

2009

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Recommended Citation

Benitez, Elaiza Aquino and Pauleen, David, "Brainfiltering: The Missing Link Between PKM and PIM?" (2009). *AMCIS 2009 Proceedings*. 13.

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Brainfiltering: The missing link between PKM and PIM?

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ABSTRACT

This paper explores post graduate students' approaches to Personal Information Management and Personal Knowledge Management, as they pursue their academic studies and learn to create new knowledge through research and specifically the location and use of large amounts of relevant information. Data for this study was collected in interviews with seven postgraduate students. Findings show that students use 'brain filtering' as a mediating step between personal knowledge and information management and that technology plays a significant role as students tend to develop more effective information and knowledge management skills as they progress through their studies.

Keywords

Personal Information Management, Personal Knowledge Management, Postgraduate Study, Experience, Technology

INTRODUCTION

Knowledge is perceived as a strategic organizational asset (Drucker 1999). Recently there has been a growing interest in personal knowledge management (PKM). Knowledge first exists within the individual's mind as they keep track of information encountered in their daily lives (Miller, 2005). Mitchell (2005) indicates information and knowledge should be understood as personal rather than corporate assets. Understood this way, the processes and content of information and knowledge revolve around the individual's purposes and goals.

The concept and practice of PKM has not yet been explored in depth by researchers (Pauleen, 2009). This study was conducted to gain more insight into PKM and it specifically examines postgraduate students and their approaches to PKM as they locate and use information to create knowledge (Fischer and Zigmund, 1998). More specifically, the paper looks into the relationship of PKM and personal information management (PIM) as practiced and understood by postgraduate students as well as the influence of technology on these practices.

This paper is structured as follows: in the next section the relevant literature is reviewed. This is followed by sections on the methodology, the findings, and the limitations and conclusions of the research.

LITERATURE REVIEW

Postgraduate students' management of information and knowledge affects the success of their research (Fischer and Zigmund, 1998). This section introduces PKM and PIM as well as background information on postgraduate studies.

Personal Information Management

Effective PIM is a necessary skill for postgraduate students. PIM is the ordering of information through categorization, placement, or embellishment in a manner that makes it easier to retrieve when it is needed (Jones and Teevan, 2007). It is an activity in which an individual stores personal information for later use (Bergman, Behty-Maroon and Nachmias, 2007). Personal knowledge is used to identify information relevant to one's work and life and to organize that new information so that it is meaningful and useful (Jefferson, 2006). Determining whether information is relevant or irrelevant presumably increases with experience.

Jones and Teevan (2007) organize PIM into the following activities: information seeking, information keeping, organization and information maintenance. They explain information seeking as 'finding' and 'refinding' information. 'Finding' is seeking information to satisfy some goal of the individual. Technology such as the World Wide Web and library databases are often used (Wilson, 2000). 'Refinding' is the process of finding information that was seen before and is based on an 'information keeping' action in which the individual has made a decision on the information item's relevance and value to themselves.

This is followed by the organization of the information and how to represent that information when storing it, in order to be able to retrieve it at a later stage (Jones and Teevan, 2007). Information maintenance is then required and involves the individual deciding on the composition and preservation of information, how the information is stored and when the information is no longer useful (ibid).

Barreau (1995) lists five PIM activities, which are acquisition, organization and storage, maintenance, retrieval and output. PIM is described as a system supported by the technology found in the personal computer environment such as the operating system, mailbox and browser (ibid). PIM systems have become ubiquitous as the searching, storing and managing of information is a fundamental aspect of computer-based activity. Computer users manage their personal information through technology as a daily routine (ibid).

PIM is connected to PKM in that once an individual has found, managed and made use of information it becomes a part of their personal knowledge.

Personal Knowledge Management

PKM is still a relatively new research area with few empirical studies. It is a concept rooted in a number of diverse fields such as KM, PIM, cognitive psychology, philosophy, management science, and communication (Pauleen, 2009). Martin (2000) describes personal knowledge management as knowing what knowledge we have and how we can organize it, mobilize it and use it to accomplish our goals, and from this, how we can continue to create new knowledge. PKM's focus is on helping individuals be more effective in personal, organizational and social environments (Pauleen, 2009).

