

HOW DO K-12 STUDENTS' MANAGE APPLICATIONS ON THEIR MOBILE DEVICES?

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ABSTRACT

Personal information management (PIM) is a research field that examines the activities by which users save, organize and retrieve personal information items. PIM is a one of the essential new literacies for learners in the 21st century. This paper reports results from a pilot study that explored PIM practices and strategies of k-12 students, on their mobile devices. The results reveal three practices of organizing mobile applications: Never Organize (applications are left in the default location), Organize Occasionally (applications are organized periodically) and Organize Immediately (applications are organized as soon as they are downloaded). Three main strategies for organizing the applications were found: Organization by frequency of use and relevance, Organization by themes and Organization by visual cues. Finally, it was found that when trying to allocate applications on their mobile device, most students prefer to swipe the screens, rather than use the search option, even if it means going back and forth several times. The study is a part of a larger research which examines PIM strategies on mobile devices by adults and children.

KEYWORDS

Personal Information Management, Mobile Learning, K-12.

1. INTRODUCTION

Personal information management (PIM) is a research field that examines the activities by which users save, organize and retrieve personal information items on a daily basis (Jones, 2008). PIM processes were found to be closely connected to functional, cognitive and emotional processes and therefore, are a significant part of learning processes in the digital age (Hardof-Jaffe & Nachmias, 2013). In general, PIM practices have four main objectives: information capturing and retention for later use; finding and organizing information across applications; reminders and attention management and finally, managing versions, controlling clutter, and combatting fragmentation (Jones et al., 2015). A study comparing high school students to adults, in respect to personal information management practices on a PC, concluded that there are age discrepancies in PIM practices and skills; high school students show less tendency to manage personal information, compared to older students (in college or university) and that the organizational strategies of younger students are largely driven by short-term, functional goals (Hardof-jaffe & Nachmias, 2013).

The mobile device has become an integral part of our daily lives, carried around everywhere, at all times and used for versatile needs and objectives. Mobile devices are used for a wide range of personal information related purposes, including creating documents and notes, recording audio notifications, drawing diagrams and more (Buttfield-Addison & Lueg, 2013). The interaction with the mobile device is carried through mobile applications. The mobile user may organize the applications by reordering them on the screens and also by placing them in folders. The range and availability of mobile applications is expanding rapidly and thus, the process of organizing the applications on the mobile device and the process of allocating and accessing the applications may be seen as a continuation of the “traditional” PIM tasks of organizing and accessing information items on the personal computer (PC). Mobile technologies have become a major gateway for interacting with information and effectively serve as a personal information space, yet the research on PIM and mobile is quite limited. A recent study on PIM practices of college students on their mobile devices, found four strategies for organizing mobile applications: Classification/Categorization- using folders and screens for classification and categorization of the applications, Frequency of Use- organizing the applications by frequency of use, Position- remembering the location of an application and Visual Clues –

using visual signs in order to allocate applications (Zhang & Liu, 2015). The pilot study presented in this paper, examined PIM strategies of k-12 students for organizing applications as well as strategies of allocating the applications on the personal mobile device.

2. STUDY DESCRIPTION

41 participants aged 8-18 have answered a questionnaire about their PIM practices. The questionnaire included questions regarding the size and scope of the personal mobile space (as depicted by the number of applications downloaded onto the device), the organizational practices of mobile applications, ways of allocating applications and the naming conventions of the mobile folders (for participants who used folders). Results were grouped by 3 age groups: group 1, included 7 participants aged 8-12; group 2, included 22 participants, aged 13-15 and group 3, included 12 participants, aged 16-18.

3. FINDINGS

3.1 Scope of the Personal Information Space

It was found that the average size of the personal information space (as depicted by the number of applications), was 30.6 applications and the average number of screens was 3 screens per device. 39% of the participants chose not to use folders at all for organizing the applications. The remaining 61% used 3.8 folders on average, with the largest number of folders per device being 9. It was found that the younger participants (group 1, ages 8-12), were less likely to create folders with 14.3% (representing only one participant) using one or more folders and 85.7% who did not use any folders at all.

Table 1. Scope of personal application space

Age group	Average number of screens	Average number of applications	Percentage with no folders	Average number of folders
1	3.6	26.3	85.7	1.0
2	2.6	34.8	22.7	3.9
3	3.3	26.2	41.7	3.7
Total	3	30.6	39.0	3.8

3.2 Organization and Allocation Strategies

When asked about the practices of organizing the applications, 48.8% of the participants reported that they tend to arrange the applications on their mobile device every once in a while, on an occasional basis. 26.8% of the participants reported that they organize their mobile space each time and immediately after downloading a new application, and 24.4% of the participants, stated that they do not organize their mobile space at all and leave the applications in their default location and order. When examining the variation between age groups, it was discovered that in the younger group (group 1) no one had reported organizing the applications immediately post download.

