The Roles of Profession and Gender in Some PIM Tasks

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Abstract. In this paper, the roles of selected individual difference factors were examined in some personal information management (PIM) tasks. A questionnaire was completed by 295 participants regarding their personal characteristics, retrieval of previously saved information, and selective use of multiple computers. Clustering of individual difference factors suggested further analysis of profession and gender as classifiers. Profession seemed to modulate the behaviors and attitudes of users in these PIM tasks. And certain gender difference in PIM tasks could be explained by different expectations or standards.

Keywords: Personal Information Management, Profession, Gender.

1 Introduction

Computers have become integral parts of modern life. They are playing increasing number of roles in people's lives. Computer users have also expanded from a few in scientific fields to almost everyone everywhere around the world. The phenomenal growth is accompanied by increasing diversities in computer usage and computer users. With recognition of the diversities, designers have strived to make computers easier to use for everyone. Usability is improved by reducing the knowledge or skills required to use computers. Universal usability is an effort to accommodate human limitations of all kinds so that everyone can use a well-designed computer system, despite difference in personal and social characteristics [1].

On the other side, the growing power and availability of personal computers resulted in a more and more complex computing environment for typical users. Multiple systems running on multiple computers may be readily available to the user. The user will inevitably have to choose from duplicate functionalities provided by these systems. Although this issue is a relatively new development in recent years when computers become increasingly affordable, it presents a growing challenge for users. We need to understand how users of different characteristics cope with ever more complex computing environment.

It is possible that individual difference of users can affect the ways they view and use computers, causing difference in attitude and activities. In particular, gender difference has long been a subject of studies [2,3]. The inquiry into individual difference continues to be an interesting topic due to the following competing effects. First, better usability tends to make individual difference less important. Second, today's

M.J. Smith and G. Salvendy (Eds.): Human Interface, Part I, HCII 2009, LNCS 5617, pp. 429–436, 2009.

users started using computers and received training or education much earlier than previous generations. It is possible the experience and education in computers reduce individual difference among them. Third, growing complexity of computing environment, along with growing list of activities performed with computers, are demanding more and more capabilities from users. Thus individual difference may be exposed and highlighted as a result of high demand.

The present study investigates several individual difference factors in some PIM tasks with multiple computers. This is unlike previous studies on individual difference that focused on statistics of computer usage and general attitude towards computers. By focusing on a common and popular set of tasks such as PIM tasks performed by almost every computer users, we intend to understand how users deal with the technological complexity of having multiple computers, and whether individual difference factors play a role in users' behaviors.

2 Individual Difference Factors

One of the most prominent individual difference factors is gender. Whitley concluded that gender difference exists in computer usage patterns but the effect sizes were small and probably of little practical significance [2]. In a more recent study of college students, Imhof could not detect gender gap in computer use, both in terms of time spent and activities in using computers [3]. However, Imhof did found male students continue to use computers more frequently than female, mostly for personal or non-study related activities. In other studies, females were found to email more than male but male searched the Internet more than females [4][5]. Males also utilized different type of sites compared to females [6]. Gender difference in computer experience was also reported in specific contexts such as video games[7] and online shopping [14]. Hence, the role of gender still deserves to be examined in specific context of computer usage despite hints from the literature that such role was diminishing.

Other important individual difference factors include age, ethnic background, education, and computer experience. We naturally expect some factors, such as computer experience, to affect attitudes and activities in using computers. Yet Garland and Noyes found that computer experience is a poor predictor of computer attitudes [8]. Inconsistent results regarding the roles of ethnic background were also reported. Digital divide among ethical groups has long been reported and studied [9,10]. On the other hand, some studies also found no effects of ethnic groups in attitudes and usage of computers [11,12].

Regarding the age factor, studies have compared the computer usage and attitude of older adults to young adults. Many studies were concerning senior adults of 55 years of older. Not surprising, senior adults had less access, less experience and skills in computers [13]. However, this finding might not apply to working professionals in their 30-50s. Instead of comparing the two extremes of young adults to senior adults, the present study compared college students around 20 to working professionals in PIM tasks.

3 Research Method

A survey of PIM was developed for the present study. The survey had 55 questions concerning the ownership and use of multiple computers, management and retrieval of information from the computers. These questions covered these issues regarding three types of information: textual files, bookmarks, and emails. We asked participants to rate the frequency of experiencing difficulty in retrieval of the three types of information. We also asked them to rate how satisfied they were with their management of the information. In addition, participants were asked to rate the importance of six possible factors in selecting a computer device to use, when they have more than one available computers. These factors are: overhead or how long it takes for the device to be ready; display; input or how comfortable is the input devices; software availability; purpose of usage; and length of usage. With these questions, we hoped to understand how computer users decide which computer to use.

The questionnaire also contained questions measuring several individual difference variables, including age, gender, ethnic classification, education levels, and profession. There were also questions regarding participants' computer ownership, experience, and frequency of usage.