PKM was organized into a conceptual framework at the Anderson School (Frاند and Hixon, 1999) as a way to organize and integrate information that individuals value as important enough to become a part of their personal knowledge base. It is a process of discovering and valuing information that means something to an individual which results in the expansion of the individual's personal knowledge. Avery, Brooks, Brown, Doresey and O'Connor (2003) consider personal knowledge management to be a set of learning-to-learn information skills: retrieving information, securing information, evaluating information, organizing information, collaborating around information, analyzing information, securing information and presenting information. They emphasize the role of information technology in PKM. Technology has become a means for accessing, retrieving and storing massive amounts of information. They state that a framework is needed to help address this issue and believe PKM is a suitable strategy:

“PKM...promises to provide us with both a common language and a common understanding of the intellectual and practical processes necessary for the acquisition of information and its subsequent transformation into knowledge” (Avery et al., 2003).

Jefferson (2006) argues that PKM is a conceptual framework for blending personal skills and processes. Jefferson argues technology is only a supporting tool and that individuals must have PIM skills that allow the retrieving, processing, filtering, structuring, storing and securing of information.

PKM assumes that individuals have developed self awareness of their limits of what they know and can do (Avery et al., 2003). Individuals understand what they know and don't know and have methods for obtaining new knowledge and accessing new information when needed (ibid). The core focus of PKM is 'personal inquiry' - the quest to find, connect, learn and explore (Clemente and Pollara, 2005).

Postgraduate Studies

Vast amounts of information are managed by postgraduate students in their academic studies. The acquisition and processing of information leads to knowledge creation, which affects strategies and methods of learning and research (Zuber-Skerrit, 2005). Postgraduate students must retrieve information and transform it into knowledge. Methods of finding information are essential to postgraduate students and they must find ways of re-accessing that information when required and using it in the production of personal knowledge (Miller, 2005).

Expectations vary for what students will have experienced in their undergraduate studies. Postgraduate students need to develop new skills (Fischer and Zigmond, 1998), as the structure and expectations of undergraduate and postgraduate studies are very different.

Dr. Indira Nair of Carnegie-Mellon University describes the transition process this way: “students are ‘consumers’ of knowledge in their undergraduate years and when they become postgraduate students they are ‘creators’ of new knowledge,” (Fischer and Zigmond, 1998, p.31). Therefore postgraduate students “must go beyond what is known, ask questions, seek

answers and evaluate their findings” (ibid). Furthermore, postgraduate students are responsible for their achievements as they assign their own tasks and objectives.

Information resources are needed and personal management of the information and knowledge retrieved from these resources will affect students’ abilities to assign accomplish these tasks and objectives.

Research Methodology

The objective of this study was to examine how PIM and PKM are used in postgraduate studies in conjunction with technology. As this is an exploratory study in a relatively new research area a qualitative, inductive approach was used. Qualitative methods aim to provide an understanding of people’s view of the world and how they interact with and understand their environment (Creswell, 1994). To gather data, seven postgraduate students in a school of information management in a New Zealand university were interviewed. Purposive sampling was used since the “processes being studied are most likely to occur” in these individuals as they are constantly using PIM and PKM in their academic study. Interviews allowed the researchers to uncover rich and complex information from the study participants. Each interview lasted between 20 and 40 minutes, and was recorded and transcribed. Notes were written and probing questions were applied where appropriate. The following table shows the different types of postgraduate students interviewed and provides background information on their use of technology resources and devices.

Participants	Level of Study	Technology Resources	Technology devices used
A	Honours ¹ Full Time	EndNote Nvivo Library databases Internet Wikis	Laptop USB stick External hard drive
B	Honours, Full Time	EndNote Adobe Series LaTex Microsoft Outlook Library databases Internet Wikis	Laptop Mobile phone External hard drive
C	Honours, Part Time	EndNote SPSS Notepad Library databases Gmail Internet	Desktop Mobile phone USB stick
D	PhD, Full Time	EndNote Library Databases Internet Wikis	Laptop Desktop Mobile phone USB stick External hard drive

¹ The Honours program in the British system of education is usually an optional (competitive entry) fourth year of study. It is roughly equivalent to the first year of a two year Masters Program.

