Investigating Simple Task-Performance Behavior

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Abstract

To date there has been very little research in the community of HCI for investigating simple task-performance behavior on the Internet. We have conducted a pilot study with students studying in technical university, investigating their simple task-performance behavior. These tasks included for example, Search, upload, download, and creating profile in Social networking web sites over the given period. The preliminary findings reveal measure of the task performance of five participants on three tasks. The participants have to classify each task as very easy, easy or hard. This study could be helpful for usability purposes. Thus, the result suggests that the users with technical background have no difficulty performing simple tasks on the Internet.

Index Terms: Task, Behavior, Internet, Human Computer Interaction (HCI)

I. INTRODUCTION

A task is work that needs to be carried out [1]. There can be easy task and difficult task based on types of task and user's ability to deal with such task. A righteous skill maybe required to perform any type of tasks. For example, writing a book on computer science is much harder than writing an e-mail to a friend. Moreover, the level of difficulty of task is determined by how it is performed and when it is performed. Some questions related to task performance are: i) what is the task about ii) why it is important to perform such task iii) motivation, goal and reward from the task iv) results and benefit of the task v) performance, satisfaction and efficiency of conducing task.

Any task on the Internet such as writing blog or updating personal website requires skill. A person who is unaware of technology cannot easily write blog or update website. This is simple task for computer professionals or those who are majoring in computer science. However, this can be difficult task for those who are not majoring in computer science.

The Internet evolves in terms of number of human online, as the Internet evolves as the social community (e.g. share on Facebook and Twitter button linked to the website).

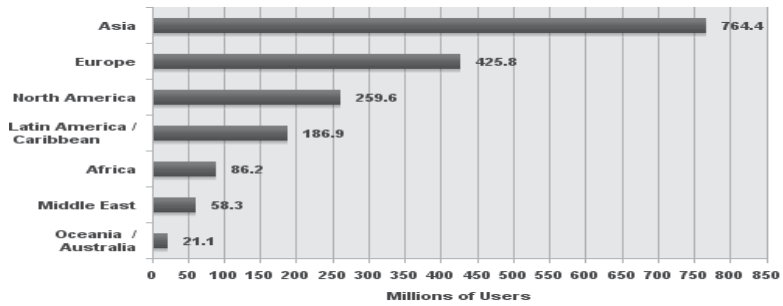


Figure 1: Internet Users by Geographic regions in the World as of Dec 31, 2009 [2].

On one hand, the number of human accessing information, creating, sharing and learning, is booming like never before. The total estimated internet users are 1,802,330,457 for December 31, 2009 [2]. This data also suggest that more than two billion users will be online. Based on this data, it is easy to generalize that more and more people want to stay 'online than offline'. On the other hand, many studies have shown us that these simple browsing and webpage can cause serious damage to personal privacy, health and security [e.g. 3, 4].

The Internet's ubiquitous nature and technical strengths, in particular, the flexible hypermedia document format and general communication protocols, have given humanity a powerful infrastructure for sharing knowledge and for interactive communication. The Internet has emerged into digital playground for many actors (e.g. Researchers, Students and Teachers) to perform many different tasks. As these various actors are eligible to share, connect, interact and perform many activities on the Internet, no doubt it is useful to investigate task performance behavior of these actors. Undoubtedly, Quality of the contents becomes more important element than the quantity of the contents. The contents on the Internet may vary from simple blogs; to websites that are more general; to popular social networking webpage (e.g. YouTube, twitter and Facebook etc).

The users who desire to browse and perform tasks on these websites have no difficulty because of simplicity of webpage. There is potential for performing the similar experiments in the mobile Internet. However, we studied how tech savvy users would use the Internet if given them very simple tasks on desktop personal computers. Users taste and personal interest is a key element for performing any tasks. For example, some users may visit the webpage to get "information" and some may visit to "hang-around" on the Internet. This research maps how human perform simple tasks such as searching, uploading downloading and creating profile in SNS (e.g. Facebook) The primary goal of the study was to engage only five users on SNS and analyzes how they perform given tasks on the Internet. There is much debate if only five participants are not suitable enough to measure usability of product or system. Nevertheless, Tom Tullis and Bill Albert in their book "Measuring User Experiences" recommend that only five participants could be enough [5]. In this paper, we first provide a research question on what we are investigating. We then describe the methods and procedure used and detailed discussion on the results and findings. Finally, we conclude with a brief discussion of the future work. Based on the rationale of study, following research question and hypothesis is posited:

RQ1 (Research Question): How users behave to perform simple tasks on the Internet? (If users are tech-savvy, can they still perform simple tasks on the Internet?)
If all participants would successfully complete the given task, it would be easy to hypothesize that users with technical expertise can perform simple tasks on the Internet.

