An Evaluation of the Use of PDAs for Reading Course Materials

Jenny Waycott
Institute of Educational Technology
The Open University
J.L.Waycott@open.ac.uk

Abstract
This paper reports a study that evaluated the use of PDAs as tools for reading course materials on a distance education course. The findings are discussed with reference to activity theory to explain how new tools are integrated into existing activities.

1. Introduction

We are said to be moving away from a world in which the computer is a static office machine to a world consisting of 'personal', 'invisible' and 'pervasive' technologies [1]. Evidence of this approaching new world can be found in the plethora of handheld computers currently on the market, including personal digital assistants (PDAs). These are lightweight, palmtop devices that can be used for various functions, including to read and interact with electronic text - which is one way in which their potential as learning tools could be realised [2]. This research examines the impact that PDAs have upon the activity of reading course materials in a distance education context, using activity theory as a framework for understanding how tools mediate activity. One of the central tenets of activity theory is the notion that all human activity is mediated by the use of tools, both conceptual tools, such as language and physical tools, such as technology. These tools are one aspect of the socio-cultural context in which activity takes place. Engestrom [3] has extended this notion of tool mediation to provide a representation of the wider social context of activity. According to his model, activity takes place within a community of people who share the same object, or goal, of activity. The community is governed by a set of rules or regulations, and there is a division of labour among members of the community, which impact upon the activity.

Activity theory also provides tools for understanding the impact of new technologies at the operational level of activity. Leont'ev [4] divided activity into hierarchical layers, consisting of actions and operations. Operations are routinized processes that are carried out to perform the action, while actions are conscious processes with specific goals that help to meet the overall objective of the activity. The introduction of a new mediating tool - such as a new technology – would change the conditions of the activity, leading to a reorganization of actions and operations. Processes that were formerly operations, when a more familiar tool was used, would become individual actions and over time, as familiarity with the new tool increases, these actions may become operationalized [5]. The research described in this paper aims to examine the impact of PDAs on reading activity at both the operation/action level, and in terms of the wider social context of the activity.

2. The research

Masters students on an Open University course were supplied with Palm m105 PDAs, which were used to access and read course materials. Students' perceptions of this experience were evaluated using questionnaires and interviews. Participation in the evaluation of PDAs was voluntary; students also had access to the printed version of the course materials. More information about this study can be found in [6] and [7].

Using activity theory to make sense of the qualitative data from this study, it became clear that there is a two-way process by which a new tool is integrated into an activity. The existing activity system - that is, the socio-cultural context in which activity takes place - influences how the new tool is adopted and used. Meanwhile, the new tool - the PDA - changes the activity it is used to support. The following sections summarise these findings.

3. Factors contributing to use of the PDA

Students varied greatly in the extent to which they integrated the PDA into the reading activity. They had different preferences for features of the device (e.g.,
screen size, display colour, portability), and these were weighed against the actual device characteristics to determine whether it would be worthwhile to use the PDA for reading. Past experience was also an important contributing factor, particularly in relation to data input methods. Those who were touch-typists compared handwriting on the PDA unfavourably with typing on a full-size keyboard, whereas those who did not consider themselves touch-typists were less concerned about this. It was also important for the new tool to be easily integrated with existing tools. The PDA did not replace the tools students already used. Instead, it was used in conjunction with existing tools, and - for those who used the PDA extensively - it modified the way those tools were used. Unsurprisingly, it was also important for students to have time available to learn to use the PDA. Students received their PDA during the final block of the course when they were also busy completing course assignments, and therefore many students found it difficult to prioritise time to learn to use the new tool.

4. How the PDA changed the reading activity

The portability of the PDA opened up new possibilities that changed the reading activity. In particular, it made it easier for students to fit their reading around other activities, such as work and family commitments. The PDA was an "unobtrusive and neat device that could always be to hand" and could be used to read course materials while students were engaged in other activities. However, the small screen size of the PDA made it difficult for students to skim-read the text and meant they had to adopt a more concentrated, line-by-line reading strategy. It was also difficult to pick up on visual clues, such as headings, and some familiar contextual clues, such as page numbers, were not available on the PDA. Therefore, students had to learn to use new contextual clues to aid the process of navigation, and this caused some disruption to the reading activity. Students also experienced difficulties when taking notes about the course materials on the PDA. The PDA introduced new methods for note-taking and as these were not yet operationalized, they were difficult and time-consuming to use. Nevertheless, some students persevered with note-taking on the PDA and found it useful for this purpose. For example, notes recorded on the PDA could be synchronised with the desktop computer and modified or incorporated into more extensive documents.

5. Summary

These findings suggest that the integration of a new tool into existing activities is a two-way process. The new tool (the PDA) introduces new possibilities and constraints to the activity. These change the conditions of the activity, introducing new ways of doing things and modifying the relationship between actions and operations. Typically, former operations become actions as the user adjusts to the new tool.

There are also socio-cultural factors that affect the success with which the new tool is integrated into an activity. These include the user's personal preferences for device characteristics, past experience and the time available to learn to use the new tool. The relationship between the new tool and existing tools is also important, particularly in the case of PDAs, which are seen as extensions - rather than replacements - of existing tools. If the PDA complements rather than conflicts with existing tools, it is more likely to be successfully adopted.

References


Acknowledgements

This study was conducted in collaboration with Agnes Kukulska-Hulme, chair of the masters course team.