E	PhD, Full Time	EndNote Nvivo Library databases Google Desktop Gmail Mobile Me	Laptop Mobile phone – iPhone USB stick
F	PhD, Full Time	EndNote SPSS Library databases Google Desktop Internet Wikis	Laptop USB stick External hard drive
G	PhD, Full Time	EndNote Microsoft Outlook Refworks Library databases Internet	Laptop Desktop USB stick

Table 1. Details of participants interviewed

Grounded theory coding techniques were used in data analysis. According to Glaser and Strauss (1976) grounded theory is an inductive approach used to generate theory from qualitative data. This technique was used to analyze and look for common categories of codes from the transcripts (Creswell, 1994; Glaser and Strauss, 1976; Oates, 2006). The three phases of open, axial and selective coding were used (Oates, 2006; Strauss and Corbin, 1990). Open coding is the initial process of labeling the categories found in the data, which leads to axial coding where a higher level of categorization is undertaken to find the relationships between the open codes. Selective coding is then used to focus the relationship between the categories that are most significant to the investigation. This relationship may be presented as a model. Three of the key categories developed from the interview data are illustrated below. Two of the terms used in the higher level categories, personal information management and personal knowledge management, come from the literature.

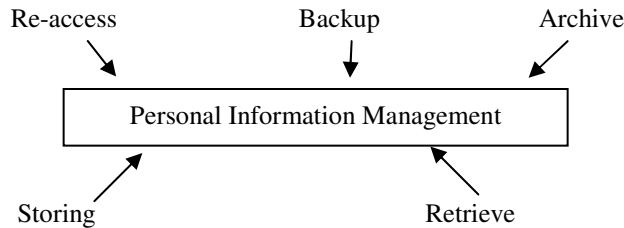


Figure 1. Conceptual category of personal information management

Figure 1 illustrates how the category ‘personal information management’ was based on open codes involving skills such as re-accessing, backing up, archiving, storing and retrieving information.

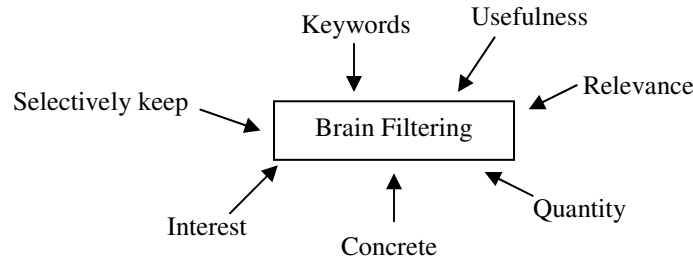


Figure 2. Conceptual category of brain filtering

Figure 2 shows how the category ‘brain filtering’ was generated by the postgraduate students descriptions of how they decide what information to look for and what to keep. Brain filtering includes the following codes: selectively keep, keywords, relevance, quantity and concrete.

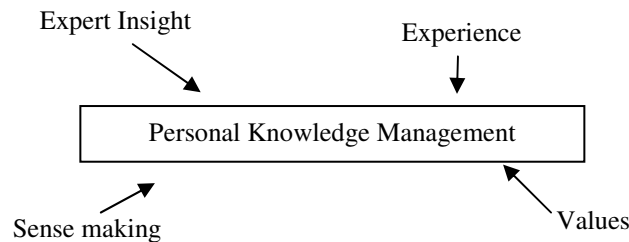


Figure 1.3 – Conceptual category of personal knowledge management

Figure 3 illustrates how the category ‘personal knowledge management’ involved codes that described how the students continually learn new information and evaluate it in the light of what they already know through experience and their values.

FINDINGS AND DISCUSSION

In this section the findings from the interviews are discussed. The conceptual categories are explained first and then evaluated against the current PIM and PKM literature. The use of technology by the postgraduate students is then discussed.

Personal Information Management

The codes, derived from the data, related to PIM - retrieve, store, back up, archive and re-access - are similar to the processes described by Barreau (1995) and Jones and Teevan (2007). The retrieving process involves seeking and storing information, such as journal articles and conference papers, needed for their studies. Storing and archiving involve organizing information in such a way that it can be re-accessed later (ibid). Information is also backed up in case anything happens to the original files.

