Exploring Students' Competency in Personal Information Management: Problems and Prospects

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The selection of relevant information and its effective management is not a simple task and requires specific competencies. This study is aimed at exploring the competency of university students with regards to personal information management (PIM). The objective is to identify the problems in PIM and to provide a framework for improving it. For this study, the sample consisted of 400 undergraduate students randomly selected from a large public-sector university in Islamabad. The data were collected through a questionnaire with closed and open-ended items. The closed-ended items were analyzed through cross tabs and Chi square tests to find a relationship between specific PIM competencies in different programs. The questionnaire items helped in acquiring information about students' specific competencies in PIM were categorized as 'low', 'moderate' and 'high' competency. The students identified the problems they faced in PIM and suggested ways for improving it. The findings of this study will help in improving organization and application of information, and also in exploring further avenues of research in improving PIM skills of university students in the developing countries.

INTRODUCTION

Information reaches us through multiple sources such as television programs, Facebook posts, tweets, mobile apps, Global Positioning System (GPS) amongst

many others and may take the form of written texts, images, videos, and/or sound (Anson, 2011). New ideas, concepts and theories circulate regularly through electronic and print media. Managing this diversity and fragmentation of information may not be easy for a user (Karger & Jones, 2006). In order to meet these emerging issues and challenges, we need to develop ways to manage knowledge efficiently (Qureshi, Ilyas, Yasmin, & Whitty, 2012). The concept of Personal Information Management (PIM) is used to describe the role of an individual in the collection, storage, organization, and retrieval of information in digital form (Bergman, Boardman, Gwizdka, & Jones, 2004; Boardman & Sasse, 2004) and is frequently cast in terms of an individual's ability to manage information in fulfilment of their various life roles (Bergman et al., 2004; Fourie, 2011). The information is termed personal because it is for one's own use (Lansdale, 1988), directly under one's control (Henderson, 2003) and serves only one person (Ofer, Beyth-Marom, & Nachmias, 2008).

PIM has become an important field at present (Al Nasar, Mohd, & Ali, 2011) and has assumed an influential role in our life (Qureshi, Raza, & Whitty, 2015). Students search for web information to complete their assignments, prepare for assessments and to seek information for pleasure. Even libraries maintain an online catalogue, providing access to texts and references.

The increasing access to online information creates a dire need for users to develop skills to manage information (Stewart & Basic, 2014). In addition, the user also encounters information that is not actively sought but is still relevant or interesting to them. The individual often finds it difficult to sort and scan through the required information from the large bulk of information which is accessed. Managing personal information is not an easy task and is error prone (Barreau & Nardi, 1995).

Saving and storing information from the web is another issue. Shall the individual save all that is searched or save only the relevant? The next question is how to save the relevant without reading all the material Has the individual enough time to read all the searched pages/documents for effective use? These are some of the issues that users face while searching for information. Moreover, the individual while looking for information may encounter material which may not be relevant but may still be interesting to him/her. Following this new information will drag the user in a completely different domain than what one was searching for initially. Thus, restricting oneself to the required domain of information is also necessary.

The effective use of searched information also implies that it is retrieved timely and accurately. However, retrieving relevant information from the large volume of stored information is not an easy task. If efforts are not made to improve the retrievability of information, then the quality of available information could be seriously undermined (Lansdale, 1988). Retrieving information from files and folders requires remembering the location where the information is saved as well as the name/tag of the file to help in identifying the relevant document. Thus, grouping of similar and related information helps in Information Management (IM) (Karger & Jones, 2006). There are software programs that can be used for Keeping Found Things Found (KFTF) such as the Universal Labeler (Jones, Munat, Bruce, & Foxley, 2005). But the question is: Do our students know about these software programs and how to use them for storing and retrieving information? There is a dire need to develop students' ability to manage information efficiently (Stewart & Basic, 2014).

