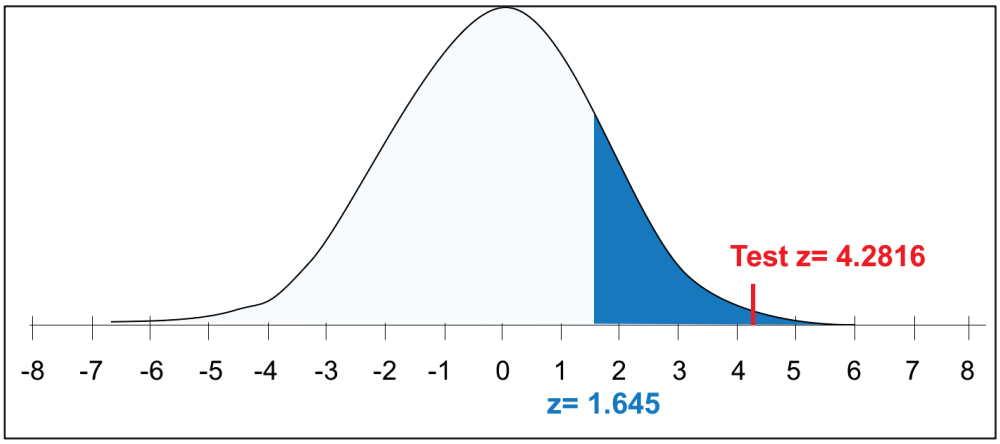


Figure 5.79: Hypothesis testing graph of the z-score for SNS users who suggest to provide resources that remind them often of the need to understand and change the SNS settings in case they forgot the settings.

- ***P-value Method***

According to the z table, the area for z=5.0784 is 0.9999 and the P-value is (P<0.0001). Therefore, I reject the null hypothesis H_0. There is enough evidence to support the claim that ***most*** of SNS users demand more open and interactive SNS settings and sleek pages or layouts. Furthermore, the area for z= 6.0744 is 0.9999 and the P-value is (P<0.0001). Thus, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users suggest providing more visual content (e.g. photos and videos), explanations, and examples to help them understand and change SNS settings and ensure that the outcomes match my expectations. Lastly, the area for z= 4.2816 is 0.9999 and the P-value is (P<0.0001). Consequently, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users suggest providing a tutorial when creating an account to facilitate SNS settings' descriptions and terms.

The following are quotes that the participants wrote in response to the open-ended question (Provide any additional comments?):

"Things are just generally hard to find when I am looking to do a certain task, such as seeing who can tag me in things, I feel there are 6 different places I

could possibly look to change that setting and it's always under the one that makes the least sense" (P11)

"If this is a popular opinion, maybe sites should have a poll or forum where users can vote for security features they'd like to see. I'm not sure if some sites already have a system similar to this" (P16)

Influencing of users' levels and experience

52% of the participants (Strongly Agree and Agree) indicated that SNS settings and their functions are suitable for experts but not novices (*M*= 2.53, *SD*= 0.98) (Table 5.49). In addition, 54% of the participants (Strongly Agree and Agree) indicated that SNS settings terms and descriptions are for professional users not for normal users (*M*= 2.45, *SD*= 1.03) (Figure 5.80).

Table 5.49: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes in the factor "Influencing of users' levels".

	Strongly Agree ← Rating → Strongly Disagree					Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	**5 (%)**	***M***	***SD***
SNS settings and their functions are suitable for experts but not novices.	14 (13.9)	39 (38.6)	29 (28.7)	18 (17.8)	1 (1)	2.53	0.98
SNS settings terms and descriptions are for professional users not for normal users.	20 (19.8)	35 (34.6)	29 (28.7)	15 (14.8)	2 (2)	2.45	1.03

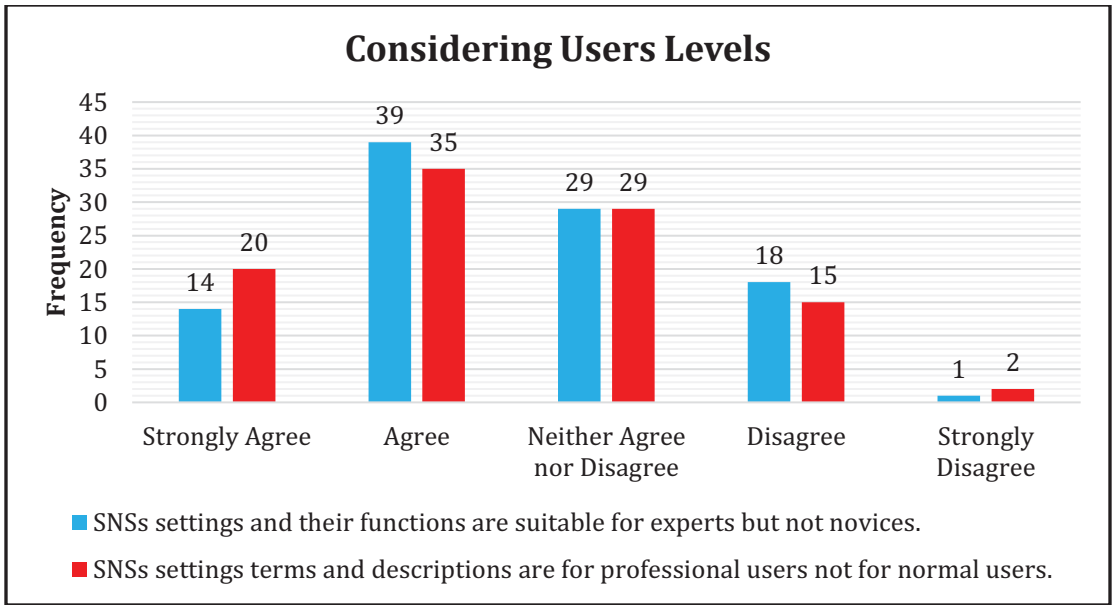


Figure 5.80: A bar graph showing the frequency of the participants and the responses to the obtained codes "Considering users' levels".

On the other hand, 68% of the participants (Occasionally to Frequently) understand the meaning of SNS settings via personal experience (*M*= 1.76, *SD*= 0.79) (Table 5.50). Moreover, 87% of the participants (Occasionally to Frequently) observe the outcomes of SNS settings changes through personal experience (*M*= 1.72, *SD*= 0.79). Thus, 76% of the participants (Occasionally to Frequently) seek more information from different resources such as Google because of the unsatisfactory experience with SNS updated settings and help center (*M*= 1.94, *SD*= 0.90) (Figure 5.81).

Table 5.50: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes "Influencing of users' experience".

	Frequently ← Rating → Never				Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	***M***	***SD***
Understanding and learning the meaning of SNS settings via personal experience.	42 (41.6)	45 (44.5)	10 (9.9)	4 (4)	1.76	0.79
Observing the outcomes of SNS settings changes through personal experience.	45 (44.5)	43 (42.6)	9 (8.9)	4 (4)	1.72	0.79
Seeking more information from different resources such as Google because of the unsatisfactory experience with SNS updated settings and help center.	37 (36.6)	40 (39.6)	17 (16.8)	7 (6.9)	1.94	0.90

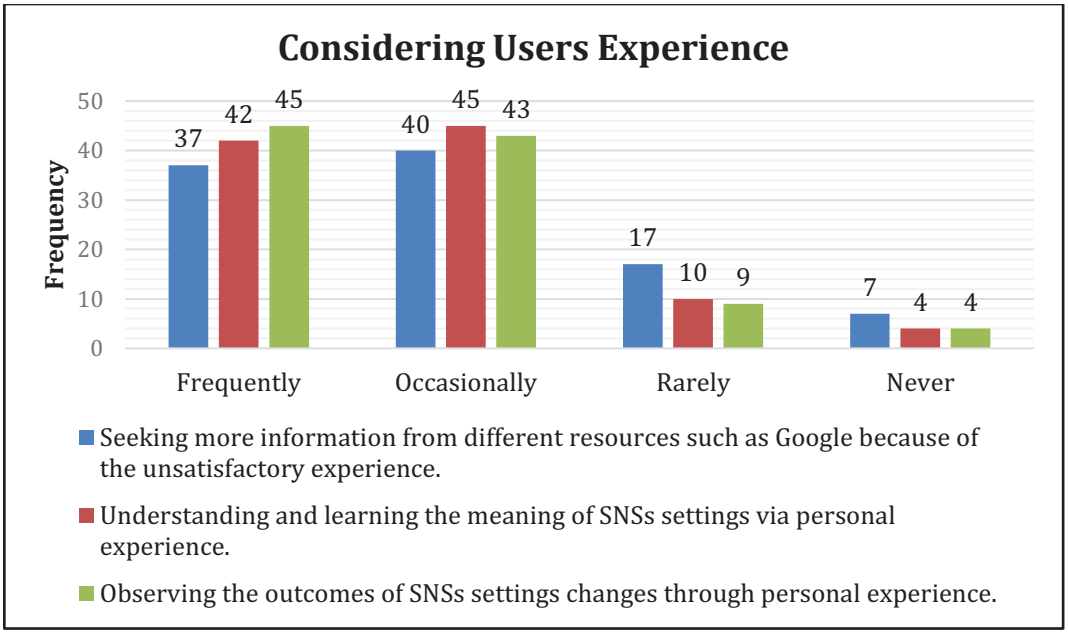


Figure 5.81: A bar graph showing the frequency of the participants and the responses to the obtained codes "Considering users experience".

Test of Proportions (z-test)

Table 5.51. The Confidence Intervals for z-test (Infleuncing of users' levels and experience)

Codes	$\hat{p}$	$\hat{q}$	E	Confidence Intervals
SNSs settings and their functions are suitable for experts but not novices.	0.5247	0.4752	0.0973	$0.4274 < P < 0.622$
SNSs settings terms and descriptions are for professional users not for normal users.	0.5445	0.4554	0.0971	$0.4474 < P < 0.6416$
Understanding and learning the meaning of SNSs settings via personal experience.	0.8613	0.1386	0.0673	$0.794 < P < 0.9286$
Observing the outcomes of SNSs settings changes through personal experience.	0.8712	0.1287	0.0653	$0.8059 < P < 0.9365$
Seeking more information from different resources such as Google because of the unsatisfactory experience with SNSs updated settings and help center.	0.7623	0.2376	0.0830	$0.6793 < P < 0.8453$

According to the presented results in (Table 5.51), we are 95% confident that the actual population proportions of SNSs users who find that SNSs settings and their functions are suitable for experts but not novices falls between 43% and 62%. In addition, we are 95% confident that the actual population proportion of SNSs user who find that SNSs settings terms and descriptions are for professional users not for normal users falls between 45% and 64%.

Further, we are 95% sure that the actual population proportion of SNSs user who understand and learn the meaning of SNSs settings via personal experience falls between 79% and 93%. In terms of the settings' outcomes, we are 95% confident that the actual population proportions of SNSs users who observe the outcomes of SNSs settings changes through personal experience falls between 81% and 94%. Lastly, we are 95% confident that the actual population proportions of SNSs users who seek more information from different resources such as Google because of the unsatisfactory experience with SNSs updated settings and help center falls between 68% and 84%.

- ***Test statistic Method***

Table 5.52: The z-scores of the obtained codes in the factor "Influencing of users' levels and experience".

Codes	$\hat{p}$	z-score
SNS settings and their functions are suitable for experts but not novices.	0.5247	0.4969
SNS settings terms and descriptions are for professional users not for normal users.	0.5445	0.8953
Understanding and learning the meaning of SNS settings via personal experience.	0.8613	7.2696
Observing the outcomes of SNS settings changes through personal experience.	0.8712	7.4688
Seeking more information from different resources such as Google because of the unsatisfactory experience with SNS updated settings and help center.	0.7623	5.2776

I claim that ***most*** of SNS users find that SNS settings and their functions are suitable for experts but not novices (P>0.50). Thus, I stated the null hypothesis H_0 is P = 0.50 and the alternative hypothesis H_1 is P>0.50. The critical value according to the significance level (0.05) is 1.645. The test statistic (z-score) is 0.4969 (Table 5.52) which falls in the fail to reject region (Figure 5.82). Therefore, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users find that SNS settings and their functions are suitable for experts but not novices.

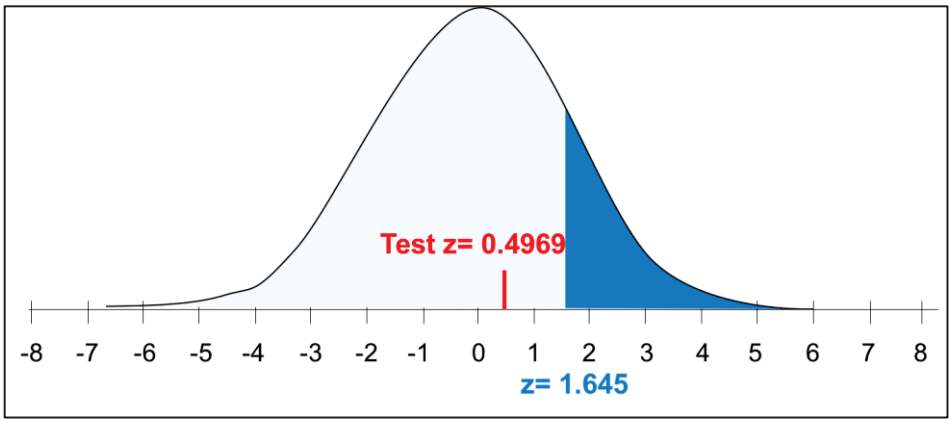


Figure 5.82: Hypothesis testing graph of the z-score for SNS users who find that SNS settings and their functions are suitable for experts but not novices.

In addition, I claim that ***most*** of SNS users find that SNS settings terms and descriptions are for professional users not for normal users (P>0.50). The test statistic (z-score) is 0.8953 which falls in the fail to reject region (Figure 5.83). Therefore, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users find that SNS settings terms and descriptions are for professional users not for normal users.

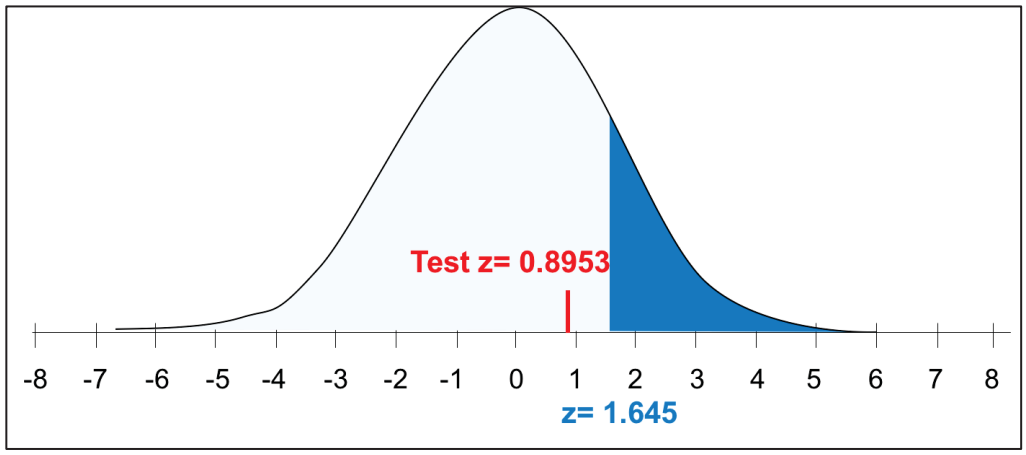


Figure 5.83: Hypothesis testing graph of the z-score for SNS users who find that SNS settings terms and descriptions are for professional users not for normal users.

Furthermore, I claim that ***most*** of SNS users understand and learn the meaning of SNS settings via personal experience (P>0.50). The test statistic (z-score) is 7.2696 which falls in the rejection region (Figure 5.84). Therefore, I reject the null hypothesis H_0. There is

sufficient evidence to support the claim that ***most*** of SNS users understand and learn the meaning of SNS settings via personal experience.

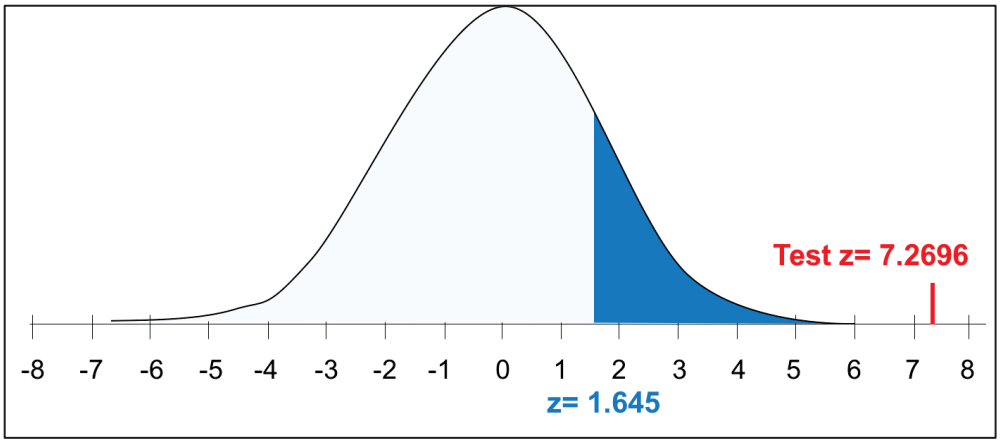


Figure 5.84: Hypothesis testing graph of the z-score for SNS users who understand and learn the meaning of SNS settings via personal experience

In terms of the settings' outcomes, I claim that ***most*** of SNS users observe the outcomes of SNS settings changes through personal experience (P>0.50). The test statistic (z-score) is 7.4688 which falls in the rejection region (Figure 5.85). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users observe the outcomes of SNS settings changes through personal experience.

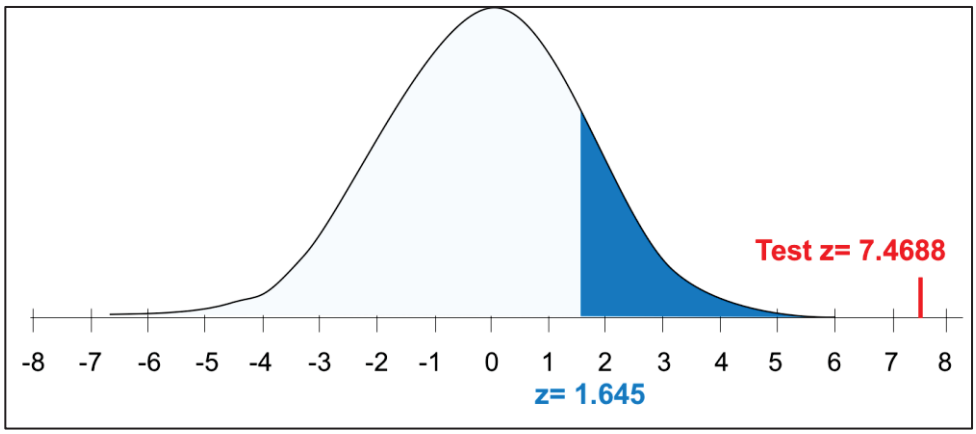


Figure 5.85: Hypothesis testing graph of the z-score for SNS users who observe the outcomes of SNS settings changes through personal experience

Eventually, I claim that ***most*** of SNS users seek more information from different resources such as Google because of the unsatisfactory experience with SNS updated settings and help center (P>0.50). The test statistic (z-score) is 5.2776 which falls in the

rejection region (Figure 5.86). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users seek more information from different resources such as Google because of the unsatisfactory experience with SNS updated settings and help center.

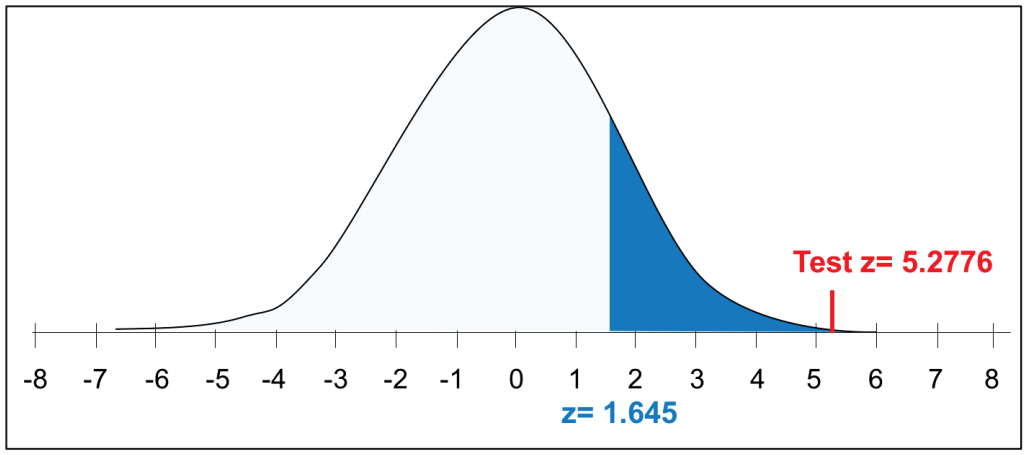


Figure 5.86: Hypothesis testing graph of the z-score for SNS users who seek more information from different resources such as Google because of the unsatisfactory experience with SNS updated settings and help center

- ***P-value Method***

According to the z table, the area for z=0.4969 is 0.7088 and the P-value is (P>0.2912). Therefore, I fail to reject the null hypothesis H_0. There is enough evidence to support the claim that ***most*** of SNS users find that SNS settings and their functions are suitable for experts but not novices. Furthermore, the area for z=0.8953 is 0.8289 and the P-value is (P>0.1711). Thus, I fail to reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users find that SNS settings terms and descriptions are for professional users not for normal users.

Also, the area for z=7.2696 is 0.9999 and the P-value is (P<0.0001). Therefore, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users understand and learn the meaning of SNS settings via personal experience. In terms of the settings outcomes, the area for z=7.4688 is 0.9999 and the P-value is (P<0.0001). Thus, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users observe the outcomes of SNS settings changes through personal experience. Lastly, the area for z=5.2776 is 0.9999 and the P-value is (P<0.0001).

Consequently, I reject the null hypothesis H_0. There is sufficient evidence to support the claim that ***most*** of SNS users seek more information from different resources such as Google because of the unsatisfactory experience with SNS updated settings and help center.

Ignoring SNS settings and new updates

44% of the participants (Occasionally to Frequently) indicated that they ignore SNS settings because they do not care about them (*M*= 2.77, *SD*= 1.02) (Table 5.53). Similarly, 49% of the participants (Occasionally to Frequently) ignore SNS settings because it is time wasting (*M*= 2.61, *SD*= 1.08). In addition, 57% of the participants (Occasionally to Frequently) filter out the received new updates of SNS settings without checking them (*M*= 2.50, *SD*= 0.92) (Figure 5.87).

Table 5.53: Distributions and descriptive statistics (Means and Standard Deviations) of the obtained codes in the factor "Ignoring SNS settings and new updates".

	Frequently ← Rating → Never				Descriptive Statistics	
Codes	**1 (%)**	**2 (%)**	**3 (%)**	**4 (%)**	***M***	***SD***
Ignoring SNS settings because I do not care about them.	11 (10.9)	33 (32.7)	25 (24.7)	32 (31.7)	2.77	1.02
Ignoring SNS settings because they waste my time.	18 (17.8)	31 (30.7)	24 (23.8)	28 (27.7)	2.61	1.08
Filtering out the received new updates of SNS settings without checking them.	11 (10.9)	47 (46.5)	24 (23.8)	19 (18.8)	2.50	0.92

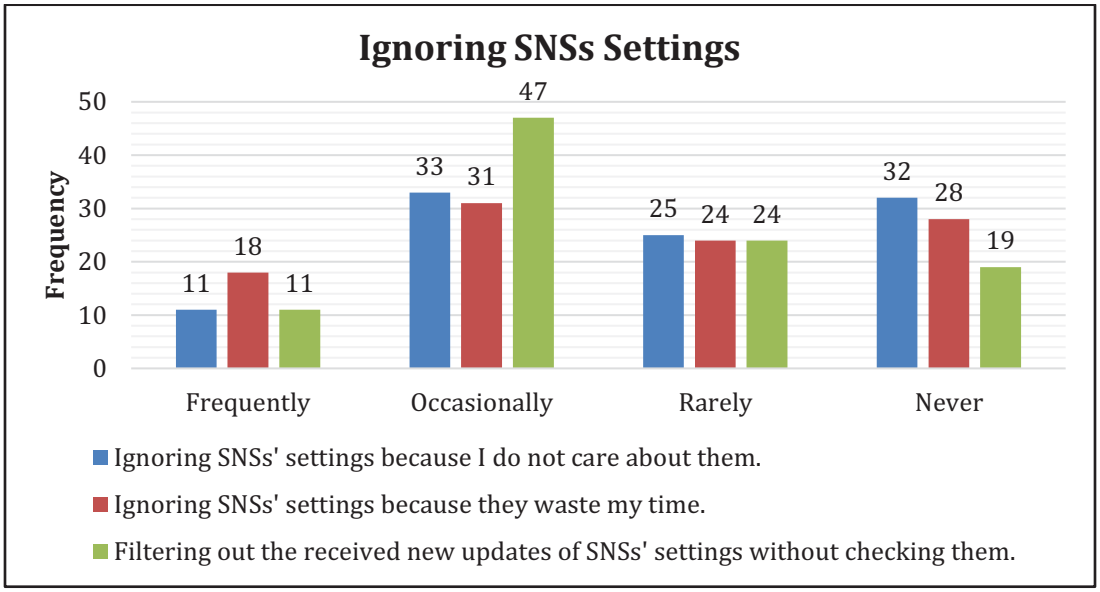


Figure 5.87: A bar graph showing the frequency of the participants and the responses to the obtained codes "Ignoring SNS settings and new updates".

Test of Proportions (z-test)

Table 5.54. The Confidence Intervals for z-test (Ignoring SNS settings and new updates)

Codes	$\hat{p}$	$\hat{q}$	E	Confidence Intervals
Ignoring SNSs' settings because they do not care about them.	0.4356	0.5643	0.0966	$0.339 < P < 0.5322$
Ignoring SNSs' settings because they waste my time.	0.4851	0.5148	0.0974	$0.3877 < P < 0.5825$
Filtering out the received new updates of SNSs' settings without checking them.	0.5742	0.4257	0.0964	$0.4778 < P < 0.6706$

According to the presented results in (Table 5.54), we are 95% confident that the actual population proportions of SNSs users who ignore SNSs' settings because they do not care about them falls between 34% and 53%. In addition, we are 95% confident that the actual population proportion of SNSs user who ignore SNSs' settings because they waste my time falls between 39% and 58%. Lastly, we are 95% confident that the actual population proportion of SNSs user who filter out the received new updates of SNSs' settings without checking them falls between 48% and 67%.

- ***Test statistic Method***

Table 5.55: The z-scores of the obtained codes in the factor "Ignoring SNS settings and new updates".

Codes	$\hat{p}$	z-score
Ignoring SNS settings because they do not care about them.	0.4356	-1.2957
Ignoring SNS settings because they waste my time.	0.4851	-0.2997
Filtering out the received new updates of SNS settings without checking them.	0.5742	1.4929

I claim that ***most*** of SNS users ignore SNS settings because they do not care about them ($P>0.50$). Thus, I stated the null hypothesis H_0 is $P = 0.50$ and the alternative hypothesis H_1 is $P>0.50$. The critical value according to the significance level (0.05) is 1.645. The test statistic (z-score) is -1.2957 (Table 5.55) which falls in the fail to reject region (Figure 5.88). Therefore, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users ignore SNS settings because they do not care about them.

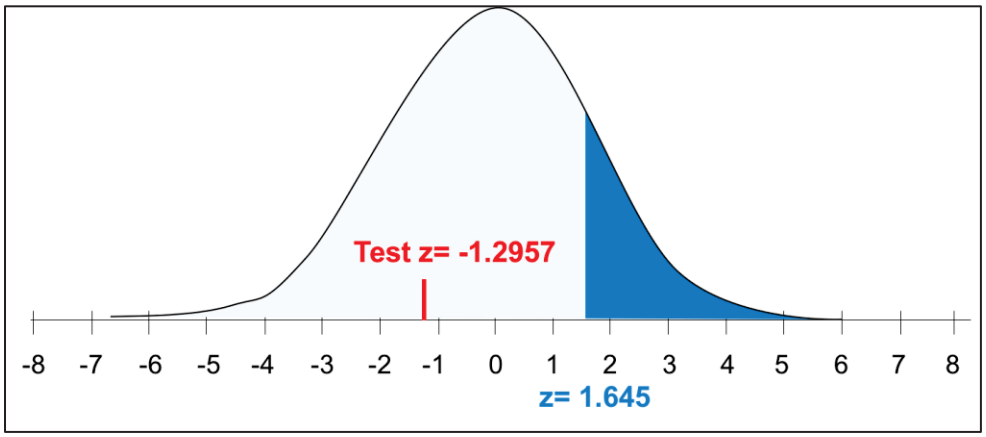


Figure 5.88: Hypothesis testing graph of the z-score for SNS users who ignore SNS settings because they do not care about them.

In addition, I claim that ***most*** of SNS users ignore SNS settings because they waste my time (P>0.50). The test statistic (z-score) is -0.2997 which falls in the fail to reject region (Figure 5.89). Therefore, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users ignore SNS settings because they waste my time.

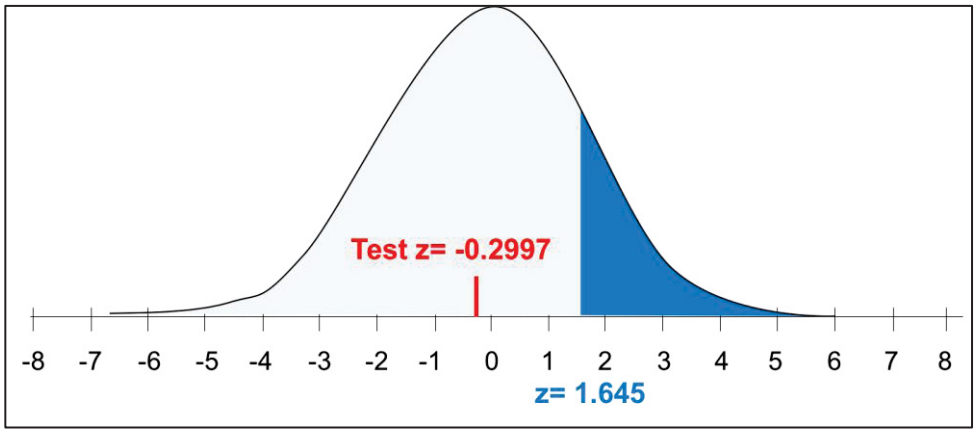


Figure 5.89: Hypothesis testing graph of the z-score for SNS users who ignore SNS settings because they waste my time.

Eventually, I claim that ***most*** of SNS users filter out the received new updates of SNS settings without checking them (P>0.50). The test statistic (z-score) is 1.4929 which falls in the fail to reject region (Figure 5.90). Thus, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users filter out the received new updates of SNS settings without checking them.

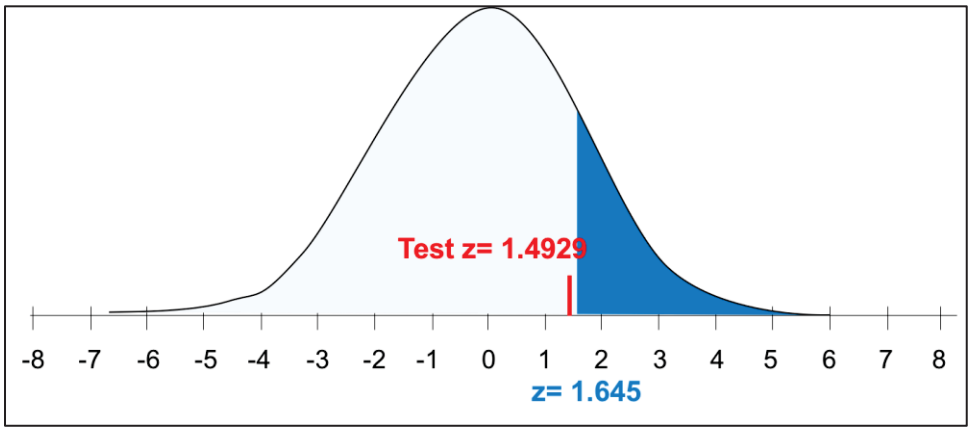


Figure 5.90: Hypothesis testing graph of the z-score for SNS users who filter out the received new updates of SNS settings without checking them.

- ***P-value Method***

According to the z table, the area for z=-1.2957 is 0.0885 and the P-value is (P>0.9115). Therefore, I fail to reject the null hypothesis H_0. There is not enough evidence to support the claim that ***most*** of SNS users ignore SNS settings because they do not care about them. Furthermore, the area for z= -0.2997 is 0.3632 and the P-value is (P>0.6368). Thus, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users ignore SNS settings because they waste my time. Lastly, the area for z= 1.4929 is 0.9394 and the P-value is (P>0.0606). Consequently, I fail to reject the null hypothesis H_0. There is not sufficient evidence to support the claim that ***most*** of SNS users filter out the received new updates of SNS settings without checking them.

