Fighting email phishing attacks utilizing brand icon (Favicon) : An Empirical Research

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ABSTRACT

The release of tablets and smartphones, which offer more advanced communication and computing capabilities, has led to the strong emergence of communication media on the market. Email systems are continuously being improved. In addition to facilitating communication between businesses and customers, users and businesses are proposing new communication methods such as App-based chat and instant messengers. Nevertheless, email is still the most popular means of communication in use. Google's Gmail is one of the most widely used email service applications in the email market. It is top-notch at filtering out spam and offers useful extras such as quick links to track deliveries, amend reservations, and more without opening the email and looking for a link. Google has interpreted "know your user" and designed a system that can be accessed even by the novice computer user [1]. As of May 2016, Google announced in their I/O Developers Conference that Gmail now has more than 1.5 billion monthly active users, giving Gmail the largest email user base [2]. Usability becomes a key factor in the adoption of these applications, which are often used by people who have problems when using mobile devices, spammers and hackers, and those who have limited experience with technology. The aim of this paper is to conduct an empirical study to evaluate the Gmail Sender's Icon feature to stop phishing. The result of the study will provide recommendations that may help improve the efficiency and effectiveness of email communication and avoid phishing, scam.

Keywords: Phishing, Human-Computer Interaction, HCI, Think aloud, Heuristic Evaluation, Favicon, email, Gmail, webmail, Security, Spam.

I. INTRODUCTION

In today's world, email is an indispensable tool for correspondence. It has further developed for use in ways that it was not initially intended for, such as login identity (ID), VoIP, group chat, social media communication, etc. [3, 4]. Each email service has its own advantages and disadvantages for its user interfaces (UI) and friendliness. Popular email services like Yahoo Mail, Hotmail, AOL Mail, Gmail, and Outlook all have different user interfaces and feature sets. Gmail offers a superior spam filter system, user interface, and several security features among service providers. Gmail now has more than one billion monthly active users, giving it the largest email user base [2]. Google's Gmail webmail has 'Human-Centered Design' (HCD) that enhances productivity for email users [1]. It has a vastly improved user experience to guard against receiving unwanted emails sent by spammers and phishers.

Despite its user-friendly nature, at present, Gmail has a certain feature that may need further improvement. The emails are sorted in reverse chronological order with the newest messages listed at the top. The problem with this layout is that the user cannot figure out the message's actual sender without opening the email. For instance, if a user gets an email from say 'John' who works at ABC company and a second email from another 'John' who is employed with XYZ company, Gmail will simply show John as the sender for both emails.

To solve this specific problem Agarwal, a computer engineer, introduced Gmail Sender Icons. The Gmail sender's icon can be enabled in the web client through Chrome browser [5]. Gmail allows the user to add more features through a number of options such as by enabling it in the user's settings, adding it through Chrome Web Store or by adding it from the Gmail Lab.

This will make it easy for the user to identify the company or the organization of the email sender right inside the message list of his or her Gmail inbox. It analyzes the website domain from the URL and pulls out the favicon image (logo) from the website domain. It then appends the logo image and the company's domain as a label to the message subject thus making it easier for users to quickly identify the email sender. This extremely useful add-on has been available since 2015 and it makes it possible to see the email domain name and favicon (icon) in the inbox without opening the email. Since this add-on has not yet become popular, the assumption is that this may be because the add-on is fairly new, or users may be having difficulty navigating steps to use this add-on. This empirical study of the Gmail senders Icon may help reveal issues with phishing and email scam.
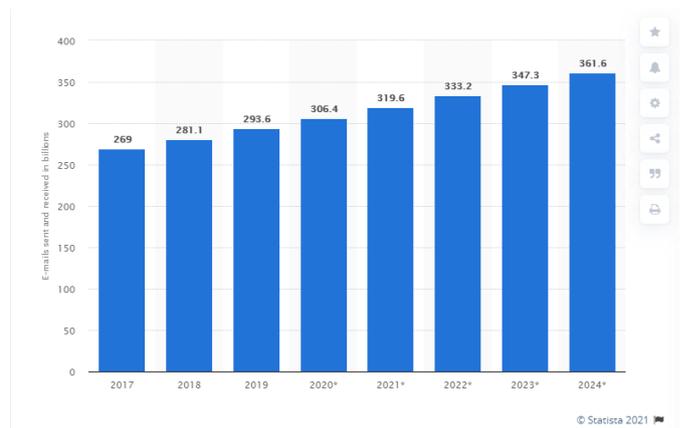