Students and working professionals from two universities voluntarily completed the survey either online or by filling out the identical printout of the survey. A total of 296 completed surveys were collected. Participants indicated their profession as student, working professional, or others.

4 Individual Difference Factors

4.1 Clustering of Individual Difference Variables

We performed a two-step clustering to reveal the patterns of the following individual difference variables measured in the questionnaire: age, gender, ethnic background, education, and profession. The automatic cluster number selection method in SPSS was adopted. The result showed two clusters closely corresponding to the profession variable. 96% of working professionals belonging to cluster 1, and 98% of students belonging to cluster 2. Two participants indicated "others" as their profession and they belonged to cluster 1.

Table 1. Clusters found within individual difference variables

		Student		Working Professional		Others	
		Freq.	Percent	Freq.	Percent	Freq.	Percent
Cluster	1	4	1.6%	48	96.0%	2	100.0%
	2	239	98.4%	2	4.0%	0	.0%
	All	243	100.0%	50	100.0%	2	100.0%

Working professionals reported more available computers (p-value=0.006). This is because of greater number of laptops for working professionals than students. The number of available desktop computers did not differ significantly (p-value=0.677). Surprisingly, students reports significantly more mobile devices than working professionals. This is perhaps due to the ownership of many types of mobile devices popular among young college students, including mp3 player, cell phone, pda, game players etc.

We repeated the two-step clustering of these individual difference variables inside the student samples, which is much larger than the samples from working professionals. Six clusters were automatically selected by SPSS. No obvious patterns emerged from the result. However, the gender variable had an interesting distribution among the clusters as shown in Table 2. The distribution suggested that gender can be a meaningful classifier for our individual difference variables. Clusters corresponding mostly to female students (cluster 1-3) are characterized by less computer experience and less frequent use of computers.

Table 2. Clusters found within individual difference variables of student samples

		Female		Male	
		Freq.	Percent	Freq.	Percent
Title	1	58	55.8%	0	.0%
	2	18	17.3%	11	7.9%
	3	19	18.3%	15	10.8%
	4	9	8.7%	30	21.6%
	5	0	.0%	33	23.7%
	6	0	.0%	50	36.0%
	All	104	100.0%	139	100.0%

Hence, there appeared to be two classifiers, profession and gender, for the individual difference variables in our data. In addition, we did not find significant association between profession and gender as nominal variables (Chi-square test showed a p-value of 0.09). Our analysis is therefore focused on the difference in PIM variables across groups of participants identified by profession and gender.

4.2 Difference between Students and Working Professionals

Difficulty and Satisfaction in PIM. No significant difference was found between the satisfaction of working professional and students in management of files, bookmarks, and emails, although in the case of emails, the difference in satisfaction was approaching statistical significance (p-value=0.059).

Significant difference was found between working professionals and students in rated difficulty in finding files, bookmarks, and emails. Greater difficulty was reported in each category by working professionals.

Table 3. Difficulty and satisfaction in PIM, comparison by profession

	Students			Working Professionals			Difference		
	N	Mean	S.D.	N	Mean	S.D.	t	df	p
Difficulty in file[A]	243	2.34	1.324	50	3.28	1.294	-4.60	291	*<0.001*
Satisfaction in file[B]	243	4.82	1.281	50	4.54	1.541	1.22	64	0.229
Difficulty in bookmark[A]	243	1.73	1.233	50	2.12	1.438	-1.99	291	*0.048*
Satisfaction in bookmark[B]	243	4.65	1.547	50	4.62	1.652	0.14	291	0.888
Difficulty in email[A]	243	2.08	1.405	50	2.60	1.370	-2.40	291	*0.017*
Satisfaction in email[B]	243	4.98	1.372	50	4.56	1.593	1.89	291	0.059

A. Scale: 1: never, 2: every few months, 3: every month, 4:every week, 5:every few days, 6: every day
B. Scale: 1:very dissatisfied to 7: very satisfied

Selective Use of Computers. We measured 6 variables regarding the selective use of computers. We compared these variables between students and working professionals. Working professionals did not differ significantly in any computer-related variables (input, display, software, and overhead). However, working professional considered the other two variables (purpose and length of usage) less important than students. (p-values were 0.022 and 0.015, respectively).

4.3 The Effect of Other Individual Difference Factors

We examined other individual difference factors to identify possible factors responsible for the significant difference we found between students and working professionals in Section 4.2.

Ethnical Background. This is not affecting the significant difference between working professionals and students in selective use of computers. This is also not affecting the significant difference in reported difficulty between working professionals and students.

Age. When we limit the samples to older age ranges (18 students, 48 working professionals), the significant difference in reported difficulty between students and working professionals disappeared. However, the difference in means became greater and standard deviations of each group remained similar. Therefore, it is likely the difference in means were not significant because of loss of statistical power due to small samples. Similar situation was found for the two significant variables in selective use of computers.