II. METHOD & PROCEDURE

The method used for calculating the task performance behavior was based on observation and note taking. A short summary about the methods is illustrated below.

Observational Analysis

The tasks were given and the level of difficulty of the tasks was divided such as Very Easy, Easy and Difficult. For simplicity, the task apparatus was set up. The notes were taken based on user's feedback during the research.

Participants

The participants were five university students from a technology university. All of these students were male, mean average age of 25 years. We conducted pilot study with the goal of revealing task performance behavior of these users.

In the first task, Participants searched for the picture on the Internet with label “human behavior on the Internet_scope.jpg”. This task was assumed “Very Easy”. The time allocated for the completion of this task was 2 minutes. For simplicity, the picture was already uploaded in the Flickr website two months prior to this experiment.

Similarly, Second task was to download the picture “human behavior on the Internet_scope.jpg” in the computer and upload it again by renaming the picture with different name by creating a profile in Flickr website. It was assumed the task would be “Easy” and the time allocated for the item was 5 minutes.

In addition, third task was to visit the social networking web site and to create a personal profile with the name “hbi_study” and upload the picture “human behavior on the Internet_scope.jpg” previously downloaded from the earlier task. It was assumed that the task would be “Difficult” and the time allocated for the item was 7 minutes.

III. RESULT & DISCUSSION

The task analysis was carried out. The statistical data about five participants and the amount of time taken to complete these tasks is shown in the table 1 below. Since it was informed to the participants, they should continue to work on each item of the task until they either complete it or reach to the point where they would give up or seek assistance. These result from the table 1 showed that two participants took more than 100 seconds of the time to complete the total task. Except that, three participants completed the total task in less than 100 seconds. As the value set for the task 1 was 120 seconds, all the participants were able to complete the task within the allocated period. Majority of the participants completed the task 1 within 20 seconds of the time. For the task 2, the time taken by the participants to complete the task was much higher. Majority of the participants completed the task 2 within 25 seconds of the time. Similarly, for the task 3, majority of the participants completed the task 3 within 90 seconds of the time. From the above data, only one participant took longer time to complete all of the tasks. It was found that, all participants successfully completed these given tasks.

Table 1: Number of tasks and the total time

Id	Task 1	Task 2	Task 3	Total
1	10	20	30	60
2	30	40	50	120
3	10	25	55	90
4	120	60	300	480
5	15	20	25	60
Note: *Task time is expressed in seconds.*				

The formula (*See formula 1*) for calculating the Adjusted Wald [6] confidence interval is as follows:

$$p_{adj} \pm z * sqrt(p_{adj}(1- p_{adj})/n_{adj}) \quad (1)$$

Where:
n = total number of trials

p = proportion of trials that were successes
z = the z-value corresponding to the desired confidence level

$$p_{adj} = (n*p + z^2/2)/ (n + z^2) \quad (2)$$
$$n_{adj} = n + z^2$$

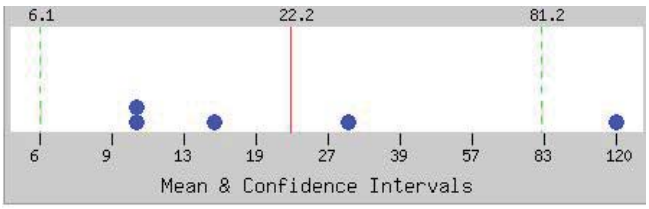
With reference to the tables and equations, it was found that, participants successfully carried out the entire three tasks within the given period. From the table 2, it can be seen that total number of successfully completed tasks and given the tasks was three. The z-score represents a 95% CI or 95% of which are under normal curve equals 1.96 standard deviation above the mean 0. The proportion of successes is recorded. The “p” and “n” are adjusted which determines total number of trials and proportion of trails that were successes of 1.0.The proportion of successes indicates majority of successful task completion, among the participants. Therefore, out of 5,500 students in the university, 60% or above of them are more likely to complete the simple tasks on the Internet. Furthermore, this data suggests that, the tech-savvy university students can be 95% confident of performing the task on the Internet.

