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ICT devices as ubiquitous tools for information seeking activity

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Abstract

This paper investigates the use of current and developing ubiquitous digital devices and the way that they impact on, and are integrated into, use by groups within the community for information seeking. Three cases are presented involving ubiquitous use of the mobile phone, USB memory devices, and a wireless groupware system. The study considers the need for ongoing research to inform, direct and study the innovative use, appropriation and development of such tools. The primary methodological framework that is applied is activity theory, as it allows dasiatoolpsila to be examined in light of purposeful activity in the context of their use.

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Introduction

Information Seeking is traditionally studied as behaviour. Some more recent writing, however, has taken a different view; one that sees that Information Seeking can also be usefully studied as an activity. Treating Information Seeking as an activity, as opposed to a behaviour, allows us to think of Information Seeking in new or different ways, and to draw upon different literature and to develop or borrow other conceptual frameworks, and thus to further explore new ways of understanding Information Seeking.

This paper will investigate Information Seeking as an *activity* with a focus on new tools and technologies that have impacted on the nature of this activity. Three case studies are presented to illustrate contemporary forms of the activity of Information Seeking where digital tools are seen a providing ubiquitous support.

Theoretical Approach

The term *activity* as it is used here, is taken form the Russian concept *deyatelnos*, (Bedny, G., & Meister D., 1997). Here the core of human activity is a dialectic relationship between subject (who does the activity) and object (what is done). In other words it is both objective and subjective and hence open to different interpretations. This synthesis is a reflection of the Hegelian notion:

- **Thesis**
- **Antithesis**
- **Synthesis**

This Hegelian process of invention, modification and modification/replacement (Hegel in Petry, 1970) is captured in the current manifestation of a tool. All human activity is mediated by tools in the sense that the way the activity is conducted depends on the tools available and the activity of use leads to modifications to the tool.

This view of activity acknowledges, but differentiates, between internal and external activities, and includes motives for the activity. Activity Theory (AT) also places a notable emphasis on the social context and the tools used or available within the context, as AT holds that tools shape the way human beings interact within a given context. Furthermore, *tools* also reflect the experiences of people who have tried to solve similar problems at an earlier time and reflect similar events. Tools in this respect then can be seen to be artefacts of design, which is initially invented, and then modified and re-modified, and replaced, to make the activity more efficient (Bedny & Meister 1997).

Bonnie Nardi (1999) used metaphor to study the nature of 'tools' seeing that metaphors can be a useful form of 'shorthand' that hen closely examined provide an insights into our thinking, as she observed that our use of language conditions our thinking.

The metaphor of mobility is used here to encompass the ubiquitous nature of the tools under discussion. The use of the tools is discussed in view of research and includes a personal experience by the author in another cultural setting.

The shape, properties and use of tools, can be usefully viewed, as embodied experience and knowledge about their use, and usefulness.

In taking this view we can see that, tools are always used in activities, and that they are usually transformed through time in the course of their use. It is in this way that Tools can be seen to be an articulated accumulation of social experience and knowledge, and as a cultural source of transmission of this accumulated knowledge. As a result, the nature of the tools will influence and affect not only our external activities, but also our internal activities, and the very thinking of individuals. Vygotsky viewed language and other symbol systems, as psychological tools. In this respect, metaphor can be seen to be a symbolic cognitive tool, or even a symbolic tool system (Meloche 2006).

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Some activities underpin many others and form 'bedrock' that supports their operation. Information seeking is such a fundamental ubiquitous activity and one that underpins most of the more specific or purposeful tasks that we undertake. Thus it is important to examine the tools that are associated with information seeking as they are in flux and there use is frequently opportunistic.

The term 'tools' as used here includes a wide range of devices, procedures, techniques, strategies and approaches. Tools when thought of as approaches, or structured activities, are adaptive, are cognitive, and are almost fluid.

The role of cognitive tools in learning is important and here we include, mastering techniques, or more likely the adaptation of processes via feedback or through the assessment of the results. Tools can also be combinations of devices and the use of these devices. An example of a device that has been transformed will be examined here, the phone, and its transformed version, the mobile phone. Clearly the mobile phones is not a 'new' device, they are an enhancement of the standard phone; this enhancement of *mobility* has also had a significant impact on the nature of a number of aspects of information seeking activity. While the phone always had a limited role in information seeking, the mobility of the device, presented new opportunities and these opportunities in turn presented the possibility of new strategies and approaches to its use.