The government of Pakistan initiated the laptop scheme by which thousands of laptops were distributed to university students for free. The Higher Education Commission (HEC) also launched the digital library program to help students' access online libraries and journals databases. There is a considerable increase in the use of online material in academia and research endeavors (Warriach & Tahira, 2014). In fact, there is a significant change in the behaviour of the new generation in Pakistan concerning the reading of online digital material (Batool, AhsanUllah, & Awan, 2015). This requires knowledge about PIM to make good use of online resources. The research by Ameen (2016) found that the university students in Pakistan are not involved in independent research writing due to a lack of knowledge and training. Further, these students do not share the online digital information. Whether this is due to a lack of competency in sharing or otherwise, needs to be explored.

In addition, research studies have found that managing information and KFTF is not an easy task (Bergman et al., 2004; Jones, Dumais, & Bruce, 2002). Although, there are systems such as Stuff I've Seen (SIS) that help the user in re-finding the information that one has seen/saved before (Dumais et al., 2016), this would add another burden on the user to learn and use another information design. The individual using online resources requires certain competencies to manage information accurately and conveniently (Karger & Jones, 2006). The present study was aimed at exploring the competency of undergraduate (UG) students in PIM. The study also explores the problems that the UG students face in PIM and

identifying strategies for improving IM. The findings help in understanding students' competency and in making effective use of PIM for academic purposes. Improving PIM could also help the students in making effective use of their time, effort and money in organizing their work and achieving their academic milestones (Bergman et al., 2004).

Conceptual Framework

The research study makes use of the conceptual framework as elaborated by Henderson (2003). According to Henderson (2003), effective PIM requires three aspects: personal, information and management. The first is related to user behaviour and his/her demographic characteristics. The second is related to the type of information and its format and the third is about the organization, presentation and use of information. For personal aspect, we focus on identifying the specific competencies for handling and using information in university students. Regarding information and management aspect, we sought students' views about their PIM and the problems they face in information management with the purpose to improve PIM in university students.

Research Objective

The objectives of the present study were to:
1. Explore students' competency in PIM;
2. Identify students' problems in PIM; and
3. Suggest ways and means for improving students' PIM.

Research Questions

The following research questions guided the research study. The approach for answering each research question is given in Table 1.
1. How do university students perceive their competency on different aspects of PIM?
2. What problems do the students encounter during PIM?
3. What strategies can be employed to improve PIM in university students?

Table 1

The approach adopted to answer objectives and research questions

Objectives	Research Questions	Approach
Explore students' competency in PIM	How do university students perceive their competency on different aspects of PIM?	Measured through self-reported questionnaire on Five-point Likert scale to find the level of various competencies (searching, storing, saving, disposal, retrieval)
Identify students' problems in PIM	What problems do the UG students encounter during PIM?	Identified through open-ended items in the questionnaire
Suggest ways and means for improving students' PIM	What strategies can be employed to improve PIM in UG students?	Identified through open-ended items in the questionnaire

METHODOLOGY

This study was conducted in a large public-sector university in the federal capital, Islamabad. The university was purposively selected on the criteria that each course during the semester required a specific number of quizzes and assignments (minimum four), two monthly exams and a terminal exam at the end of the semester. Thus, the students were intensely involved in the use of the Internet for searching, storing, and retrieving information for fulfilling their academic requirements. We assume the students in the sample institution are involved in information management though not to the level/degree of this engagement.

Sample

The data were collected from students of UG level in eight departments comprising Management Sciences, Humanities, Bio Sciences, Computer Sciences, Electrical Engineering, Physics, Math, and Architecture and Design. The data from the first two departments were combined to make the social science group. Architecture and Design was treated as a separate group. Although, Humanities could be combined with Architecture and Design, however, in the university where the study was conducted, the Management Sciences and Humanities departments are grouped under one faculty while Architecture and Design was a separate

faculty. The data from the remaining departments were combined as the science group. Thus, three program groups were formed consisting of social science program, science program and, architecture and design (A&D) program. The data were collected through convenient sampling technique. We used questionnaires for collecting data with closed- and open-ended items. The students were approached in the café, classrooms, and grounds to include maximum number of students in the sample. The questionnaire was properly validated and pilot-tested before being used for this study. Some of the items in the questionnaire were adopted and modified from Wise, Erdelez & Chiang's (2012) Information Encountering Scale.

Data Analysis

The items in the questionnaire were constructed on a five-point scale aimed at measuring the level of competence in IM. The options on the five-point scale and the score assigned to each option is given as follows to analyse data quantitatively:

1- Needs Improvement, 2- Below Expectations, 3- Meets Expectations, 4- Exceeds Expectations, 5- Exceptional.