Education. We tried to limit samples by requiring the education level to "Graduate school or higher" which resulted in 23 students and 42 working professionals. With the reduced samples, we found different results for variables in selective use of computers. "Overhead" and "input" differed significantly between professions while "purpose" and "length" ceased to be significant between professions. However, the difference in means for "purpose" and "length" remain similar to the larger sample, suggesting that the disappearance of significance was caused by lack of power. For the variables measuring difficulty in retrieval of files, bookmarks, and emails, similar difference in means were found in the small sample compared to the larger sample. However, only difficulty in retrieving files remained significant. The education factor appeared to play a big role in our data because it was associated with the age, computer experience, and nature of computer usage of our participants.

Number of Computers. We limited the samples to students only and performed one-way ANOVA with the factor being the number of computers. The number of computers was found to significantly affect the difficulty of retrieving emails, especially when comparing students with 3 or more computers to students with one or two computers. This result suggested that the difficulty in retrieving emails may be ultimately related to the number of computers people have to use, instead of as resulted from the profession.

Frequency of Usage. We limited the samples to students only and performed one-way ANOVA with the factor being the number of computers. The result was not significant for dependent variables difficulty in retrieving files, emails, and bookmarks. Frequency of use did affect the selection variable "display". Participants who use computers more frequently judged the variables to be more important in selecting a computer than those who use computer less frequently. No other selection variables were found to differ by frequency of computer use.

4.4 Difference between Male and Female Students

Our analysis in this section is limited to the samples from students only to eliminate the effect of profession. Male students have more desktops and overall counts of computers available to them than female students. On the other hand, the number of laptop did not differ significantly between the genders.

We measured the amount of computer usage by several questions: frequency of computer usage, number of files created, number of files received, and frequency of organizing files. A clustering of these variables produced two clusters corresponding perfectly to the two genders. This result suggested distinctive patterns of male versus female computer usage. A t-test of these variables revealed that significant difference existed between genders in frequency of usage, number of files created, and number of files received. Male students use computers more frequently than females. They also created and received more files than females.

A t-test by gender found significant difference in satisfaction regarding files and bookmarks management. Male students are more satisfied in their management of files and bookmarks than females. However, no significant difference was found between genders in difficulty of retrieving files, bookmarks, and emails.

Table 4. Difficulty and satisfaction in PIM, comparison by gender

	Female			Male			Difference		
	N	Mean	S.D.	N	Mean	S.D.	t	df	p
Difficulty in file[A]	104	2.26	1.344	139	2.40	1.311	-0.792	241	0.429
Satisfaction in file[B]	104	4.62	1.332	139	4.98	1.225	-2.202	241	*0.029*
Difficulty in bookmark[A]	104	1.83	1.340	139	1.65	1.147	1.078	241	0.282
Satisfaction in bookmark[B]	104	4.32	1.708	139	4.91	1.367	-2.986	241	*0.003*
Difficulty in email[A]	104	1.91	1.323	139	2.20	1.456	-1.586	241	0.114
Satisfaction in email[B]	104	5.01	1.451	139	4.95	1.315	0.336	241	0.737

A. Scale: 1: never, 2: every few months, 3: every month, 4:every week, 5:every few days, 6: every day
B. Scale: 1:very dissatisfied to 7: very satisfied

We also compared the importance of the 6 variables for selective use of computers. The data reported by male students did not differ significantly from female students. On the importance of the selecting computer with the purpose of usage, female students reported a mean of 4.81in a 1-to-7 scale. This was not significantly higher than the mean of 4.47 from male even though the p-value was only 0.075.

5 Discussion and Conclusion

We studied the roles of many individual difference variables in PIM. The effects of these variables were usually difficult to separate. We took a different approach in analyzing the data by clustering these variables. Profession and gender naturally emerged as candidate classifiers of individual difference. We tested whether behaviors and attitudes in some PIM tasks differed between the groups identified by the classifiers. For any significant difference between groups, we examined if any single variable could have explained the difference.

Our result suggested that people's professions made a difference in the frequency of difficulty they experienced in retrieving previously saved information. We also found that working professionals rated two usage factors (purpose and length) in selective use of computers more important than students. We could attribute the difference to having or not having a working environment that typically requires timely management of information and good organization skills. A working environment could make retrieving information a demanding task with time pressure, resulting in frequently experienced difficulty. It could also foster a purpose-driven behavior in computer usage. Students and working professionals in our study had different personal characteristics in variables such as age, education, and frequency of computer usage. Also it was possible for some of these variables to interact with profession, none of these variables alone could have explained the difference we found between

students and working professionals. Therefore, the profession of people seemed to provide a powerful context that shaped the behaviors and attitudes of them in these PIM tasks.

The only difference we found between male and female students were their satisfaction of information management. On all three types of information, female students had lower satisfaction than male students. This was interesting because female students used computer less frequently and process less files than male students. We hypothesized that the low satisfaction of female students can be explained by high expectation or high standard of them to get organized in information management. The fact that female students did not differ significantly from male students in the frequency of difficulty in retrieving information provided support for this hypothesis. Further study on this issue is necessary to identify the specific difference.

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