Three Cases of Information Seeking Activity

Three cases of the activity of Information Seeking are now described to illustrate the emerging ubiquity of digital technologies.

Case 1: Appropriate of a communications tool for Finding Directions

The following is an instance of mobile phone usage in Korea is based upon a personal experience. It happed at a time when the communications device (mobile phone) was just becoming common. Locating a 'street' address in Korea is difficult as the Korean language uses a different character set or alphabet than English. It was only with help from the Hotel staff and other native speakers, that I was able to establish address of a particular restaurant. Furthermore the restaurant was not listed in a phone directory as such; it was merely listed in an advertisement on a brochure. The Hotel staff approached the problem by phoning the restaurant (with a traditional phone) and asking the staff of the restaurant for its location. This information was then written for me in Korean so that it could be shown to a taxi driver. The taxi driver stopped near the

restaurant, but not at the restaurant. In not knowing the address in any form other than the note in Korean, I asked locals by showing them the 'street address' on the note and asking them to assist me in finding the restaurant. Now the organisation of addresses in Korea, like Japan, is not based upon 'street addresses' in the way we normally understand them. They are instead based on 'areas' and these areas are comprised of 'blocks' and these blocks are comprised of 'lots'. Now having the address, being on the right street, and with the help of extremely helpful locals, the restaurant was still not easily found. The locals used a similar approach to that which the Hotel staff had used, they called the restaurant, but as the phones they used, were mobile, and they were able to walk up and down the street to engage in conversions that included describing local buildings and shops and through this discussion with the applied ubiquitous use of the phone, they were able to move closer and closer, to the location of the restaurant. This use of the mobile phone for interactive ubiquitous collaboration occurred in 1998 when mobile phone use was still largely new.

The ubiquitous method that was used to find the restaurant is now very common and people will also use this discussion and landmark identifier approach to locate each other while both parties are moving around an unfamiliar or even familiar area. This use of the phone as a ubiquitous location device is now well established. The mobile phone is now often a ubiquitous safety device, as well, and is perhaps one of the more adaptive tools of this time. It is however the community or the communication strategies that gives it this ubiquitous potential.

Case 2: Tools to provided Mobility of Information

Mobility is a product of many digital devices. The camera, mobile phones, PDA, MP3s, and laptop computers all which feature new levels of mobility for what remain fairly conventional activities. One device that has become the most mainstream ubiquitous device, with little fanfare, is the Memory Stick, Flash Card or USB Thumb drives. This device unlike almost all earlier devices has no singular function, like taking pictures or computation. It merely interacts with most other devices to store digital files whatever they may be. It has no permanent attachment. Mobility and ubiquitousness is the sole advantage that USB drive has. It has no functions in of itself and does not even work without connection to a computer or other device. Yet this simple device has replaced or made redundant many other portable or mobile devices because it takes away the advantage or purpose associated with other less ubiquitous devices.

This brings to us to the importance of the technology that falls under the umbrella of 'digital' and what it means in terms of information seeking, communication, and ubiquitous work practices. The purpose of offices and even office buildings have long included the provision of tools, processes and access to groups of people, where the core group of people is typically referred to as a company. As the increased provision of ubiquitous digital services are more readily available, the location of tools, and individuals is becoming increasing flexible. It is not uncommon to watch meetings where one or more of the participants are present via a digital representation on LCD screens with associated sound transmission. These devices provide for clear and immediate communication that previously, would have previously required individuals to be physically present. It is also easy increasingly easy to record and transmit and store all such interactions. The most difficult aspect has become the design and communication of the strategy or the procedure rather than its implementation. This situation is causing a rethink of almost all our processes and the relationships that are associated with them as ubiquitous technologies have exposed the limitations of design from single propose tools.

The advantages are clear. The form of the activity is not restricted by the structure of the tool. We are free to design and act almost, as we wish. One complication that arises is that consistency of practice is no longer forced upon us; consistency has become a design condition.