The students' responses were fed into SPSS (PASW) for analysis. For finding the competency score for each student, the scores obtained by each student on the five-point scale was added for each variable (searching, sharing, storing, disposal and retrieval) and the percentile was found for 25th, 75th and 100th rank. The scores in the percentile range of 1-25, 26-75 and 76-100 were taken as 'low competency', 'moderate competency' and 'high competency', respectively. Cross tabs and Chi square value were calculated between students' competency score and program to find associations between them. The responses of the students on open-ended items were categorized to identify key themes. The related themes were further combined to narrow down the number of themes. The frequency of students' responses on each theme was counted and then converted into percentages.

FINDINGS & DISCUSSION

The data from the closed-ended items are illustrated in tables showing the students' program and level of competency on various aspects of PIM (searching, sharing, storing, disposal, retrieval).

The percentage of students with low and moderate searching competency was almost equal in all the three programs (38.8% and 39.3%). So, the students' program did not affect the level of searching competence. Moreover, the

percentage of students with high competency in searching was less in all the three programs (22%).

Table 2

Students' level of searching competency program wise

			Program			
			Social Science	Science	A&D	Total
Searching Competency	Low Competency	Count	31	106	18	155
		% within Program	31.0%	42.4%	36.0%	38.8%
	Moderate Competency	Count	44	94	19	157
		% within Program	44.0%	37.6%	38.0%	39.3%
	High Competency	Count	25	50	13	88
		% within Program	25.0%	20.0%	26.0%	22.0%
Total		Count	100	250	50	400

$(\chi^2 (4, 400) = 4.50, p=.342)$.

This contradicts that searching information at present is a normal and simple behaviour and does not require any competency (Martin, Byrnes, McGarry, Rea, and Wood, 2016). The value of chi square revealed that there was no association between the degree of competency and students' program $(\chi^2 (4, 400) = 4.50, p=.342)$.

Table 3

Students' level of storing competency program wise

			Program			
			Social Science	Science	A&D	Total
Storing Competency	Low Competency	Count	29	64	15	108
		% within Program	29.3%	25.6%	30.0%	27.1%
	Moderate Competency	Count	51	117	30	198
		% within Program	51.5%	46.8%	60.0%	49.6%
	High Competency	Count	19	69	5	93
		% within Program	19.2%	27.6%	10.0%	23.3%
Total		Count	99	250	50	399

$(\chi^2 (4, 400) = 8.59, p=.072)$

The data from Table 3 indicates that UG students in all the three programs have moderate competency in storing/saving digital information (49.6%). The percentage of students with low and high competency in storing/saving was relatively less. It was surprising that only 10% students in A&D viewed their competency as high which was very small. One possible reason for this may be the nature of information involved in A&D comprising of visuals, maps and high-resolution images which may require specialized skills for their accurate storing/saving. However, there was no significant association between the storing competencies of students in all the three groups (χ^2 (4, 400) = 8.59, p=.072). Sometimes, the students avoid storing and filing information as it creates a sort of archive with the bulk of unwanted and irrelevant information making it harder to find the right stuff (Whittaker & Sidner, 1996).

Table 4

Students' level of sharing competency program wise

			Program			
			Social Science	Science	A&D	Total
Sharing Competency	Low Competency	Count	44	116	26	186
		% within Program	44.0%	46.4%	52.0%	46.5%
	Moderate Competency	Count	38	77	15	130
		% within Program	38.0%	30.8%	30.0%	32.5%
	High Competency	Count	18	57	9	84
		% within Program	18.0%	22.8%	18.0%	21.0%
Total		Count	100	250	50	400

(χ^2 (4, 400) = 2.74, p=.603)

Regarding competency in sharing information, we found no significant relationship in the level of competencies and students' program (χ^2 (4, 400) = 2.74, p=.603). The percentage of students with low competency in sharing information was greater (46.5%) than the other two. It is concluded that information sharing is easy to say but difficult to do as supported by Wilson and Gray (2015). The students with low competency were more evident in architecture and design (52%). One reason for this may be the personalized nature of information in A&D that make students reluctant to share. Wilkes (2014) also found the problem of what to share and what not to share. Individuals also show reluctance to share information if they feel incapable of sharing information (Bandura, 1982).