Fig 1: Number of emails sent and received per day worldwide from 2017 to 2024 (in billions)

In the present study, the research on the Gmail Sender Icons in the Chrome web browser will be evaluated. Research concentrates on how users can learn and utilize an application to accomplish objectives. Outcomes of the research are needed to assess the interaction and the overall design of add-ons [5]. Numerous online consumers use email for information exchange. Often, they are in need for further support to protect themselves from the unavoidable surge of spam and promotional correspondences. Though most undesirable messages resulting in phishing attacks appear amiable,

consumers are becoming more aware about malicious emails. Generally speaking, users are more mindful of the risks of obscure emails, and as indicated by a worldwide study in February 2019, 45% of web clients revealed that they tried not to open email from obscure email addresses.

II. RESEARCH GOAL

The purpose of this empirical study is to assess phishing email identification with the add-on for the Gmail Sender Icons in Chrome web browser and evaluate its design to identify the learnability, effectiveness, efficiency, user-friendliness, security, and productivity. Evaluation research is essential because it is helpful in many circumstances, especially in interface development situations [6]. By collecting data from the users, the present study may shed light on the user's experience of the Gmail Sender Icons app and may generate insights for possible improvement. The ten usability heuristics elaborated by Nielsen 2015 was considered during this evaluation of Gmail's inbox interface. On the whole, this study may offer suggestions about how this Gmail feature, which enables one more level of email security from hackers, spammers, and phishing emails, can have increased user satisfaction.

III. PLANNING

As explained in the purpose of the study, this research study drew from the usability evaluation framework of Ten Usability Heuristics suggested and developed by Jakob Nielsen and Rolf Molich [7]. The current set of 10 'Usability Heuristics that is widely used was made available by Jakob Nielsen in 1994. The usability evaluation process is a method that consists of a set of predefined tasks for collecting observational data from the end-user by interacting with products such as software, hardware, and so forth [8].

According to Jakob Nielsen and Mack, "heuristic evaluation includes having a small set of researchers examine the user-interface and evaluate its compliance with recognized Usability Evaluation principles ('heuristics')" (1995). While planning the study, the researcher's basic approach in conducting this Usability Testing was to identify potential issues with certain designs in usability interface [9]. The researcher tried to maintain a less formal, yet well-designed test that will identify the issue of the usability of the product.

The planning for this study involved several aspects. Firstly, care was taken in determining the participants of the study. Secondly, the tasks and questionnaires involved in the study were planned, and finally, steps in the data collection process were determined [10]. Each of these planning steps will be described in detail in the following sections.

A. Determination of Participants

In general, independent evaluators can achieve a Heuristic Evaluation of a user interface by themselves. However, it has been shown from numerous projects that poor results were the outcome when the researchers did an evaluation exercise with a single user. Using different users would yield a better outcome since different users tend to identify different phishing issues [11]. However, it would be more beneficial to have a smaller group as quality may be considered more important than quantity in such studies. Also, since evaluation comes from the memory of observational data, too many sessions may jeopardize data collection [9]. While deciding on participant recruitment, it was important to consider the number of participants, whether they had Gmail accounts, their experience or skill level that may affect the experience, and any disability the user may have. To begin with, the principal researcher prepared an email communication requesting volunteer participants for usability evaluation. The email also included 11 questions asking for participant

details. The email was sent to the 42 randomly selected members of an International Photography club. Out of these, five people volunteered to be part of the study and finally, the researcher worked with four (4) participants: two male and two females.

The researcher chose the participants based on the criteria established by Rubin and Chisnell [9].

- The degree of assurance in the results that the researcher required.
- The convenience of the type of participants the researcher required.
- The time of the test session

Gmail Sender's Icon targets users who access Gmail on a desktop with the Chrome web browser. Therefore, any participant who uses Gmail calendar, Gmail task, Gmail contacts, or Google drive for Gmail was part of the target population. As such, there were no specific demographic user-targets selected or identified.