Students demonstrated these personal information management skills when they were questioned about their PIM. One student described his activities this way:

“Managing information is important because the information that I get...I have to manage it so that I am able to retrieve it at a later stage. Whichever information I retrieve through [information] resources... I keep it in different folders and I also create subfolders and give proper names for the folders. So that at a later stage if I want to see the documents I will be able to get the documents easily because I have categorized it with meaningful names.” (Participant D)

This process implies that information can be easily accessed when folders are categorized accordingly to the student’s preferences. How they decide what to name each folder is personal to them because they have categorized it in a meaningful way which perhaps only they understand. This is further emphasized by another student:

“What I’m currently doing for every article that I store... I use the year, let’s say 2008 in the first place then dash and go for the main author, go for another dash and then the title of the article. Having this structure for all my articles allows me to access them quite easily.” (Participant F)

This student realized it was important to store, retrieve and re-access information effectively. Postgraduate students, especially PhD students, are dealing with a large number of information sources, including journal articles, conference papers and books. It is vital for them to store these sources in a meaningful way so that they can be accessed throughout their research investigation. The students realized that a personal approach was needed in organizing their information:

“If you haven’t got a specific approach that you use all the time for all studies that you are currently doing ... you’re wasting your time searching for articles that you have somewhere stored in your computer.” (Participant G)

Students used technology to assist in their PIM. Information resources such as library databases and online academic journals were used to retrieve information needed for their studies. As they selected information sources appropriate for their study, a personally meaningful approach was taken when naming and storing each electronic file. This enhanced their ability to find the file later on. Some students preferred to store files electronically, others in paper form. However, because so many articles and other academic information sources are used, it is more effective to store them electronically because of easier re-access. This student explains:

“It’s very good to read [articles] in paper based form and then store it somewhere on your computer because you can re-access it much easier. I print them off, go home, read them... and then once I have done that I just put it onto a shelf. But I re-access them quite often through my computer... so I prefer storing and re-accessing it electronically.” (Participant F)

Students are aware of the consequences if they do not back up their electronic files. They have invested a lot of time and effort in locating information sources. The students have either lost work themselves or are aware of colleagues who have lost their work.

“Students are not aware of hardware failure and some of them already have done reports... 20 hours of work before they realise the USB key broke... and this work is gone. So I’m quite aware about this and I back up my systems every week, everything” (Participant A)

The second key category, brain filtering, emerged from the data.

Brain Filtering

With their research topic in mind, students have an idea of what information to look for. The term ‘brain filtering’ describes how the students identify what information needs to be incorporated as personal knowledge. Brain filtering is a process used to determine what information is relevant, and for what purposes it will be used. PKM attributes such as experience, sensemaking, and critical thinking, are used to identify worthwhile information. A student describes brain filtering as:

“It’s when I see information, it goes right to my brain filter as in things of my interest... I read something and I think it’s relevant... I need that.” (Participant B)

Skyttner (1998) provides a definition of the relationship between data, information and knowledge that relates to this process of brain filtering:

“Data reaches our senses and makes us aware that something has changed or is going on is said to give us information. That is, we have cognitive or physical representation of data about which we are aware of. In other words, we have been informed. Assigning meaning and understanding to information by the use of higher mental processes then makes it possible to speak about knowledge.” (Skyttner, 1998, p.889).

Postgraduate students use information resources such as journal databases to gather data, which in turn becomes information for their research. This information is then transformed into something meaningful and useful in their studies (Skyttner, 1998). Through analysis and reflection they engage in a form of knowledge creation. By applying communication skills, students develop their thesis and demonstrate academic achievement as they make explicit the knowledge that they have created (Fischer and Zigmond, 1998). The students are able to ‘speak about knowledge’ which they developed from data and information. Based on Li and Liu (2008), PKM includes the process of converting personal tacit knowledge to explicit knowledge. Brainfiltering uses personal tacit knowledge to determine whether or not newly acquired information acquired is relevant. ‘Filtered’ information can then be made applied to their work in their research paper and literature review.

Postgraduate students are knowledge creators, a clear progression from when they were undergraduate students and mere knowledge consumers (ibid). As postgraduate students they go beyond what is known, ask questions and disseminate their results (ibid). Brain filtering involves determining what information will be of use and how this information will provide meaning and understanding. Selecting information for storage and re-use is described by this participant:

“You’re always overloaded [with information], you have to be a kind of filter and grab all the stuff around which is relevant to your study. And then try to structure them, identify them and put them into different categories which will facilitate your future study.” (Participant A)

Postgraduate study makes students aware of this brain filtering process, something which they may have not acquired in the workforce or as an undergraduate. They use brain filtering to efficiently manage information. While doing so they add to their personal knowledge of how to filter irrelevant information.