Case 3: Collection information on social interaction.

It is useful to act in familiar ways and to use ubiquitous devices at least initially in ways that mimic familiar physical forms of devices that are and thus do not require additional training or instruction to use. The 'mobile phone' is one example while it has move on several generations from its fixed ancestor it is still referred to as a phone, although 'texting' is probably more common than speaking. Another example of this is the Zing technology a group learning tool that uses wireless keyboards, a laptop and a data projector.

Zing is therefore is a facilitated decision-support system, applicable to small group problem solving or organisation-wide knowledge creation through democratic learning processes that can lead to cultural change and accelerated innovation. In addition Zing is used in classrooms to promote teaching and learning in teams which can be facilitated by the students themselves. "The software includes thinking methods and scaffolds for problem solving, planning, creative writing, feedback, hypothesis formation, playwriting,

criticism, logical reasoning, ethics and team and self evaluation" (Zing 2005). Zing is portable and can also be used remotely over the Web.

The effect in using Zing is similar to using a group facilitator and a common whiteboard. The methods used for brainstorming, and group decision making, is an example of how traditional tools, such as whiteboards can function to facilitate discussion and have all the advantages of a digital medium. The keyboards work in conjunction with wireless receivers that plug into the USB port on a laptop computer. A data projector also plugged into the computer and projects the data to the 'Whiteboard' where the typed discussion is displayed. This technology is typically used with a facilitator who leads the discussion.

The participants interact with the keyboards, other participants and the material displayed on the whiteboard. Due to ubiquitous nature of the technology the complexity of the technology is not experienced by the participants who need only to talk, type, and read. The facilitator is assisted as the content of the session is available in a digital file and little transcription is required.

Ubiquitous tools such as case with Zing are being appropriated from their original use and being adopted for new activities as people see their potential. The use of Zing technology to facilitate data collection is one example. (Meloche, Hasan & Mok 2006) This use of Zing is particularly effective in the Concourse stage of Q Methodological research where the participants can freely engage in conversations and the material is freely 'typed' and projected for all to see. The process engages the participants and promotes discussion. The research is also provided with a digital copy of the discussion and no additional or obvious effort is required of the participants. With the rigors of group brainstorming in the background, the quality of the information provided and the willingness to participate is greatly enhanced. These digital tools are less complex, more mobile and with results that can be stored, transmitted and easily.

Discussion

Innovative ICT-based tools such as Zing and its related processes can be applied together with human interventions and actions to carry out innovative KM applications which together can create an environment comprised of ambient intelligence. Such ambient Information Systems typically include a variety of people and technologies and routinely adopt different social roles within an organisation.

These roles now have a major influence on a system's acceptability (Masterton & Watt 2000).

People will develop and use the technical components of information systems in a purposeful way, but design is increasing based on the social nature of the system, as the tools themselves are increasingly ubiquitous now, this social underpinning of design impacts on most of the day-to-day operations, and may appear to develop in an ad hoc fashion (Benson & Standing 2001). In particular, systems which connect people to people directly or indirectly are best understood as the interrelationship of organisational, cultural and technical elements (Boland & Tenkasi 1995). The nature of the tool will have less impact on the nature of the activity. Information seeking with the use of mobility provided by ubiquitous mobile devices, global networks, and other forms of connectivity will impact positively on our relations.

It is the applied use of methodologies that will allow us to address the elemental relationships between, people, tools, contexts and purposes need to be adopted. Activity Theory is particularly effective in this regard. It not only includes that elements mentioned above it also gives us the associated benefits that arise from studying activity rather than behaviour. Other effective methodologies include both Metaphor Theory and Q Methodology as they allow us to elicit and probe peoples' thoughts in a substantive way. (Meloche 2006)

To the extent that it is possible, the current tools and technologies available should be used to inform or inspire the development of subsequent tools and techniques. The mobile phone and Zin cases described in this paper are particular instances of a phenomenon where digital devices appropriated by people for unintended uses. Users will thus play a leading role in the new direction that these tools take and innovatively inform their design. This phenomenon will be a fascinating topic of research as the tools become increasingly ubiquitous and an integral part of our lives.

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