As mentioned, participant selection and screening were carried out after the participants completed a questionnaire that was included in the email. The questionnaire included a brief explanation of the proposed usability evaluation and the purpose of the research. It had required fields marked with (*) such as age range, gender, academic qualification, level of computer usage, and the user's Gmail ID. There was also a non-required field that was not mandatory to fill. The mandatory fields were used to ensure that the participants were 18 years or above, had the required basic skill to perform UE tasks, and could assume the responsibility required of the user. It also helped to identify any potential misuse or error that could be made by the user.

B. Informed Consent

All the participants signed an informed consent form Usability.gov Consent Form, Adult [18] which clearly

explained the purpose of the research, procedures, Risks/discomforts, or benefits associated with the task and measures that guarantee confidentiality [10]. They were also told about opportunities to ask questions, freedom to withdraw at any point during the testing process as well as the right to receive a copy.

C. Research Evaluation Task List

The task list planned for the participant is central to the usability evaluation as they are the primary tool to gain insight into the usability of the product. Ten main realistic tasks were planned for completion by the participants. As indicated by Nielsen in Marcus, 2015[12], usability cannot be measured by solely one aspect. There are five characteristics that are associated with the usability components which include learnability, memorability, efficiency, error recovery, and satisfaction. While Hix and Hartson in Marcus, 2015 [12] have suggested different factors, Nielsen's usability components are used widely and are also being followed by the researcher for the purposes of this usability evaluation. After due consideration, ten task scenarios were formulated that had a focus on collecting visual data by observing the participants using the Gmail sender's icon [9]. These task scenarios have been fully enumerated below.

Task #1: Open Google Chrome web browser and log in to your Gmail account.
Task #2: Navigate to the inbox and search a sender's name in the search box.
Task #3: Navigate to the chrome web store and search for Gmail Senders Icons in the chrome web browser.
Task #4: Read the description of the Gmail senders' icon on the Web Store screen before adding it.
Task #5: Add (Install) Gmail sender's icon to Chrome by clicking add to chrome.
Task #6: Click on the Gmail sender's icon to manage the extension of chrome to enable show domain name icon and show domain text.

Task #7: Go back to Gmail inbox to see the domain icon (favicon) and domain text.

Task #8: Search the name of frequent email senders in the search.

Task #9: Identify the domain icon (favicon) and the domain text of the senders from a different domain, if any.

Task #10: Can you identify the domain text of a phishing and spam email from the spam or junk folder?

The time allotted for the completion of tasks was 35 minutes.

D. Evaluation Goals

Specific usability evaluation goals were identified from the usability evaluation task list. These participant goals allow for the creation of evaluation scenarios and what measures can help the researcher to determine if the participants are having trouble completing the tasks. This usability evaluation list was based on the following usability goals: Participants will be able to successfully complete tasks or locate specific information.

1) Determine if the participant can identify the Chrome web browser and log in to Gmail.

2) Determine if the participant can easily search the name and identify senders.

3) Determine if the participant can easily navigate to the Chrome web store and search store.

4) Identify any errors and understand how the participant recovers from errors.

5) Determine if the participant can easily install the app.

6) Determine if the participant can see the difference in the inbox after the Gmail sender's icon is Installed.

7) Determine if participants can identify the one particular sender's domain icon and domain name text.

8) Observe the Participant's ability identify the spammers and phishing domain name & icon.

E. Evaluation Test Lab

The research test lab has become more important and prominent than the testing method itself [9]. Here the researcher selected a 'Simple Single Room' set up lab approach at the home office for conducting the usability testing. In this kind of setup, the moderator/researcher has the advantage of being close to the users who are participating in the testing and the researcher can monitor the task completion a few feet from the user at about a forty-five-degree angle [9]. This setup is ideal for the 'Think aloud' protocol type of method. There were certain basic articles of equipment that is set up in the home office to conduct the usability testing as below. 'Think aloud' is a widely used method that enables the researcher to grasp what the participant is evaluating by accessing their thoughts through their self-reflection [13]. As the name suggests, it requires the participant to verbally describe aloud what they are experiencing as they progress through the tasks.