Table 5.56: Summary of the verified and unverified factors and codes

Factors	Codes	Test of Proportions
Navigation through SNS settings	Navigation takes time	Verified
	Navigation is not effective	Verified
Categorizing of SNS settings	Some features or settings are not categorized under privacy category.	Verified
	Adding categories and sub-categories is necessary.	
	Classifying the settings based on features such as posts, photos, tags is more practical.	Verified
Questioning the existence of settings, options, and explanations.	Learning about the existence of SNS settings and their options from other resources.	Verified
	Having difficulties finding out if an explanation of a setting exists in the SNSs.	Verified
Asking for help or advising others about SNS settings	Asking friends to help me understand, change, and test SNS settings or activities.	Unverified
	Asking an expert to help me understand, change, and test SNS settings.	Unverified
	Asking people who have the same issue with SNS settings.	Verified
	Advising friends and family to ask for help.	Verified
	Advising friends and family to use the most limited SNS settings options.	Unverified
Guessing or assuming SNS settings' meanings and functions	Guessing the meaning of SNS settings and new updates instead of reading it.	Verified
	Guessing the options and how to change SNS settings or features instead of reading it.	Verified
	Guessing the location of SNS settings instead of asking for help.	Verified
	Guessing or assuming the outcomes of SNS settings instead of searching about them.	Verified
	The meaning and the outcomes of SNS settings is different than what I think or assume.	Verified
Using shortcuts to change SNS settings	Using shortcuts to change the timeline or SNSs' settings.	Unverified
	Using different resources such as Google to search for shortcut on how to achieve specific setting.	Verified
	Using shortcuts to change SNSs' settings is more practical than going through all the settings.	Verified
	Customizing individual post is more practical (easier, faster) than going through global SNSs' settings.	Verified
Receiving notifications about new updates of SNS settings	SNSs provide new updates of their settings without sending notifications.	Verified
	Reading to understand and take action to change only after I get a notification.	Unverified
	Receiving notifications about new updates from an accurate resource will change my attitude toward the SNSs' settings.	Verified
	Presenting and advertising the notifications in an easy manner will help to understand and change SNSs' settings.	Verified
	SNSs do not provide the right information about SNSs settings new updates at the right time.	Unverified
Searching about SNS settings and new updates	Challenging when attempting to search and find enough and accurate information about new updates.	Verified
	Looking for new updates of SNS settings only if I receive notifications.	Verified

Factors	Codes	Test of Proportions
	Looking for and finding new updates of the SNS settings take time.	Verified
Using different resources	Using Google to understand, change, and test SNSs' settings.	Verified
	Using Google to search and find new updates of SNSs' settings.	Unverified
	Using Google to find a solution from people who have the same issues that I have with my SNSs' settings.	Verified
	Using videos to help me understand, change, and test SNSs' settings.	Verified
	Using photos to understand and change SNSs' settings.	Verified
	Hearing about SNSs settings and new updates from experts, friends, or family members.	Verified
	Hearing about SNSs settings and new updates from the news or media.	Unverified
	Providing different resources would enhance my understanding and ability to change them.	Verified
Reading SNS settings' descriptions and new updates	Reading SNSs settings descriptions to understand the meaning of the settings instead of guessing it.	Verified
	Reading SNSs settings descriptions to change the settings instead of guessing it.	Verified
	Reading online from time to time to find new updates of SNSs' settings.	Unverified
	I will not read a long paragraph of texts about new updates of SNSs' settings.	Verified
	Reading texts of SNSs settings descriptions is boring.	Verified
	Reading to understand and change SNSs settings options takes time because there are so many options.	Verified
	I waste my time when reading texts of new updates of SNSs' settings.	Verified
Observing and checking SNS settings' outcomes to match users' expectations.	Observing and check the outcomes after changing SNSs' settings.	Verified
	Observing and ensuring that the outcomes of changing SNSs' settings are effective via experience.	Verified
	Ensuring that the outcomes will match my expectations based on SNSs settings descriptions and explanations.	Verified
	Suggesting to add an interactive review page, animations videos, or examples to reflect the expected outcomes.	Verified
Remembering SNS settings, outcomes, and new updates.	Forgetting the SNSs' settings and how to change them.	Verified
	Forgetting if I received new updates of SNSs' settings.	Verified
	Suggesting to provide resources that remind me often of the need to understand and change the SNSs' settings.	Verified
Dealing with interface and usability issues.	Demanding more open and interactive pages or layouts.	Verified
	Suggesting to provide more visual contents.	Verified
	Suggesting to provide a tutorial.	Verified
Influencing of users' levels and experience.	SNSs settings and their functions are suitable for experts but not novices.	Unverified
	SNSs settings terms and descriptions are for professional users not for normal users.	Unverified
	Understanding and learning the meaning of SNSs settings via personal experience.	Verified

Factors	Codes	Test of Proportions
	Observing the outcomes of SNSs settings changes through personal experience.	Verified
	Seeking more information from different resources such as Google because of the unsatisfactory experience with SNSs updated settings and help center.	Verified
Ignoring SNS settings and new updates.	Ignoring SNSs' settings because they do not care about them.	Unverified
	Ignoring SNSs' settings because they waste my time.	Unverified
	Filtering out the received new updates of SNSs' settings without checking them.	Unverified

Chapter 6 Mixed Method Interpretation and Discussion

This chapter provides interpretations of the results obtained from the qualitative and quantitative studies and discusses how the quantitative results prove or disprove the qualitative results. In addition, I discuss the conceptual model of the factors that SNS users perform (inside and outside SNSs) when attempting to manage the settings and inline feature controls. I also present the design guidelines that should be considered when enhancing SNS settings and inline features controls or designing settings' management tools. Finally, I illustrate the limitations of the two mixed method studies.

6.1 Interpretation of the Mixed Method Findings

The codes of the green factors were all validated and the results showed sufficient evidence to support the codes. However, some of the codes in the blue factors and all the codes in the red factor were not validated (Figure 6.1). The following sub-section demonstrates all the validated and invalidated codes.

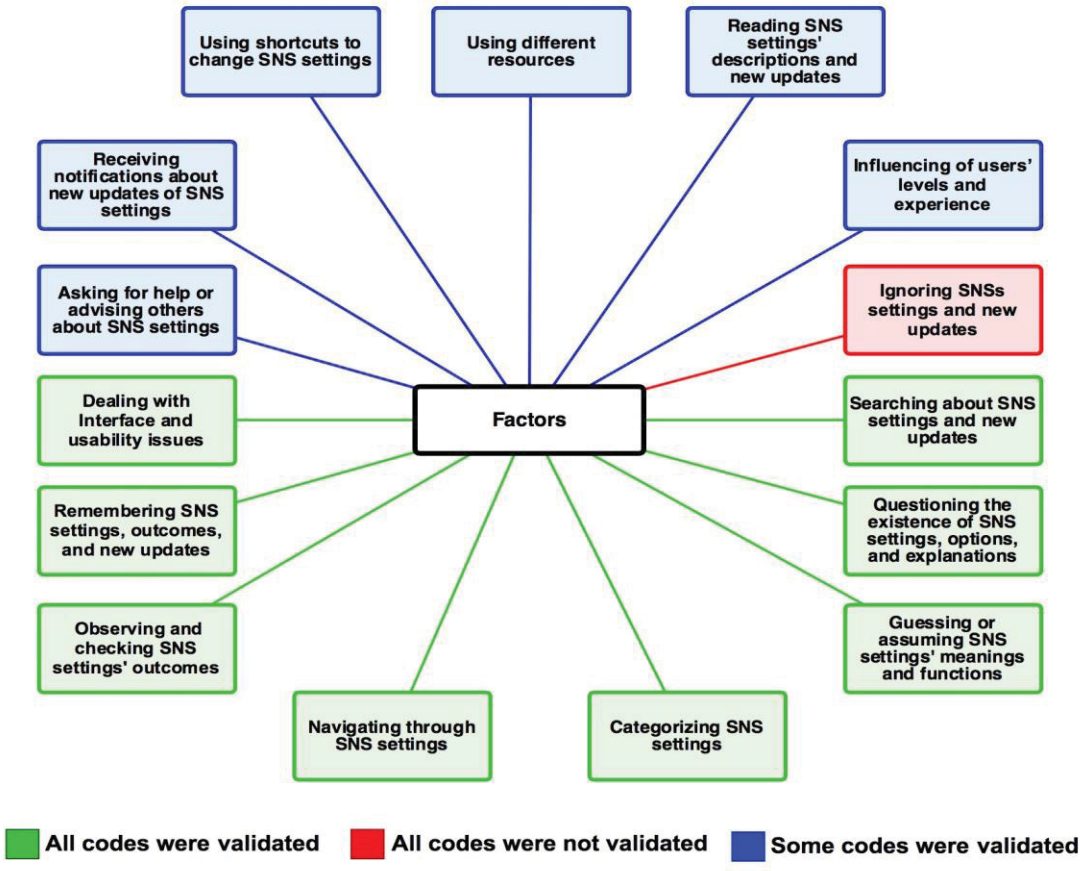


Figure 6.1: Validated and invalidated Factors

6.1.1 Influencing Factors of SNS Users' Behaviours toward SNS Settings

The interoperations of the mixed method findings begin with an illustration of the obtained factors in the qualitative study followed by comparison with the quantitative study. Then, I base the decision on the factor whether it is significant or not significant.

Navigating through SNS settings

The two studies justified that, when users go through (navigate) SNS settings to understand and change the settings as well as find new updates, they frequently take time to find the desired settings, and the outcome of this navigation is not always as desired. In the qualitative study, the users attempted to find the fastest resource that gives any result rather than navigating all the settings. In fact, providing a huge number of settings and options is useful in terms of privacy enhancements; however, it can be an obstacle because SNS users may find it laborious to go through and read all of the settings' descriptions and options. Meanwhile, there is no proper way of guidance to reach the right setting. A well-ordered presentation of the settings may assist SNS users to navigate through the settings efficiently (in less time) and effectively (with the accurate outcomes). Providing shortcuts symbols (e.g. locked icon) or links that confuse the users while they are navigating the settings affected user' behaviours because the users assumed that these symbols or links are not straightforward and might guide them to a different or wrong direction.

On the other hand, in the quantitative study, I asked the participants if navigation through settings takes time and is not effective (e.g. using different paths to the settings with no guidance, and providing many settings and options). The findings evidently verified the results of the previous study. The majority of the participants confirmed that they take time to navigate and they use different paths to the settings with no guidance. In addition, the statistical hypothesis test proved that there is sufficient evidence to support our claims that most SNS users take time to navigate and that the current strategy of navigation is not effective. Consequently, navigating through SNS settings and inline feature controls is a significant factor that influence SNS users' behaviours when managing the settings and inline feature controls.

Categorizing SNS settings

The studies demonstrated that SNS users faced difficulties when attempting to comprehend how SNSs place the settings in groups. They suggested that the settings should be grouped into categories and sub-categories to simplify navigation, understanding, and aid the changing of the settings. They should also be classified based on the provided features. In the qualitative study, the users recommended creating groups and sub-groups to assist the users to easily reach the desired setting. For instance, allowing the users to search and find a specific setting using various paths was apparently not an effective strategy because the users quickly lose track and become unable to backtrack to their previous steps. Another issue of setting categorization is that the users were not able to exactly indicate the specific setting they wanted to control because they were not able to differentiate between settings in the same category (e.g. Tagging for posts and Tagging for photos). Thus, providing sequential processes that guide SNS users to the desired setting would enhance the users' behaviours when managing the settings and inline feature controls. Similarly, providing classified settings based on the existing features will effectively assist SNS users to understand and change the settings, and find new updates. Instead of using general terminologies such as Account, Security, or Privacy, SNSs and/or their designers should provide the exact feature's term that is related to the setting or inline feature controls. For instance, if the users are willing to change the settings of tags or their location, the settings should clearly present the terms "Tag" or "Location" in a way such that the users can visually specify them.

In contrast, in the quantitative study, I asked the participants if some features or settings are not categorized under "Privacy" category, whether adding categories and sub-categories is necessary, and whether classifying the settings based on features such as posts, photos, tags would be more practical. The findings apparently verified the results of the previous study and the majority of the participants confirmed these claims. Further, the statistical hypothesis test proved that there is sufficient evidence to support our claims. Therefore, categorizing SNS settings is a significant factor that influences SNS users' behaviours when managing the settings and inline feature controls.

Questioning the existence of SNS's settings, options, and explanations

The two studies verified that the participants have no knowledge about most of the settings, options, or explanations that exist and that they have difficulties in understanding and locating an existing settings or inline feature controls. Qualitatively, most of the participants were able to identify general or basic settings that are related to their permanent activities, such as timeline and tagging, whereas the other settings were mostly disregarded. One of the reasons for this relates to the user's desire to change. To illustrate this, once the users have the desire to manage a setting related to a specific feature, they would search for information about it. Thus, the users find out about the setting's existence at the point at which they need to control it. Interestingly, the reaction of the participants when they know the settings exist and that they can manage them is encouraging because it indicates that they want to learn and control. For example, when I discussed the meaning of a setting that exists and the outcomes after changing this setting, they showed their delight at having access to such settings. Likewise, the participants indicated that it is difficult to search for the setting after knowing that it exists, which leads to the use of different resources, such as Google, to direct them to the specific setting in SNSs.

One the other hand, in the quantitative study, I asked the participants if they learn about the existence of SNS settings and their options from other resources such as friends or news and have difficulty finding an explanation for a setting in the SNSs. The findings evidently verified the results of the previous study and the majority of the participants confirmed these claims. In addition, the statistical hypothesis test proved that there is sufficient evidence to support our claims. Therefore, questioning the existence of SNS settings, options, and explanations is a significant factor that influences SNS users' behaviours when managing the settings and inline feature controls.

Asking for help or advising others about SNS settings

Generally, the two studies verified that SNS users ask for help or advise others about SNS settings and inline feature controls. In the qualitative study, the participants emphasized that asking friends for help in understanding the meaning of and how to change the settings is more effective than going through the descriptions. They found it more practical to ask friends to help them understand and change new updates even before searching on Google. Moreover, the participants tended to involve their friends in testing and ensuring that the

results of changing the SNS settings were accurate (i.e., proper outcomes). Similarly, other participants preferred to ask experts because people who have experience have clearly learned about the settings in detail and could clarify the current settings' issues and avoid outdated information. Interestingly, the participants also indicated that they would ask people who have the same issues. They believed that people who have encountered an issue with the settings would easily assist them in solving their problem. Likewise, the results showed that SNS users advise others to understand, change, and test SNS settings. However, they emphasized that it is important to keep the settings private and only take action and make changes if the user has the necessary knowledge.

In contrast, in the quantitative study, I asked the participants if they ask friends, family, experts, or people who have had the same issues and whether they advise others about the settings. Remarkably, the findings did not verify all of the results in the previous study. The statistical hypothesis test proved that there is sufficient evidence to support only the claim that SNS users ask people who have the same issue with their own SNS settings. However, I was not able to prove whether SNS users ask friends or experts to help them understand, change, and test SNS settings. Similarly, the statistical hypothesis test proved that there is enough evidence to support only the claim that SNS users advise friends and family to ask for help or support in order to understand and change the settings, and find new updates. Nonetheless, I was not able to prove that SNS users advise friends and family to use the most limited SNS settings' options. Consequently, asking for help and advising others about SNS settings is generally a factor that may influence SNS users' behaviours when managing the settings and inline feature controls. Further studies are required to explore the unverified claims.

Guessing or assuming SNS settings' meanings and functions

The two studies verified that SNS users guess or assume a settings meaning, options, location, and outcomes. In the qualitative study, the participants guessed and assumed the meaning of the settings even though they read the setting descriptions and searched for information about them on Google. The same issue also occurred when I asked about testing or checking of the outcomes of changing a setting. The participants indicated that they had not thought of checking the outcomes and they assumed that the changes would be effective. Moreover, the confusion regarding the setting categorization forced the users

to assume the location of the needed settings or options. Thus, the participants in general relied on their own judgment and self-learning.

One the other hand, in the quantitative study, I asked the participants whether they guess or assume the settings' meaning and options, location, and outcomes instead of reading, asking for help, and searching; respectively. Also, I asked the participants if the meaning and the outcomes of SNS settings are different than what they believe or assume will be the case. The findings apparently verified the results of the previous study and the majority of the participants confirmed these claims. In addition, the statistical hypothesis test proved that there is sufficient evidence to support our claims. Therefore, guessing or assuming SNS settings' meanings and functions is a significant factor that influence SNS users' behaviours when managing the settings and inline feature controls.

Using shortcuts to change SNS settings

In the qualitative study, the users verified that they employ shortcuts to change the timeline and SNS settings. For instance, they would use any option that seems to be related to privacy or settings in order to reach the privacy settings page. They would also use different resources such as Google to search for a shortcut regarding how to properly change a specific setting. It eventually became a habit to use shortcuts when searching about a particular setting rather than using the SNS settings' pages. Moreover, the users found that using shortcuts to change SNS settings and customizing individual posts was more practical (i.e. easier, faster) than going through the global SNS settings to make the change.

One the other hand, in the quantitative study, I asked the participants if they generally use shortcuts to change the settings and whether they use different resources such as Google. Interestingly, the findings did not verify all of the results in the previous study. The statistical hypothesis test proved that there is sufficient evidence to support the claim that SNS users use different resources such as Google to search for shortcuts regarding how to change a specific setting. However, I was not able to prove that SNS users in general use shortcuts to change the timeline or SNS settings. Furthermore, I also asked the participants if they believe that using shortcuts to change SNS settings and customizing individual posts are more practical (i.e. easier, faster) than going through all of the global settings' pages. The majority of the participants confirmed these two claims. The statistical hypothesis test also proved that there is sufficient evidence to support these two claims.

Therefore, using shortcuts to change SNS settings is a factor that may influence SNS users' behaviours when managing the settings and inline feature controls. Additionally, I need to conduct further studies to explore the unverified claim.

Receiving notifications about new updates of SNS settings

In the qualitative study, the findings showed that SNS users attempt to understand and change the settings without receiving notifications from SNSs. For instance, they would update a setting based on their experience without waiting to receive notification about the new updates. In contrast, SNSs may provide new updates for the settings without sending notification to the users. The participants found that changing the settings without any notifications about the new updates is unacceptable because it may affect their privacy. However, there are also participants who may ignore or filter out the notifications of new updates once they receive them. They justified that, if the new updates include long paragraphs and take time, they will filter them out without reading them as long as they are satisfied with the current settings (i.e. not essential to change). In fact, the number of updates being sent to the users impacts their experience with the updates. For instance, the users insisted that if they receive many updates in an inadequate way (e.g. they are presented the new updates while doing other activities in SNSs), they would potentially ignore them.

Likewise, the majority of the participants emphasized that using different resources (e.g. news, vlogs, blogs, or friends) whether inside or outside SNSs would assist them to properly receive and effectively comprehend the notifications regarding the new updates. The main reason observed concerning the issue of getting notifications of new updates is the way in which the updates are presented or provided in SNSs. Most of the users complained about being forced to read huge amounts of text. Thus, the participants suggested changing the ways in which the updates are presented and considered that SNSs should utilize more attractive methods that include visual forms. However, enhancing the way of presenting the notifications of new updates does not imply sending emails and using untrusted resources. Using Email to send notifications about new updates might not be helpful in case the users do not notice the email notifications. Further, using untrusted resources outside SNSs may provide inaccurate information about the new updates. To illustrate this, the users would prefer to get the new updates from SNSs rather than hearing

about the new updates at a later time from friends. This issue obviously raised another concern, which is providing right information concerning the new updates at the right time.

In the quantitative study, I asked the participants if SNSs provide new updates of their settings without sending notifications. I also asked if SNSs do not provide the right information about the settings' new updates at the right time, and whether the users read to understand and take action to change their settings only after they receive a notification about the new updates. Remarkably, the findings did not verify all of the results in the previous study. The statistical hypothesis test proved that there is sufficient evidence to support the claim that SNSs provide settings' new updates without sending notifications. However, I was not able to prove that SNSs do not provide the right information about new updates at the right time and whether the users read to understand and take action to change only after they get a notification about the new updates of SNS settings.

Likewise, I asked if receiving notifications about new updates from an accurate source would change the users' behaviours toward the SNS settings, and whether presenting the notifications of new updates in an easy manner would help to understand and change the SNS settings. The majority of the participants confirmed these two claims. Moreover, the statistical hypothesis test proved that there is sufficient evidence to support these claims. Thus, receiving notifications about settings' new updates is a factor that may influence SNS users' behaviours when managing the settings and inline feature controls. I also need to conduct further studies to explore the unverified claims.

Searching about SNS settings and new updates

The two studies justified that SNS users search for information about SNS settings and new updates - inside and outside SNSs - to understand and change the settings. They also demonstrated that the new updated settings' information is not enough to learn about and manage the settings. In the qualitative study, the users indicated that it is challenging to find enough accurate information about the settings and new updates. In fact, it was apparent that it is a common challenge for all SNSs. For instance, the participants do not immediately understand the meaning of the settings, instead, they search for information about the unknown words or terms in the settings. In some cases, English is a second language for SNS users and that may cause issues when attempting to understand the complex terms in the descriptions. Another reason that caused issues in understanding the

new updated settings and forced users to search was not showing how to apply the settings with proper practice or guidance.

Meanwhile, SNS users would check official and nonofficial sources (e.g. vlogs, blogs, public news, or friends) to search and find the settings or the new updates. Based on the findings, Google is the first choice for the majority of SNS users to search quicker about the new updated settings. Interestingly, the participants preferred using the official resources such as SNS help centres after being redirected there from Google. However, there are participants who totally ignore SNS help centres and directly use Google to search for the desired settings or updates. Remarkably, if Google did not provide information leading to the proper or expected outcomes, the users may stop searching for information about updated settings.

Further, SNS users would look for new updates regarding the settings only if they receive notifications, otherwise they do not search. The two main reasons for this is that SNSs do not properly advertise the new updated settings and the new updated settings take time to learn and configure. Allocating time to search for the new updates in order to understand and then change the settings is a challenge, especially when the majority of SNS users only log in to check their friends' activities. They are not willing to spend much time searching for and then managing the settings.

In contrast, in the quantitative study, I asked the participants if they search for accurate information relating to SNS settings and new updates and whether it takes time for them to search. I also asked them if they only look for new updates regarding SNS settings whenever they receive notifications. The findings apparently verified the results of the previous study. The statistical hypothesis test proved that there is sufficient evidence to support the claims that most of SNS users search for information to manage SNS settings and new updates, and that the searching process takes time. Also, the users do not search unless they received notifications. Thus, searching about SNS settings and new updates is a significant factor that influence SNS users' behaviours when managing the settings and inline feature controls.

Using different resources

The two studies justified the proposition that SNS users utilize resources inside and outside SNSs to understand and change the settings, as well as find new updates. The users rarely

use resources inside SNSs whereas they check conversations included in help centres or posts received from others in case of any reported issue. However, the users mostly use resources outside SNSs such as Google, bloggers, vloggers, friends and experts, or the news in various media.

In the qualitative study, the main resource that was selected to manage the settings and new updates was Google. In fact, there are users who would not check the setting descriptions because SNSs would explain the meaning from their points of view. Instead, such users would rely only on Google results to present explanations. In addition, they would utilize Google to check if the outcomes of the changed settings are accurate. Interestingly, using Google became a habit because the users constantly utilize Google whenever they have an issue with the settings and new updates. However, there is also a hesitation to use Google by a few participants because they were concerned about the accuracy of the results provided in Google.

Likewise, the findings showed that the participants would use other resources such as examples, photos, and videos instead of reading the long descriptions in text. The findings also indicated that SNS users seek more information via asking friends, experts, and family members and they considered them as resources to help them manage the settings and new updates. For instance, friends and family members may encourage each other to check and change new updated settings, notify each other about an issue related to the settings, and test the outcomes of the changed settings. Similarly, the users would consider experts or people who professionally understand the settings as resources to assist them when managing the settings and the new updates. For example, the users would act on noticing any explanation about the settings and new updates provided by an expert. Further, the results also disclosed that SNS users seek more information and read about the settings and new updates from the news or media when there are debates about the settings.

On the other hand, in the quantitative study, I asked the participants if they use Google to understand, change, or obtain solutions from people who have the same issue about the settings and new updates. I also asked the participants whether they use mainly Google to search for information about the SNS settings and new updates. Remarkably, the findings did not verify all of the results of the previous study. The statistical hypothesis test proved that there is sufficient evidence to support the claim that SNS users use Google once they

need to find solutions from people who have the same issues. However, I was not able to prove if SNS users generally use Google to search for information about the settings and new updates. It is apparent that the users do not establish a process of searching in Google unless they need to understand or change a specific setting or solve an issue.

I also asked if SNS users consider examples, visual content, news and media, experts, friends, and family members as resources to manage the settings and new updates. I also asked whether providing different resources concerning the SNS settings and new updates - inside SNSs - such as photos, short videos, or animations would enhance their understanding and ability to change the settings. The findings apparently verified the results of the previous study and the majority of the participants confirmed these claims. Moreover, the statistical hypothesis test proved that there is sufficient evidence to support our claims. Thus, using different resources is a significant factor that influences SNS users' behaviours when managing the settings and inline feature controls. In addition, I need to conduct further studies to explore the unverified claim.

Reading SNS settings' descriptions and new updates

The two studies demonstrated that SNS users read to understand and change the settings and new updates. In the qualitative study, the users tended to either read about the settings inside and outside SNSs or they would completely disregard the settings and new updates without reading anything about them. Inside SNSs, the users read the setting descriptions to ensure they understand the settings' meanings and to ensure proper outcomes. However, the users emphasized that reading the setting descriptions is a challenge because all of the texts look identical and take much time to read. Noticeably, the users usually compare the settings' meanings in various SNSs. They emphasized that if the settings are common between SNSs, it would be easy to figure them out. Outside SNSs, the users read about the settings and new updates using various resources such as Google and blogs. Although Google provides tremendous options to assist SNS users to read and understand about the settings and new updates, it does not ensure that these resources contain accurate and trusted information. In contrast, the findings exposed that there are users who would never read about the settings and would disregard the settings and the new updates. The users declared the reasons for not reading about the updates which are: reading is not going to change the limitations of the settings, receiving a huge number of updates, inability to

understand without examples that show the results of the changes, and using lots of texts which discouraged SNS users from reading about the settings and new updates.

In the quantitative study, I asked the participants if they read the settings' descriptions to understand and change them and whether they read online about the new updates. Noticeably, the findings did not verify all of the results of the previous study. The statistical hypothesis test proved that there is sufficient evidence to support the claim that SNS users read the descriptions to understand and change the settings. However, I was not able to prove whether SNS users read online to find information about the settings and new updates. Apparently, the users do not constantly read about the settings on Google unless they need to understand or change a specific setting or solve an issue.

Likewise, I asked the participants if they would not read a long paragraph of texts about new updated settings and whether they find that reading is a waste of time and boring. The findings evidently verified the results of the previous study and the majority of the participants confirmed these claims. Moreover, the statistical hypothesis test proved that there is sufficient evidence to support our claims. Therefore, reading SNS settings' descriptions and the new updates is a significant factor that may influence SNS users' behaviours when managing the settings and inline feature controls. I also need to conduct further studies to explore the unverified claim.

Observing and checking the SNS settings' outcomes to match users' expectations

The two studies verified that SNS users observe and check the outcomes of the settings to match their expectations. In the qualitative study, SNS users asserted the outcomes via checking or testing the changed settings, waiting to experience the outcome, or relying on the descriptions provided by SNSs. In addition, the participants followed different strategies to ensure that the outcomes of the changed settings matched their expectations such as saving the settings and using different resources (e.g. Google, blogs, friends, experts, or family members). In fact, the reasons that discourage the users from checking the outcomes after changing the settings were that the outcomes were not instantaneous, and that it was a time consuming process. However, there are users who would not test the changed settings to ensure accurate results because there was no a particular method to test the changed settings and the users would trust SNSs to apply the changes.

In the quantitative study, I asked the users whether they observe and check the outcomes after changing SNS settings to ensure that the outcomes are effective or wait to experience the changed settings. I also asked if they would rely on the SNS settings' descriptions and explanations to assure that the changed settings matched their expectations. Moreover, I asked if they suggest the addition of an interactive review pages, animation videos, or examples to reflect the expected outcomes from changing SNS settings. The majority of the participants confirmed these claims. In addition, the statistical hypothesis test proved that there is sufficient evidence to support our claims. Thus, observing and checking SNS settings' outcomes to match users' expectations is a significant factor that influences SNS users' behaviours when managing the settings and inline feature controls.

Remembering SNS settings, outcomes, and new updates

The two studies showed that SNS users frequently forget the settings, options, and how to change them. In addition, they would not recall if they receive new updates about the settings. The participants specified that the reasons that caused them to forget the changed settings were providing many features, and not checking the settings for a long time. Interestingly, a few participants declared that they would forget next time if they change a setting because they have to go through the settings and find out how they previously applied it. Similarly, the users indicated that they cannot remember if they had received new updates about the settings from all the SNSs (Facebook, Twitter, and Instagram). They emphasized that they received advertisements but not settings' updates.

One the other hand, in the quantitative study, I asked the participants if they forget about the SNS settings and new updates, and how to change them. I also asked them if they suggest providing resources that remind them often of the need to understand and change the SNS settings in case they forgot the settings. The majority of the participants confirmed these claims. In addition, the statistical hypothesis test proved that there is sufficient evidence to support our claims. Therefore, remembering SNS's settings, outcomes, and new updates is a significant factor that influences SNS users' behaviours when managing the settings and inline feature controls.

Dealing with interface and usability issues

The two studies justified that SNS users face difficulties when using SNS settings' layouts because the settings are not categorized properly, there are no obvious examples and explanations, and SNSs do not provide resources such as visual content (i.e. photos, videos, or animations) to assist the users to understand and change the settings as well as find the new updates. In the qualitative study, the participants demanded enhancements to the settings page via improving the visibility in order to easily locate settings, reduce the path length to a specific setting (i.e. avoid providing many paths to a specific setting), renaming the categories to be more specific based on the provided features, and including review messages (e.g. providing pop up messages as a form of feedback to show the expected outcomes of the settings). Similarly, the users suggested using visual content (e.g. photos, videos, and animations), further explanations, and examples to enhance SNS users' usability of the settings. For example, the users suggested adding a checked icon next to the settings and new updates - similar to the messages received in Twitter and WhatsApp - that clearly indicate to the users that these settings have been reviewed. It would also encourage the users to review the unchecked settings or new updates. Highlighting the new settings or updates is another way of improving the interactions between the users and the settings. Further, the participants suggested providing a tutorial when creating an account to facilitate the understanding of SNS settings' descriptions and terms.

In contrast, in the quantitative study, I asked the participants if they demand open and interactive SNS settings and sleek pages or layouts. I also asked them whether they suggest providing visual content, explanations, examples, and tutorials to facilitate SNS settings' descriptions and terms. In fact, the majority of the participants confirmed these claims. Also, the statistical hypothesis test proved that there is sufficient evidence to support our claims. Thus, dealing with interface and usability issues is a significant factor that influence SNS users' behaviours when managing the settings and inline feature controls.

Influencing of user' levels and experience

Each user utilizes SNSs for different purposes and needs. Thus, SNSs should take into consideration SNS users' experience regarding the settings and new updates. In the qualitative study, the participants indicated that the settings and their descriptions were only suitable for experts or professional users. The users also declared that SNSs should

not consider their settings as practical for all users since the users have various levels and knowledge of the settings. Likewise, user experiences of the settings may improve their understanding of, ability to change, and ability to find the settings and new updates. The users usually select the basic settings and took time to experience and learn the meaning of the advanced settings. For instance, they would learn the meaning of a particular setting once they received information from friends or by comparing the meaning of the setting on a specific SNS with other SNSs. Similarly, the findings presented that the users would observe and check (i.e. test) the outcomes of the changed settings via experience. For example, the participants would change the settings and ask someone to send content and, based on this, they could observe the outcomes of the changed settings.

In the quantitative study, I asked the participants whether SNS settings and their functions are suitable for experts but not novices and if SNS setting terms and descriptions are appropriate for professional users but not for normal users. The majority of the participants disproved these two claims. In addition, the statistical hypothesis test disproved that there is sufficient evidence to support our claims. Therefore, I was not able to consider users' levels as a factor that influences SNS users' behaviours when managing the settings and inline feature controls. In addition, I need to conduct further studies to explore these unverified claims.

In contrast, I asked the participants if they understand and has learnt the meaning of the SNS settings via personal experience, observing the outcomes of SNS settings changes through personal experience, and seeking more information from different resources because of unsatisfactory experience with settings and help centres. The majority of the participants confirmed these claims. In addition, the statistical hypothesis test proved that there is sufficient evidence to support our claims. Consequently, users' experiences toward the settings and new updates is a significant factor that influence SNS users' behaviours when managing the settings and inline feature controls.

Ignoring SNS settings and new updates

The quantitative study did not prove that the users ignore SNS settings similar to the qualitative study. In the qualitative study, the findings showed that SNS users regularly avoid checking the SNS settings and filter out or ignore the new updated settings. They would only take the settings and new updates into considerations when facing an issue. For

instance, when the users faced the search engine setting dilemma, they declared that there is no way to fix the setting and that attempting to do so would take time. Similarly, the findings presented that the users would filter out or ignore the new updated settings received inside or outside SNSs. They would skim the content and then ignore the updates or directly ignore them without reading them. The main reason that discouraged the users from checking the new updates is that it is time consuming.

In the quantitative study, I asked the participants if they ignore SNS settings because they do not care about them, ignore SNS settings because they are a waste of their time, and filter out the received new updates concerning SNS settings without checking them. The majority of the participants disproved these claims. In addition, the statistical hypothesis test disproved that there is sufficient evidence to support our claims. Therefore, I was not able to consider ignoring SNS settings and new updates as a factor that influence SNS users' behaviours when managing the settings and inline feature controls. I significantly need to conduct further studies to explore this factor.

6.2 Discussion

6.2.1 Shifting Between Inside and Outside SNS

Our findings demonstrated how SNS users are influenced by various factors when attempting to achieve the PSM components. Significantly, these factors are involved inside and outside SNSs (Figure 6.2). To illustrate this, I observed that SNS users are constantly shifting from the inside to the outside of SNSs to obtain clearer information and access other resources about the settings and inline feature controls. This movement allowed the users to rapidly and effectively (i.e., obtain proper outcomes) understand and take action regarding the settings and inline feature controls. Noticeably, some of the factors existed simultaneously inside and outside the SNSs. For instance, inside SNSs, the users searched for information about the settings and new updates at the help centres. However, outside

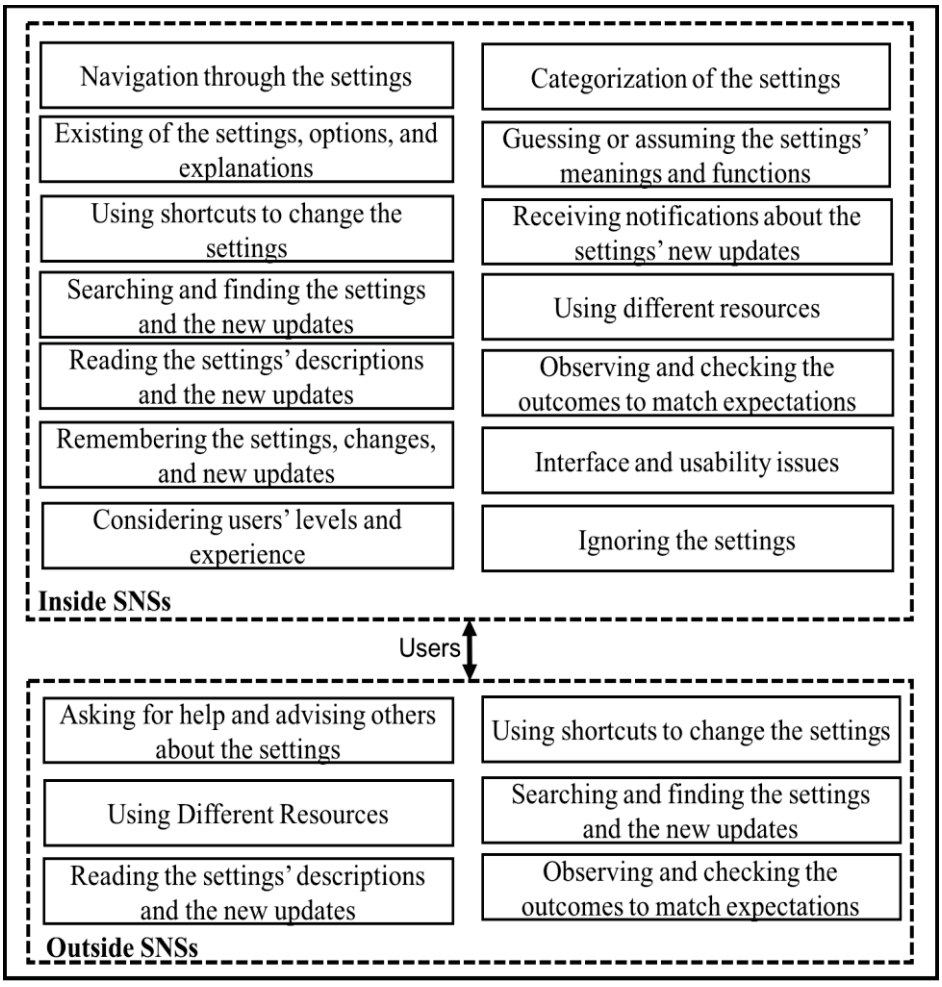


Figure 6.2: The Conceptual model of the factors that SNSs users perform (inside and outside SNSs) when learning and configuring the settings

SNSs, the users searched on Google and the news (or media) to manage the settings and new updates. Likewise, the users read the setting descriptions and new updated settings inside SNSs; nevertheless, the users used bloggers to read further about the settings and new updates. The users also observed and checked the setting results via experience inside SNSs and by asking friends, experts, or family members to test the settings outside SNSs. In contrast, there are factors that could only be inside or outside of the SNSs. For example, navigation through the settings and categorization of the settings are issues that directly impacted the users' behaviours inside SNSs. Similarly, questioning the existence of the settings and remembering the settings are also concerns that affected users' experience inside SNSs. However, asking friends for help and advising others about the settings mostly occurred outside SNSs.