Personal Knowledge Management

Davenport and Prusak’s (1998, p.5) definition of working knowledge - “a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information” - implies individuals are constantly exposed to learning environments as they continually integrate new information. This section evaluates PKM using this concept of working knowledge as a frame for dealing with new experiences and information. Values will first be assessed followed by experiences, expert insight and sense making.

Values influence an individual’s behaviours: “people with different values ‘see’ different things in the same situation and organize their knowledge by their values” (ibid, p.12). The following two quotes show how different students view managing information:

“I found out that I didn’t like it when [information] was structured, the way I structured it. At the beginning of the year I didn’t know how to do a lit review so I followed the steps that our lecturers advised... keeping tidy notes, etc, and I tried that... it just messed with my head and I couldn’t find anything when it was tidy. But when it was a big mess I knew where everything was.” (Participant C)

“I learnt through Honours that I needed a system to work through. When I started my PhD I realised that I had articles in mind that I read from my Honours studies but I wasn’t sure where to access them or find them again... I realised if I continued to work this way it’s going to be hard to come up with a research thesis including 300-400 articles or so.” (Participant F)

The PhD students recognised it was crucial to have a structured management approach to deal with an increasing number of journal articles. Most PhD students realised they needed an efficient personal management system. As the volume of information increased, so did their level of PIM. This understanding underpins the codes of the PKM category: sense making, experience and expert insight as this student explains:

“Knowledge is skills acquired through experience. The skills come from the experience of previous understanding. Knowledge of course is an understanding of my previous skills.” (Participant D)

These skills result from experience which forms individual expertise. Davenport and Prusak (1998) explain, ‘experience’ and ‘expert’ are related words and that experts are people with knowledge about a subject developed by past and new experiences. Experience allows individuals to formulate connections between what is happening now and what happened then.

Experience teaches the individual to act according to the situation as exemplified by the student recognizing the need for a PIM system in their PhD studies. Previously in their Honours studies they had not developed a PIM system. After moving up to PhD level, the students learned the importance of PIM that allow them to efficiently retrieve important information.

As for sense making, the students apply their own context to incorporate the new information received into a personal knowledge base. An example of this can be seen in this explanation of a student’s perception of personal knowledge:

“If I go back and see notes I wrote months ago I can’t remember the context. I might have thought it was meaningful at the time but it doesn’t connect. So to make it personal it’s the connection with something that meaningful to you in the context of what you are doing. I guess the other thing is that it’s the language that I can relate to. It’s not jargonistic, the terms used are ones that I can connect with. So it relates to my experience.” (Participant E)

In the next section the relationship between PIM, PKM and brain filtering are modelled and the role of technology is introduced.

Linking PKM and PIM

Figure 4 illustrates how brain filtering links PKM and PIM. As Davenport and Prusak (1998) explain, knowledge is used to make decisions about strategy. This understanding is applied to how the postgraduate students use their PKM (values and

beliefs, expert insight, experience, and sensemaking) to engage in brain filtering in order to access, select, structure and reaccess information.

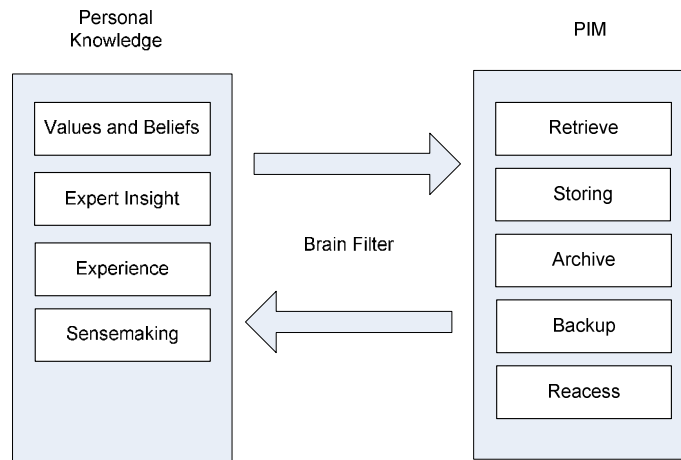


Figure 4. Brainfiltering and the relationship between Personal Knowledge and Information Management