F. Evaluation Workstation Arrangement

For a comfortable testing environment, the workstation for the user participants was set up on an ergonomic sit and stand automatic motorized desk along with the ergonomic chair. This would enable user participants to customize the view angle of the monitor as per their convenience to perform their tasks. It was also equipped with a monitor desk mount connected to a 28" monitor. A medium powerful business laptop connected with high-speed network internet was the computer used for usability testing. The laptop could also be used as a desktop when connected to a docking station with mice and a keyboard. Windows 10 operating system was installed along with the Chrome web browser, which is the mandatory software for this usability testing. The Gmail sender icon usability testing is conducted only with google chrome web browser, and another web

browser is not evaluated in this usability and out of scope. A bottle of water was also placed on the desk if participants needed to drink during the evaluation.

TABLE 1. EQUIPMENT DETAILS

Equipment	Advantage for Participants.
An HP laptop connected to a docking station.	This laptop is a business model laptop connected to a docking station. The technical specification of this laptop is top of the range. This workstation is the appropriate machine for the mentioned testing
28" wide monitor connected to Desk Mount.	This external monitor helps user participant's visibility while testing and can adjust the height of the monitor according to their needs
Network connected internet (not Wi-Fi)	This will help the uninterpreted internet connection while testing
Additional Keyboard and Ergonomic mouse	The laptop is connected to a keyboard and mouse
Ergonomic Sit and Stand computer motorized desk	Participants can stand or sit while they do the task
Ergonomic chair	Participant can adjust the seat according to their needs while testing

G. Test Site Details

The test room measured 150 square feet of space and was in a quiet condo with a great view of the outdoors. This lab was well-lit with natural light as well as with dimmable bright white light LEDs. This lab is also equipped with HVAC equipment for heating/air

conditioning that helped maintain a room temperature of 75°F.

H. Description of Tasks

The goal and general description of each task with the five characteristics usability components and Heuristic Evaluation are as follows. All the following tasks are independent.

Task #1: Open Google Chrome web browser and log in to your Gmail account.

Description: The participant opens the google chrome web browser and types in Gmail.com in the browser to get the login page of Gmail. After getting the login page, the participant enters the user id and the password of his/her Gmail account.

Goal: Understand if the participant can identity chrome web browser and log in to Gmail account Usability components: Learnability, Memorability Heuristic Evaluation: Match between system and the real world

Task #2: Navigate to the inbox and search a sender's name in the search box.

Description: After task one, the participant will be able to see the inbox in Gmail. On the top of the Gmail dashboard, there is a search tool. This search can be used to search by a sender's name, subject, or any keywords from the email body. This task is to search the name of the sender in the search box, and the search result will show the sender's name. This is to show the participant before installing the Gmail sender's icon from the Web Store.
Goal: Determine if the participant can easily search name and identify senders
Usability components: Learnability, Efficiency Heuristic Evaluation: Recognition and efficiency of use

Task #3: Navigate to the chrome web store and search for Gmail Senders Icons app in the chrome web browser.

Description: This task is very important, in this task users should find where the Gmail senders Icon app is from the Chrome Web Store. To achieve this, participants should navigate to the Chrome Web Store and identify Gmail sender's icon app from the Web Store.

Goal: Determine if the participant can easily navigate to the Chrome Web Store and search store.
Usability components: Learnability, Efficiency, Error recovery, Heuristic Evaluation: Consistency and standards, and Match between system and the real world

Task #4: Read the description of Gmail senders' icon in the Web Store screen before adding (installing) Gmail Senders Icons

Description: After finding the Web Store and Gmail senders app, participants read the description of the app in the Web Store to know more about the usage instructions and what changes will take place after installing the app.

Goal: Identify any errors and understand how the participant recovers from errors.
Usability components: Learnability, Efficiency, Error recovery Heuristic Evaluation: Help and documentation

Task #5: Add (Install) Gmail sender's icon to chrome by clicking add to chrome.
Description: After reading the description, participants install the app by clicking 'add to chrome browser. This process will allow the Chrome browser to install the app. The participant will also see an icon appearing on the browser's menu bar with a message.

Goal: Determine if the participant can easily install the app Usability components: Learnability, Efficiency Heuristic Evaluation: Visibility of system status

Task #6: Click on the Gmail Sender's Icon to manage the extension of chrome to enable show domain name icon and show domain text.

Description: In this process, the participant clicks on the icon of the installed app in the menu bar to enable to show domain name icon and to show domain text in the emails. Here users can use both options or choose any one option.