Furthermore, the younger participants were using the outside supports more than the older participants who preferred to only use SNSs supports. Thus, there is a generational difference when dealing with the new information and resources. In fact, there are implications for using information and resources outside SNSs even though the users found them to be more efficient and effective. The main issue is the use of nonofficial resources because the users cannot assure that these resources are trustworthy and provide accurate information (e.g. not outdated). The information presented on Google or other external resources are provided by people who give their opinions or encounter a problem with a setting. Similarly, with many resources explaining the new updated settings, it may take much time to find the appropriate information.

Although SNSs provide a large amount of content about the settings in their help centres, the users found them incomprehensible and impractical. The users emphasized that SNSs feedback did not assist in their understanding of and ability to change the settings. For instance, when a participant asked a question about tagging at the Instagram help centre, the latter gave all related descriptions and explanations related to that question. The results were not prioritized; instead they provided all information about tagging. Meanwhile, the participants declared that the information obtained from other people – not the help centre – was relevant to the users' inquiries because people discussed the issue based on experience. The improper feedback forced participants to ignore the help centres. In addition, the SNS help centres do not provide live support or help. Instead, they include

pages that are full of texts and descriptions. The users admitted that they would not read these and would instead utilize Google to search for direct and accurate answers to their inquiries. Time consumption is also another reason of not checking the SNSs help centres. The participants avoid using SNS help centres when attempting to manage the settings and new updates because the help centres would waste their time in terms of asking SNS help teams and searching for or reading the Frequently Asked Questions (FAQs). They would take time when reading the FAQs because they are always general questions that involve lots of steps. Interestingly, I observed that the participants use the help centre and FAQs only if they were redirected from Google. The participants declared that this was more practical because Google finds a proper indication in the help centre and that is more beneficial than the users directly visiting the help centres. Additionally, the help centre interfaces and settings were not designed to be attractive similar to the traditional SNS layouts. Obviously, SNSs spend a long time on designing and improving the timeline and profile pages whereas they keep the help centres pages and settings very basic. Consistency between the traditional layouts and the help centres' pages and settings would enhance users' usage and experience.

6.2.2 SNS Policy and Settings New Updates in 2018

After the Cambridge Analytica dilemma, the majority of SNSs updated their policies and settings. Interestingly, all of the new updates were presented to users when they checked their activities. They also used the same strategies they were using before the existence of this issue. For instance, in Facebook, all of the participants were asked to check the brief of the new updates, then they were asked to either review more with extra paragraphs of text, to click on the "remind me later" button, or to click the "Close" icon that takes the users to where they can check their activities without checking the new updates (Figure 6.3).

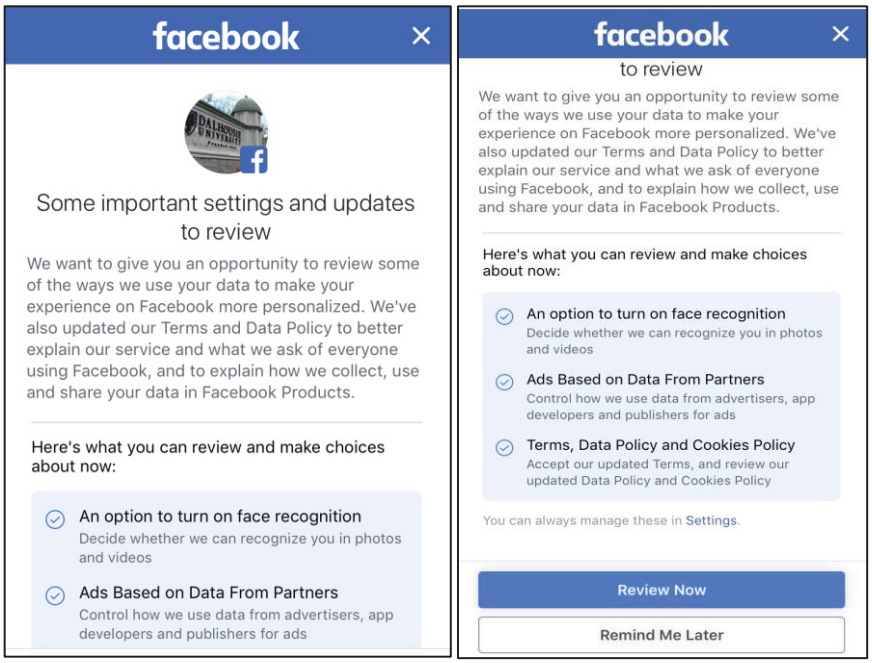


Figure 6.3: Facebook new updates in 2018

Likewise, in Twitter, the options were extremely limited because they forced their users to either click “Learn more” and read paragraphs of text or click the “Got it” button and continue using the application (Figure 6.4). Using the words “Got it” however does not represent the functionality of the button because SNSs did not apparently provide information to ensure that the users comprehended the new updated information. In this update, the “Got it” button was designed and presented in the middle of the page with a blue colour in comparison to the “learn more” link that was buried in the text with no interactive features. Presumably, Twitter is compelling users to not read the new updates and clearly encouraging the users to just click the “Got it” button.

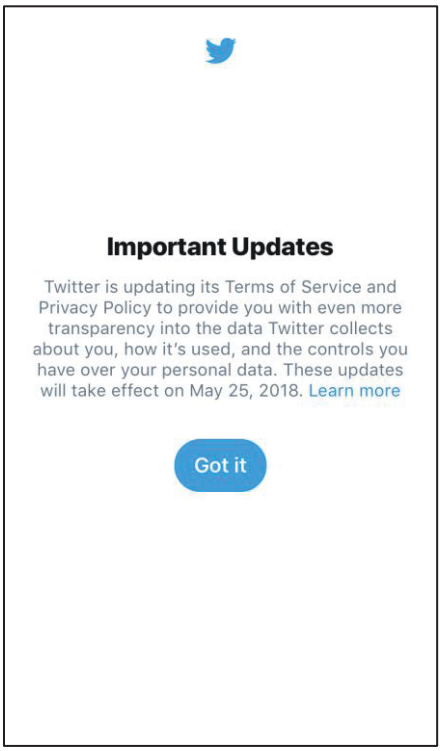


Figure 6.4: Twitter new updates in 2018

Similarly, Instagram provided all the information and asked the users to either read and check links such as "Terms" and "Data policy" which also contain detailed paragraphs of text, or click the well-designed and centred "back to Instagram" button that directs the users to the main page of the Instagram application (Figure 6.5). In fact, the users would be able to escape from the detailed new updated content by clicking the "Cancel" button or the "back to Instagram" button which both direct the users to the homepage of Instagram.

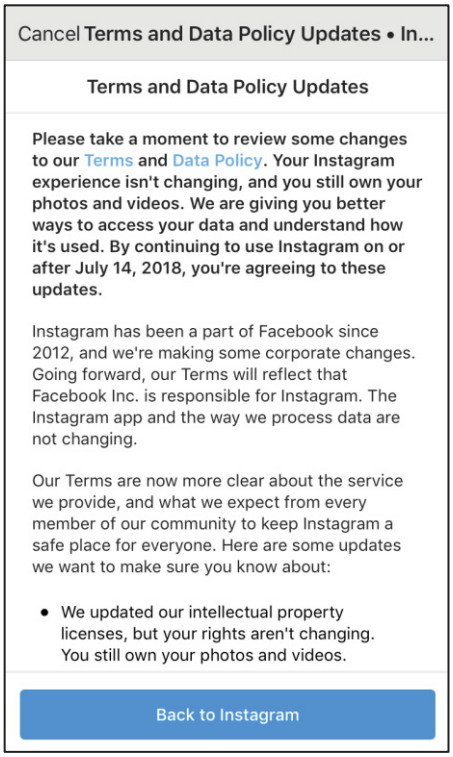


Figure 6.5: Instagram new updates in 2018

On the other hand, it was apparent that the majority of SNSs follow the same methods to update their policies or settings. In Snapchat and Periscope (Figure 6.6), they followed the exact same strategies of presenting the new updates as Twitter and Instagram. For example, they buried the buttons that include detailed information under brief descriptions of text and interactively displayed “Accept” and “Ok” buttons that might have encouraged the users to disregard the new updates.

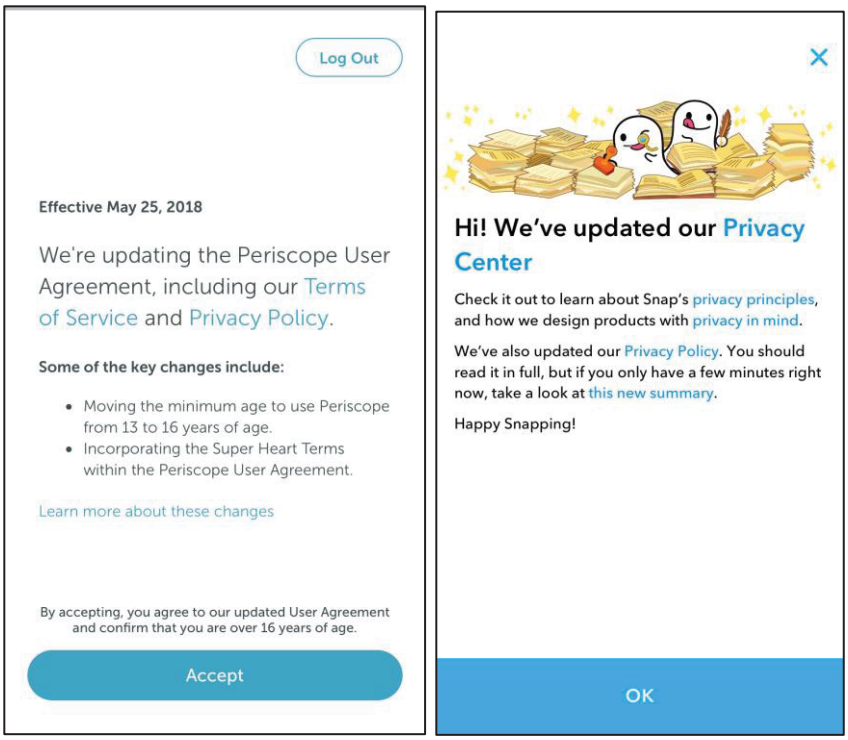


Figure 6.6: Periscope and Snapchat new updates in 2018

6.2.3 Design Guidelines

Based on the mixed-method study findings, I derived set of guidelines that may assist in the design of SNS settings or SNS settings' management tools:

1. **Simplify the paths and steps when navigating through the settings**

This guideline is derived from the obtained factors in the qualitative study (Phase 1). The participants emphasized that navigation takes time and is not effective because they had to go through multiple paths to reach the desired settings. Thus, the designers should reduce the number of steps or paths required to get to the settings by narrowing down the steps to reach a particular setting or option. Using shortcuts or changing each post individually were considered to be more practical than going through the entire settings' content. In addition, designers may highlight the settings and new updates to assist users who are not familiar with the settings because there is no proper guidance to reach the right setting. Presently, there are various paths that take much time to get to the settings in many SNSs, which complicates the management process, especially for people with fewer technical skills. Simplifying the paths would reduce the time required to navigate through the settings.

2. **Provide meaningful categorization of features based on their functions**

This guideline is derived from the obtained factors in the qualitative study (Phase 1). The participants indicated that the settings are not properly categorized based on the settings' functions. SNS users were not able to differentiate between settings in the same category such as using tagging for post or tagging for photos. In addition, the help centre is not properly categorized and SNSs rely on Frequently Asked Questions (FAQs) pages. Thus, the users suggested to enhance the categorization of the settings based on the provided features (e.g. Tags, Location, and Apps) without using general terms such as Account, Security, and Privacy. The users tended to search for information about the features when they attempted to understand and change the settings as well as find new updates (i.e. inside and outside SNSs) because they found this to be more practical and they were directed to the desired features. Further, they usually attempt to find the exact words that they are thinking of while finding specific settings or explanations. For instance, if the user is attempting to change the location, they would search about the exact word "Location".

3. **Allocate separate pages for each feature (e.g. Tags, Location, Apps) and its content (e.g. SNSs that provide the feature, options of the feature, and platforms used to manage the feature)**

This guideline is derived from the observation session in the qualitative study (Phase 1). I observed that the participants are usually distracted by the unrelated information displayed when searching about a specific setting. For instance, when a participant searched about tagging in Instagram help centre, it showed all the information related to tagging. Compelling the users to check all of the possible information about the features in separate pages (i.e. each on separate pages) may help the users to focus on managing each content individually. For instance, designers may introduce all possible features in an individual page. After allowing the users to choose a specific feature, another page appears to show the options provided in each SNS. This may allow the users to have knowledge about all of the provided content (basic and advanced) and may – in the future – assist the users to ensure whether a desired feature exists.

4. **Avoid using the distracted icons or links (e.g. "Learn More" links) buried under the texts**

This guideline is derived from the observation session in the qualitative study (Phase 1). In fact, I observed that the majority of the users did not use the "Learn More" links that are designated to provide more information about setting's meanings and functions. Since the users do not take into consideration checking and reading the additional information provided in these links, the designers may provide fixed short texts or visual content such as photos or videos that instantly clarify the purpose and the outcomes of controlling a specific setting or inline feature control.

5. **Prepare informative and attractive notifications of the new updates**

This guideline is derived from the obtained factors in the qualitative study (Phase 1). The participants indicated that they would filter out the notifications because they receive a large number of notifications regarding new updates. The numbers of updates being sent are huge and this may confuse the users and cause a challenge when attempting to find a specific new update. Designers should provide the notifications of the new updates in the easiest way (i.e. the users can instantly understand and change the setting). Most of the users complain about sending paragraphs of texts and having to read a lot of explanations. Consequently, the users suggested changing the ways the updates are presented and designers should utilize more attractive methods that include visual forms.

6. **Use SNS help center information to provide trusted and accurate information**

This guideline is derived from the interview session in the qualitative study (Phase 1). The majority of the participants admitted using nonofficial resources to understand and change the settings as well as find new updates. However, in the interview session, they emphasized the importance of managing the settings according to trusted resources. As I previously indicated, SNS help centres provide all possible information about settings, inline feature controls, and policies. Nonetheless, the problem is related to whether users obtain and perceive this information properly and easily. Presenting only the desired setting's information and avoiding suggesting related results would encourage the users to manage the settings and new updates. In addition, it may help SNS users to concentrate on

official resources or content and avoid using nonofficial information provided by external resources such Google articles, news, or people.

7. **Include visual content to guide SNS users when understanding and changing the settings**

This guideline is derived from the obtained factors in the qualitative study (Phase 1). The participants emphasized that it is significant to use different resources such as visual content (e.g. photos or videos) to help them understand and change the settings and inline feature controls. The users emphasized that following the steps is much easier than looking for the steps. One of the reasons that discourages the users from reading the setting descriptions is the inability to understand the content in the absence of visual examples. Thus, the designers should include visual content such as photos or videos that clearly highlight the process of controlling the settings and inline feature controls.

8. **Show the expected outcomes of the settings or inline features controls**

This guideline is derived from the obtained factors in the qualitative study (Phase 1). The results demonstrated that the majority of the participants would attempt to observe and check the outcomes after changing the settings. There are no instantaneous outcomes, it is time consuming, and it is a long process are the reasons that discourage the users from checking the outcomes after changing the settings. SNS users are not only searching for information about the settings and the new updates because they do not understand, they are also not certain whether they are going to observe the proper outcomes. Providing the expected outcomes may assist the users to visualize the outcomes before they configure the settings or inline feature controls and to acquire proper results after configuring them.

9. **Provide full information (e.g. the last date and time) about the settings and inline features controls' new updates**

This guideline is derived from the interview session in the qualitative study (Phase 1). The users indicated that they found outdated explanations when they searched for information about the settings in external resources such as Google and YouTube. The new updates of the settings must be shown in an up-to-date format (e.g. date and time) based on the information provided by the help centre. Providing the date and time of the setting updates

would also help the users to check whether specific setting has been removed and it is not any longer available.

6.3 Studies Limitations

Although the findings provided a huge amount of information from the qualitative study to generate major factors or themes that serve the purpose of the two phases, nevertheless, it is significant to indicate the limitations of the two phases. The majority of the participants were from a university community (i.e. mostly educated users and familiar with SNSs) with only 22 participants, which can reduce the generalizability of our findings. In addition, the study had a limited sample size even though it provided sufficiently robust data to create themes that explain how SNS users are influenced when learning and controlling the SNS settings and new updates. Thus, further research is needed to confirm and expand the factors that have emerged with a larger sample and various levels of age and expertise.

One of the limitations of an online survey is that it depends on the participants' abilities to precisely report their data. However, the advantage of conducting the exploratory sequential design (mixed method approach) was that I was able to interpret the data and compare results between the two methods. Although the qualitative study identified a number of robust factors, the test statistics of the quantitative data could not prove the accuracy of some factors. The sample size may have influenced the findings; therefore, further studies with larger sample sizes may prove the unverified issues.

Chapter 7 System Design, Implementation, and Evaluation

This chapter presents the design, implementation, and evaluation of the PrivSet application; an application that can help SNS users to manage SNS settings and inline feature controls. The obtained design guidelines (presented in chapter 6) were considered to design the PrivSet application. To illustrate this, I provided meaningful categorization of features based on their functions (e.g., Posting, Sharing, Ads, Location), instead of using general terms for the settings' categories (e.g., Account, Privacy, Security). I also allocated separate pages for each feature and its content (e.g. SNSs that provide the feature, options of the feature, and platforms used to manage the feature). I presented this information using visual content (highlighted high-quality images) to guide SNS users while understanding and changing the feature. In addition, these highlights images simplified the paths and steps when navigating through the SNS settings. In order to assure proper outcomes when managing the settings and inline feature controls, I displayed the expected outcomes that the users should observe when changing the settings or inline feature controls. I also provided full information (e.g. the last date and time) about the new updated settings and inline features controls. Moreover, I only provided a few links to precisely show how the PrivSet application obtained the desired feature's information from SNS help center. The links would encourage the users to trust the provided information because they are obtained from official resources (i.e. SNSs) . The following table illustrates how the guidelines were applied in the PrivSet application and fulfils each guideline:

Table 7.1: Summary of design guidelines, illustrating if and how the PrivSet fulfills each guidelines

Guidelines	PrivSet	Fulfilled?
1. Simplify the paths and steps when navigating through the settings.	I provided highlighted images of SNS settings that guide users when managing the settings. Also, each layout of the PrivSet website include specific information (e.g. features, options, or platforms) for the user to select and then sequentially be guided to the desired content.	Yes
2. Provide meaningful categorization of features based on their functions.	I provided meaningful categorization of features based on their functions (e.g., Posting, Sharing, Ads, Location), instead of using general terms for the settings' categories (e.g., Account, Privacy, Security).	Yes

Guidelines	PrivSet	Fulfilled?
3. Allocate separate pages for each feature.	I allocated separate pages for each feature and its content (e.g. SNSs that provide the feature, options of the feature, and platforms used to manage the feature).	Yes
4. Avoid using the distracted icons or links.	I did not use icons and links to provide additional information. However, I only provided a few links to precisely show how the PrivSet application obtained the desired feature's information from SNS help centre.	Yes
5. Prepare informative and attractive notifications of the new updates.	Not applicable due to the need for long-term studies.	No
6. Use SNS help center information to provide trusted and accurate information.	I provided highlighted images and links to precisely show how the PrivSet application obtained the desired feature's information from SNS help centre. The links would encourage the users to trust the provided information because they are obtained from official resources (i.e. SNSs).	Yes
7. Include visual content to guide SNS users when understanding and changing the settings	I presented the information using visual content (highlighted high-quality images) to guide SNS users while understanding and changing the feature as well as checking the information in the help centres.	Yes
8. Show the expected outcomes of the settings or inline features controls.	I demonstrated the expected outcomes that the users should observe when changing the settings or inline feature controls in the content page (i.e. the last page of the PrivSet application after selecting desired features, options, and platforms).	Yes
9. Provide full information (e.g. the last date and time) about new updates	I provided full information (e.g. the last date and time) about the new updated settings and inline features controls in the content page (i.e. the last page of the PrivSet application after selecting desired features, options, and platforms).	Yes

To test the application, I used a usability testing approach to compare the efficiency (time to complete the tasks) and effectiveness (the successful completion of tasks and error rates) when using the PrivSet and without using it. I asked the participants to perform five tasks in Facebook, Twitter, and Instagram settings without using the PrivSet application and then to perform the same tasks after using the PrivSet application. Second, I conducted

a post-task questionnaire to measure the perceived usefulness (PU) and ease of use (PEOU) of the PrivSet application. Eventually, I conducted a semi-structured interview to examine the strengths and weaknesses of the PrivSet application. The following research questions were formulated to guide the study:

- ***RQ1:*** *To what extent is the PrivSet application efficient in terms of time spent to complete the tasks in comparison to the users' current experience?*
- ***RQ2:*** *To what extent is the PrivSet application effective in terms of successfully completing the tasks with the least number of errors in comparison to the users' current experience?*
- ***RQ3:*** *How do SNS users perceive the usefulness of the PrivSet application in comparison to the users' current experience?*
- ***RQ4:*** *How do SNS users perceive the ease of use of the PrivSet application in comparison to the users' current experience?*
- ***RQ5:*** *What are the strengths and weaknesses of the PrivSet application from the users' points of view?*

7.1 Design and Implementation

The application is designed to streamline the process of understanding and changing the settings, and finding of new updates. The PrivSet application was developed in HTML, CSS, and JavaScript and could be deployed as a Google Chrome plug-in extension to provide a rapid access to the features of the PrivSet application. The application comprised two main interfaces which are website interface and plug-in extension (i.e. continually positioned in Google Chrome browser). In the website (Figure 7.1), the first page includes a tutorial button that would assist SNS users to learn about the PrivSet application. It also includes features provided by SNSs such as posting, sharing, ads, location, Apps, and delete or deactivate an account. The first page also includes the new updates' button – in the navigation bar- which lists all the possible updates in SNSs and direct SNS users to the exact page in the PrivSet website to learn more about the update. In the plug-in extension, the SNS user can easily change the settings and inline features' controls with one click in the upper right corner of the Google Chrome browser (Figure 7.2).

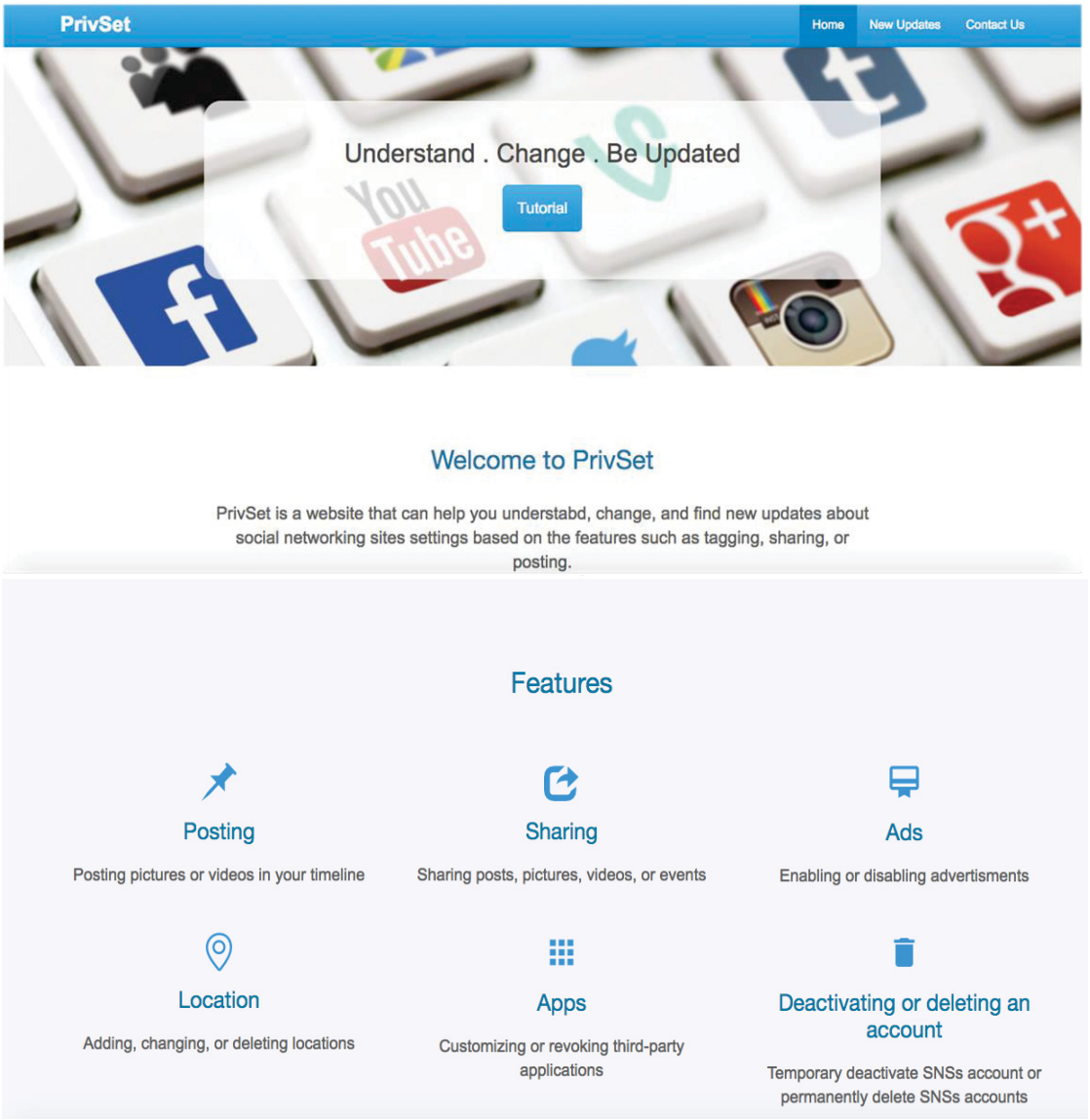


Figure 7.1: The PrivSet website home page

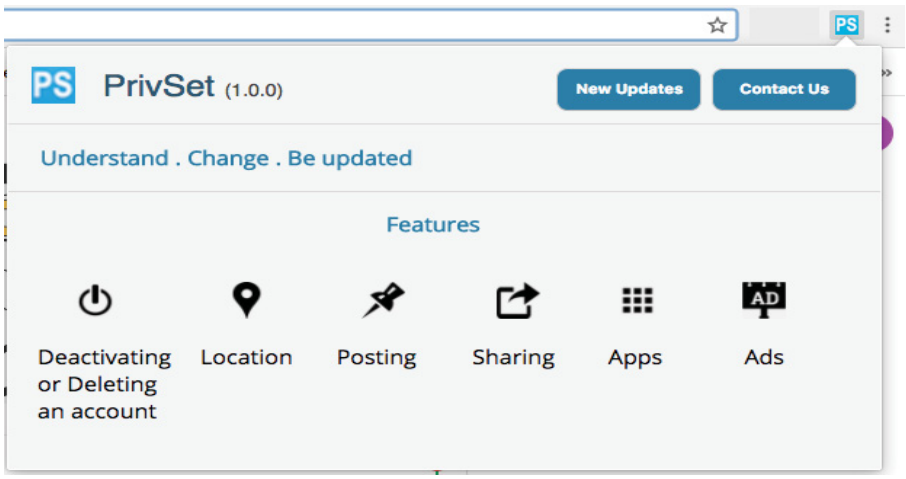


Figure 7.2: The PrivSet plug-in extension

It directs the users to the specific feature in the PrivSet website to begin learning about and managing the preferred setting. Features can be visible with one click and more details appear when directed to the website. When SNS users choose a specific feature (e.g. Deactivate or Delete an account), the PrivSet website narrows down the process to assist users to make proper decisions. For instance, all possible SNSs that provide Delete or Deactivate an account are assembled in a particular web page (Figure 7.3).

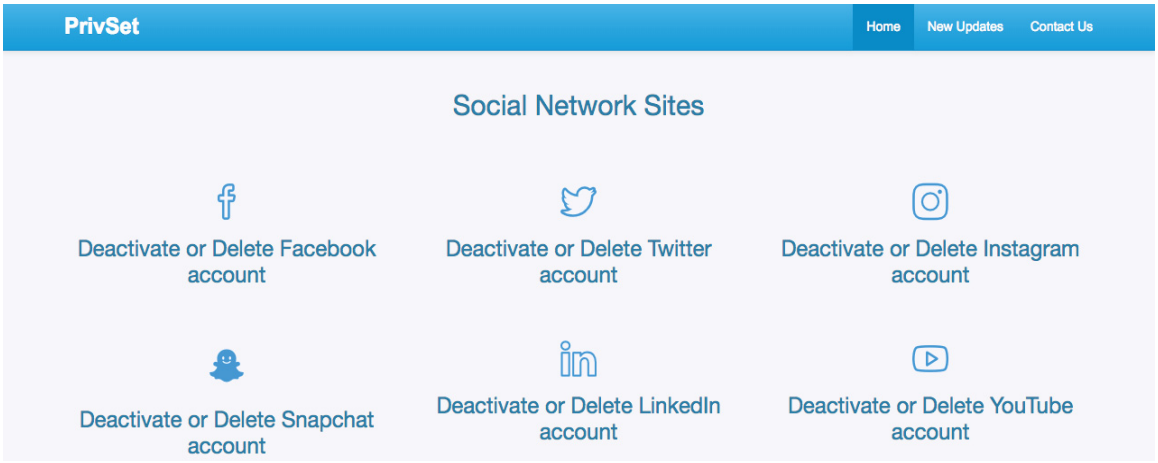


Figure 7.3: Deactivate or Delete an account in all SNSs

Each feature may have more than one option. For example, Facebook has only two options either deactivate or delete the account. When the users reach the options' page, they already narrowed down two steps (i.e. features and SNSs) and they can choose a specific option to continue learning about and managing the setting or inline feature control. The following figure showed the possible options on Facebook for Deactivation or Deletion (Figure 7.4).

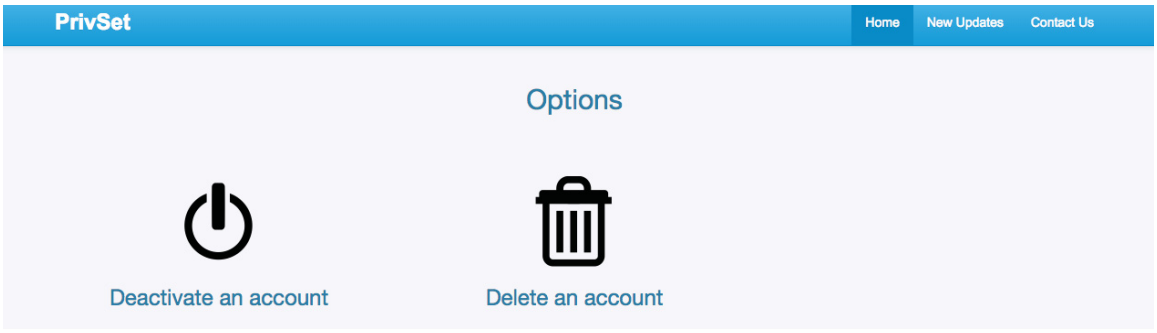


Figure 7.4: Deactivate or Delete options in Facebook

Most of SNSs provide two options of platforms to help their users manage the settings which are desktop (computer) and mobile phone (IOS or Android). In the PrivSet website, the users already narrowed down three steps (i.e. features, SNSs, and Options) and they can now choose the preferred platform to begin the managing process according to PSM components. The following figure displayed all the possible platforms to begin managing the setting (Figure 7.5).

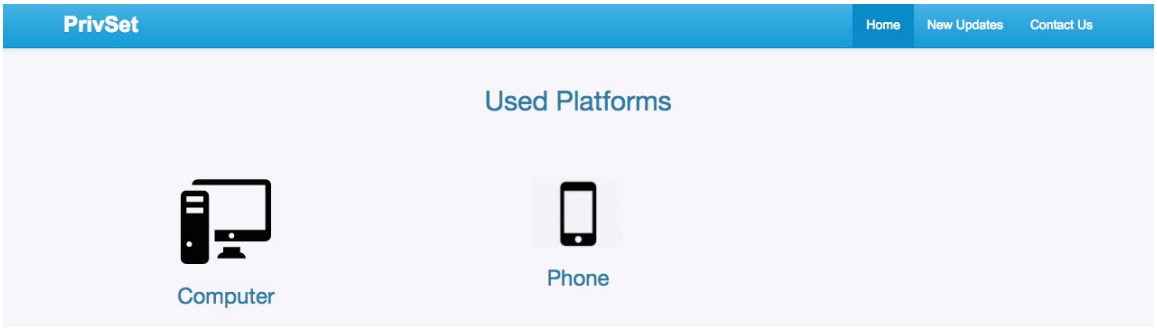
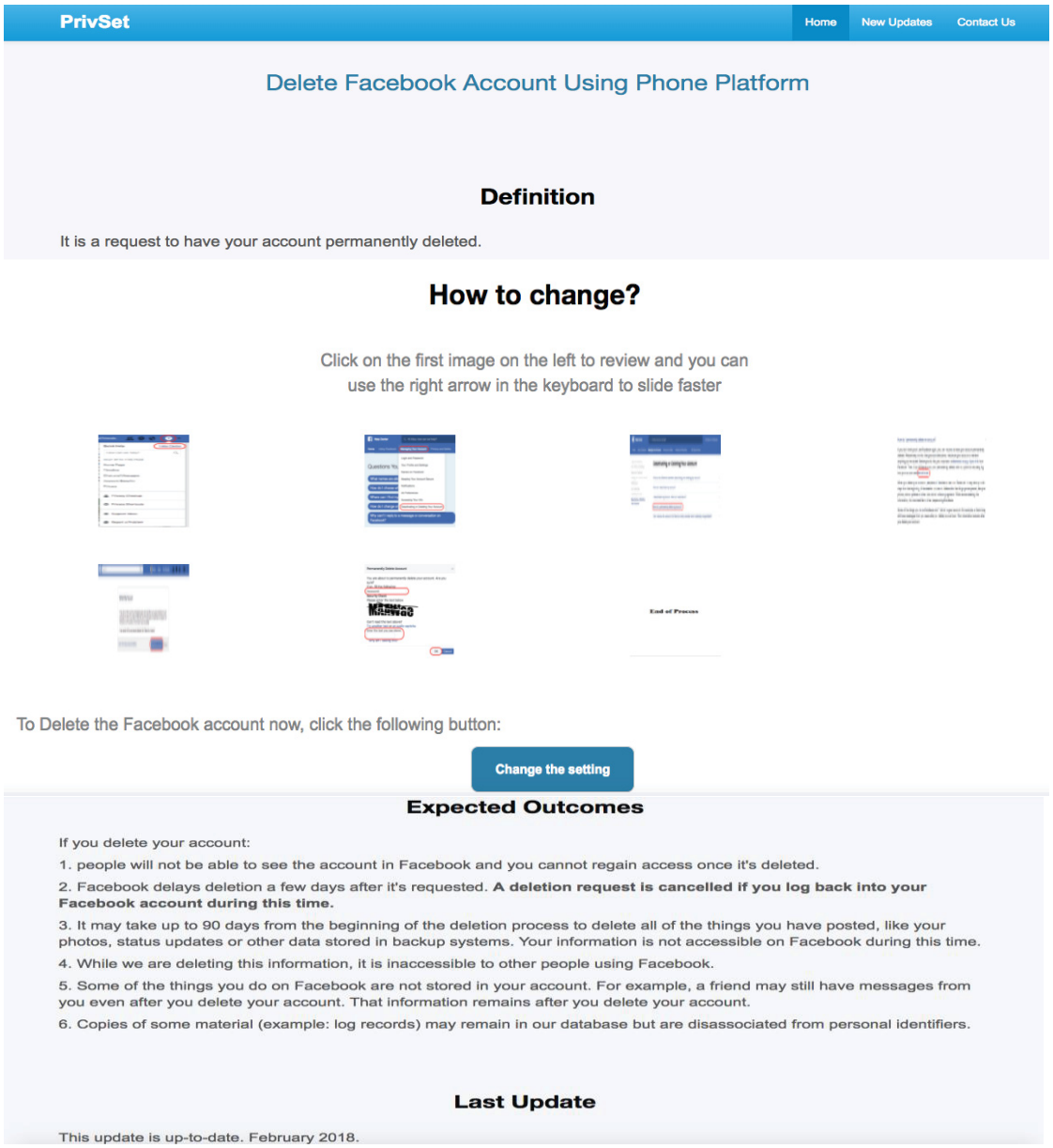


Figure 7.5: Applicable platforms in SNSs

After choosing a specific platform, the PrivSet application will only presents information about deleting Facebook (Figure 7.6). In this page, the first subsection is the definition of the selected feature (e.g. Delete the Facebook account). Next, the PrivSet application displays all the processes of deleting a Facebook account in two ways. First, the users can delete the account following steps using high-quality images that include highlighted red circles to indicate where the users should click before they proceed to the next image. The users will click on the first image on the left and then go through the images one by one using the right arrow key in the keyboard. I configured a modal image gallery called Lightbox to attractively present the images.