The arrows in Figure 4 indicate the recursive nature of the relationships between PKM, PIM and brain filtering. As the findings show, a student's ability in these three areas usually increases over time as they learn from teachers and supervisors and gain experience through trial and error. Davenport and Prusak's (1998) define working knowledge as constant learning and the renewal of information that adds to an individual's existing knowledge base. Through the learning experience of brain filtering during the retrieval and storing of information sources, personal knowledge grows and the student becomes more effective in managing information. PKM is an essential prerequisite for information literacy, to recognize when information is needed which leads to locating (PIM) and evaluating (Brain Filtering) and effectively (PKM) using the needed information, (ALA, 1998).

The Critical Role of Technology

The findings and discussion demonstrate that technology played a critical role helping students with their PIM, brain filtering and PKM skills. Technology influenced these processes in several ways. First, technology gave students access to the information resources they needed, including the Internet, library databases, online journals, and e-versions of conference papers. All the students used the Internet to access these information resources:

"Internet is the bank... a huge network whereby it can retrieve information where you know, we get ideas." (Participant D)

The Internet allows the students to 'information seek'" (Jones and Teevan, 2007), and use their brain filtering skills to identify relevant information. There is a symbiotic relationship between PIM and brain filtering because to find information in the library databases and on the Internet, students have to be able to distinguish between irrelevant and relevant information sources. As they continue to research and practice their brain filtering skills, this experience is added to their PKM skills.

Technology is also used as a 'mechanical support'. The students used technological applications and devices to increase their PIM and PKM skills. As discussed earlier, information is organized according to the student's personal approach to management. This personal approach is formed from their values and experience but also as they deal with technology and large volumes of information (Avery et al., 2003). The students developed personal management systems through their relationship with technology:

"I have Google Search, which can search anything on my computer. That's one of the main things I use. If I remember a quotation or two words used in an interview, the best way to find that is go to my laptop, and key it into the Google Search." (Participant E)

The students process large quantities of information while their mental capacity can only handle a certain amount. Other 'devices' apart from the human mind are needed to store the knowledge and information. Technology, such as Google Desktop and mobile devices, is used as knowledge repositories.

The Importance of Experience

The 'experience' and 'information' Davenport and Prusak (1998) speak of in their definition of working knowledge is evident when looking at the increasing ease with which PhD students use their brain filtering and PIM skills. The PhD students are entirely responsible for their own success. In Honours they were shown how to use the information resources such as the library databases and guided in how to write a literature review. As their studies continued, their experience in PIM increases improving their brain filtering skills. As knowledge workers, they are constantly applying their brain filtering and PIM skills as they work through their studies. They are responsible for their own success (Fischer and Zigmond, 1998), and are using these skills which they develop in postgraduate study.

LIMITATIONS

While these findings and discussion provide insight into the concept of PKM and PIM, there are obvious limitations. First, the research only interviewed postgraduate students in a school of information management in a New Zealand university. These students' perspectives, particularly towards technology, may be different to those of postgraduate students in other departments and faculties. The findings of this study need further confirmation and require a broader scaled survey. Secondly, the number of interviewees was small due to time limitation within which to conduct the research.

CONCLUSIONS

Postgraduate students learn how to brain filter through a combination of experience, learning and the use of technology to retrieve relevant information for their studies. Brain filtering was a term used by students in this study, reflects how students identifies what information is useful and relevant. As they progress in their studies, the students are exposed to new learning environments in which their personal knowledge grows through their increasing use of brain filtering.

Brain filtering is a skill which they may not acquire in the workforce, but they learn it out of necessity in postgraduate studies. Their brain filtering skills improve as they continually search for literature, and become more efficient and effective in their PIM skills.

Technology not only provides sources of information; it enables students to develop their brain filtering skills and becomes a form of 'mechanical support' in terms of handling and storing information. It was discovered that students favor particular technologies that allow them to use and develop their own PIM and PKM skills demonstrating a symbiotic relationship between the students and their chosen applications and devices. The postgraduate students agreed it would be difficult to complete their studies without the use of technology because it provides them with access to current literature, and assists them in their PIM skills.

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