Table 2: Calculation of a confidence interval for binary task completion data

Total task	**#Successful task**	**desired confidence Interval(CI)**	**z value of CI**	**proportion of success**	**p-adjusted**	**n-adjusted**	**CI**	**lower limit**	**upper limit**
03	03	95 %	1.960	1.000	0.719	6.841	0.337	38.3 %	105.6 %

Let us derive the graph and calculate the CI for task times using measuringusability.com [7]. We need to calculate CI because we are trying to make inference about the entire population of students and their task behavior on the Internet. For the task 1, the average time found is 22 seconds. It could be seen from the graph that the geometric mean is lower than the arithmetic mean, which shows positively skewed distribution. Similarly, for the task 2 with 95% CI, the average time found is 29 seconds. It can be seen from the figure that the geometric mean is lower than the arithmetic mean, which shows positively skewed distribution.

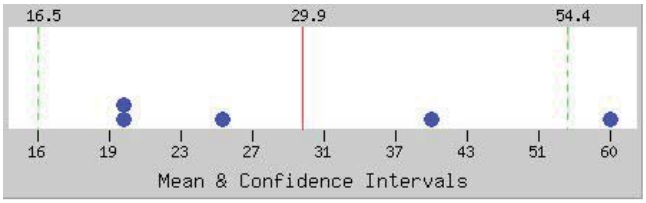
Finally, for the task 3 with 95% CI, the average time found is 57 seconds. It could be seen from the figure the same phenomenon of positively skewed distribution.



Results

95% Confidence Interval:	(6.1, 81.2)	Geometric Mean	22.21
		Median:	15
Arithmetic Mean	37	Observations	5
Arithmetic StDev	47.12		

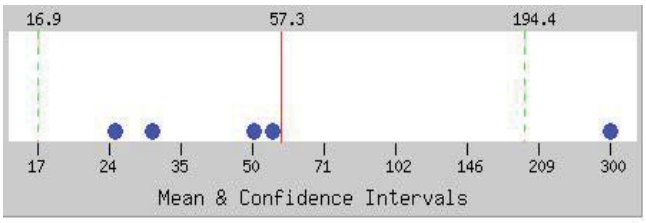
Figure 2: Task 1 evaluation



Results

95% Confidence Interval:	(16.5, 54.4)	Geometric Mean	29.93
		Median:	25
Arithmetic Mean	33	Observations	5
Arithmetic StDev	17.18		

Figure 3: Task 2 evaluation



Results

95% Confidence Interval:	(16.9, 194.4)	Geometric Mean	57.32
		Median:	50
Arithmetic Mean	92	Observations	5
Arithmetic StDev	116.97		

Figure 4: Task 3 evaluation

If we test users, assuming zero successfully completed the task and all five participants failed the task we would have a completion rate of 0% with 95% CI. However, in our case we found that zero users failed the task, and all five participants successfully completed the tasks with 95% CI that suggests that the actual completion rate is above 60%. This has been illustrated in graph, which shows how sample size will affect the CI around the completion rate of the tasks.

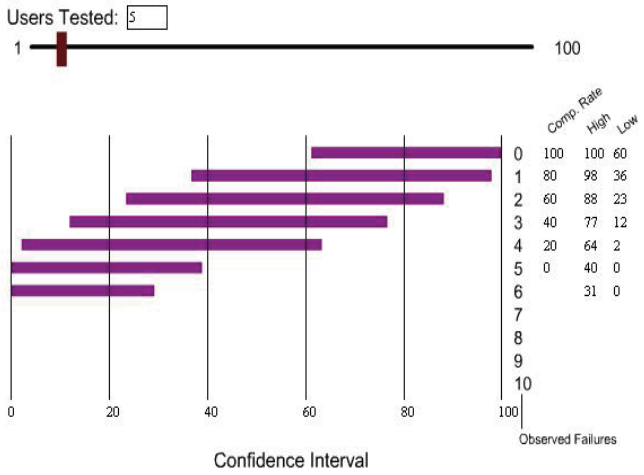


Figure 5: Confidence Interval (CI) with actual completion rate above 60% mark.

IV. Conclusion and future work

In this particular study, we have tested five users with simple tasks of searching, uploading, downloading and creating basic profile in Social Networking Website. We have thoroughly investigated the usability aspects by evaluating each task carried out by these users. Our findings may appear obvious however, while the population size is not representative, the statistical analysis carried out with the participants might be useful for more study that is comprehensive in the future. In addition, we believe that mobile Internet could be used to investigate simple task-performance behavior of users as shown in this study. Based on our evaluation this is significant result because if only five users can perform these simple tasks on the Internet then we are 60% confident that all the users in the university can perform simple tasks. Moreover, it is hard to generalize in this preliminary investigation. Furthermore, the population size must be larger and non-technical population should be included. Therefore, in the future work, we plan to conduct same experiments by dividing these users among different groups or clusters (e.g. business users vs. tech-savvy users), with the larger participants and investigate if the same results is bound to be true.

Acknowledgment

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