1. https://www.facebook.com/help/250563911970368?helpref=hc_global_nav

Figure 7.6: Understand and change the "Delete" feature in Facebook, and find new updates

Second, they can click on the “Change the setting” button and it directs the users to the exact deletion page inside Facebook. In order to assure that the users achieve proper outcomes, I added a subsection called “Expected Outcomes” to assist the user to observe the result after changing the setting. Moreover, a subsection that provides information about the update of the setting is included to show the date and time of that update and assure that the user is managing an up-to-date setting. Eventually, the user has the right to ensure that all of the information that has been provided in the PrivSet application is accurate. In order to convince SNS users that the PrivSet application can be a trusted source of information to learn about and manage the settings, all the information provided in the application are derived from the SNS help centers and there are no other resources used to explain the settings or inline features controls. The users would trust the application because they will be directed to the resources provided in SNSs to check the information accuracy.

7.2 Study Design

I examined the usability of the PrivSet application using one-on-one mixed method approach (qualitative and quantitative). The study comprised tasks, a post-task questionnaire, and a semi-structured interview. I analyzed the collected data using general descriptive statistics and a one-way between subject ANOVA. The test statistic determines whether the means of the time to complete tasks, successful completion of tasks, and number of wrong clicks in the two groups (***Without*** PrivSet and ***With*** PrivSet) are significantly different [61]. Moreover, I used tools such as Dal Opinio, SPSS, Microsoft Excel, and Nvivo to analyze and code the gathered data. Before starting the study, an approval from the Dalhousie University Ethics Board was obtained and it is included in (Appendix D1).

7.2.1 Sample Size and Eligibility

The sample size will be 20-30 SNS users. According to Jackob Nielson [48], there is no specific sample size to evaluate the usability of a system. He recommended that if a quantitative method is included, at least 20 participants should be examined. Thus, I recruited 30 SNS users who are currently using or have used Facebook, Twitter, and Instagram (all of them) and personally manage their settings and inline features controls. I

believe that this number is sufficient to acquire accurate and robust data and to evaluate the usability of the PrivSet application.

7.2.2 Recruitment, Duration, and Study Setting

I began recruiting by following the Dalhousie University Ethics Board approval from March 23rd, 2018 to May 2018 (3 months' duration). The participants completed the tasks on the researcher's devices, thus they did not need to bring their own devices. They completed the tasks on accounts established for this study, thus they did not use their own accounts. I sought participants who are part of the general Dalhousie University community or public including students, staff, faculty, and friends. The study was conducted in one of the meeting rooms located in the Killam library (at Dalhousie University). The participants first met with the researcher to go over the study details and give consent to participate in the study. The participants' comments and feedback were audio and screen recorded. The study session took 60-90 minutes to be completed and the participants were compensated $10 for their participation. This study is a two-way of communication between the participant and the lead researcher, thus the researcher was always available during the study session to answer any questions that the participants may have or address any problem they may encounter. All the data will be kept confidential.

7.2.3 Study Process

The study consisted of three phases: tasks, a post-task questionnaire, and a semi-structured interview. The study duration to complete the tasks took about 45-60 minutes, 10-15 minutes to complete the post-task questionnaire, and 10 minutes to complete the semi-structured interview.

Task Phase

The participants were asked to complete five tasks; 15 participants completed the tasks without using the PrivSet application and then apply the same tasks while using the PrivSet application. However, a different group of 15 participants completed the tasks using the PrivSet application and then applies the same tasks without using the PrivSet application (Table 7.2). The participants had the chance to experience all of the features in the PrivSet application and explore as much as possible of its strengths and weaknesses when completing the tasks.

Table 7.2: Descriptions of the five tasks

Facebook
Scenario: You have an issue with privacy in Facebook and you have decided to permanently delete your account. • **Task 1:** Delete "Alice PrivSet" Facebook account.
Twitter
Scenario 1: If you regularly visit specific websites or search about specific topic, Twitter might suggest accounts that frequently Tweet about that topic or show you ads related to the visited website. • **Task 1:** Disable the option that allow "Alice PrivSet" Twitter account to show you ads based on visited websites.
Scenario 2: TwitPic is a website and application that allowed users to post pictures to the Twitter microblogging service. • **Task 2:** Post a picture using TwitPic application to "Alice PrivSet" Twitter account.
Instagram
Scenario 1: Authorized Apps in Instagram are third-party applications that are used to control and analyze your content in Instagram such as HootSuite, Unfollowgram, GramGrab, and FollowGram. • **Task 1:** Revoke the authorized app "HootSuite" in "Alice PrivSet" Instagram account.
Scenario 2: You decided to create a new location for a new business on Instagram (Let's call it "Instagram(P#) New Business"). • **Task 2:** Create a new location for your business in "Alice PrivSet" Instagram account.

The participants were randomly assigned into the two groups. The tasks were counterbalanced in order to account for the order effect by rotating the tasks' orders for every five participants. In addition, I had recording issues for P1 and P6, thus I recruited different two participants and shifted them to the second set of participants (Table 7.3).

Table 7.3: Order of Tasks

The following participants completed the tasks ***Without*** PrivSet (i.e. Only settings) and then used the PrivSet application	
P2, P3, P4, P5, P7	**Tasks:** Facebook, Twitter, Instagram
P1, P6, P8, P9, P10	**Tasks:** Twitter, Facebook, Instagram
P11, P12, P13, P14, P15	**Tasks:** Instagram, Twitter, Facebook
The following participants completed the tasks ***With*** PrivSet and then ***Without*** PrivSet (i.e. Only settings)	
P16, P17, P18, P19, P20	**Tasks:** Facebook, Instagram, Twitter
P21, P22, P23, P24, P25	**Tasks:** Twitter, Instagram, Facebook
P26, P27, P28, P29, P30	**Tasks:** Instagram, Facebook, Twitter

Post-Task Questionnaire

When the participants completed all the tasks, I asked them to complete the post-task questionnaire (Appendix D2). The post-task questionnaire includes background questions, general question (Based on 15 factors obtained in chapter 4), perceived usefulness questions, and perceived ease of use questions. I adapted the Technology Acceptance Model (TAM) questionnaire as a reference and guide to design our questionnaire [15]. TAM, which was introduced by Davis [14], is one of the most commonly employed models to evaluate technology acceptance. I adjusted and customized its questionnaires to only study the PU (Perceived Usefulness) and PEOU (Perceived Ease of Use) of the PrivSet applications. The ***Dal Opinio*** survey software was used to collect the data.

Semi-structure Interview

After the completion of the post-task questionnaire, the participants were asked to answer short interview questions (Appendix D3). The main goal was to identify the weaknesses and strengths of the PrivSet application and to gather descriptive recommendations for improvements.

7.3 Results

7.3.1 Tasks

I analyzed the data using a one-way between-subject ANOVA. I used the IBM SPSS Statistics 22 to calculate the descriptive statistics and ANOVA for equality of means. *Without* and *With* PrivSet are the independent variables while the time to complete the task, completion of the task, and error rates are the dependent variables. Moreover, I examined the effect size of the means using partial eta squared η^2 (for ANOVA, the difference of the groups means based on variances) [73].

Time of tasks completion

The following findings represent the time to complete the tasks (*efficiency*) and the time is represented in ***seconds***:

Facebook Task

The descriptive statistics across the two groups are reported in (Table 7.4). The results showed that The *Without* PrivSet group was associated with a higher mean of time to complete the task (M = 210.20, SD = 117.195, Min= 83, Max= 497). By comparison, the

With PrivSet group was associated with a lower mean of time to complete the task (*M* = 84.53, *SD* = 33.857, *Min*= 50, *Max*= 168). Prior to conducting test statistics, the two groups distributions were normal since the two groups distributions were associated with skew and kurtosis less than |2.0| and |9.0|, respectively [54][82].

Table 7.4: Descriptive statistics for Facebook task between the two groups (Time of tasks completion)

	Groups	N	Mean	Std. Dev	Minimum	Maximum	Skewness	Kurtosis
Facebook Task	**Without PrivSet**	15	210.20	117.195	83	497	1.088	0.960
	With PrivSet	15	84.53	33.857	50	168	1.647	2.318

To test the hypothesis that the two groups are associated with statistically significantly different means of time to complete the Facebook task, a between-groups ANOVA was also performed. The independent between-groups ANOVA demonstrates a statistically significant effect of the time to complete the Facebook task between the two groups (F (1,28) = 15.919, P<.000 (Table 7.8), $\eta^2 = 0.362$ (Appendix D4)). Thus, the null hypothesis of no differences between the means was rejected, and 36.2% of the variance in time (effect size) was accounted for by the groups. It can be observed that participants who used the PrivSet application completed the Facebook task with less time than the participants who used the settings without the PrivSet application. In addition, I assessed the magnitude of difference in the Facebook task's time (effect size) to identify the partial eta squared (η^2) via using IBM SPSS Statistics 22. The partial eta squared shows the proportion of variance in the dependent variable that is explained by the independent variable. The range of values for a partial eta squared is between 0 to 1 [73][81]. In Facebook task, the partial eta squared ($\eta^2 = 0.362$) is very large since the effect sizes for partial eta squared is valued as follow; (0.01) is small, (0.06) is medium, and (0.14) is large [46]. To illustrate this, 0.362 indicates that only 36.2% of the variance in the dependent variable (i.e. time to complete the Facebook task) is accounted for by the independent variable (i.e. two groups).

Twitter Task1

The descriptive statistics across the two groups are reported in (Table 7.5). The *Without* PrivSet group was associated with a higher mean of time to complete the task (*M* = 169.33, *SD* = 58.25, *Min*= 89, *Max*= 285) and the *With* PrivSet group was associated with a lower mean of time to complete the task (*M* = 63.33, *S*D = 17.94, *Min*= 30, *Max*= 95).

Table 7.5: Descriptive statistics for Twitter task1 between the two groups (Time of tasks completion)

	Groups	N	Mean	Std. Dev	Minimum	Maximum	Skewness	Kurtosis
Twitter Task1	**Without PrivSet**	15	169.33	58.25	89	285	0.635	-.482
	With PrivSet	15	63.33	17.94	30	95	0.269	-0.217

The independent between-groups ANOVA demonstrates a statistically significant effect of time to complete Twitter task1 between the two groups (F (1,28) = 45.372, P<.000 (Table 7.8), η^2 = 0.618 (Appendix D4)). Therefore, the null hypothesis of no differences between the means of the time to complete the task was rejected, and 61.8% of the variance in time (effect size) was accounted for by the groups. It can be observed that the participants who used the PrivSet application completed the task with less time than participants who used the settings without the PrivSet application. In addition, I assessed the magnitude of difference in the Twitter task1's time (effect size) to identify the partial eta squared (η^2). In Twitter task1, the partial eta squared (η^2 = 0.618) is very large. This value indicates that 61.8% of the variance in the dependent variable (i.e. time to complete Twitter task1) is accounted for by the independent variable (i.e. two groups).

Twitter Task2

The descriptive statistics across the two groups are reported in (Table 7.6). The *Without* PrivSet group was associated with a higher mean of time to complete the task (M = 168.07, SD = 62.15, Min= 96, Max= 311) and the *With* PrivSet group was associated with a lower mean of time to complete the task (M = 43.60, SD = 15.50, Min= 24, Max= 80).

Table 7.6: Descriptive statistics for Twitter task2 between the two groups (Time of tasks completion)

	Groups	N	Mean	Std. Dev	Minimum	Maximum	Skewness	Kurtosis
Twitter Task2	**Without PrivSet**	15	168.07	62.15	96	311	0.954192	0.303877
	With PrivSet	15	43.60	15.50	24	80	0.770151	0.563862

The independent between-groups ANOVA demonstrates a statistically significant effect of the time to complete Twitter task2 between the two groups (F (1,28) = 56.636, P<.000 (Table 7.8), η^2 = 0.669 (Appendix D4)). Therefore, the null hypothesis of no differences between the means of time to complete the task was rejected, and 66.9% of the variance in time (effect size) was accounted for by the groups. It can be observed that the participants who used the PrivSet application completed the task with less time than the

participants who used the settings without the PrivSet application. In addition, I assessed the magnitude of difference in the Twitter task2's time (effect size) to identify the partial eta squared (η^2). In Twitter task2, the partial eta squared ($\eta^2 = 0.618$) is very large. This value indicates that 66.9% of the variance in the dependent variable (i.e. time to complete Twitter task2) is accounted for by the independent variable (i.e. two groups).

Instagram Task1

The descriptive statistics across the two groups are reported in (Table 7.7). The *Without* PrivSet group was associated with a higher mean of time to complete the task (*M* = 124.33, *SD* = 113.29, *Min*= 14, *Max*= 361) and the *With* PrivSet group was associated with a lower mean of time to complete the task (*M* = 32.13, *SD* = 14.65, *Min*= 7, *Max*= 52).

Table 7.7: Descriptive statistics for Instagram task1 between the two groups (Time of tasks completion)

	Groups	N	Mean	Std. Dev	Minimum	Maximum	Skewness	Kurtosis
Instagram Task1	Without PrivSet	15	124.33	113.287	14	361	.743	-.640
	With PrivSet	15	32.13	14.648	7	52	-.544	-.871

The independent between-groups ANOVA demonstrates a statistically significant effect of the time to complete Instagram task1 between the two groups (F (1,28) = 9.772, P<.004 (Table 7.8), $\eta^2 = 0.259$ (Appendix D4)). Thus, the null hypothesis of no differences between the means of time was rejected, and 25.9% of the variance in time (effect size) was accounted for by the groups. It can be observed that participants who used the PrivSet application completed the task with less time than participants who used the settings without the PrivSet application. Moreover, I assessed the magnitude of difference in the Instagram task1's time (effect size) to identify the partial eta squared (η^2). In Instagram task1, the partial eta squared ($\eta^2 = 0.259$) is large. This value indicates that 25.9% of the variance in the dependent variable (i.e. time to complete Instagram task1) is accounted for by the independent variable (i.e. two groups).

Instagram Task2

The descriptive statistics across the two groups are reported in (Table 7.8). The *Without* PrivSet group was associated with a higher mean of time to complete the task (*M* = 264.73, *SD* = 103.87) and the *With* PrivSet group was associated with a lower mean of time to complete the task (*M* = 253.60, *SD* = 47.11).

Table 7.8: Descriptive statistics for Instagram task2 between the two groups (Time of tasks completion)

	Groups	N	Mean	Std. Dev	Minimum	Maximum	Skewness	Kurtosis
Instagram Task2	**Without PrivSet**	15	264.73	103.872	134	488	1.166	.839
	With PrivSet	15	253.60	47.112	169	326	-.490	-.558

The independent between-groups ANOVA demonstrates that there is no a statistically significant effect of the time to complete Instagram task2 between the two groups (F (1,28) = .143, P>.708 (Table 7.8), η^2 = 0.005 (Appendix D4)). Thus, the null hypothesis of no differences between the means of time was not rejected, and 0.5% of the variance in time (effect size) was accounted for by the groups. It can be observed that the participants who used the PrivSet application completed the task with less time than the participants who used the settings without the PrivSet application; however, the difference between the groups' means of time are very small. Further, I assessed the magnitude of difference in the Instagram task2's time (effect size) to identify the partial eta squared (η^2). In Instagram task2, the partial eta squared (η^2 = 0.005) is very small. This value indicates that 0.5% of the variance in the dependent variable (i.e. time to complete Instagram task2) is accounted for by the independent variable (i.e. two groups).

Table 7.9: t-values (*t*), f-value (*f*), and Significant levels (p) for the time to complete all the tasks

	Independent between-groups ANOVA	
	F	***P(f)***
Facebook Task	15.919	<.000
Twitter Task1	45.372	<.000
Twitter Task2	56.636	<.000
Instagram Task1	9.772	<.004
Instagram Task2	.143	>.708

A graphical representation of the time of completion of all the task means is displayed in the following (Figure 7.7).

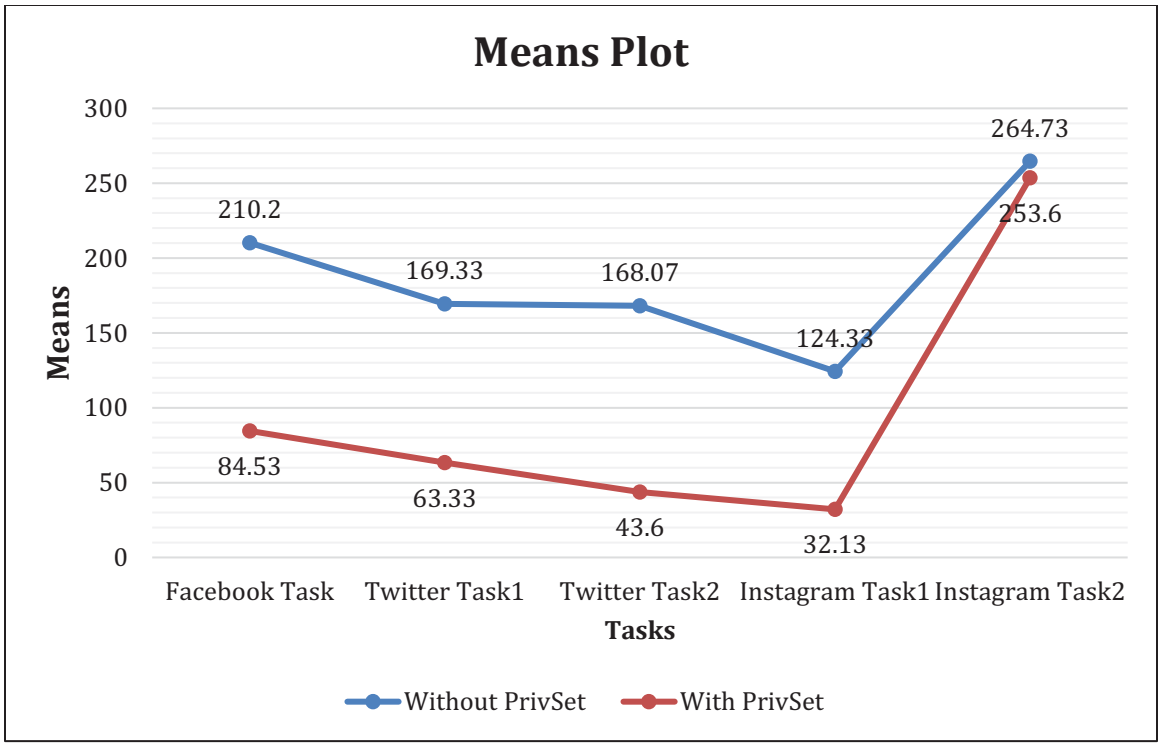


Figure 7.7: Means plot of the time completion of all the tasks

Successful completion of tasks

I analyzed the successful completion of tasks using IBM SPSS Statistics 22 with only two values; Incomplete represented as (1) and Complete represented as (2). The following findings represent the completed and uncompleted tasks:

Table 7.10: Means and Standard Deviations (SD), t-values (t), f-value (f), and Significant levels (p) for the successful completion of all the tasks

	Means and Std. Dev			Chi-Square		ANOVA	
	Groups	***Mean***	***SD***	***Value***	***P-value***	***F***	***P(f)***
Facebook Task	**Without PrivSet**	1.13	.352	22.94	<.000	91	<.000
	With PrivSet	2	0				
Twitter Task1	**Without PrivSet**	1.07	.258	26.25	<.000	196	<.000
	With PrivSet	2	0				
Twitter Task2	**Without PrivSet**	1.07	.258	26.25	<.000	196	<.000
	With PrivSet	2	0				
Instagram Task1	**Without PrivSet**	1.53	.516	9.13	<.003	12.25	<.002
	With PrivSet	2	0				
Instagram task2	**Without PrivSet**	1	0	30	<.000	N/A	N/A
	With PrivSet	2	0				

Facebook Task

The descriptive statistics across the two groups are reported in (Table 7.10). The mean and standard deviation of the task completion in the *Without* PrivSet group was (M = 1.13, SD =.352) while in the *With* PrivSet group was (M = 2, SD = 0). The independent between-groups ANOVA demonstrates a statistically significant effect of the successful completion of Facebook task between the two groups (F (1,28) = 91, P<.000 (Table 7.9), η^2 = 0.765 (Appendix D4)). Therefore, the null hypothesis of no differences between the means of successful completion of Facebook task was rejected, and 76.5% of the variance in the successful completion of the task (effect size) was accounted for by the groups. It can be observed that the participants who used the PrivSet application successfully completed the task more than the participants who used the settings without the PrivSet application. In addition, I assessed the magnitude of difference in the successful completion of Facebook task (effect size) to identify the partial eta squared (η^2). In Facebook task, the partial eta squared (η^2 = 0.765) is very large. This value means that 76.5% of the variance in the dependent variable (i.e. successful completion of the task) is accounted for by the independent variable (i.e. two groups).

In addition, we conducted a Chi-Squared test to determine whether there is a significant difference between the two groups in terms of successfully completing the Facebook task. In the *Without* PrivSet group, 86.7% of the participants did not successfully complete the Facebook task while 13.3% successfully completed the task. In the *With* PrivSet group, all the participants successfully completed the task (Appendix D4). These differences were statistically significant (χ^2 (1) = 22.94, P<0.000). Further, Cohen [9] demonstrated the effect size of Phi and Carmer's V as follow: (0.1) is a small effect, (0.3) is a medium effect, and (0.5) is a large effect. The Phi and Carmer's value is (φ_c = 0.87, P<.000) which indicates that the strength of association between the variables is very large (Appendix D4).

Twitter Task1 and Task2

Twitter Task1 and Task2 have exactly the same results regarding the successful completion of tasks, thus the results of both test statistics are identical. The descriptive statistics across the two groups are reported in (Table 7.10). The mean and standard deviation of the task completion in the *Without* PrivSet group was (M = 1.07, SD =.258) while in the *With* PrivSet group was (M = 2, SD = 0). The independent between-groups ANOVA

demonstrates a statistically significant effect of the successful completion of both tasks between the two groups (F (1,28) = 196, P<.000 (Table 7.9), η^2 = 0.875 (Appendix D4)). Thus, the null hypothesis of no differences between the groups' means of both tasks was rejected, and 87.5% of the variance in the successful completion of the task (effect size) was accounted for by the groups. It can be observed that participants who used the PrivSet application completed the two tasks more than the participants who used the settings without the PrivSet application. Furthermore, I assessed the magnitude of difference in the successful completion of Twitter task1 and task2 (effect size) to identify the partial eta squared (η^2). In Twitter task1 and task2, the partial eta squared (η^2 = 0.875) is very large. This value indicates that 87.5% of the variance in the dependent variable (i.e. successful completion of the tasks) is accounted for by the independent variable (i.e. two groups).

Moreover, we conducted a Chi-Squared test to determine whether there is a significant difference between the two groups in terms of successfully completing the Twitter Task1 and Task2. In the *Without* PrivSet group, 93.3% of the participants did not successfully complete the Facebook task while 6.7% successfully completed the task. In the *With* PrivSet group, all the participants successfully completed the task (Appendix D4). These differences were statistically significant (χ^2 (1) = 26.25, P<0.000). Further, the Phi and Carmer's value is (φ_c = 0.93, P<.000) which indicates that the strength of association between the variables is very large (Appendix D4).

Instagram Task1

The descriptive statistics across the two groups are reported in (Table 7.10). The mean and standard deviation of successful completion of Instagram task1 in the *Without* PrivSet group was (M = 1.53, SD =.516) while in the *With* PrivSet group was (M = 2, SD = 0). The independent between-groups ANOVA demonstrates a statistically significant effect of the successful completion of Instagram task1 between the two groups (F (1,28) = 12.250, P<.002 (Table 7.9), η^2 = 0.304 (Appendix D4)). Thus, the null hypothesis of no differences between the means of the successful completion of the task was rejected, and 30.4% of the variance in the successful completion of this task (effect size) was accounted for by the groups. It can be observed that the participants who used the PrivSet application successfully completed the task more than the participants who used the settings without the PrivSet application. In addition, I assessed the magnitude of difference in the successful

completion of Instagram task1 (effect size) to identify the partial eta squared (η^2). In Instagram task1, the partial eta squared ($\eta^2 = 0.304$) is very large. This value indicates that 30.4% of the variance in the dependent variable (i.e. successful completion of the task) is accounted for by the independent variable (i.e. two groups).

Additionally, we conducted a Chi-Squared test to determine whether there is a significant difference between the two groups in terms of successfully completing the Instagram Task1. In the *Without* PrivSet group, 46.7% of the participants did not successfully complete the Facebook task while 53.3% successfully completed the task. In the *With* PrivSet group, all the participants successfully completed the task (Appendix D4). These differences were statistically significant (χ^2 (1) = 9.13, P<0.003). Further, the Phi and Carmer's value is ($\varphi_c = 0.55$, P<.003) which indicates that the strength of association between the variables is large (Appendix D4).

Instagram Task2

All the participants were not able to complete this task in the *Without* PrivSet group while all the participants completed this task in the *With* PrivSet group. Thus, performing the between-groups ANOVA is not applicable because there is no variance to analyze. However, we conducted a Chi-Squared test to determine whether there is a significant difference between the two groups in terms of successfully completing the Instagram Task2. In the *Without* PrivSet group, all of the participants did not successfully complete the Facebook task. In the *With* PrivSet group, all the participants successfully completed the task (Appendix D4). These differences were statistically significant (χ^2 (1) = 30, P<0.000). Further, the Phi and Carmer's value is ($\varphi_c = 1$, P<.000) which indicates that the strength of association between the variables is extremely large (Appendix D4).

A graphical representation of the means of the successful completion of all the tasks is displayed in the following (Figure 7.8).

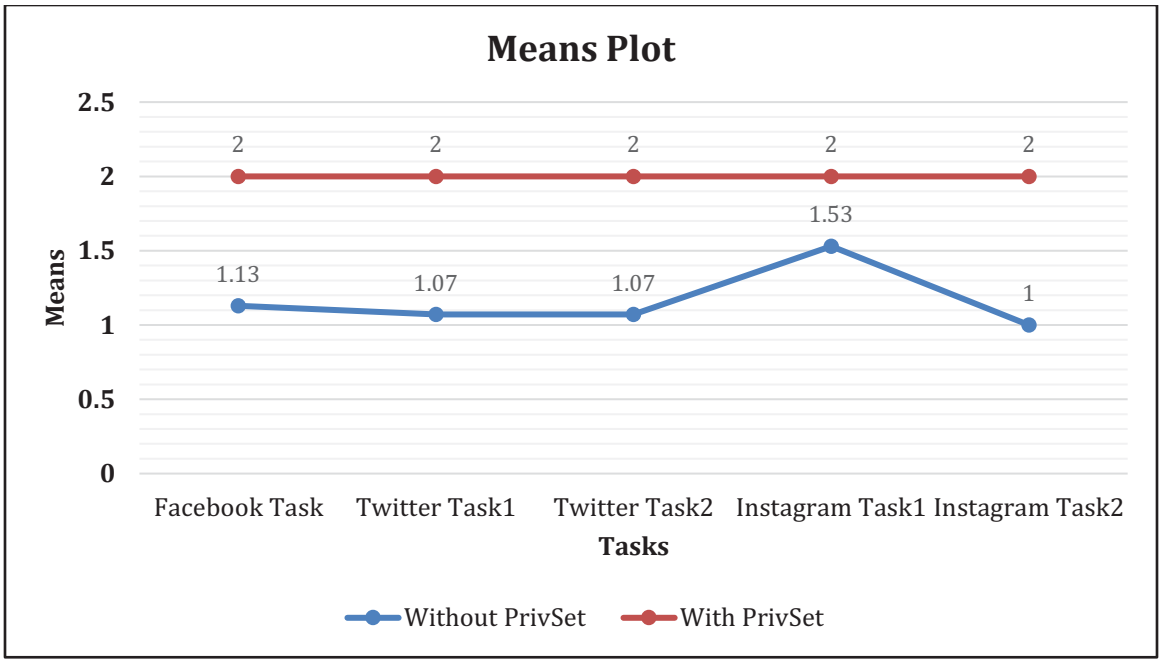


Figure 7.8: Means plot of the successful completion of all tasks

Error rates (number of wrong clicks)

I analyzed the number of wrong clicks (i.e., Error Rates) while applying the tasks using IBM SPSS Statistics 22. The following findings represent the wrong clicks observed in each task:

Table 7.11: Means, Standard Deviations (SD), Minimum, Maximum, t-values (t), f-value (f), and Significant levels (p) for the number of clicks in all the tasks

	Means and Std. Dev					ANOVA	
	Groups	***Mean***	***SD***	***Min***	***Max***	***F***	***P(f)***
Facebook Task	**Without PrivSet**	10.13	11.08	2	48	11.69	<.002
	With PrivSet	0.33	0.62	0	2		
Twitter Task1	**Without PrivSet**	7.60	2.82	2	12	100.87	<.000
	With PrivSet	0.20	0.41	0	1		
Twitter Task2	**Without PrivSet**	5.07	2.12	3	10	73.46	<.000
	With PrivSet	0.27	0.46	0	1		
Instagram Task1	**Without PrivSet**	6.40	7.60	0	28	10.62	<.003
	With PrivSet	0	0	0	0		
Instagram Task2	**Without PrivSet**	18.07	7.19	7	35	89.27	<.000
	With PrivSet	0.47	0.52	0	1		

Facebook Task

The descriptive statistics across the two groups are reported in (Table 7.11). The *Without* PrivSet group was associated with a higher mean of number of wrong clicks (*M* = 10.13, *SD* = 11.08, *Min*= 2, *Max*= 48) and the *With* PrivSet group was associated with a lower mean of number of wrong clicks (*M* = 0.33, *S*D = 0.62, *Min*= 0, *Max*= 2). The independent between-groups ANOVA demonstrates a statistically significant effect of the number of wrong clicks in Facebook task between the two groups (*F* (1,28) = 11.691, *P*<.002 (Table 7.10), $\eta^2 = 0.295$ (Appendix D4)). Thus, the null hypothesis of no differences between the means of the number of wrong clicks was rejected, and 29.5% of the variance in the number of wrong clicks (effect size) was accounted for by the groups. It can be observed that the participants who used the PrivSet application had less number of wrong clicks than the participants who used the settings without the PrivSet application. In addition, I assessed the magnitude of difference of the number of wrong clicks in Facebook task (effect size) to identify the partial eta squared (η^2). In Facebook task, the partial eta squared ($\eta^2 = 0.295$) is large. This value indicates that 29.5% of the variance in the dependent variable (i.e. number of wrong clicks) is accounted for by the independent variable (i.e. two groups).

Twitter Task1

The descriptive statistics across the two groups are reported in (Table 7.11). The *Without* PrivSet group was associated with a higher mean of number of wrong clicks (*M* = 7.60, *SD* = 2.82, *Min*= 2, *Max*= 12) and the *With* PrivSet group was associated with a lower mean of number of wrong clicks (*M* = 0.20, *SD* = 0.41, *Min*= 0, *Max*= 1). The independent between-groups ANOVA demonstrates a statistically significant effect of the number of wrong clicks between the two groups (*F* (1,28) = 100.874, *P*<.000 (Table 7.10), $\eta^2 = 0.783$ (Appendix D4)). Thus, the null hypothesis of no differences between the number of wrong clicks' means was rejected, and 78.3% of the variance in the number of wrong clicks (effect size) was accounted for by the groups. It can be observed that the participants who used the PrivSet application had less number of wrong clicks than the participants who used the settings without the PrivSet application. In addition, I assessed the magnitude of difference in the number of wrong clicks (effect size) to identify the partial eta squared (η^2). In Twitter task1, the partial eta squared ($\eta^2 = 0.783$) is very large. This value indicates that 78.3% of

the variance in the dependent variable (i.e. number of wrong clicks) is accounted for by the independent variable (i.e. two groups).

Twitter Task2

The descriptive statistics across the two groups are reported in (Table 7.11). The *Without* PrivSet group was associated with a higher mean of number of wrong clicks (*M* = 5.07, *SD* = 2.12, *Min*= 3, *Max*= 10) and the *With* PrivSet group was associated with a lower mean of number of wrong clicks (*M* = 0.27, *SD* = 0.46, *Min*= 0, *Max*= 1). The independent between-groups ANOVA indicated a statistically significant effect of the number of wrong clicks between the two groups (*F* (1,28) = 73.457, *P*<.000 (Table 7.10), η^2 = 0.724 (Appendix D4)). Thus, the null hypothesis of no differences between the number of wrong clicks' means was rejected, and 72.4% of the variance in the number of wrong clicks (effect size) was accounted for by the groups. It can be observed that participants who used the PrivSet application had less number of wrong clicks than participants who used the settings without the PrivSet application. In addition, I assessed the magnitude of difference in the number of wrong clicks (effect size) to identify the partial eta squared (η^2). In Twitter task2, the partial eta squared (η^2 = 0.724) is very large. This value means that 72.4% of the variance in the dependent variable (i.e. number of wrong clicks) is accounted for by the independent variable (i.e. two groups).