Table 2. Frequency of Organization

Age group	Organize Immediately (%)	Never Organize (%)	Organize Occasionally (%)
1	0.0	42.9	57.1
2	27.3	18.2	54.5
3	41.7	25.0	33.3
Total	26.8	24.4	48.8

Three key strategies for organizing the applications were found: Organization by Frequency and Relevance refers to organizing the applications based on the usage, with the most commonly used applications first, for example: "*the first ones are the one I use most: WhatsApp, Instagram, photos, YouTube*

all on the first screen". Organization by Themes refers to categorizing the applications into meaningful groups, for example: "I use folders according to topics such as games, photography etc." Organization by Design, refers to organizing the applications by visual qualities, such as the color of the icon of the application or by its shape, for example: "I organize the screens by color (whites and blacks on one screen, green and blue on a screen and yellow, red and orange on another screen), It helps me feel better oriented on the mobile". Several participants combine strategies. For example, one participant uses both the themes and frequency of use strategies: "I put the applications in folders by subjects, except for the applications that I use most- I leave them out and organize them on the second screen"

Two strategies were found for allocating the applications on the personal mobile device: Swiping refers to moving between screens and Searching refers to using the mobile search option. It was found that 85.4% of the participants use Swiping. Analyzing the allocation strategy by age group revealed that the younger group (group 1) did not use the search option at all, whereas search was used in the two older groups, though it was less popular than swiping.

Table 3. Allocation Strategies

Age group	Swipe	Search
1	100	0
2	77.3	22.7
3	91.7	8.3

3.3 Folder Naming Conventions

Two participants stated that they use the default names when creating folders (when a new folder is created, a default name is assigned automatically by the operating system), others chose to name folders based on topics (such as "Fashion" or "Social") by functionality (such as "Daily" or "Unnecessary"). One participant reported that she renames the folders using visual signs: *"I use Emoji to name the folders. For example, a camera icon (photography), music note icon (music), Earth icon (maps) etc."*

4. DISCUSSION AND CONCLUSIONS

Personal information items are regarded as "Digital Possessions" and have become a part of the individual's identity, holding personal value and becoming an "extension of the self" (Cushing, 2013). Previous studies have found that organizing the personal information space is a key process which allows users to take ownership, as well as to reflect on their personal digital space (Hardof-Jaffe & Nachmias, 2013). The three practices that were found on our study for organizing applications (Occasional, Immediate and Never), may reflect different perceptions and mental models of the mobile as a personal information space. Specifically, the tendency to immediately organize the applications, as soon as they have been downloaded (the Immediate practice), may indicate the existence of a solid and well-structured mental model of the personal mobile information space. On the other hand, choosing to leave the applications in their default location with no organization at all may indicate a lack of classification and a less structured mental model. Further research should investigate a possible correlation between organizing the mobile space and the sense of ownership and control of the non-organizers over their mobile information space, in comparison to users who regularly organize the information items. It may also be worthwhile to compare the efficiency of allocating application between regular organizers and non-organizers.

Creating folders and assigning them with meaningful labels, essentially requires associating the newly acquired information item with existing ones. While performing this activity, users engage in cognitive processes, such as classification, sorting, grouping, naming and filtering and in knowledge construction processes (Hardof-Jaffe et al., 2009). However, this study found that 39% of the participants did not use any, which raises questions about the lever of ownership over their personal mobile space.

The majority (85.4%) of the participants in this study prefer to use swiping over search, as means for allocating applications on their mobile device. Swiping consists of moving back and forth between screens while scanning the application icons, in search of the required application. Further research is needed in order to better understand the allocation strategy. Analyzing aspects such as the number of times that users swipe

back and forth, the time it takes to allocate each application and the visual clues (such as the color of the application), may lead to a deeper understanding of the allocation mechanism as well as ways of better supporting and assisting users with allocating applications in a more efficient way.

The analysis by age groups revealed that none of the participants in the younger age group (group 1, ages 8-12) organizes applications immediately after download, compared to 41.7% of the older group age (group 3, ages 16-18) that organize applications immediately after downloading. On average, it was found that the scope of the mobile information space consists of 30.6 applications, a substantial amount of items to handle, especially at a young age. The difference between age groups may stem from factors such as cognitive discrepancies (implying that the PIM competency is not yet fully developed in the younger age group) or functional aspects (such as the possibility that each group has different needs). Further research is needed on the factors underlying the differences.

Finally, it is worth noting that the mobile device often serves as the first personal digital information space for K-12 students. Hence, engaging in mobile PIM activities may be the first step in the ongoing, life long process of building a PIM literacy, which is one of the essential literacies for learners in the digital age (Mioduser et al., 2008). Although this pilot study is limited in size and scope, it provides an initial understanding of the ways in which K-12 students manage their personal mobile space. We plan to expand this study, in order to gain a deeper perspective on the ways in which users of all ages manage their personal mobile space and on strategies for supporting the process of constructing the PIM literacy.

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