Goal: Identify any errors and understand how the participant recovers from errors.
Usability components: Efficiency, Error recovery
Heuristic Evaluation: Help users recognize, diagnose, and recover from errors.

Task #7: Go back to Gmail inbox to see the domain icon (favicon) and domain text.
Description: After task 6, participants do the same process as task #1 to see the difference in the email inbox. The participant will be able to see the domain name icon (image) and to show domain text from the senders. This will also show if the participant has installed the app correctly and enabled the two options.
Goal: Understand if the participant can see the difference in the inbox after the Gmail sender's icon is Installed.
Usability components: Efficiency, Satisfaction
Heuristic Evaluation: Aesthetic and minimalist design

Task #8: Search the name of frequent email senders in the search.
Description: This process is also the same as task #2. Participants search one of the frequent email senders to verify the icon and the domain. The participant can

also choose a company's email id other than email providers.

Goal: Verify if participants can identify the one particular sender's domain icon and domain name text.

Usability components: Learnability, Efficiency, Satisfaction

Heuristic Evaluation: User control and freedom

Task #9: Identify the domain icon (favicon) and the domain text of the senders from a different domain, if any

Description: In this task, participants identify the icon and the domain name text from the searched result. It will also provide visibility on whether the participant is searching 'John' who works at ABC company or from another individual named 'John' who is employed with XYZ company. Gmail will simply show John as the sender for both emails, allowing the participant to see the company's domain text and differentiate the emails.

Goal: Understand if the participant can identify the icon and domain name text from the sender

Usability components: Learnability, Efficiency, Satisfaction

Heuristic Evaluation: Flexibility and efficiency of use

Task #10: Can you identify the domain text of a phishing and spam email from a spam folder or junk folder?

Description: Participants can use this process as a prevention method from spammers and hackers by looking at the domain name text and the icon by trusting their own eyes. The participant will be able to see the domain text even if the domain name is mimicked as an example: the genuine domain name of Nova Southeastern University is nova.edu. All the employees in the university are familiar with the university domain name. If an adversary attempts to send an email from nova.com or similar, the app will show the domain name's text in the subject line.

Goal: Participant identifies the spammers and phishing domain name & icon.

Usability components: Memorability, Efficiency, Error recovery, and Satisfaction

Heuristic Evaluation: Recognition rather than recall

IV. Methodology for Collecting Data: The Heuristic Evaluation Method

In this section, the researcher will describe how the components planned in the previous section were used to collect data during actual interaction sessions with participants. As part of this usability evaluation, a total of four participants were recruited. These participants examined the interface and identified the Gmail sender's icon in the chrome web browser and its compliance with the ten usability heuristics.

A. *Severity Ratings in Heuristic Evaluation*

To understand each usability problem's effect, the severity in terms of usability principles was estimated, and the ease with which the problem might be solved was analyzed. Severity ratings were determined by the frequency with which the problem occurred, whether it could be solved once, or whether it would impact the user every time a task was attempted. This resulted in a rating for each problem found and was used to prioritize the problem areas for presentation in this report. The findings will be discussed in the report section. The tables below define the severity and ease of fix rating systems applied. Severity ranks are based on those defined by Jakob Nielsen [14].

0 = Violates a heuristic, may not be a usability problem

1 = Improvement issue: do not need to address till next release

2 = Minor usability problem: addressing this issue is a low priority

3 = Major usability problem: urgency to fix, should address as a high priority

4 = Usability catastrophe: Serious issue or a problem, imperative to fix this before the product can be released

B. *Conducting the Usability Evaluation Test*

The researcher treated each participant as a completely new case, regardless of what previous outcomes and sessions have shown. Below is a table of the participants showing age range, gender, academic qualification, level of computer usage experience, Gmail ID, and date & time when usability evaluation was conducted.

TABLE 2- PARTICIPANTS

Part icip ant	Age Rang e	Gende r	Acade mic Qualifi cation	Level of Compute r Usage Experien ce	Gmail ID
1	18-25	Male	Underg rad	Advance d	Yes
2	26-35	Female	Underg rad	Professio nal	Yes
3	36-45	Female	Underg rad	Advance d	Yes
4	26-35	Male	Gradua te	Professio nal	Yes

On the day of the Usability Evaluation session, the researcher briefed the participants about the usability test, the task list, the task goal, the heuristic evaluation, the think-aloud method, and the Informed consent form in simple day-to-day language. Care was taken to inform participants that the software/product was being evaluated rather than the user/participant. Contact details were also provided in case the participant had any concerns or just needed further information about the study from someone other than the primary researcher [10]. The following are the observations collected for each participant. For each participant, the think-aloud method was used while testing and not to rescue

participants when they were struggling. The researcher acted as a timekeeper and kept notes.