Instagram Task1

The descriptive statistics across the two groups are reported in (Table 7.11). The *Without* PrivSet group was associated with a higher mean of number of wrong clicks (*M* = 6.40, *SD* = 7.60, Min= 0, Max= 28) and the *With* PrivSet group has no wrong clicks. The independent between-groups ANOVA demonstrates a statistically significant effect of the number of wrong clicks between the two groups (*F* (1,28) = 10.625, *P*<.003 (Table 7.10), η^2 = 0.275 (Appendix D4)). Thus, the null hypothesis of no differences between the number of wrong clicks' means was rejected, and 27.5% of the variance in the number of wrong clicks (effect size) was accounted for by the groups. It can be observed that the participants who used the PrivSet application had less number of wrong clicks than the participants who used the settings without the PrivSet application. In addition, I assessed the magnitude of difference in the number of wrong clicks (effect size) to identify the partial eta squared (η^2). In Instagram task1, the partial eta squared (η^2 = 0.275) is very large. This value means

that 27.5% of the variance in the dependent variable (i.e. number of wrong clicks) is accounted for by the independent variable (i.e. two groups).

Instagram Task2

The descriptive statistics across the two groups are reported in (Table 7.11). The *Without* PrivSet group was associated with a higher mean of number of wrong clicks (M = 18.07, SD = 7.20, Min= 7, Max= 35) and the *With* PrivSet group was associated with a lower mean of number of wrong clicks (M = 0.47, SD = 0.52, Min= 0, Max= 1). The independent between-groups ANOVA indicated a statistically significant effect of the number of wrong clicks between the two groups (F (1,28) = 89.272, P<.000 (Table 7.10), η^2 = 0.761 (Appendix D4)). Thus, the null hypothesis of no differences between the means of the number of wrong clicks was rejected, and 76.1% of the variance in the number of wrong clicks (effect size) was accounted for by the groups. It can be observed that the participants who used the PrivSet application had less number of wrong clicks than the participants who used the settings without the PrivSet application. In addition, I assessed the magnitude of difference in number of wrong clicks (effect size) to identify the partial eta squared (η^2). In Instagram task2, the partial eta squared (η^2 = 0.761) is very large. This value indicates that 76.1% of the variance in the dependent variable (i.e. number of wrong clicks) is accounted for by the independent variable (i.e. two groups).

A graphical representation of the error rates (number of wrong clicks of all the task) means is displayed in the following (Figure 7.9).

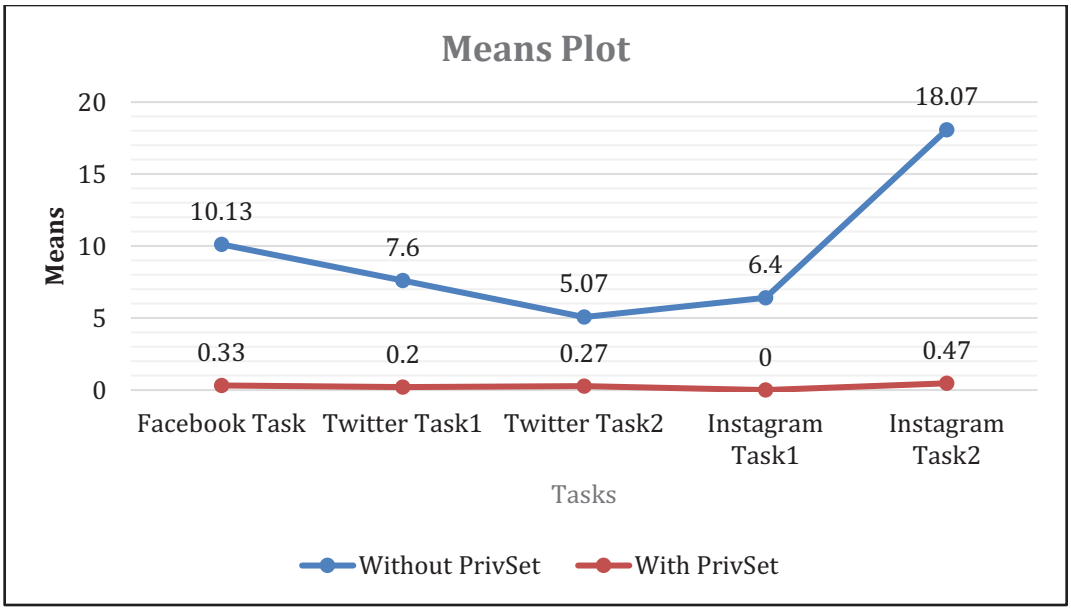


Figure 7.9: Means plot of error rates (number of wrong clicks of all tasks)

7.3.2 Post-Task Questionnaire

Initially, I asked the participants general questions about the PrivSet application according to the 15 factors - discussed in chapter 4 and 5 - that impact SNS users when attempting to learn about and manage settings and inline features controls (Appendix D5). All questions used 7 points Likert scale coded as Strongly Agree (1), Agree (2), Somewhat Agree (3), Neither Agree or Disagree (4), Somewhat Disagree (5), Disagree (6), and Strongly Disagree (7). Approximately, 96% of the participants found navigation through the SNS settings is easier when using the PrivSet application (*M*=1.3, *SD*=1.12) and the PrivSet application helped the participants to learn the different categories and sub-categories of the SNS settings (*M*=1.37, *SD*=0.49) (Table 7.12). In fact, the PrivSet application showed the participants existed settings, options, and explanations that they did not know about before in SNSs (*M*=1.23, *SD*=0.5). Thus, the participants emphasized that the PrivSet application is an adequate resource to understand and change the settings, as well as find new updates and there is no need to ask others for help. Further, 83% of the participants found the PrivSet application enough resource and no need to find different online resources (*M*=1.6, i=0.86). It was apparent that more than 90% of the participants used the PrivSet application to shortcut the process when controlling SNS settings which also reduce the time when searching and reading about the settings (*M*=1.43, *SD*=0.86).

The main contribution that can be a huge success of the PrivSet application is providing expected outcomes of the settings and accurate information. Over 93% of the participants indicated that the application would assist them to assure proper outcomes (expected outcomes) (*M*=1.33, *SD*=0.55) and reduce guessing or assuming the meaning or the function of the settings (accurate information) (*M*=1.33, *SD*=0.61). In addition, 83% of the participants denoted that the PrivSet application is suitable for novices as well as experts (*M*=1.73, *SD*=1.2) and it would help them to remember SNS's settings, options, changes, outcomes, and new updates (*M*=2.07, SD=1.34). Although one of the limitations of this study is not evaluating the PrivSet application's notifications about the new updates, more than 90% of the participants showed a favorable impression of providing a specific page for the new updates of the features and settings. They found it interactive to include all the updates in one page and then – based on the new updates' features - they can navigate to learn more about the new updates. Interestingly, 73% of the participants found that the PrivSet application would help to regularly check the settings and new updates and avoid filtering them out (*M*=1.77, *SD*=1.07).

Table 7.12: Distributions and descriptive statistics of the general questions about the PrivSet application according to the obtained factors

Q #	Questions	Mean	SD
1	Navigation through the SNS settings is easier when using PrivSet application.	1.3	1.12
2	PrivSet application helps me to learn the different categories of features and settings (e.g. security and login, privacy, notification, apps, etc.) in SNSs.	1.37	0.49
3	PrivSet application shows me existed settings, options, and explanations that I did not know before in SNSs.	1.23	0.5
4	PrivSet application is an adequate resource to understand, change, and find new updates of the settings without asking others for help.	1.27	0.52
5	PrivSet application provides accurate and enough information that reduce guessing or assuming the meaning and the function of the settings.	1.33	0.61
6	PrivSet application is a shortcut process to understand, change, and find new updates of the settings.	1.43	0.86
7	PrivSet application helps me to search and find the SNS settings and new updates easily.	1.43	0.86
8	PrivSet is enough resource to understand, change, and find new updates about SNS settings and no need to find different resources.	1.6	0.86
9	PrivSet application would help me to remember SNS's settings, options, changes, outcomes, and new updates.	2.07	1.34
10	PrivSet application is suitable for novices and expert users.	1.73	1.2
11	Providing specific page for the new updates of the features and settings is helpful to check the notifications of the new updates.	1.87	1.25

Q #	Questions	Mean	SD
12	The descriptions and definition of the features and settings' meanings in PrivSet application is readable and clear.	1.33	0.8
13	Providing expected outcomes when changing the setting would assist me to guarantee that the changes match my expectations.	1.33	0.55
14	PrivSet application's interface is interactive.	1.43	0.57
15	PrivSet application will help me to regularly check the settings and new updates and do not ignore them.	1.77	1.07

On the other hand, the survey comprised questions that assessed the following usability attributes: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). All questions used 7 points Likert scale coded as Strongly Agree (1), Agree (2), Somewhat Agree (3), Neither Agree or Disagree (4), Somewhat Disagree (5), Disagree (6), and Strongly Disagree (7).

Perceived Usefulness

Most of the questions began with "I think the PrivSet application would (be):". There are 19 questions which include sub-questions specifically in questions 1 – 4. Q1 evaluated the improvements of the participants' performance in terms of understanding and changing the settings, and finding of new updates after using the PrivSet application. Q2 and Q3 examined the perceived usefulness in terms of productiveness. Q4 evaluated the information accuracy provided in the PrivSet application. Q5 – Q11 investigated general usefulness (Table 7.13).

Table 7.13: Distributions and descriptive statistics for Perceived Usefulness questions

Q #	Questions	Mean	SD
1a	Improve my understanding of SNS settings.	1.33	0.61
1b	Improve my way of changing SNS settings.	1.43	0.68
1c	Improve my way of finding SNS settings' new updates	1.57	0.9
2a	Easier to understand SNS settings	1.5	0.82
2b	Easier to change SNS settings.	1.13	0.35
2c	Easier to find new updates of SNS settings.	1.47	0.63
3a	Faster to understand SNS settings	1.4	0.86
3b	Faster to change SNS settings	1.17	0.46
3c	Faster to find new updates of SNS settings.	1.37	0.61
4a	Provide accurate information that I need during the process of understanding the settings.	1.53	0.57
4b	Provide accurate information that I need during the process of changing the settings.	1.37	0.61

Q #	Questions	Mean	SD
4c	Provide accurate information that I need during the process of finding the settings' new updates.	1.5	0.57
5	Provide a feedback in timely manner.	1.8	0.96
6	Enhance my privacy behavior toward SNS settings.	1.63	0.96
7	Help me to complete the desired settings successfully when using SNSs.	1.27	0.52
8	Give me greater control over the settings.	1.5	0.73
9	Address my needs when using SNS settings.	1.47	0.63
10	Save my time.	1.2	0.61
11	Overall, I found PrivSet application useful when using SNS settings.	1.1	0.31

The responses showed a positive impression of the PrivSet application in comparison to the participants' current experience, especially when using the SNS settings without assistance. Most of the responses that the participants provided are in the SA (Strongly Agree) and A (Agree) categories. In addition, most of the means and standard deviations are close to one (Strongly Agree) than seven (Strongly Disagree). Thus, the participants find the PrivSet application useful. The participants assured that the PrivSet application improved understanding of the settings (93%), changing the settings (90%), and finding of settings' new updates (86%). Moreover, over 85% of the participants found that the PrivSet application is easier and faster to understand and change the settings, and find new updates than their current strategies. In terms of information accuracy, more than 90% of the participants found that the PrivSet application provided accurate information that they need during the process of understanding, changing, and finding the settings and new updates (Figure 7.10).

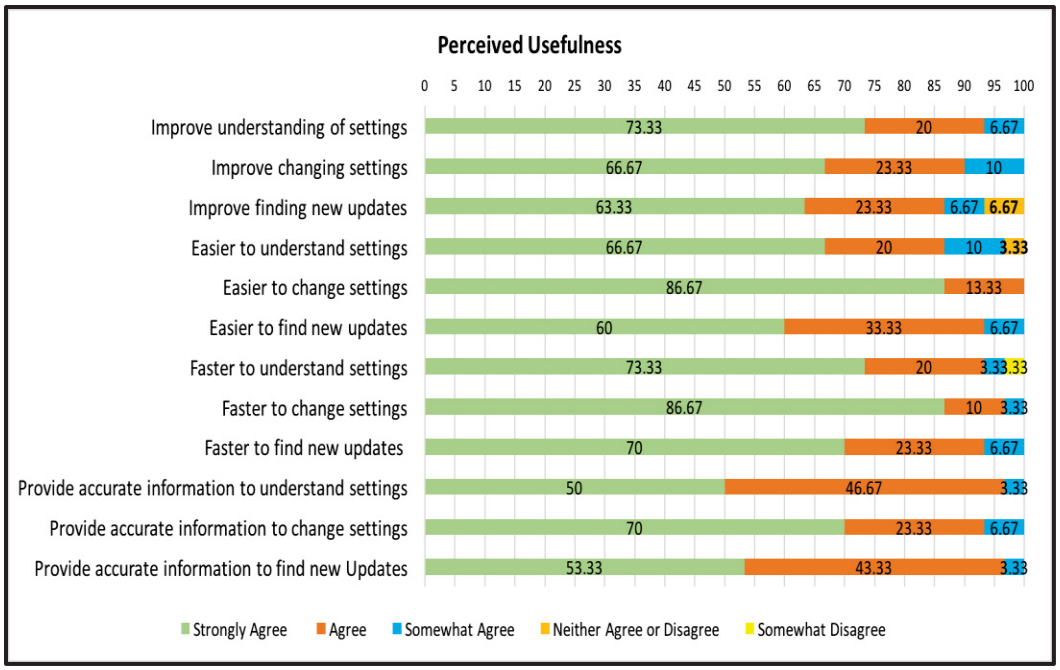


Figure 7.10: The percentages of users' responses regarding the Perceived Usefulness (performance improvements, productiveness, and information accuracy) of the PrivSet application

Likewise, the PrivSet application verified that SNS users would be able to achieve expected outcomes of the settings and new updates. To illustrate this, over 93% of the participants denoted that the PrivSet application would help to successfully complete the desired settings, give full control over the settings, and save their time. Consequently, all the participants found the PrivSet application overall useful when attempting to understand and change the settings, and find new updates (Figure 7.11).

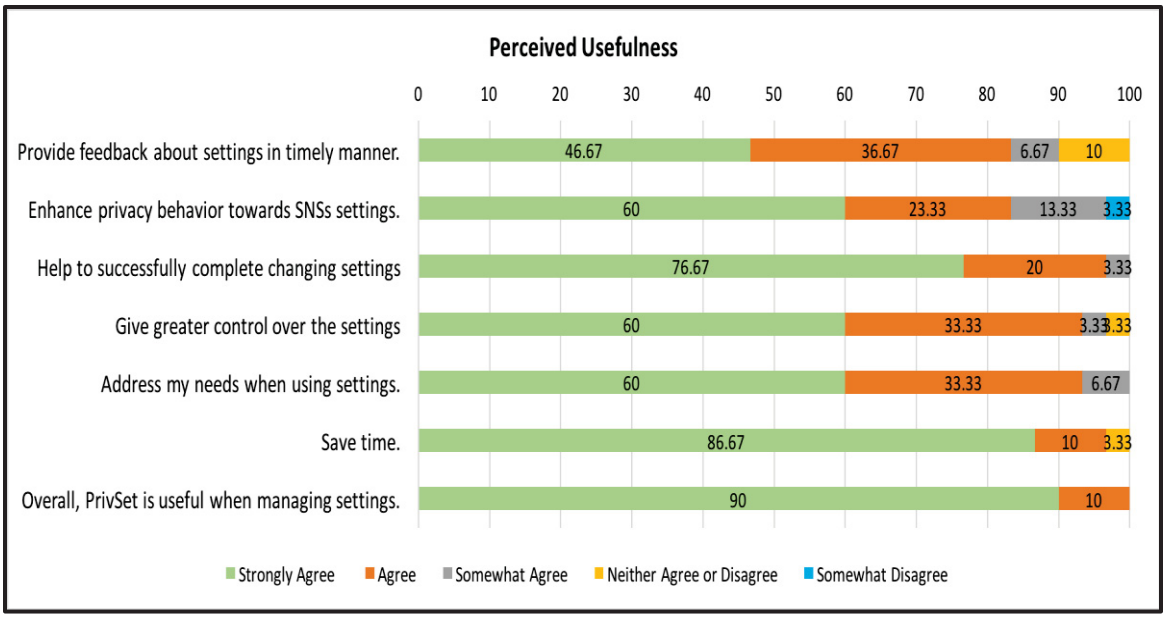


Figure 7.11: The percentages of users' responses regarding perceiving general usefulness of the PrivSet application

Perceived Ease of Use

It comprised 12 questions and the distributions descriptive statistics are presented in (Table 7.14). Q1 examined the learnability; Q2–Q4 evaluated the ease of use in terms of understating, changing, and finding the settings and new updates; Q5 and Q9 examined the competency; Q6 evaluated the memorability; Q7 evaluated error prevention, Q8 investigate the accuracy of the provided information; and Q10-Q12 evaluated the general ease of use.

Table 7.14: Distributions and descriptive statistics for Perceived Ease of Use questions

Q #	Questions	Mean	SD
1	Learning to use PrivSet application was easy for me.	1.3	0.53
2	Understanding the settings via PrivSet application was easy.	1.3	0.53
3	Changing the settings via PrivSet application was easy.	1.17	0.46
4	Finding the settings' new updates via PrivSet application was easy.	1.4	0.77
5	I think it would be easy for me to become skillful at using PrivSet application.	1.3	0.47
6	It would be easy for me to remember how to perform tasks using the PrivSet application	1.5	0.68
7	Whenever I make a mistake while using PrivSet application, I can recover easily and quickly.	1.53	0.97
8	The provided information to understand and change the settings via the PrivSet application was clear.	1.27	0.52

Q #	Questions	Mean	SD
9	I found it easy to get PrivSet application to do what I want it to do.	1.17	0.46
10	My interaction with PrivSet application was flexible.	1.4	0.72
11	PrivSet application provides helpful guidance when performing tasks.	1.33	0.48
12	Overall, I found PrivSet application easy to use.	1.1	0.4

The responses showed a favorable impression of the PrivSet application in comparison to the participants' current experience, especially when using the SNS settings without help. Most of the responses that the participants provided are in the Strongly Agree and Agree categories. In addition, most of the means and standard deviations are close to one (Strongly Agree) than seven (Strongly Disagree). Thus, the participants find the PrivSet application easy to use. Approximately, 96% of the participants found that learning to use the PrivSet application was uncomplicated. Furthermore, the PrivSet application assisted 96% of the participants to easily understand and change the settings; similarly, around 82% of the participants indicated that it was easy to find the new updates of the settings. Moreover, most of the participants (over 96%) denoted that they would become skillful easily when using the PrivSet application and it would allow them to achieve expected outcomes. It would also assist them to easily remember the settings and recover efficiently (less time) and effectively (proper outcomes) in case of an issue occurred with the settings. In terms of information accuracy, over 95% of the participants found that the provided information in the PrivSet is clear in comparison to the information provided in the settings. Consequently, all the participants found the PrivSet application overall easy to use when attempting to understand and change the settings, as well as find new updates.

7.3.3 Semi-Structured Interview

The coding of the transcribed data resulted in ten strengths, two weaknesses, four major categories of enhancements, and a challenge. The following table presented the frequency of strengths and weaknesses (Table 7.15).

Table 7.15: Strengths and weaknesses of the PrivSet application

Strengths	Frequency
1. It takes SNS users through a step by step process.	(26/30)
2. It helps SNS users learn more about the settings and inline	(19/30)

Strengths	Frequency
feature controls	
3. It provides precise and clear information about settings and inline feature controls	(18/30)
4. It saves SNS users' time when attempting to understand and change settings and inline feature controls	(13/30)
5. It assists SNS users to accomplish desired outcomes when changing settings and inline feature controls	(12/30)
6. It makes settings and inline feature controls easy to understand and change	(12/30)
7. It is a simple Interface	(7/30)
8. It is applicable for novices and expert users	(6/30)
9. The PrivSet application's features are continuously available via Google Chrome Plug-in extension	(6/30)
10. It helps SNS users to continually be updated about settings and inline feature controls through the "Last Updates" section	(2/30)
Weaknesses	**Frequency**
1. It is inconvenient to switch between the PrivSet application and SNSs to see the instructions in the images	(3/30)
2. It only targets the active users.	(1/30)

Strengths of PrivSet application

1. It takes SNS users through a step by step process

The majority of the participants (26/30) asserted that the PrivSet application was well-organized. It sequentially presented the features, SNSs, options, platforms, and PSM components. P11 noticed that the PrivSet application narrows the steps down to provide a specific information.

> *"I was very satisfied with that because It doesn't ask you to plug all your information right away. It actually narrows down your needs. For example, whether you use your iPhone or Android, it narrows down that and whether the user wants to use it for Facebook or any program, it narrows again and, at the end, you'll have all the information that a user is looking for and PrivSet gives the right information based on that."*

P23 also stated that the step by step process was not confusing:

"It's not confusing. It takes you through the steps. It doesn't leave anything out and stuff like that. I don't think it's very confusing at all."

Likewise, the participants found that the PrivSet application was easy to navigate. It also assisted them to straightforwardly navigate the settings inside SNSs.

P2 commented:

"I don't have to go to multiple categories of multiple settings. If I'm interested, for example, to post a photo or looking for deleting an account, I will just go directly the thing that I'm interested in without taking the hassle to go to multiple settings to accomplish what I'm looking for."

P21 also denoted:

"The websites [SNSs]make it hard for people to go through those settings, have a lot of text, it's really hard. It's painful and boring to go read some of these lines to try to figure out how to do your settings. This way [PrivSet] it makes it more interactive, more easy to go through"

Interestingly, the following participants highlighted a significant point which is following the steps is simpler than searching for the steps. To illustrate this, the users tended to look for the steps that guide them to understand and change a specific setting; however, the PrivSet application directly guided the users with the detailed steps.

"Following the steps is easier than just looking for the steps. If the steps are in your face and tell you what to do afterwards, it's easier than just trying to navigate through a website that doesn't really give you any answers." (P29)

On the other hand, providing "Change the setting" button which directly opens the desired setting's page without navigation was unique.

P2 stated:

"The other thing that is unique about it is that it takes you directly to the setting that you are looking to change. I don't have to go back through the settings from the beginning to look for example to delete the account because I saw in the pictures it's going to take you a few steps. But with this feature, "change the settings," it takes you directly to the setting itself without going through the settings from the beginning using the real website." (P2)

Furthermore, providing step by step process to understand and change the settings persuaded the participants that they do not need to memorize the steps.

P8 stated:

> *"I can learn step by step and if I forgot the step next time I can come back to see what I forgot in that step. And I don't have to memorize all the time"*

P18 also commented:

> *"That helped me remember it. If I was not using the application [SNS], I wouldn't know where to click"*

In addition, the participants emphasized that there will be no need to use online resources such as Google to learn about the settings. The PrivSet application provided most of the significant and up-to-date information. P11 was concerned about the outdated information provided in Google and YouTube and denoted that the PrivSet application provided reliable and latest content.

> *"It's very helpful and I can see that the contents are very consistent. I have to search and Google and see so many people wrote so many different things and sometimes it's outdated and then I have to come back all the settings again to find another updated instruction. So it was very helpful. Most of the time I use YouTube videos and see how people do it but most of the videos are outdated. So PrivSet is good."*

P23 also stated:

> *"It takes you through the steps really easily so you can't really find on other websites. You were saying how when you Google, so many things come up and you don't know what to use or you don't know what's right and it doesn't really explain everything. The help center doesn't explain everything in my opinion for any website. So, this is really easy to use, made it really clear."*

2. It helps SNS users learn more about the settings and inline feature controls

(19/30) of the participants indicated that they have learned more about the settings and inline features controls after using the PrivSet application. For example, they learned and comprehended the relationship between SNSs such as Facebook and Instagram. They were also able to make an instant and proper decision whether they can or cannot do a specific task. For instance, revoking authorized applications in Instagram (i.e. using the Authorized Apps setting) is only applicable in Instagram website application and the users will not able to control this setting if they are using Instagram mobile application. The PrivSet

application clearly showed this information and the users would directly move to the website application instead of searching and wasting time in the mobile application. Interestingly, P20 and P24 insisted that they would advise their friends and family to utilize the PrivSet application if they want to understand and change their SNS settings.

P20 stated:

> *"I came in with no idea what all this and now I started to learn how to determine my location, how to use this in the right way. To see my data my privacy as well. So I think it's beneficial website, beneficial apps to use and to learn from. I can also benefit my friends who actually have no idea what's their privacy; They just download the app and register their names and do next, next, next until the end, to start using the apps."*

P24 also denoted:

> *"I like how I have to go through learning curve and try it myself because when I try it myself I knew I couldn't do it as efficient. So this give me really good indication that the website is really good. I would give it to my family to be honest with you. If they want to do something."*

P16 also showed that the PrivSet application is not only helping to finish a specific task but it assists the users to be able to do their preferred or desired settings.

> *"With PrivSet when you first understand, when you first learn and practice along, so when you do this a couple of times I feel after that you will be able to do all these settings all by yourself. So what I feel is it's a very useful tool to learn how to change the settings. There are so many settings that existed but we never knew like you can add your location. So these are very easy settings, but I never knew that these kind of settings existed. So it's not only useful for doing all these settings as per my choice, but even for learning new settings if that existed."*

3. It provides precise and clear information about settings and inline feature controls

(18/30) of the participants emphasized that the provided information to help them learn about the settings are precise and clear. Specifically, the participants found that there is no need to use different online resources such as Google since the PrivSet application provided visual content (i.e. highlighted images). The following participants were able to accurately

understand the provided information in the PrivSet application and accomplish the task.

> *"I was trying to add the new business location. It was asking me to connect to the Facebook, so I was trying to connect Instagram to the Facebook account but I wasn't able to do that. Afterwards, I went to the PrivSet which showed that first I have to go to the Facebook which gives clear information and it was so precise and I can able to understand it. It was good."* (P10)

P30 also stated:

> *"All what I need is basically added; definition, how I can change, showing photos and those steps, expected outcomes which is the result and the update that I need and some help center links, all that stuff. So for me, it's more than enough, it's perfect. Simple."*

Furthermore, providing highlighted images to guide SNS users when learning about the settings was appealing. The following participants insisted that pictures or visual content would result in proper outcomes.

> *"It's nice that it's pictures. You can't go wrong with pictures. They're visual learning"* (P13)

P16 also found that the highlighted images helped to accomplish the task:

> *"The most appealing thing was the images. The way they were highlighting each of these images it's really understandable. You can just scroll down through images and your task is done."*

A few participants suggested adding videos; however, videos might not be suitable for all SNS users. For instance, P8 was comparing the two types of visual content and found that the images are easier than videos when going back and forth while changing a setting.

> *"I thought instead of using screenshot like the image I thought that the video is much better than this, but my mind changed. I think this is better than the video because what if I forgot next step of this page? Then I have to come back this next page, right? But on the video that's uncomfortable sometimes."*

4. ***It saves SNS users' time when attempting to understand and change settings and inline feature controls***

(13/30) of the participants emphasized that PrivSet application would save their time when attempting to understand and change the settings. The following participants found it

quicker than using SNSs or any other resources.

> *"PrivSet application is actually good. It actually saves time. I feel it is actually quicker."* (P2)

P28 also denoted:

> *"I think it's a very good website overall and it really helps. The thing is I could really just really saves time and does not make you lose time and get lost in the settings in so many social media."*

The participants admitted that they would spend more than 15 minutes without PrivSet application to specifically achieve particular task. The following participants struggled to complete Task2 in Instagram and Task2 in Twitter.

> *"Instagram scenario, task two, definitely I would have spent 15 to 20 minutes to do that but it clearly mentioned me that, you can't do it from the Instagram application. You have to go to Facebook then you have to come to Instagram. So that was very useful. With PrivSet I was going through the Twitter, I have to share something on that. It clearly mentioned that you can't do that. Straightforward. So it saved my time." (P4)*

Similarly, P6 stated:

> *"Without the PrivSet I would spend maybe half an hour or more than that and just lose interest in changing the location itself because I didn't know that you have to change over there in order to go and change it to Instagram."*

5. ***It assists SNS users to accomplish desired outcomes when changing settings and inline feature controls***

One of the main goals of the PrivSet application is to enable SNS users to complete the process of changing SNS settings. Remarkably, the majority of the participants did not complete the tasks when they changed the settings without assistance (i.e. without PrivSet). However, (12/30) indicated that they successfully completed the tasks after using the PrivSet application.

P10 stated:

> *"Initially, I was trying to do it manually and it was very difficult and I was like confused to go from where to where, from which one to which one. So I was going to the help section, searching there and coming back to the profile*

settings and searching there. So I was like brushing up the whole settings but still I couldn't be able to figure out whether this will do the necessary function or not. But after going to the PrivSet, I can understand that, this can do what I need. It got completed."

P2 also specified:

"I never thought I will struggle using the regular settings in the different tasks that I used, especially the last one, the Instagram that I have to go through different applications using the phone and the computer in order to accomplish the task. I struggled at the beginning. I couldn't do the task because I didn't know the whole type of relation between these apps. I think it was really useful and it just took me a few seconds read through the pictures and the instruction. Then I was able to accomplish the task easily." (P2)

Likewise, the participants showed positive impression when they achieved proper outcomes. They were able to observe the outcomes after changing the settings which was identical with the explanations in the "Expected Outcomes" section in the PrivSet application.

P14 commented:

"The apps do describe it but it's very brief and you don't really know what the consequences are. So I really liked the feature where it says what is expected to happen. For the Facebook example where it said you'll be able to reopen your account, after you deactivate it and, after those set of days, it'll be deactivated and, your posts and all your current information will be gone after a certain set of time. I like that because you don't really know. Once you've hit that deactivate button, you just assume that, I've deactivated it and no one can find me now. That would be my first thought or something similar to that."

P23 also emphasized:

"You know what to expect and if it's going to actually work or not. Sometimes you don't with things like updating because you don't really get told any of that stuff. So, I think that's really helpful and like easy and clear."

6. It makes settings and inline feature controls easy to understand and change

(12/30) of the participants indicated the settings are easy to understand and change after

using PrivSet application. In terms of understanding the settings, the participants mentioned that the users struggle when attempting to understand the settings; however, the PrivSet application would assist to reduce this profoundness.

P19 clarified:

> *"Some people will struggle a lot but PrivSet I think will be like the best way for them to better understand and get their job done and it helps the users to know about their applications in the simplest way possible."*

P7 also declared:

> *"When it comes to, like, the Facebook, Instagram or Twitter, they're very detailed descriptions of exactly what you want. The PrivSet application basically breaks down the information so it's easy for you to understand."*

The following participants justified that an unobvious description of the settings may lead to ineffective results when searching for a specific setting.

> *"I liked how it mentioned in the description, when you pointed out to me these are Instagram and Facebook. Before you jump into changing any settings, they gave you an idea of what you're trying to do beforehand so you're not just going in blind, trying to find a location when you're supposed to be using a whole different application. So I really like that because I could have been on the settings for 20 minutes just trying to just find that."* (P14)

Similarly, the participants found that PrivSet application is a simple tool that can enhance the process of changing the settings.

P16 stated:

> *"Using PrivSet was easy to change the settings and learn about it. I found it really easy to change the setting instantly."*

P8 also commented:

> *"This is much easier to change my setting or other things. When I compare without using PrivSet application."*

In fact, using feature-based approach allowed the participants to properly start understanding and changing the settings. It was not confusing because the participants were not concentrating on what type of category (e.g. Account, Privacy, or Security, etc.), instead they were focusing on what type of feature (e.g. Tags, Posts, Locations, Apps, etc.)

to understand and control.

P14 stated:

> *"I like how it's feature-based, not towards settings. Like, again, when we talked earlier about the settings in Instagram, I felt a little frustrated going around trying to find, like, why do I need to use Facebook pages to find, like, my business location and where do I find it because I'm on Instagram"*

P28 also indicated:

> *"I think at first it would give you an idea of what do you really want to do even before like going deep inside. For example, If I want to share or post something, I would just choose it before like go to settings and just get lost there because there are so many settings that can be confusing sometimes."*

In addition, including all SNSs in a specific page after choosing the feature assisted the participants to determine if the exact setting or feature exists in other SNSs. The following participants showed their impression toward including all SNSs in a specific page for each feature or setting:

> *"It's amazing. It's a good idea. I can go and read all this thing and sometime I didn't have time to do it. So, in one place I can change all the settings, try to figure out what I should do and where I have to go and all this kind of stuff. This is a good idea actually."* (P5)

P23 also denoted:

> *"I think it's really convenient like every social network is like – you don't have to go to a bunch of different other websites or anything. It's all in one place, it's really like compact in an easy way."*

7. It is a simple Interface

(7/30) of the participants mentioned that PrivSet application's pages are uncomplicated. The following participants noticed the simplicity of PrivSet application's design in comparison to SNSs.

> *"It was really smooth. It's flexible. Overall, I like the design. I was really surprised about the complexity of the settings that the original websites have."* (P2)

Another participant found that the provided icons or logos of SNSs are much better than

using the original icons created by SNSs.

P25 stated:

> *"I kind of like the design here. I think I like how it's not exactly the same [SNSs icons]. I think it looks aesthetically better because if it were exactly the same it would be kind of like different colors and maybe look messy. So how this is designed here and then your other icons make perfect sense to me and I think that's what a user would be used to seeing on their own phones so it's good continuity."*

Further, the participants were able to easily read the provided texts in PrivSet application and showed positive impression about the size and fonts of the texts.

P5 commented:

> *"The size of font like it's readable; The font size is very good"*

8. It is applicable for novices and expert users

(6/30) of the participants denoted that the PrivSet application is applicable for both novices and expert users. Precisely, the following participant found that the PrivSet application is helpful for newcomers and elder people.

> *"PrivSet application was really easier for the SNS users, especially for people who just started using it or people who started lately and have no idea what a social network is actually. For example, Old-aged people, they know what social networks are but they don't know what exactly they are so it will be really helpful for them to guide on what to do."* (P9)

Similarly, P13 endorsed that the "Definition" section in the PrivSet application would assist SNS users to understand the settings terms.

> *"I was thinking the definition part is really good for elder people and also for kids. I know like at my age I understand most of the terminology but I feel like if it were a younger me, I probably wouldn't have known how to deactivate apps. I wouldn't understand. So it's nice that there is a definition in the settings."*

9. The PrivSet application's features are continuously available via Google Chrome Plug-in extension

(6/30) of the participants preferred using the plug-in extension because the PrivSet

application's features are always available in the browser and the users can easily access without searching for the application. The following participants showed admiration of having such an option.

> *"I love plug-in. That's the main thing I concentrate on because whenever I tried to do that [the task], I was just searching. So I was very much impressed with the plug-in." (P10)*

P13 also stated:

> *"The plug-in. I think it's really useful as a plug-in so that I don't have to go search for it. That's a really useful kind of thing."*

10. It helps SNS users to continually be updated about settings and inline feature controls through the "Last Updates" section

(2/30) of the participants found that the availability of "Last Updates" section is necessary in the PrivSet application. Explaining the purpose of the updates, the options provided along with the updates, and the time and date of the updates would assist SNS users to control their SNSs.