Table 5

Students' level of disposal competency program wise

| | | | Program | | | |
			Social Science	Science	A&D	Total
Disposal Competency	Low Competency	Count	31	58	24	113
		% within Program	31.0%	23.2%	48.0%	28.3%
	Moderate Competency	Count	45	143	18	206
		% within Program	45.0%	57.2%	36.0%	51.5%
	High Competency	Count	24	49	8	81
		% within Program	24.0%	19.6%	16.0%	20.3%
Total		Count	100	250	50	400

(χ^2 (4, 400) = 15.35, p=.004)

The competency in disposal/deleting of un-needed information was more prominent with 51.5% students expressing moderate competency. The data revealed a significant positive relationship between competency in disposing information and students' program (χ^2 (4, 400) = 15.35, p=.004). Thus, the level of competence in disposing information can be predicted from the students' program. The question that arises here is whether the students are competent in disposing/deleting information or unwanted/unneeded information from their storage record. Cumming (2011) found that disposing the right digital information is a difficult task and requires coordinated approach in an organization. However, for students in an individual capacity, this might be a simple task of merely deleting information from their devices.

The students' competency in retrieving information can be identified from the students' program ((χ^2 (4, 400) = 9.80, p=.044). The students in A&D have same percentage of low and moderate competency (40% each). However, the majority of students in social science have moderate competency in retrieving information (60%). It is evident that a few students have high competency in retrieving information. This is also supported by Al Nasar et al. (2011) that retrieving information is a major problem in PIM. In fact, retrieving information is a time consuming, challenging and frustrating task as reported by Elsweiler, Baillie, & Ruthven (2011).

Table 6

Students' level of retrieval competency program wise

| | | | Program | | | |
			Social Science	Science	A&D	Total
Retrieval Competency	Low Competency	Count	18	66	20	104
		% within Program	18.0%	26.4%	40.0%	26.0%
	Moderate Competency	Count	60	122	20	202
		% within Program	60.0%	48.8%	40.0%	50.5%
	High Competency	Count	22	62	10	94
		% within Program	22.0%	24.8%	20.0%	23.5%
Total		Count	100	250	50	400

$((\chi^2 (4, 400) = 9.80, p=.044)$.

Response on Open-ended items

There were three open-ended items in the questionnaire. The students were asked about their preferred device for PIM. The response on this item was very high. The students mentioned the device they commonly use for PIM. The frequency count was made for each device and then converted into percentages. The other two items were aimed at identifying problems in PIM and how to improve it.

The concept of PIM was very novel for UG students in the sample institution which was also reflected in their responses on the last two items. The students did not have information about PIM and what issues or problems are associated with it. The same was found by Sedghi, Abdolahi, Azimi, Tahamtan, and Abdollahi (2015). Gerken et al. (2009) also elaborated that PIM deals with the novice internet user. This led to a relatively weak response on the open-ended items that sought to identify the problems students face in PIM and how it can be improved. Some of the problems and improvement strategies identified by students were not related to PIM and were thus omitted from the analysis. The responses of the students were categorized in order to identify key themes. The related themes were further merged to narrow down the number of themes. The frequency of students' responses was counted and then converted into percentages.

Table 7

Frequency of students preferred device for PIM

Preferred device	Count & %	Social Sciences	Science	A & D	Total
PC/laptop	Count	62	166	29	257
	Percentage within Program	62%	66.4%	58%	64.3%
Mobile Phone	Count	28	62	14	104
	Percentage within Program	28%	24.8%	28%	26%
Flash Drive	Count	26	61	15	102
	Percentage within Program	26%	24.4%	30%	25.5%
Hard Copies	Count	4	17	5	26
	Percentage within Program	4%	6.8%	10%	6.5%
Sky Drive	Count	6	14	0	20
	Percentage within Program	6%	5.6%	0%	5%

