

Supporting Continuous Learning

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ABSTRACT

This paper deals with problems of learning in the working environment and introduces ideas of supporting the learning on demand process. With the system LEAR (Learner's Living Repository), we propose a solution that supports users in exploiting and exchanging learning and consultation episodes: Users can describe problems or solutions when accomplishing tasks by memos or by registered screen actions, comment on them, and store them in a personal „demotheque“. Users can send memos and registered screen actions that describe questions or problems as a request for off-line help to a consultant. Memos and registered screen actions that describe representative solutions can be made available to a group of users in a „purse for demos“.

Keywords

Learning and re-learning support, exploiting and exchanging learning and consultation episodes

1. INTRODUCTION

Today's working life and its widespread use of technology require more than ever to acquire permanently new domain and tool knowledge. As the user's task competence can dynamically be increased by a flexible work organisation and task support, the user's tool competence should dynamically be increased by systems suitable for learning, exploration facilities tolerant for correction, and support environments reinforcing recapitulation and re-evaluation of problems and solutions. We focus our view on the latter: to increase the tool competence of the user by strengthen the learning process and the reuse of already acquired knowledge in further working situations. Learning is ubiquitous, it has to be supported in every working situation, not only in particular learning phases or environments. Learning is a combination of exploration and instruction: people learn by trying things out and by asking other people for advice. Learning is an iterative phenomenon, it evolves step by step using early knowledge for later understanding.

2. THE SITUATION

Users' motivation to learn. We assume the learning process as being integrated into the task accomplishment [8, pp. 295f.; 14, p. 168]. A substantial part of learning does not happen during the training but during task performance. Users explore the system in use and try out functions to reach their goals. A „guided exploration“ facility was proposed to support this kind of learning [6; 7]. Guided exploration owes its origins in the concept of „discovery learning“ out of the late '60s and early '70s [16, p. 41]. Accomplishing tasks users often do not consider problem solving as a learning event. As Carroll and Rosson cite: „adults resist explicitly addressing themselves to new learning“ [6, p. 101]; see also [11, p. 73; 10, p. 77]. In particular, if the critical situation is supposed to occur only once the user is not motivated to *learn* a solution. It is sufficient if he or she is enabled to create the solution, for instance by the help of step by step instructions not meant to induce a knowledge acquisition with the user. Williams and Farkas give an example where a user who has exceptionally to produce a footnote instead of known endnotes for a particular journal will not accept the „compel (...) to 'learn' or 'remember' the procedures that he or she explicitly needs now in order to create the footnotes“ [16, p. 44]. Only for recurrent problems and tasks new knowledge will be acquired.

Support from on-line help. When problems arise addressing the on-line-help is often insufficient for the user. The support users get from on-line help systems is restricted to the information that experts have brought into the system. Help from the system is restricted to information about system functionality and to well-known notorious problem situations [9, pp. 186f.]. We only know one example that provides growing support based on questions of users and answers of consultants: „Answer Garden“, see [1]¹. On-line help support

¹ „TeamInfo“ was developed as a shared repository for informal group-relevant information by [3]. For producers of software, a „Living design Memory“ was proposed by [15].

should be extendible to the user's individual results of exploration-based learning and to learning with consultants so as to integrate the learning results into technical support facilities (individualised help system). This individual help environment can be perceived as a user's own created guiding solution in contrast to the „guided exploration“ manuals proposed by [7].

Consulting local or central experts. The learning process may occur individually where the user helps him- or herself by exploration (trying things out) but often the user asks for help consulting a competent colleague („power-user“) in face-to-face interaction or consulting an expert by telephone or remote diagnose. Empirical studies show that users have problems with consultants and consultants have problems with users [5; 12; 13]: Consultants are overloaded; their increasing number is over-compensated by a yet increasing number of clients; members of the user service units show limited availability; they are often not interested in the needs of users; they „forget“ promises of problem solving that can't be executed immediately. Consultants have to solve (in their eyes) trivial problems and are therefore not motivated. User support is often organised on several levels [4] where the communication requires an exchange of problem and solution representations and where verbal or written descriptions are expensive and misunderstandable.