P19 denoted:

> *"If I ever need to know about the updates, PrivSet has an option of knowing all the updates available for a social media app. So, instead of going and navigating through the apps on the Play Store and understanding whether there's an update or not, I can just come to PrivSet and get to know about all the updates that are available and know about what kind of updates am I looking at, if that option is available. For example, WhatsApp had an update that backfired actually and people didn't like it. So, I would know whether I should update my app or whether I just should keep it as it. PrivSet helps you know what the update is all about because not all the updates are supposed to be good. Some updates are annoying and it just makes your time with the app much harder."*

P26 also stated:

> *"The most feature I like is the update, update features that give you a date about the thing you're going to change and if it's available or no longer available on the website."*

Weaknesses of PrivSet application

1. ***It is inconvenient to switch between the PrivSet application and SNSs to see the instructions in the images***

Going back and forth between the PrivSet application and SNS settings to check the instructions in the images is a disadvantage. (3/30) of the participants suggested that PrivSet application could change the images' effects (i.e. the settings and the images can be presented in parallel) to assist SNS users when controlling the settings. The following participant indicated that toggling between the two applications wasn't an issue but it is not preferable.

> *"I would say having to toggle between the site and the screen was not my favorite. I could've easily been using my phone and followed along there on a computer. I mean, having to toggle back and forth isn't really the worst thing. The pictures are really laid out clearly. I found, when I was going through the first time, I had to go to back a couple of times because I'd forget where I was going but I think that's probably just because it was really new to me too."* (P25)

Moreover, P3 also suggested that the images can be enhanced to display the instructions side by side along with the settings in SNSs. Thus, SNS users can control the settings in continuous experience instead of switching between the two applications.

> *"I expect the instruction can be better. So you have a list of images to show the process from 1, 2, 3, 4, 5, right? But, I think if you can put that images in a corner of the screen so you have the continuous experience. You see the setting page and then you see your instruction just next to it. So, it can be side by side as long as I click and then I see what is there. So that I don't have to memorize."*

P5 also stated:

> *"In Parallel; This is going to be easier for me because I'm going to follow the steps directly and they can see which page because I didn't have to go back and try to figure out if I am in the right spot or not."*

2. ***It only targets the active users***

P4 only found that PrivSet application is concentrating on the active users and it should take into consideration the new users or the user who rarely use SNSs.

"Mostly the active users because even though I use Instagram, Twitter, Facebook like every day but mostly I'm just a consumer. I don't remember when was the last time I posted anything on that."

Enhancements to PrivSet application

Interestingly, the participants did not only discuss the strengths and weakness of PrivSet application whereas they found that the application can be improved to satisfy most of SNS users. The following table presented the frequency of enhancements and challenges (Table 7.16).

Table 7.16: Enhancements and challenges of PrivSet application

Enhancements	Frequency
Enhancements to PrivSet application's content	
Add more instructions in images	(13/30)
Add more SNSs.	(8/30)
Add videos.	(8/30)
Add more settings and inline features controls.	(5/30)
Add content for each platform such as IOS and Android.	(1/30)
Add image resizer.	(1/30)
Add more languages.	(1/30)
Add more settings and inline features controls' options.	(1/30)
Use drop-down list instead of pages.	(2/30)
Enhancements to PrivSet application's platform	
Using the exact SNS icons or logos instead of the provided blue SNS logos.	(10/30)
Add a search bar in the features page.	(4/30)
Provide PrivSet application in various platforms.	(3/30)
Add animations to button.	(1/30)
Add a search bar in the update page.	(1/30)
Enhancements to PrivSet application's notifications	
Add notifications for new updates.	(4/30)
Add warning messages.	(1/30)
Enhancements to PrivSet application's pages	
Add a page for new SNS users and keep features page for users who are familiar with SNSs.	(1/30)
Include the update section with the features section.	(1/30)
Challenge	**Frequency**
Keeping the information updated.	(2/30)

Enhancements to PrivSet application's content

1. Add more instructions in images

(13/30) of the participants indicated that the highlighted color provided in the images are not enough and there should be additional instructions or annotations to facilitate the processes when controlling the settings. The following participants suggested adding more information similar to one of the images that have annotation called “scroll down”.

> *“When I was trying to use first task I was a little confused about what it is telling me to do. So later on after two tasks, I was able to understand. Oh so these are the processes. Maybe you can give information about it. You can mention like click and deactivate or click, edit. A little, not that much. You told me to scroll down, I went straightaway. Without looking at anything, I just read the world and scrolled down.”* (P10)

Similarly, P13 noticed that there were two highlighted circles in an image in Instagram task2 and suggested to specify which option should be clicked in advance.

> *“I think when we did Instagram, there was two options that were circled, so if maybe you could say, click, but it's pretty obvious. I feel like what's a benefit about this website is even if English wasn't your first language, you'd know but if you circle two things, I would want to know it's this one or this one.”*

P25 also stated:

> *“There was a couple of times where I felt that maybe there was an explanation missing, like just a really small explanation. So, there could be like an additional step added in. I think it was with the Instagram. So, I think because I was being so reliant on the PrivSet application, I was expecting it to deliver every little thing I should do. So, maybe that could be added in.”*

2. Add more SNSs

(8/30) of the participants suggested adding more SNSs. For instance, P2 recommended adding Snapchat because their users are struggling with the new updates and the PrivSet application would assist them to figure out the new changes.

> *“I think it’s going to be helpful if you can add more like the Snapchat. If you can add that, people are like struggling with keep updating, keep changing. I think they can stay in the loop to see the process by defining it and then see the steps they have to take and they will see the expected outcomes. Especially for the Snapchat I have no idea about something they said. Using my current*

location, I have to go through the settings hide my location from other users. If that is the application [PrivSet], Snapchat is going to be helpful. Really helpful."

P29 also commented:

"If you want to develop more you can add like new websites, like new social media websites."

3. Add videos

Although the majority of the participants showed a positive impression toward the images, (8/30) of the participants denoted that adding videos to show the process of controlling the settings can be an additional option because users have different preferences.

P27 stated:

"I prefer videos to watch it maybe it's easier instead of going back. It's different for people."

Likewise, P2 justified that videos can be a better option for users who may lose track while using the images.

"Maybe if some people are interested to watch like small video instead of going through different pictures, maybe it's going to be helpful just to watch a few seconds of a video instead of just going through ten pictures or eight pictures. Maybe people will lose track of the pictures that they use."

4. Add more settings and inline features controls

(5/30) of the participants found that the settings or inline features controls are limited and PrivSet application should provide more content to help SNS users learn about them.

P13 indicated:

"Perhaps, later on, add more features. So instead of just posting and sharing, maybe, later on, if you were to develop it more, I would include more."

P12 also declared:

"I actually feel like if it adds on more features it would be better. So as far as now the features are good to go."

5. Add content for each platform such as IOS and Android

P21 recommended that the PrivSet application should pay attention to the content provided in various mobile platforms. SNSs may present the settings' content in various ways in

each platform. For instance, the participant asked if SNSs provide the content of the settings in IOS platform exactly as Android platform.

> *"You have here phone, right, does it all the same for both settings? When you use iOS or Android, are they the same settings? Because I know in some like social network providers they have different settings. Based on the, how you get to that settings. If it's different maybe you need to have like Android or IOS Something like that."*

6. Add image resizer

P5 denoted that the images can be enhanced by adding a resizer such as "Maximize" button and "Minimize" button to clearly display the content of the images.

> *"It's very good but if you make it more interaction. For example, I can maximize and minimize the image because some people they cannot see without glasses."*

7. Add more languages

Since SNSs are available in many countries and regions, P28 recommended providing various languages to assist them learn about the settings.

> *"Some other countries they use apps and also languages. If there's another language like you know any other language like Latino, French or maybe Arabic, it would help so much for customer use like not bilingual, they just use one language. So would help them so much."*

8. Add more settings and inline features controls' options

P5 suggested that it would be helpful if PrivSet application can explain all possible options regarding the settings and not only focusing on options provided by SNSs. Based on these options, SNS users would be able to decide which options are proper to protect their privacy.

> *"I recommend if you can edit the privacy and the level of privacy. For example, some people they would like to make their page as public page, some people they would like to make it as friends, friends of their friend."*

Enhancements to PrivSet application's platform

1. Using the original SNS icons or logos instead of the provided blue logos

In the PrivSet application, the icons or logos of SNSs were designed all in a blue color.

(10/30) of the participants recommended that these logos should be replaced to the original logos in SNSs. For instance, Facebook, Twitter, and LinkedIn are blue, Instagram is pink, Snapchat is yellow, and YouTube is red.

P11 stated:

> *"I understand, you're trying to be consistent with PrivSet but everyone has that color with SNS, right? Snapchat, yellow, and Twitter, blue, Instagram is, like, pink, pinkish, right, and YouTube are red, so they're going to understand it right away."*

P7 also commented:

> *"One main thing that stuck out to me was color. When you're trying to find a specific icon, you think of a color. Facebook it's blue, but Snapchat is not blue, Snapchat is yellow. The color is not right. Humans are visual learners, right, so color is very, very important. Very important. I mean, like this is fine but YouTube is red, right? These here are just completely different."*

2. Add a search bar in the features page

(4/30) recommended that there should be a search bar in the features page to assist SNS users search about the exact feature without scrolling down. The following participants indicated that a search bar is necessary especially when many features will be included in the future.

> *"You are probably going to be building with more contents later on and the user will have a hard time to find the right content from there, like, full of contents. So maybe, like, adding search, a searching feature."* (P11)

P16 also denoted:

> *"I would like to directly go to a specific feature, a search bar would be easy."*

3. Provide PrivSet application in various platforms

The current version of PrivSet application only support a desktop or laptop web browser. (3/30) of the participants suggested that the designed can be improved to be responsive web design. To illustrate this, the web page can be render properly on a variety of devices' browsers. In addition, PrivSet application can be redesigned as a mobile application such as IOS or Android.

P10 stated:

"I was using the website but social websites are generally used in mobile applications mostly. So if you have to check in the mobile applications, I like to have it in the mobile applications."

P6 also commented:

"I would love to use it as a mobile app because most of the users of the social network on a daily basis is the use of the social network on the mobile app."

4. Use drop-down list instead of pages

(2/30) of the participants suggested using drop-down list in the features' page. The drop-down list would instantly show all the available steps and guide the user to the last page instead of separated pages.

P6 stated:

"I did like the sequence however, if you just keep them in one page. Like you will use a drop list or just an open up window or a pop up; something like that, so it will be easier than going through them."

P28 also denoted:

"I think maybe just instead of going like into each category alone and it would get you to another page, maybe you can just click on the category and it would bring subcategories and instead of just going into each page."

5. Add animations to button

P8 recommended adding button animations or effects in every button in the PrivSet application. As a result, the button behaves whenever the user hover over or clicked the button.

"I have one idea that if we click posting do you know the pop-up motion, the posting is bigger or change the icon color. that's good."

6. Add a search bar in the update page

P7 recommended adding a search bar in the new updates' page to facilitate the users' performance when looking for specific update.

"I just felt that your update section wasn't as straightforward. If there are multiple updates, you're not going to have a user, like, click through every single one to be like, what happened to this update. I feel like you would need some sort of search for applications."

Enhancements to PrivSet application's notifications

1. Add notifications for new updates

PrivSet application does not currently provide notifications for new updates. (4/30) of the participants suggested providing notifications for the new updates in SNSs or the new updates in the PrivSet application.

P3 stated:

> *"I think if people go into your website, they can enable the notification and then you can notify them if there is an update in the settings. So as a user, I don't have to install the plug-in but I have the ability to see what is new. It can come up as a notification."*

Likewise, P21 suggested providing a specific type of notification which is a red circle dot that appear when a new update is available. When the PrivSet application's users clicked on that notification, it disappears:

> *"A little circle, red circle and it's updating. So it's, like it tells that the application was updated but you didn't open the application yet. When you open the application that dot will go away."*

2. Add warning messages

Another type of notifications that the PrivSet application may include is warning messages. P17 suggested providing warning messages in the "Expected Outcomes" sub-section to clarify or emphasize if there are consequences of changing a specific setting.

> *"The only concern I just said the outcome, feature you add after you finish changing the setting. For example, when I delete it now you delete it but I would say be careful. On your site it would be great to add be careful or something like it still is not deleted permanently. For example, I deactivated my account like 6 months ago and last week I just navigate, I find it is already working. Still working."*

Enhancements to PrivSet application's pages

1. Add a page for new SNS users and keep the features' page for users who are familiar with SNSs

While we were discussing the suitability of the pages for all SNS users, P18 suggested that the PrivSet application would be helpful for users who already have accounts and

experience in SNSs. However, there should be a separate page for newcomers who do not have accounts yet to get knowledge about the provided features in each SNS.

2. Include the update section with the features section

The update section or page is currently included in the navigation bar to be visibly presented when new updates is added. Nonetheless, P21 suggested that the new updates' page could be included in the features page because the new updates are usually about features.

P21 stated:

> *"I think the new updates also might go down from here because it's a feature as well. Everything else for the features should be like all together in one spot."*

The challenge of PrivSet application

1. Keeping the information updated

(2/30) of the participants declared that the PrivSet application may face a challenge to keep the content up-to-date. P3 suggested that the PrivSet application should not focus on manpower to update each content; instead the application can involve the community to collaborate with rewards (e.g. providing rates for users who upload new updates and have more credibility) whenever new updates are included.

> *"I think there is a challenge for you to update them. So, I think if you can think of a way how to keep the information updated constantly in less manpower way, then this will be vital otherwise you don't have enough manpower to keep updating things. You can do it on the collaboration of the community. So, like me as a user, I can update this. It will reduce the workload on you. They have the rating of the user. If you answer a lot of questions, you have better creditability."*

In addition, P4 was concerned about how quickly the PrivSet application can integrate new updates.

> **"***if I'm going through your way depends totally upon you, how fast you're going to integrate a new feature."*

7.4 Discussion

In this section, I answered the research questions according to our findings and analysis. In addition, I discussed the results in comparison to the literature review.

7.4.1 Answers to Research Questions

RQ1: To what extent is the PrivSet application efficient in terms of time spent to complete the tasks in terms of the users' current experience?

The PrivSet application is evidently efficient in terms of time spent to complete the tasks. It can be observed that the descriptive statistics (i.e. Mean, Standard Deviation, Maximum, and Minimum) for the time of completion in all the tasks is decreasing when the users used the PrivSet application. The group who did not use the PrivSet application was associated with higher means and maximum time in comparison to the group who utilized the PrivSet application.

However, the long steps or processes to complete the tasks clearly affected the time of completion. In Facebook Task, Twitter Task 1 and Task 2, and Instagram Task 1, the participants were able to complete the tasks with short period of time because all the processes or steps were applied in the same SNSs (i.e. only in Facebook, in Twitter, or in Instagram). In contrast, the participants spent more time to complete the task in Instagram Task 2 because the task involved two SNSs (i.e. Facebook and Instagram). Although the majority of the participants were not able to complete the tasks in the *Without* PrivSet group, they spent more time (i.e. before they quit). On the other hand, all the participants completed the tasks with less time in the *With* PrivSet group.

Furthermore, the test statistic (a between-groups ANOVA) verified that there is significant difference in means between the two groups in Facebook Task, Twitter Task 1 and 2, and Instagram Task1. The *Without* PrivSet group is associated with a statistically significantly larger means of time than the *With* PrivSet group. It can be observed that participants who used the PrivSet application completed the task with less time than the participants who used the settings without the PrivSet application. However, there is no significant difference in mean between the two groups in Instagram Task2. The time to complete this task was influenced by a significant factor which is quitting to complete the task or ignoring the setting. In the *Without* PrivSet group, the participants did not spend much time to figure out how to complete the task, instead they decided to give up after a short time which affected the time of completion's analysis in this task.

RQ2: To what extent is the PrivSet application effective in terms of completing the tasks with the least number of errors in comparison to the users' current experience?

The PrivSet application is evidently effective in terms of the successful completion of the tasks with the least number of wrong clicks. It can be observed that all the participants who used the PrivSet application successfully completed the tasks with less number of wrong clicks compared to the participants who did not use the PrivSet application. Further, the two test statistic (a between-groups ANOVA and Chi-Square) confirmed that there is a significant difference in means (i.e. successful completion of tasks and number of wrong clicks) between the two groups in all the tasks. The *Without* PrivSet group is associated with a statistically significantly larger means than the *With* PrivSet group.

RQ3: How do SNS users perceive the usefulness of the PrivSet application in comparison to their current method?

The responses showed a positive impression of the PrivSet application in comparison to the participants' current experience especially when using the SNS settings without assistance. The participants confirmed that the PrivSet application improved the understanding of the settings, changing the settings, and finding of settings' new updates. Further, most of the participants found that the PrivSet application is easier and faster to understand and change the settings, and find new updates than their current strategies. In terms of information accuracy, the majority of the participants found that the PrivSet application provided precise and essential information during the process of understanding and changing the settings, and finding of new updates. Likewise, the PrivSet application verified that SNS users would be able to accomplish expected outcomes of the settings and new updates. To illustrate this, the majority of the participants denoted that the PrivSet application would help to successfully complete the desired settings, give full control over the settings, and save their time. Consequently, all the participants found the PrivSet application overall useful when attempting to understand and change the settings, and find new updates.

RQ4: How do SNS users perceive the ease of use of the PrivSet application?

The responses showed a favorable impression of the PrivSet application in comparison to the participants' current experience especially when using the SNS settings without help. The majority of the participants found that learning to use the PrivSet application was uncomplicated. It also assisted most of the participants to easily understand and change the settings, as well as find new updates. Meanwhile, most of the participants denoted that they

would become skillful easily when using the PrivSet application and it would allow them to achieve proper outcomes. It would also assist them to easily remember the settings and recover quickly and effectively in case of an issue occurred with the settings. In terms of information accuracy, the participants found that the provided information was explicit in comparison to the information provided in the settings. Therefore, all the participants found the PrivSet application overall easy to use when attempting to understand and change the settings, as well as find new updates.

RQ5: What are the strengths and weaknesses of the PrivSet application from the SNS users' points of view?

The following points summarize the key ***strengths*** of the PrivSet application:

1. The PrivSet application guides SNS users through a step by step process to manage SNS settings and inline feature controls. It narrows the steps down to provide specific information about the settings. For example, the users would firstly choose the feature and then select the SNS that provide the feature. Next, it displays all the options of the selected feature and the platforms that the users can use to manage them. Lastly, it only provides the content of the selected option according to PSM components.
2. The PrivSet application helps SNS users to learn more about the settings and inline feature controls. To illustrate this, SNS users would identify the similarities and differences between SNSs such as the relationship between Facebook and Instagram and how they can manage the in-between settings and inline feature controls. In addition, they would be able to make instant and proper decisions whether they can or cannot do a specific task.
3. The PrivSet application provides precise and clear information about settings and inline feature controls. The PrivSet application only presents information about the setting that need to be managed in a visual form (i.e. highlighted images) which assists SNS users to accurately understand the provided information and accomplish the task.
4. The PrivSet application saves SNS users' time when attempting to understand and change settings and inline feature controls. Currently, SNS users spend much time when managing the settings and inline feature controls without assistance.

The PrivSet application would save SNS users' time and provide accurate information quicker than SNSs or any other resources.

5. The PrivSet application assists SNS users to accomplish desired outcomes when changing settings and inline feature controls. SNS users would be able to compare between the obtained outcome after changing the settings or inline feature controls and the expected outcome explained in the "Expected Outcomes" sub-section. This strategy would assist SNS users to guarantee accurate results.
6. The PrivSet application makes settings and inline feature controls easy to understand and change. For example, using feature-based approach allowed the participants to start properly when attempting to understand and change the settings. It was not vague because the users would concentrate on the type of feature (Tags, Posts, Locations, Apps, etc.), instead of the type of category (i.e. Account, Privacy, or Security) when managing the settings and inline feature controls.
7. The PrivSet application is a simple interface in terms of the pages' design and texts readability.
8. The PrivSet application is applicable for novices and expert users. For instance, the "Definition" sub-section in the PrivSet application would assist SNS users to understand the settings' terms especially for newcomers and elder people.
9. The PrivSet application's features are continuously available via Google Chrome Plug-in extension. The PrivSet application's features would be always available in the browser and the users can easily access without searching for the PrivSet website.
10. The PrivSet application helps SNS users to continually be updated about settings and inline feature controls through the "Last Updates" section. The availability of "Last Updates" sub-section was necessary in the PrivSet application. Explaining the purpose of the updates, the options provided along with the updates, and the time and date of the updates would assist SNS users to manage their SNS settings and inline feature controls.

On the other hand, the participants indicated ***two weaknesses*** that should be considered when developing the PrivSet application. The following points summarize the weaknesses related to the PrivSet application:

1. It is inconvenient to switch between the PrivSet application and SNSs to see the instructions in the images. The images should be enhanced to display the instructions side by side along with the settings and inline feature controls in SNSs. Thus, SNS users can control the settings in continuous experience instead of switching between the two applications.
2. The PrivSet application only targets the active users. The PrivSet application was focusing on the active users and it should take into consideration the new users or the users who rarely use SNSs.

7.4.2 Discussion of findings in comparison to the literature review

Efficiency and Effectiveness

Previous studies showed how SNSs enforced the users to create interpersonal boundaries or coping mechanisms that take much time to comprehend and then apply the SNS settings and inline feature controls. They also led to improper outcomes and weak control of SNS settings. For example, Vitak et al. [71] and Wisniewski et al. [79] justified that the users would create various SNSs accounts or separate profiles in the same account (i.e. filtering mechanism) to divide the audiences based on their relationship. This strategy was not effective because it requires resources and time. Using this way of filtering as a coping mechanism affected users' awareness about the filtering settings or controls that are provided inside the SNSs. It also enforced the users to specify time to control these inaccurate filtering mechanisms. Furthermore, Wisniewski et al. [77] declared that most of the users found these boundaries not significant and wasting of time to control; therefore, they created their coping mechanisms such as skimming or ignoring the content. Likewise, Lipford et al. [41] indicated that users are struggling to manage their settings because they were confusing and time consuming. By comparison, the PrivSet application allowed the users to initially specify the feature that they are willing to learn about and control and then narrows down the steps until they reach to the expected or proper outcomes in short time.

Thus, one of the strengths of the PrivSet application is saving SNS users' time when attempting to understand and change the settings, and find new updates.

Meanwhile, prior studies emphasized that SNS users are frequently uncertain about the results or outcomes of changing a specific setting or inline feature's control. Spottswood and Hancock [56] confirmed that the new users in SNSs are influenced when including explicit cues about other users' activities regarding disclosure of information and privacy settings configuration. For instance, if the newcomers noticed that the majority of SNS users entered their phone number in the profile, they would anticipate that they should provide their phone number in their profiles. However, using the PrivSet application would assist SNS users to understand the consequences of sharing a personal or sensitive content without configuring their settings. Furthermore, SNS users tended to mitigate the risk of having improper outcomes when controlling the settings and inline features' controls via applying various interpersonal privacy boundaries. For instance, Vitak et al. [71] justified that the users tended to hide friends instead of unfriending and they assumed that would prevent those friends from checking the content (i.e. incorrect outcomes). Wisniewski et al. [77] also declared that the users considered various strategies because they are not confident if they can properly use the privacy settings and acquire proper outcomes. In addition, one of the examples that users usually utilize as a corrective coping mechanism is asking others to delete a published content such as being tagged in a photo. Lampinen et al. [40] also indicated that taking an action to correct an inappropriate situation may confirm that there was a failure to control the situation from the beginning. However, the PrivSet application would reduce these corrective strategies that occurred as a result of improper configuration of settings and inline feature controls. In the PrivSet application, the users would firstly select the feature and then the PrivSet application would display the proper outcomes that must be achieved.

Significantly, King et al. [34], Zurita and Pombar [83], and Wisniewski et al. [76] supported the idea that the users should learn about the settings and get the privacy they desire. Wisniewski et al. [76] suggested designing privacy (Privacy Fit) for each user rather than privacy for all users since it is possible to anticipate SNS personal privacy preferences. Zurita and Pombar [83] also supported including the parents, teachers, and peers in the education process about privacy. For example, showing the teenagers how to acquire the

knowledge about privacy and then how to employ effective mechanisms to enhance their privacy. Additionally, King et al. [34] suggested that users should experience various educational events about privacy on SNSs because encouraging users to review and change their privacy practices without assistance is not sufficient. Further, reflecting SNS users' needs and preferences is a key factor that encourage users to learn about and configure SNS settings. Madejski et al. [43] found that the users usually get feedback about privacy settings from general news resources whereas these resources may not reflect the users' needs. In contrast, the PrivSet application proved that it would assist the users to acquire their desired privacy via managing their preferred settings (i.e. the features that they want to learn about, control, and update) and assuring accurate outcomes. Further, all the information is accurate because it is derived from the help center of each SNSs. The information and resources are displayed clearly in a specific page in the PrivSet website that direct the users to the exact page in SNSs. Providing information from SNSs would assure trustworthiness between the users and the PrivSet application. In fact, allowing SNS users to determine the setting that they want to learn and manage would encourage them to understand most of the settings' options instead of selecting one option such as "Friends only" as indicated in [63]. The PrivSet application is not only helping SNS users to finish a specific task but it assists the users to apply their preferred or customized settings with the least number of error rates (number of wrong clicks).

Usefulness and ease of use

The majority of the previous studies indicated that lack of understand and control are the main causes of the vulnerabilities when using SNS settings and inline features' controls. In fact, lack of understanding is not only in SNSs; for example, Gambino et al [24] and Egelman et al [21] denoted that lack of understanding increased users' apprehensions regarding the disclosure of information in online privacy in general. Thus, privacy education became essential to overcome online privacy obstacles. In SNSs, lack of knowledge and comprehension occurred in settings, features, and activities. Strater and Lipford [62] and Wisniewski et al. [77] indicated that users were not confident if they can use the privacy settings properly and their strategies of solving or changing privacy settings failed due to lack of understanding of the settings. Moreover, Stutzman and Kramer-Duffield [63] showed that a lack of comprehension and awareness of privacy settings led

to inconsistencies in privacy setting behaviours. Specifically, Netter et al. [47] emphasized that the lack of knowledge was the reason for the discrepancies between perceived and actual settings. Therefore, changing or modifying privacy settings without understanding the effects of these changes would impact users' privacy and the results of this alteration would mismatch users' expectations [31]. Likewise, Wisniewski et al. [77] and Wisniewski et al. [78] evidently indicated that the users do not understand all provided features. Instead, they tended to learn the basic features and postpone the advanced features. This issue is also found in King et al. [34] where the researchers noticed that users had difficulties understanding their privacy issues that caused by the Facebook Apps. Consequently, most of the researchers suggested more explorations in the challenges caused by lack of awareness in order to help enhancing SNS users' abilities to be aware of their features and settings.

In contrast to the lack of understanding discussed in previous studies, the PrivSet application showed enhancements in SNS users' knowledge about features and settings. The majority of the participants confirmed that the PrivSet application improved understanding of the settings and they found that the PrivSet application is easier and faster to acquire new knowledge about the SNS settings than their current strategies. In terms of information accuracy, most of the participants found that the PrivSet application provided accurate information that they need during the process of understanding.

The limitation of tools that assist SNS users to manage their features and settings caused lack of control. For instance, Stutzman and Kramer-Duffield [63] and Netter et al. [47] emphasized that a lack of control of privacy settings led to inconsistencies in privacy setting behaviours especially between preferred and actual settings. In addition, Wisniewski et al. [77] and Wisniewski et al. [78] justified that the users only control the basic features and postpone controlling the advanced features. For example, the SNS users may create friends lists and groups; however, they would have difficulties to continuously control them [77]. Likewise, Lampinen et al. [40] emphasized that the lack of tools to assist users to control the disclosures in SNSs enforced them to create coping mechanisms or strategies whether individually or collaboratively with others. As a result, the researchers suggested more explorations in the difficult-to-use controls or settings to help enhancing SNS users' abilities to manage their settings.

In response, the PrivSet application showed improvements in SNS users' ability to effectively change the features and settings. The majority of the participants asserted that the PrivSet application improved the changing of the settings. They also indicated that it was easier and faster to change the SNS settings than their current experience. In terms of information accuracy, the majority of the participants found that the PrivSet application provided accurate information that they need during the process of changing the settings.

Moreover, SNSs frequently update their settings and features and the new updates may positively or negatively influence users behaviours [41][80]. In Wisniewski et al. [80], the majority of the participants admitted that the new update of Facebook's interface and settings influenced their usage and experience in comparison to the previous interface and settings. By comparison, the PrivSet application clearly explained the new updates in both a separate page (i.e. include all updates in the "New Updates" page in the navigation bar) and inside each feature (i.e. include the features' last updates as a sub-section). The availability of the "Last Updates" sub-section is necessary in the PrivSet application because explaining the purpose of the updates, the options provided along with the updates, and the time and date of the updates would encourage SNS users to check the new updates and apply them. The majority of the participants indicated that the PrivSet application improved the finding of SNS settings' new updates. Additionally, they found that the PrivSet application would notify users more quickly about new updates, as well as make it easier to notice these updates than SNSs. In terms of information accuracy, most of the participants found that the PrivSet application provided accurate information that they need during the process of finding new updates. However, the participants suggested more explorations in how the PrivSet application would keep the information continually updated and reduce manpower work to update each feature or setting.

Prior studies also showed how lack of continuously tracking settings affect SNS users' privacy and behaviours. For example, Strater and Lipford [62] and Netter et al. [47] declared that the users usually create their profiles and rarely changed the settings, and then become astonished at the number of shared items. In addition, Lipford et al. [41] indicated that Facebook and other SNSs may update their privacy settings and make them more difficult to remember. In the PrivSet application, using feature-based approach assisted the participants to straightforwardly locate the exact feature when they applied the tasks. Thus,

the PrivSet application would assist SNS users to easily remember the settings and recover quickly and effectively in case of an issue or update occurred to the settings. Furthermore, the majority of the participants found that learning to use the PrivSet application was uncomplicated and the users would become skillful easily when using the application. Thus, all the participants found the PrivSet application overall useful and easy to use when attempting to understand and change the settings, and find new updates.

7.5 Study Limitation

Although the usability testing of the PrivSet application provided valuable feedback, it is significant to indicate the limitations. The sample size (Dalhousie students and staff) cannot represent all the population of SNS users. Thus, it is important to evaluate the PrivSet application with a variety of sample size. Meanwhile, it is necessary to conduct more studies about various features and SNSs (i.e. not only Facebook, Twitter, and Instagram) to find further feedback that would enhance the PrivSet functionality and content.

Table 7.17: Summary of the PrivSet application's usability testing

Section	Study	Metrics	Test Statistic	Findings
7.3.1	Usability testing (Tasks)	Efficiency (Time to complete the tasks)	ANOVA	**Facebook Task, Twitter Task1 and 2, and Instagram Task1:** The test shows a statistically significantly different means between the two groups (*With* PrivSet and *Without* PrivSet). The participants who used the PrivSet application had lower means of time to complete the tasks than the participants who did not use the PrivSet application. **Instagram Task2:** The test did not show a statistically significant effect of means between the two groups (*With* PrivSet and *Without* PrivSet). The participants who used the PrivSet application had lower means of time to complete the tasks than the participants who did not use the PrivSet application.
		Effectiveness (Successful completion of tasks)	ANOVA and Chi-Square	**All Tasks:** The test shows a statistically significantly different means between the two groups (*With* PrivSet and *Without* PrivSet). The participants who used the PrivSet application successfully completed the tasks in comparison to the participants who did not use the PrivSet application.
		Effectiveness (number of wrong clicks)	ANOVA	**All Tasks:** The test shows a statistically significantly different means between the two groups (*With* PrivSet and *Without* PrivSet). The participants who used the PrivSet application had lower means of number of wrong clicks than the participants who did not use the PrivSet application.
7.3.2	Post-task questionnaire	Usefulness	General Descriptive Statistics	The PrivSet application improved users' ability to understand and change the settings as well as find new updates. It provided accurate information and helped users to successfully complete the tasks. It saved users' time.
		Ease of Use	General Descriptive Statistics	The PrivSet application was easy to learn and the users would become skillful using it. It assisted users to remember how to perform the tasks because it provided proper guidance.
7.3.3	Semi-structure interview	Strengths	Coding	The PrivSet application guided users through step-by-step process to understand and change the settings as well as find new updates. It helped the users to learn about the settings and inline feature controls. It provided precise and clear information about the settings and inline feature control. It assisted SNS users to accomplish the desired outcomes when changing the settings. It is a simple interface and applicable for novices and experts. The participants preferred to use the Plug-in extension because it is continuously available.
		Weaknesses	Coding	Switching between the PrivSet application and settings' pages is inconvenient. The PrivSet application is only targeting the active users.

Chapter 8 Conclusion and Future Work

SNS users still struggle to manage SNS settings and inline features controls. There are discrepancies between privacy attitudes and observed privacy behaviours due to lack of understand and control of the current settings. In this thesis, a Privacy Settings Model (PSM) was derived from prior research and it comprised users' cognition, users' control, and users' update of SNS settings and inline feature controls. The model would enhance SNS users' behaviours toward the settings and thereby reduce privacy risks. The thesis was divided into three sequential phases: Phase 1 and Phase 2 concentrated on examining SNS users' concerns and factors that influence their behaviours when managing the settings and inline features controls according to the PSM components; Phase 3 focused on designing, implementing, and evaluating the PrivSet application that helps SNS users to manage the desired settings and inline features controls. In this chapter, I discussed the research contributions, limitations, and future work.

8.1 Research Contributions

This thesis contributes to the field of privacy behaviours in social networking sites and design of tools that assist SNS users to understand and change the settings and inline feature controls, as well as finding new updates. Precisely, this thesis makes four contributions: obtaining validated factors that influence SNS users' learning and behaviours regarding settings and inline feature controls; deriving design guidelines that can help in the design of usable SNS settings; designing and implementing an application (PrivSet) to manage SNS settings and inline feature controls; and conducting a usability testing to evaluate the PrivSet application in comparison to the actual settings.

8.1.1 Obtaining Validated Factors

In Phase 1, I conducted ***a qualitative study*** to examine SNS users' concerns and identify the factors that influence SNS users' behaviours over SNS settings and inline feature controls according to the PSM components. I used thematic analysis to obtain the themes (factors). Focusing on the types of conflicts that SNS users experienced helped me to identify the different types of factors that SNS users had to encounter when managing SNS settings. The obtained factors are navigating through SNS settings, categorizing of SNS settings, questioning the existence of SNS settings, options, and explanations, asking for

help or advising others about SNS settings, guessing or assuming SNS settings' meanings and functions, using shortcuts to change SNS settings, receiving notifications about new updated settings, searching about SNS settings and new updates, using different resources, reading SNS settings' descriptions and new updates, observing and checking SNS settings' outcomes to match users' expectations, remembering SNS settings' options and new updates, dealing with interface and usability issues, influencing of users' levels and experience, and ignoring SNS settings and new updates.

In Phase 2, I designed ***an online survey*** to validate the findings of the qualitative study. After I collected the data, I analyzed the data using a hypothesis testing approach. The responses were analyzed based on a statistical hypothesis test called "Test of Proportions", which tests the sample proportions with the estimated or hypothesized population proportions. The findings verified all the factors discovered in the qualitative study except the factor "ignoring SNS settings and new updates". I was not able to prove that SNS users ignore SNS settings and new updates, and further studies are required to examine this factor.