In order to seek more information about students' PIM, they were asked about the device that they preferred to use for PIM. The students identified five device types: PC/laptop, flash drive, sky drive, mobile phone and hard copies. The most preferred device for PIM was PC/laptop used by students of all Program (64.3%). The use of mobile phones for PIM was the second preferred device followed by flash drives. This supports the findings of Sedghi et al. (2015) that majority users keep information in PC/laptops. However, Sedghi et al. found flash drive as the second most preferred device which in our study was the mobile phones. The use of sky drive for PIM was very low (5%). *SkyDrive* is a storage service offered by Microsoft that enables the user to store, synchronize and access their files online and offline. One possible reason for this reluctance might be the security issue associated with the sky drive (Pearson, 2009). Surprisingly, no student in architecture and design was using sky drive for PIM.
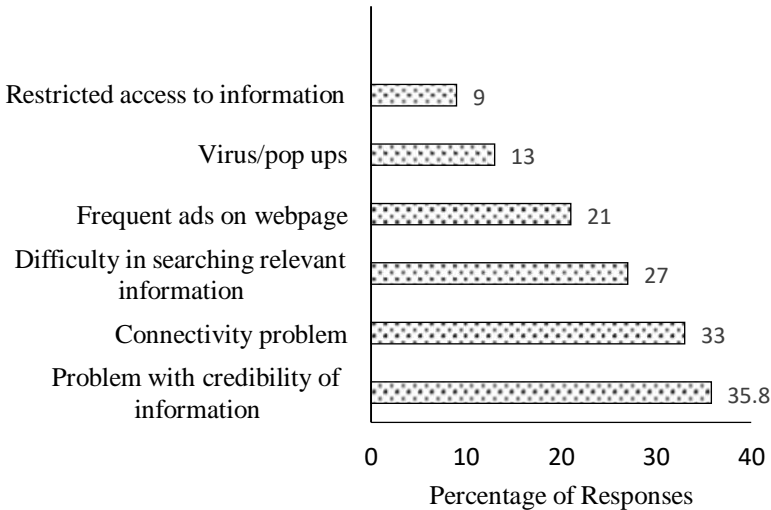
Figure 1. Problems in PIM

The problems identified by students during PIM are illustrated in Figure 1. The most common problem identified by students (35.8%) was the problem with authenticity/credibility of web information. This restrains the individual from saving and using the searched information (Wathen & Burkell, 2002). The second problem was the connectivity and low speed Internet (33%) which makes the students save only the successfully loaded pages and utilize only the information in these saved pages. This also discourages them from searching more relevant material due to slow speed and disconnection problems. Students also expressed that they face difficulty in searching relevant information on the web (27%). Some of these students reported various distractions and encountered information which diverts them from their specific target information. Hou and Zhang (2003) also asserted that finding the relevant information using search engines has become a challenge in the wake of thousands of pages suggested by search engines. Moreover, the students complain of frequent ads and offers (21%), that are loaded around the web information. This creates difficulty in searching and reading relevant information (Cho & Austin, 2004). Another problem is the virus/bugs acquired while searching and saving information from the web (13%). The students reported that while using the Internet, they encounter various types of virus/malware that infect their device and documents. Thus, they keep multiple copies of documents which results in information overload and time wastage in retrieving the right information

from their device. This supports Elsweiler et al. (2011) with regards to retrieving, as time consuming and frustrating. Lastly, the students complained of restricted access to information on the web (9%). Sometimes, the relevant information is not open access and requires payment for purchasing the document. The students thus search for free articles/information which may not be very relevant to them thus, restricting its future use and applicability.
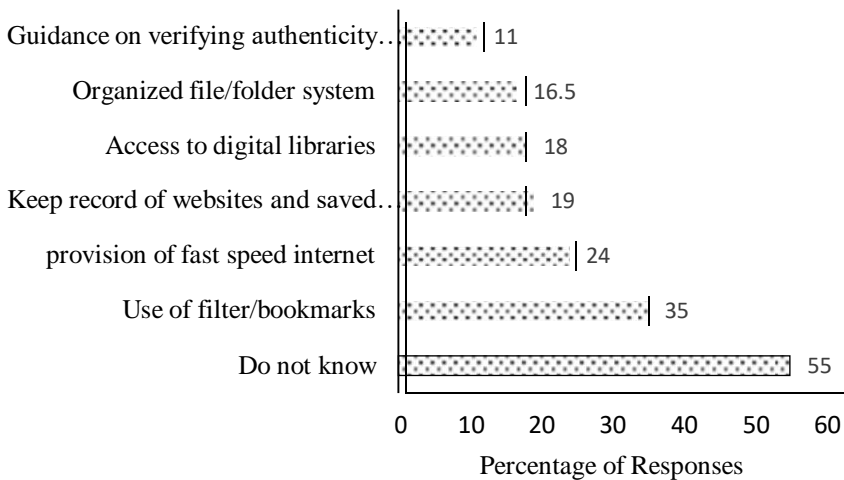