V. Analysis of the data

In the software development lifecycle, usability evaluation processes help software developers to identify usability issues and problems in the user interface stage so that the issues can be addressed before the software or product is released to the end-users. This usability evaluation had three distinct stages- planning, collecting data, and finally, analysis of the collected data.

The planning stage took into account details like participant determination, venue, and tasks for participants. Then the usability test was conducted as planned to address key features of the Gmail sender's icon. It averaged approximately 35 minutes. The usability test method was designed using ten usability heuristics [15]. Participants were asked to perform a think-aloud protocol [9] in which participants described their thoughts as to when they completed each #task. Empirical data was collected by observational notetaking by the researcher. The observations were then compared against task goals, Usability Heuristics, and the four levels of severity Ratings for Usability Problems described by Nielsen [14]. The findings are reported below.

VI. Findings

The severity of a usability issue is a combination of three factors. 1) frequency of the issues or problem occurs, 2) Impact of the issues or problem occurs, and 3) Persistence of the issue of problem occurs [16]. Based on these, the problems identified have been attributed to a severity level. This has been summarized in the table below.

Tasks	Usability Problem #	Heuristics violated	Severity Level
Task #1	Open Google Chrome web browser and log in to your Gmail account.	Match between system and the real world	0
Task #3	The user does not know how to navigate to the web store	Consistency and standards	2
Task #6	To enable show domain name icon and show domain text.	Help users recognize, diagnose, and recover from errors	3

As Wilson C.E mentioned [17], "Which attributes are most critical to the usability of a system is highly contextual, so when we are trying to identify usability problems, we first have to decide which attributes are important to focus our observations and reporting" (p.46). There were three problems identified from the usability evaluation from four participants. The first problem was not an issue of a Gmail senders' icon. In Task #1, only one user forgot their Gmail password. The user was later able to reset their password and proceed to complete the tasks. Two users had problems with Tasks #3 and #6. The severity level of those are 2 and 3, which is essential to address. Before making conclusions, it was important to consider the feedback given by the participants in combination with what was recorded from the observational data. The feedback received from participants is given below. Gmail Sender Icons is a Google Chrome app that makes it simple for users to easily recognize email senders in Gmail by the domain name. It shows the email sender's organization.
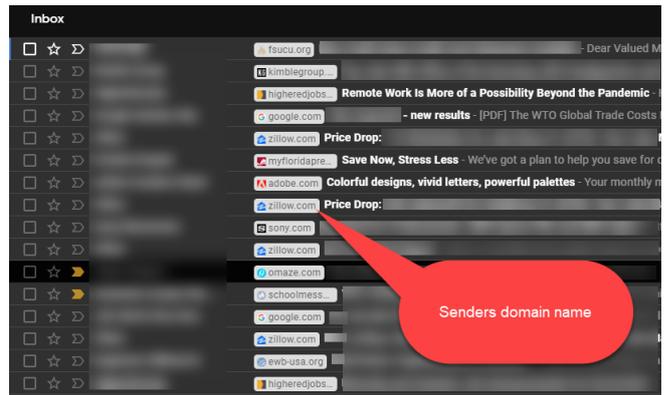

Fig 2: Email sender and the logo (favicon)

domain name along with the logo (favicon) of the sender's organization near the email message, allowing for rapid identification.

A. Feedback from Participants for evaluation:

Participant 1: 'As the icon appears next to the inbox items along with the domain name information, it becomes easier to go through the emails of interest with a glance. With the favicons, we no longer need to inside of each mail and read the content but can filter the email based on our interest'. Participant 1 was happy with discovering the new feature and said that he would continue to use the feature that he had not been aware of before.

Participant 2: 'It was easy to identify the domain names. Less effort to identify important senders would have the extension enabled all the time'. Similar to participant 1, participant 2 found the new feature extremely useful. She commented that she will continue to use it, and she hadn't used it before because she was not aware of the feature.