8.2.1 Deriving Design Guidelines

Based on the findings in Phase 1 and Phase 2, I derived a set of design guidelines and considerations that can help designers facilitate users' management of the settings. The design guidelines are simplifying the paths and steps when navigating through the settings; providing meaningful categorization of features based on their functions; allocating separate pages for each feature (e.g. Tags, Location, Apps) and its content (e.g. SNSs that provide the feature, options of the feature, and platforms used to manage the feature); avoiding using the distracted icons or links (e.g. "Learn More" links) buried under the texts; preparing informative and attractive notifications of the new updates; using SNS help centre's information to provide trusted and accurate information; including visual content to assist SNS users to follow the process of understanding and changing the settings; showing the expected outcomes from understanding and changing the settings or inline features controls; and providing full information (e.g. the last date and time) about the settings and inline features controls' new updates.

8.3.1 Designing and Implementing the PrivSet Application

In general, online privacy applications concentrated on educating users about current

privacy issues. However, tools or applications that can assist SNS users to understand and change the settings and inline features' controls as well as find new updates are limited. In this thesis, I designed and implemented the PrivSet application - based on the obtained guidelines - that consists of a website and a Google Chrome plug-in extension to help SNS users properly and confidently manage SNS settings and inline feature controls according the PSM components. The application utilized a feature-based approach. That is, it did not focus on the category of setting (Account, Privacy, Security, etc.), but rather on the type of feature (Tags, Posts, Locations, Apps, etc.), which allowed the participants to begin properly when attempting to manage the settings and inline feature controls.

8.4.1 Conducting Usability Testing Study of the PrivSet Application

The usability evaluations of the tools that assist SNS users to control their settings are limited in comparison to the studies conducted on the actual settings. In this thesis, I conducted a within-subject design study that consists of tasks, a post-task questionnaire, and a short semi-structured interview to examine the efficiency (time to complete the tasks) and the effectiveness (successful completion of the tasks with a low error rate) when using the PrivSet application and without using it. The findings emphasized that there is a significant difference in means between the two groups (***Without*** and ***With*** PrivSet) in terms of time of tasks' completion, successful completion of tasks, and error rates (i.e. number of wrong clicks). The PrivSet application has much smaller means in comparison to using only SNS settings without assistance. Furthermore, the majority of the participants found the PrivSet application useful and easy to use. They emphasized that the PrivSet application guided them to sequentially learn and configure their SNS settings. In addition, it presented precise and accurate information, assured proper outcomes, and saved them time. In contrast, the findings also showed enhancements, weaknesses, and challenges that should be considered when developing the PrivSet application. In sum, the usability testing study findings verified that using applications such as the PrivSet would enhance SNS users' ability to manage the settings and inline feature controls.

8.2 Research Limitations

Although the findings provided a large amount of information from the qualitative study to generate major factors or themes that serve the purpose of the two phases, it is significant to indicate the limitations of the two studies (Phase1 and Phase2). The majority of the

participants were from a university community (i.e. mostly educated users and familiar with SNSs) with only 22 participants, which can reduce the generalizability of our findings. In addition, the study had a limited sample size even though it provided sufficiently robust data to create themes (factors) that explain how SNS users are influenced when managing the SNS settings and new updates. Thus, further research is needed to verify the factors with a larger sample size. Further, one of the limitations of using online surveys is that it depends on participants' ability to precisely report their data. However, the advantage of conducting the exploratory sequential design (mixed-method approach) is that I was able to interpret the data and compare results between the two methods. Although the qualitative study initiated robust themes, the statistical hypothesis tests of the quantitative data did not prove all the codes of these themes. The sample size may have influenced the findings; therefore, further studies with large sample size may prove the unverified codes.

In Phase 3, the sample population (Dalhousie students and staff) cannot represent all the population of SNS users. Thus, it is important to evaluate the PrivSet application with a variety of sample sizes. Meanwhile, it is necessary to conduct further studies about various features, settings, and SNSs (i.e. not only Facebook, Twitter, and Instagram) to gather more feedback that would enhance the PrivSet application's functionality and content.

8.3 Future Work

The two main goals that should be considered in future studies are exploring the unverified codes in each factor in Phase 1 and 2 studies and developing the PrivSet application. Firstly, I will conduct further studies with a larger sample size and various levels of ages and expertise to determine if the obtained factors were influenced by the limitations of the two studies. For instance, the participants emphasized that using shortcuts when changing the settings is more practical than using the entire settings; however, the test statistics were not able to verify if they use shortcuts to change the settings. Conducting more studies about the unverified codes would assist me to determine if these factors still have an influence on SNS users' behaviours toward the settings. Secondly, I will take into consideration the participants' suggestions in Phase 3 (i.e. enhancements, weaknesses and challenges) to professionally develop the PrivSet application. For example, I should note all levels of expertise and not only the active users. In addition, I will enhance the PrivSet application

in terms of content, platforms, notifications, and pages, and continually keep the PrivSet application's information updated.

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Appendix A Literature Review – Online Privacy

The Ten principles for online privacy included in the curriculum to demonstrate the privacy risks and the strategies that can be followed for mitigation.

Principle	Description	Guidance
1. You are Leaving Footprints	Information footprints included all kind of posts and stored online activities.	Regularly check and update privacy settings.
2. There is No Anonymity	Information footprints assist to distinctly identify others.	Avoid doing anything online that cannot be done in public.
3. Information Is Valuable	Information is worthy to others because it can be utilized properly (benefit others) or improperly (disturb or critical to others).	Do not share information unless you know how it is going to be employed.
4. Someone Could Listen	Unauthorized access can interpret information sent via computers or systems if it is unencrypted.	Use robust encryption and passwords and share information through secure channels.
5. Sharing Releases Control	Sharing information enable others to have full control over the disclosed contents. They can resend and sell information without a permission.	Contemplate before sharing the contents online and be prepare yourself for any consequences.
6. Search Is Improving	Seek and explore more information via search engines because data is constantly changing and what is prevented today maybe allowed tomorrow such as terms of services, public policy, or privacy settings.	Constantly observe and check your information footprints.
7. Online Is Real	Activities whether online or offline are alike and both can positively or negatively influence people's life.	Assure only sharing contents online that it is acceptable to be understood differently and others can check them.
8. Identity is not Guaranteed	It is complicated to assure the identity of who you are publicly connecting and communicating with since it is effortless to impersonate others.	Affirm the identify of recipients or others before sharing contents online.
9. You cannot Escape	Sharing information is not restricted because if users decide not to share their own information, others may share information about them.	Help others to learn about privacy to protect your own privacy.
10. Privacy Requires Work	Since it is not fully guaranteed that privacy is protected by law and regulations, it is the users' duty to safeguard their privacy and permanently monitor their privacy behaviours.	Support the enhancement of privacy laws and regulations, learn and instruct others about privacy, and contemplate about the consequences to safeguard your privacy.

Appendix B1 Phase 1: Qualitative Study

Approval letter from Dalhousie Research Ethics Board (REB)

(REB#: 2016-3918)

Social Sciences & Humanities Research Ethics Board
Letter of Approval

October 05, 2016

Abdulhadi Aedh Alqarni
Computer Science\Computer Science

Dear Abdulhadi Aedh,

REB #: 2016-3918
Project Title: Privacy Settings Model (PSM): Exploring Users Concerns, Factors, and Relationship of the Model's Components

Effective Date: October 05, 2016
Expiry Date: October 05, 2017

The Social Sciences & Humanities Research Ethics Board has reviewed your application for research involving humans and found the proposed research to be in accordance with the Tri-Council Policy Statement on *Ethical Conduct for Research Involving Humans*. This approval will be in effect for 12 months as indicated above. This approval is subject to the conditions listed below which constitute your on-going responsibilities with respect to the ethical conduct of this research.

Sincerely,

Dr. Karen Beazley, Chair

Appendix B2 Observation and Interview Questions

OBSERVATION QUESTIONS

Facebook

- **Users Cognition:**

Recent setting used by the participants:

- According to your understanding and knowledge, what is the meaning of this setting?
- How did you learn its meaning and what resources did you use to understand this settings?
- To what extent are you sure about the accurate meaning of this setting?
  - ***If he/she is sure about the meaning,*** how did you make sure this is the accurate meaning?
  - ***If Not sure,*** Why?

"Use Activity Log" setting:

- According to your understanding and knowledge, what is the meaning of **"Use Activity Log"** setting?
- How did you learn its meaning and what resources did you use to understand this setting?
- To what extent are you sure about the accurate meaning of this setting?
  - ***If he/she is sure about the meaning,*** how did you make sure this is the accurate meaning?
  - ***If Not sure,*** Why?

"Limit Past Posts" setting:

- According to your understanding and knowledge, what is the meaning of **"Limit Past Posts"** setting?
- How did you learn its meaning and what resources did you use to understand this settings?
- To what extent are you sure about the accurate meaning of this setting?
  - ***If he/she is sure about the meaning,*** how did you make sure this is the accurate meaning?
  - ***If Not sure,*** Why?

"View As" setting in Timeline and Tagging:

- Can you show me where you can change the timeline and tagging settings?
- According to your understanding and knowledge, what is the meaning of **"View As"**?
- How did you learn its meaning and what resources did you use to understand this settings?
- To what extent are you sure about the accurate meaning of this setting?
  - ***If he/she is sure about the meaning,*** how did you make sure this is the accurate meaning?
  - ***If Not sure,*** Why?

General Questions:

- If you have applied the most security and privacy settings, what do you think strangers or public will see about your account? (Portrait picture, Cover picture and name).

        - How can other Facebook users contact you?
    - **Facial Recognition:**
        - Do you know what does Facial Recognition means?
        - Under which settings Facebook use Facial Recognition?
    - Can you share between two social networking sites such as "Instagram" and "Facebook"?
        - If your Instagram account is **"Private"** and Facebook account is **"Public"** and you have allowed **sharing** between them, what do you think will happen?
        - Do you think Instagram will share photos with Facebook?

- **Users Control:**

Recent setting used by the participants:

- Do you know how to change this setting? Can you change this setting to different status? What do you expect your modifications will apply?
- Do you think your changes will match your expectations?
    - ***If Yes,*** how did you assured that?
    - ***If No,*** Why?
        - What are you going to do now?

"Use Activity Log" setting:

- How can you delete posts and photos that you tagged in?
- Do you think your changes will match your expectations?
    - ***If Yes,*** how did you assured that?
    - ***If No,*** Why?
        - What are you going to do now?

"Limit Past Posts" setting:

- How can you limit the past post?
- Do you think your changes will match your expectations?
    - ***If Yes,*** how did you assured that?
    - ***If No,*** Why?
        - What are you going to do now?

"Who can look me up?" setting:

- How do you prevent search engines such as Google and Yahoo from listing your profile in the search results?
- Does it mean you are hidden from Facebook search result?
- Do you think your changes will match your expectations?
    - ***If Yes,*** how did you assured that?
    - ***If No,*** Why?
        - What are you going to do now?

"Who can add things to my timeline?" setting:

- How can you change your settings to check photos that you are tagged in **before** it appears in the timeline? **"ON"**
- Do you think your changes will match your expectations?
    - ***If Yes,*** how did you assured that?
    - ***If No,*** Why?
        - What are you going to do now?

"Friends Tab" setting:

- How can you edit your likes such as movies and sports?
- Do you think your changes will match your expectations?
  - ***If Yes,*** how did you assured that?
  - ***If No,*** Why?
    - What are you going to do now?

"Apps" setting:

- When Instagram is **"Private"** and Facebook is **"Public",** photos in Instagram will appear on Facebook. How can you prevent that?
- Do you think your changes will match your expectations?
  - ***If Yes,*** how did you assured that?
  - ***If No,*** Why?
    - What are you going to do now?

General Questions:

- Can you tag a friend in a photo and post it? Can you untag your friend?
- Can you delete this post (photo)? **(Any photo from the timeline)**

- **Users Updates:**

Recent setting used by the participants:

- What privacy setting did you update recently?
  - ***If there is a recent update,*** what is the meaning of this setting according to your knowledge and understanding?
    - How did you update it?
    - How did you search for the setting's last updates?
  - ***If there is no recent update, go to other settings.***

"Message Request" setting:

- How can you filter your message requests in inbox?
- Have you heard of "Strict Filtering" and "Basic Filtering"?
- Facebook has changed this setting in 2015; do you know what is the replaced setting?
- Why do you think Facebook changed that?
- Do you receive updates about this from Facebook?
- Do you search how to understand and change this updated setting? How are you going to search for that update? Do you usually look for updates in the same SNSs or different resources such as:
  - **Asking friends.**
  - **Google it.**
  - **Facebook Help Centre.**

<u>Twitter</u>

- **Users Cognition:**

Recent setting used by the participants:

- According to your understanding and knowledge, what is the meaning of this setting?
- How did you learn its meaning and what resources did you use to understand this settings?

- To what extent are you sure about the accurate meaning of this setting?
  - ***If he/she is sure about the meaning,*** how did you make sure this is the accurate meaning?
  - ***If Not sure,*** Why?

"Protect My Tweets" setting:

- According to your understanding and knowledge, what is the meaning of **"Protect my Tweets"** setting?
- How did you learn its meaning and what resources did you use to understand this setting?
- To what extent are you sure about the accurate meaning of this setting?
  - ***If he/she is sure about the meaning,*** how did you make sure this is the accurate meaning?
  - ***If Not sure,*** Why?

"Protect Content" setting:

- According to your understanding and knowledge, what is the meaning of **"Tailor ads based on information shared partner"** setting?
- How did you learn its meaning and what resources did you use to understand this settings?
- To what extent are you sure about the accurate meaning of this setting?
  - ***If he/she is sure about the meaning,*** how did you make sure this is the accurate meaning?
  - ***If Not sure,*** Why?

"Personalization" setting:

- According to your understanding and knowledge, what is the meaning of **"Tailor Twitter based on my recent website visits"**?
  - Twitter ecosystem.
- How did you learn its meaning and what resources did you use to understand this settings?
- To what extent are you sure about the accurate meaning of this setting?
  - ***If he/she is sure about the meaning,*** how did you make sure this is the accurate meaning?
  - ***If Not sure,*** Why?

"Twitter for Teams" setting:

- According to your understanding and knowledge, what is the purpose of using **"TweetDeck"** feature?
- How did you learn its meaning and what resources did you use to understand this settings?
- To what extent are you sure about the accurate meaning of this setting?
  - ***If he/she is sure about the meaning,*** how did you make sure this is the accurate meaning?
  - ***If Not sure,*** Why?
- Do you know what are the options under this setting?

- **Users Control:**

Recent setting used by the participants:

- Do you know how to change this setting? Can you change this setting to different status? What do you expect your modifications will apply?
- Do you think your changes will match your expectations?
  - ***If Yes,*** how did you assured that?
  - ***If No,*** Why?
    - What are you going to do now?

To change profile:

- How can you change your location and Bio? **(Location in general)**
- Do you think your changes will match your expectations?
  - ***If Yes,*** how did you assured that?
  - ***If No,*** Why?
    - What are you going to do now?

"Tweet Privacy" setting:

- How can you protect your tweets?
- Do you think your changes will match your expectations?
  - ***If Yes,*** how did you assured that?
  - ***If No,*** Why?
    - What are you going to do now?

"Promoted Content" setting:

- By default, twitter can show you ads based on the people you follow, how could you prevent that?
- Do you think your changes will match your expectations?
  - ***If Yes,*** how did you assured that?
  - ***If No,*** Why?
    - What are you going to do now?

"Tweet Location" setting:

- Each tweet can have the location that sent from, how could you prevent show location for tweets?
- Do you think your changes will match your expectations?
  - ***If Yes,*** how did you assured that?
  - ***If No,*** Why?
    - What are you going to do now?

"Discoverability" setting:

- What are the options that people can find you by?
  - How can you change that?
- Do you think your changes will match your expectations?
  - ***If Yes,*** how did you assured that?
  - ***If No,*** Why?
    - What are you going to do now?

"Photo Tagging" setting:

- What are the photo tagging options?
  - What are you going to choose?
- Do you think your changes will match your expectations?
  - ***If Yes,*** how did you assured that?
  - ***If No,*** Why?

- What are you going to do now?

"Personalization" setting:

- How can you prevent Twitter from sending tweets, links, or ads based on website you visit?
- Do you think your changes will match your expectations?
  - ***If Yes,*** how did you assured that?
  - ***If No,*** Why?
    - What are you going to do now?

"Twitter for Teams" setting:

- If you have a Twitter account controlled by teams such as in organization, how can you control the team's options?
- Do you think your changes will match your expectations?
  - ***If Yes,*** how did you assured that?
  - ***If No,*** Why?
    - What are you going to do now?

"Direct Messages" setting:

- How can you prevent receiving direct messages from anyone?
- What can you change to see if other people have seen your message or not?
- Do you think your changes will match your expectations?
  - ***If Yes,*** how did you assured that?
  - ***If No,*** Why?
    - What are you going to do now?

- **Users Updates:**

Recent setting used by the participants:

- What privacy setting did you update recently?
  - ***If there is a recent update,*** what is the meaning of this setting according to your knowledge and understanding?
    - How did you update it?
    - How did you search for the setting's last updates?
  - ***If there is no recent update, go to other settings.***

"Direct Message Without Following" setting:

- What would you do if you want to send someone or an organization a message?
  - Would you follow them first and then send a direct message?
- Do you know that Twitter previously enforce you to follow and then send a direct message?
- How are you going to search for that update?
  - **Asking Friends.**
  - **Google it.**
  - **Twitter Help Center.**
- Why do you think Twitter changed that?

<u>Instagram</u>

- **Users Cognition:**

Recent setting used by the participants:

- According to your understanding and knowledge, what is the meaning of this setting?
- How did you learn its meaning and what resources did you use to understand this settings?
- To what extent are you sure about the accurate meaning of this setting?
  - ***If he/she is sure about the meaning,*** how did you make sure this is the accurate meaning?
  - ***If Not sure,*** Why?

"Only tow Options Private OR Public" setting:

- What options do you have for privacy settings? **(E.g. Public Only, Private Only, Public and Private, Customize, etc.)**
  - How did you learn that and what resources did you use to figure that out?
  - To what extent are you sure about that?
    - ***If he/she is sure,*** how did you make sure this is the accurate meaning?
    - ***If Not sure,*** Why?
- What tools or devices can you use to change an account to private? {**IPhone. (□), Android. (□), and Desktop Computer (Web Browser). (□)**}
  - How did you learn that and what resources did you use to figure that out?
  - To what extent are you sure about that?
    - ***If he/she is sure,*** how did you make sure this is the accurate meaning?
    - ***If Not sure,*** Why?

"Tips for parents":

- What do you think are the tips that Instagram provide for parents?
  - How did you learn that and what resources did you use to figure that out?
  - To what extent are you sure about that?
    - ***If he/she is sure,*** how did you make sure this is the accurate meaning?
    - ***If Not sure,*** Why?

"Push Notifications" setting:

- What do you think are the features that you are allowed to control their notifications? **(12)**
  - How did you learn that and what resources did you use to figure that out?
  - To what extent are you sure about that?
    - ***If he/she is sure,*** how did you make sure this is the accurate meaning?
    - ***If Not sure,*** Why?

General Questions:

- Can you share photos between two social networking sites such as Instagram and Facebook?

- If your Instagram account is **"Private"** and Facebook account is **"Public"** and you have allowed sharing between them, what do you think will happen?
  - Do you think Instagram will share photo with Facebook?

- **Users Control:**

Recent setting used by the participants:

- Do you know how to change this setting? Can you change this setting to different status? What do you expect your modifications will apply?
- Do you think your changes will match your expectations?
  - ***If Yes,*** how did you assured that?
  - ***If No,*** Why?
    - What are you going to do now?

"Private Account" setting:

- Can you change this account to **"private"**?
- Do you think your changes will match your expectations?
  - ***If Yes,*** how did you assured that?
  - ***If No,*** Why?
    - What are you going to do now?

"Tips for Parents":

- Can you show me where are the tips for parents?

"Push Notifications" settings:

- How can you manage Follower Requests notifications?
  - Do you think your changes will match your expectations?
    - ***If Yes,*** how did you assured that?
    - ***If No,*** Why?
      - What are you going to do now?
- How can you tag and untag people in a photo in Instagram?
  - Do you think your changes matched your expectations?
    - ***If Yes,*** how did you assured that?
    - ***If No,*** Why?
      - What are you going to do now?

General Questions:

- When Instagram is **"Private"** and Facebook is **"Public",** photos in Instagram will appear on Facebook. How can you prevent that?

- **Users Updates:**

Recent setting used by the participants:

- What privacy setting did you update recently?
  - ***If there is a recent update,*** what is the meaning of this setting according to your knowledge and understanding?
    - How did you update it?
    - How did you search for the setting's last updates?
  - ***If there is no recent update, go to other settings.***

"Story Settings" setting:

- What is the recent feature or setting in Instagram?
- Have you heard of the "Story" feature in Instagram?

- Did you search how to understand and change the settings?
    - If **Yes,** How are you going to search for that update? Did you look for the updates in the same SNS or different resources such as:
        - **Asking Friends.**
        - **Google it.**
        - **Instagram Help Center.**
            - Can you show me that?
    - If **No,** Why?
    - Can you try now to search for updates about this feature or it settings?

INTERVIEW QUESTIONS

General Questions:

- What is your perceptions of SNSs such as Facebook, Twitter, or Instagram, etc.?
- According to your knowledge and experience, what do you think about privacy in SNSs?
- What are your privacy concerns of SNSs?
- What do privacy settings in your SNSs (e.g. Facebook, Twitter, etc.) mean to you?
- How do you decide which privacy settings are more suitable for you to apply?
- How do you think SNSs can facilitate privacy settings for you?
- If one of your friends asked you for an advice about how to apply his/her privacy settings? What is your advice?

User's Cognition of the privacy settings:

- When you read your privacy settings, do you quickly understand the meaning of a particular setting and its function?
- Do you use or apply a particular privacy setting based on your understanding of the setting itself? How? Can you give an example?
- What do you use to help you understand a particular privacy setting?
- How do you know that you fully understand a particular privacy setting? Can you give an example?
- What are the challenges that you encounter when you attempt to understand a particular privacy setting?
- What do you think are the reasons that cause all these challenges?
- If someone explained how to properly understand your privacy settings, would your attitude toward privacy settings change? How?

User's Control of the privacy settings:

- How do you describe your experience when you change your privacy settings?
- Do the changes usually match your expectations? How can you ensure that your changes are relevant? Can you give an example?
- What do you use to help you change a particular privacy setting?
- What do you do if you mistakenly change a particular privacy setting or the changes mismatch your expectations? Can you give an example?
- What are the challenges that you encounter when you attempt to change a particular privacy setting?

- What do you think are the reasons that cause all these challenges?
- If someone explained how to properly change your privacy settings, would your attitude toward privacy settings change? How?

User's Updates of the privacy settings:

- How do you describe your experience about receiving or finding new updates of the privacy settings?
- How can you make sure that the new updates that you found would match your expectations? Can you give an example?
- What do you use to help you find new updates of a particular privacy setting?
- What are the challenges that you encounter when you attempt to find new updates about a particular privacy setting?
- What do you think are the reasons that cause all these challenges?
- What do you do if you mistakenly changed your privacy setting – based on the new updates – and the changes mismatched your expectations? Can you give an example?
- If someone regularly notified you about the up to date updates of the privacy settings, would your attitude toward privacy settings change? How?

Concluding

- Do you think being able to understand, control, and get regular updates about the privacy settings would assist you to enhance your privacy settings? How?
- Is there anything that we have not discussed that you think it is significant for me to know about?

Appendix B3 Conceptual Model of the obtained factors

Figure: Preparing and conceptualizing the factors that SNSs users perform (inside and outside SNSs) when learning and configuring the settings

Appendix B4 Themes and Codes

Categories (Themes)	Codes
Navigation through SNSs' settings.	4 Navigation through the settings takes time. 5 Going through the settings is not sufficient.
Categorization of SNSs' settings.	6 Suggesting to add categories and sub-categories to facilitate navigation, understanding, and changing of the settings. 7 Demanding for classification of the settings based on features.
Existing of SNSs' settings, options, and explanation.	8 Indicating not knowing or have not heard of existed settings and options. 9 Declaring complexities to find the existed settings' explanations.
Asking for help or advising others about SNSs' settings.	10 Asking friends for help to understand, change, test the settings or activities 11 Asking an expert for help to understand, change, test the settings. 12 Asking people who have the same issue with the settings. 13 Advising friends and family to ask for help or support and use the most limited settings' options.
Guessing or assuming SNSs settings' meanings and functions	14 Attempting to guess or assume the settings' options, locations, meanings, functions and outcomes.
Using shortcuts to change SNSs' settings	15 Customizing each post or using shortcuts to change the timeline and the settings 16 Using different resources such as Google to shortcut searching process
Receiving notifications about new updates of SNSs' settings	17 Changing the settings directly by the users without notifications. 18 Changing the settings directly by SNSs without notifications. 19 Declaring that SNSs do not provide right information about the settings new updates at the right time.
Searching and finding SNSs' settings and new updates	20 Challenging to search or find enough and accurate information about the settings and new updates. 21 Looking for new updates of the settings only if received notifications otherwise not looking for them. 22 Looking for the settings' new updates and going through the settings' options take time.
Using different resources	23 Using Google to understand, change, test, and find the settings and new updates. 24 Using examples, photos and videos to help understand, change, and test the settings. 25 Seeking more information about the settings and new updates after hearing about them from news or media.
Reading SNSs settings' descriptions and new updates	26 Reading the descriptions inside SNSs. 27 Reading online or outside SNSs. 28 Disregarding the settings and new updates and not reading them.
Observing and checking the outcomes to match users' expectations.	29 Observing and checking the outcomes after changing the settings. 30 Ensuring that the changed settings and the new updates of the settings match expectations based on the settings' descriptions and explanations. 31 Observing and ensuring the outcomes of changing the settings are effective via experience 32 Suggesting to add interactive review pages, examples, and visual contents such as photos, videos, or animations to reflect the expected outcomes of the changes.

Categories (Themes)	Codes
Remembering SNSs' settings, options, changes, outcomes, and new updates.	33 Forgetting the settings and how to change them. 34 Indicating that cannot remember if received new updates of the settings.
Interface and usability issues	35 Declaring complexities when using the settings' layouts and demanding more interactive interface and settings. 36 Suggesting to provide visual contents, more explanations, and examples to help users understand and change the settings and ensure that the outcomes match users' expectations. 37 Emphasizing that there are so many unnecessary options of the settings although there is a need to add necessary options.
Considering users' levels and experience	38 Indicating that some features, settings and their functions are flexible for companies but not for normal users. 39 Declaring that some settings' terms and descriptions are for professional users not for normal users. 40 Understanding and learning the meaning of the settings via experience 41 Observing the outcomes of the changed settings through experience
Ignoring SNSs' settings	42 Admitting that not regularly checking the settings. 43 Filtering out or ignoring the received new updates of the settings without checking them

Appendix C1 Phase 2: Quantitative Study

Approval letter from Dalhousie Research Ethics Board (REB)

Social Sciences & Humanities Research Ethics Board
Letter of Approval

November 07, 2017

Abdulhadi Aedh Alqarni
Computer Science\Computer Science

Dear Abdulhadi Aedh,

REB #: 2017-4250
Project Title: Examining the Conceptual Model of the Factors that Impact SNSs Privacy Settings Goals

Effective Date: November 07, 2017
Expiry Date: November 07, 2018

The Social Sciences & Humanities Research Ethics Board has reviewed your application for research involving humans and found the proposed research to be in accordance with the Tri-Council Policy Statement on *Ethical Conduct for Research Involving Humans.* This approval will be in effect for 12 months as indicated above. This approval is subject to the conditions listed below which constitute your on-going responsibilities with respect to the ethical conduct of this research.

Sincerely,

Dr. Karen Beazley, Chair

Post REB Approval: On-going Responsibilities of Researchers

Appendix C2 Questions and Descriptive Statistics Results

Background and Demographic Questions

1. Do you use any SNSs (e.g. Facebook, Twitter, Instagram, etc)?
   - o Yes.
   - o No (If you choose this option, the survey will be terminated).
2. What is your gender?
   - o Female
   - o Male
   - o Other
3. What is your age? (in years)

   [ ]
4. What is the highest level of education you have completed?
   - o High school.
   - o Some college credit (no degree).
   - o Bachelor's degree (Undergraduate).
   - o Master's degree (Graduate).
   - o Ph.D. degree (Post-Graduate).
   - o Other (please specify)

   [ ]
5. What is your occupation? (If student, specify your major)

   [ ]

General Questions about privacy, SNSs, and privacy in SNSs

6. How concerned are you about privacy in general?
   - o Extremely Concerned
   - o Moderately Concerned
   - o Somewhat Concerned
   - o Slightly Concerned
   - o Not at all Concerned
7. What Social Networking Sites (SNSs) do you use currently or have used in the past? (Check all that apply)
   - □ Facebook.
   - □ Twitter.
   - □ Instagram.
   - □ YouTube.
   - □ Google Plus.
   - □ Others (please specify)

   [ ]
8. Why do you use Social Networking Sites (SNSs) such as Facebook or Twitter, etc? (Check all that apply)

□ Creating awareness.
□ Helping people.
□ SNSs are indispensable and you have to be on them.
□ Sharing information.
□ Connection and communication with others.
□ Others (please specify)

9. How long have you been using SNSs such as Facebook, Twitter, Instagram, etc.?
   - o Less than a year.
   - o 1-2 years.
   - o 3-4 years.
   - o 5-6 years.
   - o 7-8 years.
   - o 9-10 years.
   - o More than 10 years. (please specify)

10. How many hours do you spend in the SNSs daily?
    - o Less than an hour.
    - o 1-2 hours.
    - o 3-4 hours.
    - o 5-6 hours.
    - o 7-8 hours.
    - o 8-9 hours.
    - o More than 10 hours (please specify)

11. Have you ever seen any windows that explain how to use the settings in the SNSs that you use (e.g. Facebook, Twitter, Instagram, etc.)?
    - o No.
    - o Yes (I have seen windows inside the SNS).
    - o Yes (I have seen windows outside SNS).
    - o I am not sure

    If Yes, can you give an example?

12. Have you ever changed the default settings in the SNSs that you use?
    - o Yes.
    - o No.

    If Yes (Please describe the changes you make):

13. The last time you were aware that a SNS updated their settings, did you check to make sure your preferences were still applied?
    - o Yes.
    - o No.
    - o I am not sure.
14. Have you checked or applied all updated settings provided by SNSs?
    - o Yes.
    - o No.
    - o I am not sure.

    Other (please specify)

15. Do you know how SNSs handle their settings and why they provide settings updates?
    - o I am not sure.
    - o No.
    - o Yes, (please describe how?)

16. For each of the following statements, how strongly do you agree or disagree?

Questions	**Strongly Agree – Strongly Disagree***				
My definition of what privacy means is different from SNSs' definition.	○	○	○	○	○
My definition of privacy in SNSs is that all my information must be protected.	○	○	○	○	○
SNSs have the right to use or spread my information and activities.	○	○	○	○	○
I have lost control over how my personal information is collected and used by SNSs companies.	○	○	○	○	○
SNSs handle my personal information that they collect in a proper and confidential way.	○	○	○	○	○
Existing laws and organizational practices provide a reasonable level of protection that ensure my privacy.	○	○	○	○	○
I believe all that kind of frauds can be committed with my information in SNSs.	○	○	○	○	○
SNSs sneak data - data that I do not know about - into their terms and conditions.	○	○	○	○	○
I am responsible for what I share in SNSs.	○	○	○	○	○

I am open to accepting any vulnerabilities from sharing personal information to a wider world.	○	○	○	○	○
It is my duty to learn about privacy issues in SNSs and I should not wait for SNSs to present them.	○	○	○	○	○
SNSs settings are exactly the same (i.e. Facebook, Twitter, and Instagram settings look similar to each other).	○	○	○	○	○
SNSs' settings are tricky because they are different and have different ways of dealing with information.	○	○	○	○	○
Privacy must be a concern for me and the SNSs.	○	○	○	○	○

* Strongly Agree(1) – Agree (2) - Neither Agree nor Disagree (3) – Disagree (4) - Strongly Disagree (5)

17. How often do you do the following?

Questions	Frequently – Never*				
I attempt to understand, change, and receive or find new updates of SNSs' settings only from the same SNSs (i.e. No other external resources are used).	○	○	○	○	○
I attempt to understand, change, and receive or find new updates of SNSs' settings from resources outside SNSs (e.g. Using Google or other resources).	○	○	○	○	○

* Frequently (1) – Occasionally (2) - Rarely (3) – Never (4)

Themes (Factors) and Codes Questions and Findings

1. Navigation through SNSs settings

Q #	Questions	SA ←Rating → SD *					Mean	Std Dev
		1	2	3	4	5		
1	Navigating through SNSs' settings and their options to understand, change, and find new updates takes time.	31	52	9	8	1	1.97	0.9
2	Going through SNSs' settings to understand, change, and find new updates is not sufficient (e.g. using different paths to the settings with no guidance and providing many settings and options).	15	53	25	5	3	2.29	0.89

* Strongly Agree(1) – Agree (2) - Neither Agree nor Disagree (3) – Disagree (4) - Strongly Disagree (5)

2. Categorization of SNSs settings

Q #	Questions	SA ←Rating → SD *					Mean	Std Dev
		1	2	3	4	5		
1	Some features or settings are not categorized under privacy settings. For example, Timeline and Tagging settings in Facebook are not under privacy settings.	20	52	24	5	0	2.14	0.79

2	Adding categories and sub-categories to facilitate navigation, understanding, changing of SNSs settings is necessary.	34	50	16	1	0	1.84	0.72
3	Classifying the settings based on features such as posts, photos, tags is more practical.	39	43	17	1	1	1.83	0.81

3. Existing of SNSs' settings, options, and explanation.

Q #	Questions	Yearly ←Rating → Never *					Mean	Std Dev
		1	2	3	4	5		
1	Check to know if a specific setting or option exist (e.g. whether it is possible to remove a tag from posts or photos).	29	37	13	3	19	2.47	1.43

Q #	Questions	Frequently ←Rating → Never *				Mean	Std Dev
		1	2	3	4		
1	I learn about the existence of SNSs settings and their options from other resources such as friends or news.	16	50	32	3	2.22	0.74
2	I have difficulties finding out if an explanation of a setting exists in the SNSs.	21	50	23	7	2.16	0.83

* Frequently (1) – Occasionally (2) – Rarely (3) – Never (4)

4. Asking for help or advising others about SNSs' settings.

Q #	Questions	Frequently ←Rating → Never *				Mean	Std Dev
		1	2	3	4		
1	I ask friends to help me understand, change, and test SNSs settings or activities.	15	32	28	26	2.64	1.03
2	I ask an expert to help me understand, change, and test SNSs settings.	15	21	26	39	2.88	1.09
3	I ask people who have the same issue with SNSs settings.	19	41	28	13	2.35	0.93
4	I advise friends and family to ask for help or support in order to understand, change, and find new updates of SNSs settings.	20	43	22	16	2.34	0.97
5	I advise friends and family to use the most limited SNSs settings options.	27	31	22	21	2.37	1.09

Q #	Questions	Options			Mean	Std Dev
		Yes (1)	No (2)	I am not sure (3)		
1	Is there any live support or help in the SNSs (e.g. Live Chat) you use that can assist people to understand and change their SNSs settings?	12	44	45	2.33	0.68

5. Guessing or assuming SNSs settings' meanings and functions

Q #	Questions	Frequently ←Rating → Never *				Mean	Std Dev
		1	2	3	4		
1	I guess the meaning of SNSs' settings instead of	29	40	16	16	2.19	1.03

	reading it.						
2	I guess the meaning of the new updates of SNSs' settings instead of reading it.	28	40	19	14	2.19	0.99
3	I guess how to change SNSs' settings or features instead of reading it.	26	43	15	17	2.23	1.02
4	I guess the options of SNSs' settings instead of reading it.	26	42	14	19	2.26	1.05
5	I guess the location of SNSs' settings instead of asking for help.	29	43	16	13	2.13	0.98
6	I guess or assume the outcomes of SNSs' settings instead of searching about them.	30	39	21	11	2.13	0.97
7	The meaning and the outcomes of SNSs' settings is different than what I think or assume.	22	40	35	4	2.21	0.83

6. Using shortcuts to change SNSs' settings

Q #	Questions	Frequently ←Rating → Never *				Mean	Std Dev
		1	2	3	4		
1	I use shortcuts to change the timeline or SNSs' settings. For example, on Facebook, you can change each post's settings or use Privacy Checkup (the shortcut way) instead of changing in the settings page.	26	32	22	21	2.38	1.08
2	I use different resources such as Google to search for shortcut on how to achieve specific setting.	34	37	13	17	2.13	1.06

Q #	Questions	SA ←Rating → SD *					Mean	Std Dev
		1	2	3	4	5		
1	Using shortcuts to change SNSs' settings is more practical than going through all the settings.	24	44	28	2	3	2.17	0.92
2	Customizing individual post is more practical (easier, faster) than going through global SNSs' settings to change.	22	45	25	6	3	2.24	0.96

7. Receiving notifications about new updates of SNSs' settings

Q #	Questions	Frequently ←Rating → Never *				Mean	Std Dev
		1	2	3	4		
1	SNSs provide new updates of their settings without sending notifications to me.	26	41	21	13	2.21	0.97
2	I check and read the new updates of SNSs' settings.	15	39	34	13	2.45	0.90
3	I filter out or ignore the new updates notifications of SNSs' settings.	20	43	24	14	2.32	0.95
4	I read to understand and take action to change only after I get a notification about the new updates of SNSs' settings.	16	42	29	14	2.41	0.92
5	I use different resources such as email, news, or friends to get notifications about new updates of	18	38	30	15	2.42	0.95

	SNSs' settings.						