Figure 2. Improvement Strategies in PIM

The students lack of information about PIM was also reflected in their responses on improving IM. 55% students did not give any suggestion for improving PIM and simply reported that they do not know how to improve it. A similar finding is that the participants do not know about PIM reported by Sedghi et al. (2015). The students were not even familiar with the term 'PIM'. 35% of students suggested the use of filter/bookmarks for improving PIM. Bookmarks save the web link for fast retrieval and helps in IM as found by Boardman & Sasse (2004). The students expressed the opinion that the provision of fast speed internet would also help in PIM (24%). Fast speed internet helps in googling through a greater number of websites in the pursuit of finding relevant material and its purposeful use. Some students complained that they cannot search and save files/documents with a large size if the internet speed is slow because the documents would take much time to load on the screen.

Moreover, the students suggested that keeping record of websites and saved pages would also help in searching and retrieving information (19%). Some of these students further elaborated that the web addresses and their description can be saved in a word document which would provide a quick hint to the user for retrieving information. Some mentioned that emailing the information and web links to oneself is also helpful in quickly searching for information and its retrieval. The same was found by Whittaker and Sidner (1996). Moreover, access to digital libraries may also help in improving PIM (18%). The access to these websites would help the students in finding relevant, reliable and up-to-date information for their storing and use. The same is supported by Trivedi (2010). Moreover, some students stated that the problem of encountered information and ads might also be solved as these websites have less distraction/ads. Further, the use of these websites helps in suggesting related information for further reading.

Moreover, 16.5% students reported that the user should have an organized file and folder system. This pertains to naming the file per its content and saving it to its relevant folder for fast retrieval. This is also supported by (Karger & Jones, 2006). The students also suggested proper guidance and training in how to verify authenticity of web information (11%). The students reported that they use information from the web but later they come to know that their searched information is not correct. Most of this information comes from Wikipedia, blogs, and posts. Information about reliable websites, books resources, good journals etc. would help them in selecting authentic information for future use. Stewart and Basic (2014) also suggested the need to develop students' skills to evaluate authenticity and credibility of information received over the web.

CONCLUSION

The students in all the three programs suffer from 'weak' competency in searching and sharing information and 'moderate' competency in storing, disposing, and retrieving information. Comparatively, science students seemed more competent in storing information than the students in other programs. The Architecture and Design students were weaker in sharing information than the science and social science students. The majority of the students keep their data in laptop/PC while the use of sky drive was very low. The major problems identified in PIM were credibility of information, connectivity issues and the difficulty in searcing relevant information.

The research concludes that university students are involved in PIM despite having low to moderate competency. This implies a need to develop courses in IM or that topics related to PIM should be integrated into other courses for helping university students in IM. In order to reduce information overload, the students should be provided guidance on Information literacy skills to help them select the right information for their future use (Stewart & Basic, 2014). In addition, the students may be provided basic training on how to search for reliable information on the web and the use of sky drive to help them access their saved information from anywhere. The academic departments in the universities need to allocate some library periods in the timetable to help their students learn IM (Ameen, 2016). In addition, the librarians can also announce regular briefing sessions on PIM to help students efficiently manage their resources and to save time.

LIMITATIONS

The study relied on self-reported competency by students and it was assumed that the students rightfully reported and judged their competency. Students' competency could be measured with greater degree of objectivity through actual tests on searching, storing, sharing, disposing, and retrieving information in a lab setting. Moreover, the study used data from one research instrument. For improving credibility in the findings, multiple research instruments may be used.

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