3. PROPOSED SOLUTION: SUPPORTING LEARNING AS AN ITERATIVE PROCESS

Learning does not occur as a single step. Learning is composed of detecting new knowledge, forgetting details and applying acquired knowledge. The learner proceeds in his or her competence by several trials of acquisition and application of qualifications. The first trial to acquire knowledge may be (a) exploratory, (b) supported by technical or human consultants, (c) error prone, (d) with indirect solutions, and (e) with dead ends. The first step of learning provides the user with rudimentary knowledge about errors, risks, and solutions. Making only one experience is not sufficient for full understanding and it is not robust to forgetting. It has to be reinforced and extended by re-use in later similar situations. In other words, the learning process is iterative.

With LEAR (Learner's Living Repository), we introduce a conceptual framework that places special emphasis on integrating working and learning and on supporting self-directed and group learning. Prototypes of a support environment for learning and consultation in and after face-to-face or remote

interactions will be developed and evaluated in a realistic work setting. The components of LEAR can be described as follows:

Individual Memo: There are situations the user learns a particular feature of an application that only implies „declarative knowledge“ [2]. A simple description of handling details, parameter settings or other *static* features is helpful if this description is at hand on demand. For this purpose we propose an explanation facility that we call an „individual memo“ where the user enters his or her text or voice comments, sticks it to the relevant interface element, and consults it on demand.

Multimedia Demonstrations with Annotation Facilities: Scenic films can support the (re-)understanding of „procedural knowledge“ [2]. To exploit *dynamic* features of tasks or system interaction, we propose a recording facility to produce a film of the interaction sequence. Such a film as a living interaction record is easier to grasp than a textual description. The demonstration supports the understanding in showing the process of actions and its effects. The film can be annotated to comment the rationale, the reasons for a solution, warnings to misleading assumptions, hints to unexpected side effects, etc., to support the transfer of the former solution to the current problem. Annotation facilities can support the user with respect to these goals.

Social learning: Learning in the working environment takes place in a social context. People have similar tasks using similar applications. They consult and support each other and exchange experiences and solutions. Technical support should enable the users to send and receive typical solutions (demo clips) found by an individual provided to the group.

Users can identify portions of an animated interaction sequence describing problems they encountered or solutions they found when using the tool, comment on them, and store them as episodes in a database called „demotheque“. Users can send episodes that describe questions, problems with the tool, or breakdowns when using the tool as a request for off-line help to a consultant. Episodes that describe learned tool knowledge can be stored in the „demotheque“ for later use. Episodes that describe users' personal experiences of solutions can be made available to a group of users in a „purse for demos“. The elements of the proposal comprise the following features:

- **Individual memo:**
The user can stick an electronic description to

system elements in order to explain system features for individual needs.

- **Recording interactions:**
The user can replay and explore the own interaction history (e.g. an error situation).
- **Defining relevant demos:**
The user can select a relevant episode and keep it for similar future situations in a personal „demotheque“.
- **Annotating demos:**
The user can add comments and warnings referring to what he or she has done. Different modes of annotations should help to avoid information overload of a single sense organ.
- **Retrieving demos:**
The user can select different access methods to retrieve the relevant episode from the demotheque.
- **Selecting Views:**
The user can select different kinds of views to exploit a relevant episode from the „demotheque“ for supporting the re-learning of a solution and for supporting the transfer of the solution to the current task.
- **Exchanging questions and answers:**
A remote consultation can be supported to enable the user and the consultant to exchange questions and answers independent of their time and space constraints.
- **Exchanging solutions:**
The users of a co-operative work environment can exchange task and tool competence by providing and requesting solutions typical of the workspace („purse for demos“).

4. CONCLUSION

The problem of exploiting own and peer experience is of great practical relevance. People learn continuously but they have difficulties in finding and using prior established competence. Lear is a self-learning support system to bring the user in touch with his or her learning history and to open the access to the competence of peers. The learners might exchange their problems and solutions by this mean. The learners can exchange their problems and solutions through a network so that co-operative work is supported more effectively than by a mail system. The idea of Lear is designed for the working environment but it might also stimulate in distant learning.

Lear is limited in the form of the acquired knowledge: using memos or registered screen actions and exchanging them within a group of domain workers for the moment. The initiative remains fully in the head/hand of the user. Multi media techniques are only used scarcely not to distract the user from his or her main task.

First results of the implementation of the proposed facilities will be prepared for the conference. Evaluations have to show if and to which extent the proposed functionality of Lear will be accepted and used in a real working environment. Variables like time pressure, frequency of similar tasks, but also personality traits may influence the resonance of the facilities.

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