Q #	Questions	SA ←Rating → SD *					Mean	Std Dev
		1	2	3	4	5		
1	Receiving notifications about SNSs settings new updates from an accurate resource with accurate information will change my feelings and attitude toward the SNSs' settings.	29	41	26	4	1	2.08	0.89
2	Presenting and advertising the notifications of SNSs settings new updates in an easy manner will help me to understand and change SNSs' settings.	31	44	20	4	2	2.03	0.92
3	SNSs do not provide the right information about SNSs settings new updates at the right time.	14	30	45	8	4	2.58	0.96

8. Searching and finding SNSs' settings and new updates

Q #	Questions	Frequently ←Rating → Never *				Mean	Std Dev
		1	2	3	4		
1	I search for proper explanations and seek more information to understand the meaning of SNSs settings.	18	41	29	13	2.37	0.92
2	I search for the new updates of the settings to ensure that they match my expectations.	14	42	31	14	2.45	0.90
3	It is challenging when I attempt to search and find enough and accurate information about SNSs settings new updates.	18	45	26	12	2.32	0.90
4	I use different resources such as Google to find new updates of SNSs' settings.	23	38	23	17	2.34	1.01
5	I seek for the easiest way to find new updates of SNSs' settings.	36	47	10	8	1.90	0.88
6	I look for new updates of SNSs' settings only if I receive notifications otherwise I do not look for them.	24	48	17	12	2.17	0.93

Q #	Questions	SA ←Rating → SD *					Mean	Std Dev
		1	2	3	4	5		
1	Looking for and finding new updates of the SNSs settings take time.	23	42	25	10	1	2.25	0.95

9. Using different resources

Q #	Questions	Frequently ←Rating → Never *				Mean	Std Dev
		1	2	3	4		
1	I use Google to understand, change, and test SNSs' settings.	40	28	22	11	2.04	1.03
2	I use Google to search and find new updates of SNSs' settings.	23	33	28	17	2.39	1.02
3	I use Google to find a solution from people who have the same issues that I have with my SNSs' settings.	49	29	14	9	1.83	0.98

4	I use videos to help me understand, change, and test SNSs' settings.	28	40	14	19	2.24	1.06
5	I use blogs to read and change SNSs' settings in case of any new updates.	18	32	23	28	2.60	1.08
6	I use photos to understand and change SNSs' settings.	23	40	23	15	2.30	0.99
7	I hear about SNSs settings and new updates from experts, friends, or family members.	23	43	24	11	2.23	0.93
8	I hear about SNSs settings and new updates from the news or media.	20	32	31	18	2.47	1.01
9	I use the provided links in SNSs settings descriptions (e.g. Learn More) to understand and change settings.	23	34	27	17	2.38	1.02
10	I check the Frequently Asked Questions' (FAQs) pages to understand the meaning of SNSs' settings.	21	37	27	16	2.38	0.99

Q #	Questions	SA ←Rating → SD *					Mean	Std Dev
		1	2	3	4	5		
1	Providing different resources about the SNSs settings and new updates - inside SNSs - such as photos, short videos, or animations would enhance my understanding and ability to change them.	39	43	15	2	2	1.86	0.88
2	Providing a direct help (e.g. Live Chat, a website, links) would assist me to instantaneously understand and change the settings and new updates.	30	40	23	5	3	2.12	0.99

10. Reading SNSs settings' descriptions and new updates

Q #	Questions	Frequently ←Rating → Never *				Mean	Std Dev
		1	2	3	4		
1	I read SNSs settings descriptions to understand the meaning of the settings instead of guessing it.	26	38	25	12	2.23	0.97
2	I read SNSs settings descriptions to change the settings instead of guessing it.	20	42	27	12	2.31	0.92
3	I read conversations in SNSs' Help Centers (e.g. Facebook Help Centre) to understand the meaning and change SNSs settings.	12	37	26	26	2.65	0.99
4	I read online from time to time to find new updates of SNSs' settings.	8	31	40	22	2.75	0.89
5	I read the agreements and conditions in SNSs to identify an issue about new updates.	8	30	21	42	2.96	1.02
6	I read about the new updates of the settings to assure that they match my expectations.	11	38	31	21	2.61	0.94
7	I use different resources such as photos and videos to understand and change SNSs' settings instead of reading.	18	49	22	12	2.28	0.90
8	I use different resources such as blogs to read about new updates of SNSs' settings.	11	46	23	21	2.53	0.94

Q #	Questions	SA ←Rating → SD *					Mean	Std Dev
		1	2	3	4	5		
1	I will not read a long paragraph of texts about new	38	29	15	14	5	2.20	1.22

	updates of SNSs' settings.							
2	Reading to understand and change SNSs settings options takes time because there are so many options.	33	44	17	6	1	1.99	0.91
3	I waste my time when reading texts of new updates of SNSs' settings.	24	41	19	12	5	2.34	1.12
4	Reading texts of SNSs settings descriptions is not clear and simple to understand and change the settings.	22	39	29	9	2	2.31	0.98
5	Reading texts of SNSs settings descriptions is boring.	38	42	14	6	1	1.91	0.92
6	SNSs settings' descriptions are not enough to understand and change the settings.	21	39	28	8	5	2.38	1.06

11. Observing and checking the outcomes to match users' expectations.

Q #	Questions	Frequently ←Rating → Never *				Mean	Std Dev
		1	2	3	4		
1	I observe and check the outcomes after changing SNSs' settings.	37	40	12	12	1.99	0.98
2	I notice a lag (delay) when I attempt to see the results after directly changing SNSs' settings.	18	37	29	17	2.45	0.97
3	I test the SNSs' settings to ensure that they match my expectations.	34	38	16	13	2.08	1.01
4	I take action to change SNSs' settings after noticing an issue.	43	38	12	8	1.85	0.92
5	I search to ensure the outcomes of changing SNSs' settings match my expectations.	22	43	25	11	2.25	0.92
6	I read to ensure the outcomes of changing SNSs' settings match my expectations.	19	44	26	12	2.31	0.91
7	I ask friends to ensure the outcomes of changing SNSs' settings match my expectations.	19	35	27	20	2.48	1.02
8	I observe and ensure that the outcomes of changing SNSs' settings are effective via experience.	26	44	18	13	2.18	0.96
9	Ensuring that the changed SNSs' settings and the new updates of SNSs' settings will match my expectations based on SNSs settings descriptions and explanations.	16	46	26	13	2.36	0.90

Q #	Questions	SA ←Rating → SD *					Mean	Std Dev
		1	2	3	4	5		
1	I suggest adding an interactive review page, animations videos, or examples to reflect the expected outcomes from changing SNSs settings.	35	44	16	4	2	1.95	0.92
2	SNSs settings are superficial and useless and whether changing or not, the outcomes will be relatively even.	10	31	35	17	8	2.82	1.08

12. Remembering SNSs' settings, options, changes, outcomes, and new updates.

Q #	Questions	Frequently ←Rating → Never *				Mean	Std Dev
		1	2	3	4		

1	I forget the SNSs' settings and how to change them.	29	31	29	12	2.24	1
2	I forget if I received new updates of SNSs' settings.	29	38	27	7	2.12	0.91
3	I do not remember SNSs settings' options.	23	36	29	13	2.32	0.97
4	I do not remember the outcomes of changing SNSs' settings.	19	35	33	14	2.42	0.95

Q #	Questions	SA ←Rating → SD *					Mean	Std Dev
		1	2	3	4	5		
1	I suggest providing resources that remind me often of the need to understand and change the SNSs' settings in case I forgot the settings.	25	45	23	5	3	2.17	0.96

13. Interface and usability issues

Q #	Questions	SA ←Rating → SD *					Mean	Std Dev
		1	2	3	4	5		
1	I demand more open and interactive SNSs settings and sleek pages or layouts.	37	39	19	5	1	1.95	0.92
2	I suggest providing more visual contents (e.g. photos and videos), explanations, and examples to help me understand and change SNSs' settings and ensure that the outcomes match my expectations.	43	38	17	1	2	1.82	0.89
3	There are so many options of SNSs settings.	27	38	26	9	1	2.20	0.97
4	There are unnecessary options that are provided in the settings.	18	32	36	13	2	2.50	1
5	There is a need to add necessary options that are not currently included in the settings.	22	32	38	6	3	2.37	0.99
6	I suggest providing a tutorial when creating an account to facilitate SNSs settings' descriptions and terms.	32	40	21	4	4	2.09	1.02
7	The settings page does not look professional and interactive similar to the Timeline or Profile pages.	21	30	38	10	2	2.43	0.99

14. Considering Users' Levels and Experience

Q #	Questions	SA ←Rating → SD *					Mean	Std Dev
		1	2	3	4	5		
1	SNSs settings and their functions are suitable for experts but not novices.	14	39	29	18	1	2.53	0.98
2	SNSs settings terms and descriptions are for professional users not for normal users like me.	20	35	29	15	2	2.45	1.03

Q #	Questions	Frequently ←Rating → Never *	Mean	

		1	2	3	4		Std Dev
1	I understand and learn the meaning of SNSs settings via personal experience.	42	45	10	4	1.76	0.79
2	I observe the outcomes of SNSs settings changes through personal experience.	45	43	9	4	1.72	0.79
3	I seek more information from different resources such as Google because of the unsatisfactory experience with SNSs updated settings and Help Centre.	37	40	17	7	1.94	0.90

15. Ignoring SNSs Settings

Q #	Questions	Frequently ←Rating → Never *				Mean	Std Dev
		1	2	3	4		
1	I do not check SNSs' settings even if there is an issue.	15	25	28	33	2.78	1.06
2	I ignore SNSs' settings because I do not care about them.	11	33	25	32	2.77	1.02
3	I ignore SNSs' settings because they waste my time.	18	31	24	28	2.61	1.08
4	I use SNSs publicly and I do not post too personal information.	25	43	17	16	2.24	1
5	I filter out the received new updates of SNSs' settings without checking them.	11	47	24	19	2.50	0.92
6	I keep SNSs' settings as they are (using default settings).	14	38	19	30	2.64	1.05

Appendix D1 Proof of Concept and Guidelines

Approval letter from Dalhousie Research Ethics Board (REB)

Social Sciences & Humanities Research Ethics Board
Letter of Approval

March 23, 2018

Abdulhadi Aedh Alqarni
Computer Science\Computer Science

Dear Abdulhadi Aedh,

REB #: 2018-4445
Project Title: Testing the Usability of an Educational Application (PrivSet) When Social Networking Sites' Users Attempt to Understand, Change, and Find Settings and New Updates

Effective Date: March 23, 2018
Expiry Date: March 23, 2019

The Social Sciences & Humanities Research Ethics Board has reviewed your application for research involving humans and found the proposed research to be in accordance with the Tri-Council Policy Statement on *Ethical Conduct for Research Involving Humans.* This approval will be in effect for 12 months as indicated above. This approval is subject to the conditions listed below which constitute your on-going responsibilities with respect to the ethical conduct of this research.

Sincerely,

Dr. Karen Beazley, Chair

Appendix D2 Post-Task Questionnaire

Participant ID:……

Demographic Questions

1. Gender
   □ Male □ □ Female □ □ Other

2. Age (in years):
   [ ]

3. What is your highest level of education you have completed?
   - o High school.
   - o Some college credit (no degree).
   - o Bachelor Degree.
   - o Master Degree.
   - o Ph.D. Degree.
   - o Other (Please Specify):
     [ ]

4. What is your occupation (If student, what is your major?):
   [ ]

5. How long have you been using SNSs (e.g. Facebook, Twitter, Instagram, etc..)?
   - o Less than a year.
   - o 1 – 2 years.
   - o 3 – 4 years.
   - o 5 – 6 years.
   - o 7 – 8 years.
   - o 9 – 10 years.
   - o Other (Please Specify):
     [ ]

6. How many hours do you spend on the SNSs daily?
   - o Less than an hour.
   - o 1 – 2 hours.
   - o 3 – 4 hours.
   - o 5 – 6 hours.
   - o 7 – 8 hours.
   - o 9 – 10 hours.
   - o More than 10 hours (Please specify):
     [ ]

General Questions

	Strongly Agree – Strongly Disagree (7 Likert Scale*)						
1. Navigation through the SNSs settings is easier when using PrivSet application.	○	○	○	○	○	○	○
2. The PrivSet application: • Helps me to learn the different categories of features and settings (e.g. security and login, privacy, notification, apps, etc.) in SNSs. • Shows me existed settings, options, and explanations that I did not know before in SNSs. • Is an adequate source to understand, change, and find new updates of the settings without asking others for help. • Provides accurate and enough information that reduce guessing or assuming the meaning and the function of the settings. • Is a shortcut process to understand, change, and find new updates of the settings. • Helps me to search and find the SNSs settings and new updates easily. • Is enough source to understand, change, and find new updates about SNSs settings and no need to find different resources. • Helps me to remember SNSs' settings, options, changes, outcomes, and new updates. • Is suitable for novices and expert users.	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○
3. Providing specific page for the new updates of the features and settings is helpful to check the notifications of the new updates.	○	○	○	○	○	○	○
4. The descriptions and definition of the features and settings' meanings in PrivSet application is readable and clear.	○	○	○	○	○	○	○
5. Providing expected outcomes when changing the setting would assist me to guarantee that the changes match my expectations.	○	○	○	○	○	○	○
6. The PrivSet application's interface is interactive.	○	○	○	○	○	○	○

7. The PrivSet application will help me to regularly check the settings and new updates and do not ignore them.	○ ○ ○ ○ ○ ○ ○

Perceived usefulness and Ease of Use:

I would like to ask you about your opinion regarding the usability of the PrivSet application.

Perceived usefulness

	Strongly Agree – Strongly Disagree (7 Likert Scale*)
1) I think PrivSet application would improve my: 1a) understanding of SNSs settings. 1b) changing of SNSs settings 1c) finding of SNSs settings' new updates.	○ ○
2) Using PrivSet application would make it **easier** to: 2a) understand SNSs settings. 2b) change SNSs settings. 2c) Find new updates of SNSs settings.	○ ○
3) Using PrivSet application would make it **faster** to: 3a) understand SNSs settings. 3b) change SNSs settings. 3c) Find new updates of SNSs settings.	○ ○
4) Using the PrivSet application would provide me the accurate information that I need during: 4a) The process of understanding the settings. 4a) The process of changing the settings. 4a) the process of finding the settings' new updates.	○ ○
5) In case of a new update of a setting, the PrivSet application would provide a feedback in timely manner.	○ ○ ○ ○ ○ ○ ○
6) Using the PrivSet application would enhance my privacy behavior toward the SNSs settings.	○ ○ ○ ○ ○ ○ ○
7) Using PrivSet application would help me to complete the desired settings successfully when using SNSs.	○ ○ ○ ○ ○ ○ ○
8) Using PrivSet application would give me greater control over the settings.	○ ○ ○ ○ ○ ○ ○
9) The PrivSet application would address my needs when using SNSs settings.	○ ○ ○ ○ ○ ○ ○
10) Using PrivSet application would save my time.	○ ○ ○ ○ ○ ○ ○

11) Overall, I found the PrivSet application useful when using SNSs settings.	○ ○ ○ ○ ○ ○ ○

Perceived ease of use

	Strongly Agree – Strongly Disagree (7 Likert Scale*)
1. Learning to use the PrivSet application was easy for me.	○ ○ ○ ○ ○ ○ ○
2. Understanding the settings via PrivSet application was easy.	○ ○ ○ ○ ○ ○ ○
3. Changing the settings via PrivSet application was easy.	○ ○ ○ ○ ○ ○ ○
4. Finding the settings' new updates via PrivSet application was easy.	○ ○ ○ ○ ○ ○ ○
5. I think it would be easy for me to become skillful at using the PrivSet application.	○ ○ ○ ○ ○ ○ ○
6. It would be easy for me to remember how to perform tasks using the PrivSet application.	○ ○ ○ ○ ○ ○ ○
7. Whenever I make a mistake while using the PrivSet application, I recover easily and quickly.	○ ○ ○ ○ ○ ○ ○
8. The provided information to understand and change the settings via the PrivSet application was clear.	○ ○ ○ ○ ○ ○ ○
9. I found it easy to get the PrivSet application to do what I want it to do.	○ ○ ○ ○ ○ ○ ○
10. My interaction with PrivSet application was flexible.q	○ ○ ○ ○ ○ ○ ○
11. The PrivSet application provides helpful guidance when performing tasks.	○ ○ ○ ○ ○ ○ ○
12. Overall, I found the PrivSet application easy to use.	○ ○ ○ ○ ○ ○ ○

Appendix D3 (Simi-Structured Interview Questions)

1. What is your opinion in general about the PrivSet application?
2. Do you like this method (PrivSet application) of understanding, changing, and finding of new updates compared to your current method? Why?
3. Would you want to use it in an actual practice?
4. What specific features or functionalities do you like about the PrivSet application? Why?
5. What specific features or functionalities do you dislike about the PrivSet application? Why?
6. What would you recommend for improving the PrivSet application in terms of its content and functions?
7. What would you recommend for improving the PrivSet application interface?
8. What other comments do you have regarding the study in general and PrivSet in particular?

Appendix D4 Effective Size of Tasks

Facebook Task (Time to complete the task) using one-way ANOVA:

Tests of Between-Subject Effects						
Dependent Variable: Facebook Task						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	118440.833[a]	1	118440.833	15.919	.000	.362
Intercept	651508.033	1	651508.033	87.563	.000	.758
Groups	118440.833	1	118440.833	15.919	.000	.362
Error	208332.133	28	7440.433			
Total	978281.000	30				
Corrected Total	326772.967	29				
a. R Squared = .362 (Adjusted R Squared = .340)						

Twitter Task1 (Time to complete the task) using one-way ANOVA:

Tests of Between-Subject Effects						
Dependent Variable: Twitter Task1						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	84270.000a	1	84270.000	45.372	.000	.618
Intercept	406003.333	1	406003.333	218.598	.000	.886
Groups	84270.000	1	84270.000	45.372	.000	.618
Error	52004.667	28	1857.310			
Total	542278.000	30				
Corrected Total	136274.667	29				
a. R Squared = .618 (Adjusted R Squared = .605)						

Twitter Task2 (Time to complete the task) using one-way ANOVA:

Tests of Between-Subject Effects						
Dependent Variable: Twitter Task2						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	116189.633a	1	116189.633	56.636	.000	.669
Intercept	336020.833	1	336020.833	163.791	.000	.854
Groups	116189.633	1	116189.633	56.636	.000	.669
Error	57442.533	28	2051.519			
Total	509653.000	30				
Corrected Total	173632.167	29				
a. R Squared = .669 (Adjusted R Squared = .657)						

Instagram Task1 (Time to complete the task) using one-way ANOVA:

Tests of Between-Subject Effects						
Dependent Variable: Instagram Task1						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	63756.300a	1	63756.300	9.772	.004	.259
Intercept	183613.633	1	183613.633	28.143	.000	.501
Groups	63756.300	1	63756.300	9.772	.004	.259
Error	182679.067	28	6524.252			
Total	430049.000	30				
Corrected Total	246435.367	29				
a. R Squared = .259 (Adjusted R Squared = .232)						

Instagram Task2 (Time to complete the task) using one-way ANOVA:

Tests of Between-Subject Effects						
Dependent Variable: Instagram Task2						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	929.633a	1	929.633	.143	.708	.005
Intercept	2015020.833	1	2015020.833	309.791	.000	.917
Groups	929.633	1	929.633	.143	.708	.005
Error	182124.533	28	6504.448			
Total	2198075.000	30				
Corrected Total	183054.167	29				
a. R Squared = .005 (Adjusted R Squared = -.030)						

Facebook Task (Completion of the task) using one-way ANOVA:

Tests of Between-Subject Effects						
Dependent Variable: Facebook Task						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	5.633a	1	5.633	91.000	.000	.765
Intercept	73.633	1	73.633	1189.462	.000	.977
Groups	5.633	1	5.633	91.000	.000	.765
Error	1.733	28	.062			
Total	81.000	30				
Corrected Total	7.367	29				
a. R Squared = .765 (Adjusted R Squared = .756)						

Facebook Task (Completion of the task) using Chi-Squared:

Facebook Task * Groups (Without/With PrivSet) Crosstabulation					
			Groups (Without/With PrivSet)		
			Without PrivSet	With PrivSet	Total
Facebook Task	Incomplete	Count	13	0	13
		% within Facebook Task	100.0%	0.0%	100.0%
		% within Groups (Without/With PrivSet)	86.7%	0.0%	43.3%
	Complete	Count	2	15	17
		% within Facebook Task	11.8%	88.2%	100.0%
		% within Groups (Without/With PrivSet)	13.3%	100.0%	56.7%
Total		Count	15	15	30
		% within Facebook Task	50.0%	50.0%	100.0%
		% within Groups (Without/With PrivSet)	100.0%	100.0%	100.0%

Facebook Task (Completion of the task) using Chi-Squared (Phi and Cramer's V):

Symmetric Measures			
		Value	Approximate Significance
Nominal by Nominal	Phi	.874	.000
	Cramer's V	.874	.000
N of Valid Cases		30	

Twitter Task1 and Task2 (Completion of the task) using one-way ANOVA:

Tests of Between-Subject Effects						
Dependent Variable: Twitter Task1 and Task2						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	6.533a	1	6.533	196.000	.000	.875
Intercept	70.533	1	70.533	2116.000	.000	.987
Groups	6.533	1	6.533	196.000	.000	.875

Error	.933	28	.033			
Total	78.000	30				
Corrected Total	7.467	29				
a. R Squared = .875 (Adjusted R Squared = .871)						

Twitter Task1 and Task2 (Completion of the task) using Chi-Squared:

Twitter Task1 * Groups (Without/With PrivSet) Crosstabulation					
			Groups (Without/With PrivSet)		
			Without PrivSet	With PrivSet	Total
Twitter Task1	Incomplete	Count	14	0	14
		% within Twitter Task1	100.0%	0.0%	100.0%
		% within Groups (Without/With PrivSet)	93.3%	0.0%	46.7%
	Complete	Count	1	15	16
		% within Twitter Task1	6.3%	93.8%	100.0%
		% within Groups (Without/With PrivSet)	6.7%	100.0%	53.3%
Total		Count	15	15	30
		% within Twitter Task1	50.0%	50.0%	100.0%
		% within Groups (Without/With PrivSet)	100.0%	100.0%	100.0%

Twitter Task1 and Task2 (Completion of the task) using Chi-Squared (Phi and Cramer's V):

Symmetric Measures			
		Value	Approximate Significance
Nominal by Nominal	Phi	.935	.000
	Cramer's V	.935	.000
N of Valid Cases		30	

Instagram Task1 (Completion of the task) using one-way ANOVA:

Tests of Between-Subject Effects						
Dependent Variable: Twitter Task1						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	1.633a	1	1.633	12.250	.002	.304
Intercept	93.633	1	93.633	702.250	.000	.962
Groups	1.633	1	1.633	12.250	.002	.304

Error	3.733	28	.133			
Total	99.000	30				
Corrected Total	5.367	29				
a. R Squared = .304 (Adjusted R Squared = .280)						

Instagram Task1 (Completion of the task) using Chi-Squared:

Instagram Task1 * Groups (Without/With PrivSet) Crosstabulation

			Groups (Without/With PrivSet)		
			Without PrivSet	With PrivSet	Total
Instagram Task1	Incomplete	Count	7	0	7
		% within Instagram Task1	100.0%	0.0%	100.0%
		% within Groups (Without/With PrivSet)	46.7%	0.0%	23.3%
	Complete	Count	8	15	23
		% within Instagram Task1	34.8%	65.2%	100.0%
		% within Groups (Without/With PrivSet)	53.3%	100.0%	76.7%
Total		Count	15	15	30
		% within Instagram Task1	50.0%	50.0%	100.0%
		% within Groups (Without/With PrivSet)	100.0%	100.0%	100.0%

Instagram Task1 (Completion of the task) using Chi-Squared (Phi and Cramer's V):

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.552	.003
	Cramer's V	.552	.003
N of Valid Cases		30	

Instagram Task2 (Completion of the task) using Chi-Squared:

Instagram Task2 * Groups (Without/With PrivSet) Crosstabulation					
			Groups (Without/With PrivSet)		
			Without PrivSet	With PrivSet	Total
Instagram Task2	Incomplete	Count	15	0	15
		% within Instagram Task2	100.0%	0.0%	100.0%
		% within Groups (Without/With PrivSet)	100.0%	0.0%	50.0%
	Complete	Count	0	15	15
		% within Instagram Task2	0.0%	100.0%	100.0%
		% within Groups (Without/With PrivSet)	0.0%	100.0%	50.0%
Total		Count	15	15	30
		% within Instagram Task2	50.0%	50.0%	100.0%
		% within Groups (Without/With PrivSet)	100.0%	100.0%	100.0%

Instagram Task2 (Completion of the task) using Chi-Squared (Phi and Cramer's V):

Symmetric Measures			
		Value	Approximate Significance
Nominal by Nominal	Phi	1.000	.000
	Cramer's V	1.000	.000
N of Valid Cases		30	

Facebook Task (Wrong clicks) using one-way ANOVA:

Tests of Between-Subject Effects						
Dependent Variable: Facebook Task						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	720.300a	1	720.300	11.691	.002	.295
Intercept	821.633	1	821.633	13.336	.001	.323
Groups	720.300	1	720.300	11.691	.002	.295
Error	1725.067	28	61.610			
Total	3267.000	30				
Corrected Total	2445.367	29				
a. R Squared = .295 (Adjusted R Squared = .269)						

Twitter Task1 (Wrong clicks) using one-way ANOVA:

Tests of Between-Subject Effects						
Dependent Variable: Twitter Task1						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	410.700a	1	410.700	100.874	.000	.783
Intercept	456.300	1	456.300	112.074	.000	.800
Groups	410.700	1	410.700	100.874	.000	.783
Error	114.000	28	4.071			
Total	981.000	30				
Corrected Total	524.700	29				
a. R Squared = .783 (Adjusted R Squared = .775)						

Twitter Task2 (Wrong clicks) using one-way ANOVA:

Tests of Between-Subject Effects						
Dependent Variable: Twitter Task2						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	172.800a	1	172.800	73.457	.000	.724
Intercept	213.333	1	213.333	90.688	.000	.764
Groups	172.800	1	172.800	73.457	.000	.724
Error	65.867	28	2.352			
Total	452.000	30				
Corrected Total	238.667	29				
a. R Squared = .724 (Adjusted R Squared = .714)						

Instagram Task1 (Wrong clicks) using one-way ANOVA:

Tests of Between-Subject Effects						
Dependent Variable: Instagram Task1						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	307.200a	1	307.200	10.625	.003	.275
Intercept	307.200	1	307.200	10.625	.003	.275
Groups	307.200	1	307.200	10.625	.003	.275
Error	809.600	28	28.914			
Total	1424.000	30				
Corrected Total	1116.800	29				
a. R Squared = .275 (Adjusted R Squared = .249)						

Instagram Task2 (Wrong clicks) using one-way ANOVA:

Tests of Between-Subject Effects						
Dependent Variable: Instagram Task2						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	2323.200a	1	2323.200	89.272	.000	.761
Intercept	2576.133	1	2576.133	98.991	.000	.780
Groups	2323.200	1	2323.200	89.272	.000	.761
Error	728.667	28	26.024			
Total	5628.000	30				
Corrected Total	3051.867	29				
a. R Squared = .761 (Adjusted R Squared = .753)						

Appendix D5 Post-Task Questionnaire

Distributions and Descriptive Statistics for General Questions

Q #	Questions	SA ←Rating → SD							Mean	Std. Dev
		1	2	3	4	5	6	7		
1	Navigation through the SNSs settings is easier when using PrivSet application.	26	3	0	0	0	0	1	1.3	1.12
2	PrivSet application helps me to learn the different categories of features and settings (e.g. security and login, privacy, notification, apps, etc.) in SNSs.	19	11	0	0	0	0	0	1.37	0.49
3	PrivSet application shows me existed settings, options, and explanations that I did not know before in SNSs.	24	5	1	0	0	0	0	1.23	0.5
4	PrivSet application is an adequate resource to understand, change, and find new updates of the settings without asking others for help.	23	6	1	0	0	0	0	1.27	0.52
5	PrivSet application provides accurate and enough information that reduce guessing or assuming the meaning and the function of the settings.	22	6	2	0	0	0	0	1.33	0.61
6	PrivSet application is a shortcut process to understand, change, and find new updates of the settings.	21	7	1	0	1	0	0	1.43	0.86
7	PrivSet application helps me to search and find the SNSs settings and new updates easily.	20	7	3	0	0	0	0	1.43	0.86
8	PrivSet is enough resource to understand, change, and find new updates about SNSs settings and no need to find different resources.	18	7	4	1	0	0	0	1.6	0.86
9	PrivSet application would help me to remember SNSs' settings, options, changes, outcomes, and new updates.	11	14	0	4	0	0	1	2.07	1.34
10	PrivSet application is suitable for novices and expert users.	18	7	2	2	0	1	0	1.73	1.2
11	Providing specific page for the new updates of the features and settings is helpful to check the notifications of the new updates.	13	14	0	2	0	0	1	1.87	1.25
12	The descriptions and definition of the features and settings' meanings in PrivSet application is readable and clear.	23	6	0	0	1	0	0	1.33	0.8
13	Providing expected outcomes when changing the setting would assist me to guarantee that the changes match my expectations.	21	8	1	0	0	0	0	1.33	0.55
14	PrivSet application's interface is interactive.	18	11	1	0	0	0	0	1.43	0.57
15	PrivSet application will help me to regularly check the settings and new updates and do not ignore them.	18	4	5	3	0	0	0	1.77	1.07

Distributions and descriptive statistics for Perceived Usefulness questions

Q #	Questions	SA ←Rating → SD							Mean	Std. Dev
		1	2	3	4	5	6	7		
1a	Improve my understanding of SNSs settings.	22	6	2	0	0	0	0	1.33	0.61
1b	Improve my way of changing SNSs settings.	20	7	3	0	0	0	0	1.43	0.68
1c	Improve my way of finding SNSs settings' new updates	19	7	2	2	0	0	0	1.57	0.9
2a	Easier to understand SNSs settings	20	6	3	1	0	0	0	1.5	0.82
2b	Easier to change SNSs settings.	26	4	0	0	0	0	0	1.13	0.35
2c	Easier to find new updates of SNSs settings.	18	10	2	0	0	0	0	1.47	0.63
3a	Faster to understand SNSs settings	22	6	1	0	1	0	0	1.4	0.86
3b	Faster to change SNSs settings	26	3	1	0	0	0	0	1.17	0.46
3c	Faster to find new updates of SNSs settings.	21	7	2	0	0	0	0	1.37	0.61
4a	Provide accurate information that I need during the process of understanding the settings.	15	14	1	0	0	0	0	1.53	0.57
4b	Provide accurate information that I need during the process of changing the settings.	21	7	2	0	0	0	0	1.37	0.61
4c	Provide accurate information that I need during the process of finding the settings' new updates.	16	13	1	0	0	0	0	1.5	0.57
5	Provide a feedback in timely manner.	14	11	2	3	0	0	0	1.8	0.96
6	Enhance my privacy behavior toward SNSs settings.	18	7	4	0	1	0	0	1.63	0.96
7	Help me to complete the desired settings successfully when using SNSs.	23	6	1	0	0	0	0	1.27	0.52
8	Give me greater control over the settings.	18	10	1	1	0	0	0	1.5	0.73
9	Address my needs when using SNSs settings.	18	10	2	0	0	0	0	1.47	0.63
10	Save my time.	26	3	0	1	0	0	0	1.2	0.61
11	Overall, I found PrivSet application useful when using SNSs settings.	27	3	0	0	0	0	0	1.1	0.31

Distributions and descriptive statistics for Perceived Ease of Use questions

Q #	Questions	SA ←Rating → SD							Mean	Std. Dev
		1	2	3	4	5	6	7		
1	Learning to use PrivSet application was easy for me.	22	7	1	0	0	0	0	1.3	0.53
2	Understanding the settings via PrivSet application was easy.	22	7	1	0	0	0	0	1.3	0.53
3	Changing the settings via PrivSet application was easy.	26	3	1	0	0	0	0	1.17	0.46
4	Finding the settings' new updates via PrivSet application was easy.	23	2	5	0	0	0	0	1.4	0.77
5	I think it would be easy for me to become skillful at using PrivSet application.	21	9	0	0	0	0	0	1.3	0.47
6	It would be easy for me to remember how to perform tasks using the PrivSet application	18	9	3	0	0	0	0	1.5	0.68

Q #	Questions	SA ←Rating → SD							Mean	Std. Dev
		1	2	3	4	5	6	7		
7	Whenever I make a mistake while using PrivSet application, I can recover easily and quickly.	21	5	1	3	0	0	0	1.53	0.97
8	The provided information to understand and change the settings via the PrivSet application was clear.	23	6	1	0	0	0	0	1.27	0.52
9	I found it easy to get PrivSet application to do what I want it to do.	26	3	1	0	0	0	0	1.17	0.46
10	My interaction with PrivSet application was flexible.	21	7	1	1	0	0	0	1.4	0.72
11	PrivSet application provides helpful guidance when performing tasks.	20	10	0	0	0	0	0	1.33	0.48
12	Overall, I found PrivSet application easy to use.	28	1	1	0	0	0	0	1.1	0.4