Participant 3: 'A very helpful tool to identify spam & corrective measures' Participant three also found the feature easy to use.

Participant 4: 'A tool should have who all are using email to find the phishing email by seeing the domain name." Participant 4 found it useful and found phishing email can be identified.

VII. RECOMMENDATIONS AND CONCLUSION

Taking into account the observational data and feedback, it appears that none of the participants had any real issues in installing the Gmail senders Icon. If more time was spent on a task, it can be taken as an indicator of the difficulty faced in performing the task. The participants had difficulty with tasks 3 and 6. Comparing this to the heuristic evaluation, it seems that the tasks revealed the violation of three specific heuristics. This may be an indicator for developers to reconsider the match between the system and the real-world, keeping consistency and standards with the design, and include some additional help in the form of links or instructions for the everyday user to navigate to the web store.

VIII. REFERENCES

[1]. Norman, D. A. (2005). Human-centered design considered harmful. interactions, 12(4), 14-19.

[2]. Lardinois, F. (2016, February 01). Gmail Now Has More Than 1B Monthly Active Users. Retrieved April 01, 2017, from https://techcrunch.com/2016/02/01/gmail-now-has-more-than-1b-monthly-active-users/

[3]. Whittaker, S., & Sidner, C. (1996, April). Email overload: exploring personal information management of email. In Proceedings of the SIGCHI conference on Human factors in computing systems (pp. 276-283). ACM.

[4]. Marulanda-Carter, L., & Jackson, T. W. (2012). Effects of e-mail addiction and interruptions on employees. Journal of Systems and Information Technology, 14(1), 82-94.

[5]. Agarwal, A. (2017) "See the Email Sender's Company and Logo in Your Gmail Inbox." Digital Inspiration. Amit Agarwal, 13 Feb. 2017. Web. 14 Apr. 2017.

[6]. Greenberg, S., & Buxton, B. (2008, April). Usability evaluation considered harmful (some of the time). In Proceedings of the SIGCHI conference on Human factors in computing systems (pp. 111-120). ACM.

[7]. Molich, R., & Nielsen, J. (1990). Improving a human-computer dialogue. Communications of the ACM, 33(3), 338-348.

[8]. Fernandez, A., Insfran, E., & Abrahão, S. (2011). Usability evaluation methods for the web: A systematic mapping study. Information and Software Technology, 53(8), 789-817.

[9]. Rubin, J., & Chisnell, D. (2008). Handbook of usability testing: how to plan, design and conduct effective tests. John Wiley & Sons.

[10]. Jerry, M. P. (2016). Community College Development in India: Variations in the Reception and Translation of the US Community College Model by Indian Administrators to Suit Indian Contexts.

[11]. Nielsen, J. (2015). How to conduct a heuristic evaluation. 1995. Nielsen Norman Group.

[12]. Marcus, A. (Ed.). (2015). Design, User Experience, and Usability: Interactive Experience Design: 4th International Conference, DUXU 2015, Held as Part of HCI International 2015, Los Angeles, CA, USA, August 2-7, 2015, Proceedings (Vol. 9188). Springer.

[13]. Ramey, J., Boren, T., Cuddihy, E., Dumas, J., Guan, Z., Van den Haak, M. J., & De Jong, M. D. (2006, April). Does think aloud work?: how do we know?. In CHI'06 Extended Abstracts on Human Factors in Computing Systems (pp. 45-48). ACM.

[14]. Nielsen, J. (1995). Severity ratings for usability problems. Papers and Essays, 54, 1-2.

[15]. Nielsen, J. (1995). 10 usability heuristics for user interface design. Nielsen Norman Group, 1(1).

[16]. Nielsen, J. (1994). Enhancing the explanatory power of usability heuristics. In Proceedings of

the SIGCHI conference on Human Factors in Computing Systems (pp. 152-158). ACM.

[17]. Wilson, C. E. (2007). The problem with usability problems: Context is critical. interactions, 14(5), 46-ff.

[18]. Usability.gov Consent Form (Adult). (2013, October 15). Retrieved April 1, 2019, from https://www.usability.gov/how-to-and-tools/resources/templates/consent-form-adult.html

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Cite this article as :