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Support Competence and the motivation of adopters to become self-regulated ICT-learners

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Abstract:

Much informal learning in everyday working life concerns the use of Information and Communication Technology (ICT) tools. IT-supporters have, as part of their way of working, an important pedagogical role in motivating users of ICT to adapt to ever changing versions and configurations of the technology – important because motivation is critical to the diffusion of technical innovation and important because according to diffusion research, only a small minority of the adopters is self-motivated, the vast majority of ICT adopters depends on IT-supporters to become capable and sufficiently motivated to adopt. This paper deepens the understanding of what constitutes the competence to support the development of self-motivated use of ICT. A theoretical framework for understanding self-motivation is presented followed by empirical studies of ICT-support. The empirical studies bring forward important areas in relation to the creation of self-motivation of ICT-users: One is the feedback given by the ICT-supporter in the concrete learning situation which leads to, or blocks for, self-motivation. The other is the importance of the ICT-supporters' integration in the organizational context. Conclusions and perspectives for further research on ICT-support emphasize the managerial aspect: not only users, but also ICT-supporters must have work conditions that support self-motivation

1. Introduction

ICT-support plays an important role in what has become a considerable part of the informal learning that goes on in every day working life. Here we address the need for managers, ICT-supporters and pedagogues concerned with work place learning to develop ICT-learning strategies that include and draw on the talent invested in ICT-support. Informal ICT learning is an ongoing process, more related to maintenance activities than to the often very 'quick and dirty' implementation of new or renewed ICT. Newcomers at workplaces and new situations of use do, as part of the ongoing routine, dissolve any clear-cut separation between 'implementation' and 'continuing use'. The pedagogical effort –if any - tend, however, to be devoted to a confined period of implementation, rather than to be seen as a crucial part of the ongoing every day work. A reason for this potential ignorance could be lack of knowledge about how ICT-users – technology adopters as they are – become self-motivated, and also lack of knowledge of the role of ICT supporters in this respect. This paper deals with both issues.

In reviewing research on tailorability and implementation, we have found inspiration in a suggestion to see the dialogue between coach and learner about an implementation problem as the key to sustainable implementation (Åsand, Mørch & Ludvigsen, 2004). Applying a socio-cultural perspective these researchers argue that the dialogue creates a 'zone of proximal development', a term originally defined by (Vygotsky, 1934/1978), for those part taking in the dialogue, and in a wider perspective a corresponding zone of proximal development for the organization at large. In this paper we pick up on this notion of dialogue between coach and learner, and interpret what these facilitators do in the 'dialogue situation', that can be taken to have a motivating effect. We start by

describing our theoretical understanding of self-motivation in section 2. In section 3 and 4 we present empirical studies of IT-support. Our empirical studies have brought our attention to two important areas in relation to the creation of self-motivation of IT-users: One is the feedback given by the IT-supporter in the concrete learning situation which leads to, or blocks for, self-motivation. We deal with this matter in section 3. The other is the importance of the supporters' integration in the organizational context, which we deal with in section 4. Section 5 concludes and raises problems and perspectives for further research concerning managerial aspect of supporting informal ICT-learning by ICT-support.

The underlying assumption here is that implementation of technology does not automatically imply adoption. Diffusion is a learning process as much as it is a process of technology management, and motivation plays a crucial role for both speed and extension of adoption. According to Rogers' (Rogers, 1995) most cited classification, a population of technology adopters forms almost a bell curve with respect to motivation to adopt: 2.5 percent innovators, 13.5 percent early adopters, 34 percent early majority, 34 percent late majority, and 16 percent laggards. If we leave out the innovators and the laggards around 4/5 of a potential population of adopters will be depending on external means of motivation in order to become self-regulated. - And as the grand old lady of socio-technical implementation strategy, Enid Mumford, remarks in her recent book - 'innovation problems are becoming more rather than less frequent as technical change progresses at an ever faster rate' (Mumford, 2003, p. 115). Supporting this viewpoint recent research in implementation has questioned the implicit assumption in Rogers' work that 'all use is equal'. At least when it comes to ICT-infrastructure in organizational contexts, groupware for collaboration, for e-learning, mixed mode learning – all those applications of computers involving a web of practices, people and obligations, it is obvious that use is not – just – use (Bøving & Bødker, 2003; Lyytinen & Damsgaard, 2001).

Mumford puts great emphasis on the facilitator of implementation, suggesting a designated role for someone to keep members interested and motivated towards the design task (Mumford, 2003,. p.40-41). Looking more narrowly at the literature on learning in organizations or at work we also find descriptions of the value of facilitators with a foot in the local setting. For instance Billet mentions 'mentors' (Billet, 2003), Wenger 'brokers' (Wenger, 1998), Nonaka & Tekeuchi 'knowledge engineers' (Nonaka & Takeuchi, 1995), and together with Von Krogh & Ichijo 'knowledge activists' (Von Krogh et al., 2000). Specifically targeting the introduction of new technology Nardi (1993) has termed a person who 'has a green thumb' in integrating new technology in an organization a 'gardener' pointing to the 'gardener's' ability to make technology and users grow. Similarly Åsand, Mørch, & Ludvigsen (2004) op.cit., gives an overview of how the term 'super user' has come out of studies in USA in the early 90ies and become part of the solution in discussions of tailoring and customization in the fields of Human Computer Interaction and Computer Supported Cooperative Work. With regard to groupware, the acceptance from a critical mass of users is crucial to efficiency (Grudin, 1988) and it has been argued that the human (f)actor or "human mediation" is important when introducing new CSCW applications (Okamura et al. 1994). Nardi also described

her gardener as a central human (f)actor in organizational work with ICT. Thinking more broadly the whole Scandinavian tradition of systems design is based on a human (f)actor, supporting users, however, primarily in the design of new information systems (see for instance Kraft & Bansler, 1994).

Our interest in support work as a way of creating self-motivated adopters has grown from empirical findings in field studies. A study of maintenance work identified the positive effect of IT-supporters' ability to support users self-motivation (Christiansen, 1997). Similarly a study of implementation with focus on the role of IT-supporters found a surprisingly strong focus on the positive outcome with respect to engagement that could be attributed to *the way* the IT-supporter was supporting (Kanstrup, 2004). These findings have led us to search the theoretical literature of social psychology to arrive at a deeper understanding of the mechanisms behind self-motivation (section 2). The insight we have gained we have applied in a re-interpretation of our data, zooming in on our two questions: how may supporters help ICT-users become self motivated, and how do ICT supporters become successful in doing so (section 3 and 4). The data has in both cases been collected through observation and interviewing, using video-recording for data collection and a grounded approach to interpretation of findings of recurrent patterns of behavior. The presented examples in this paper are selected to illustrate our interpretations with respect to these questions. But before we present these examples, we will briefly recall the sources for our understanding of self-motivated use of technology, the goal to be achieved should a technology fulfill its purpose.

2. Self-motivation in informal learning

Our point of departure for understanding self-motivation in relation to informal learning is the fact that people do spontaneously create 'workarounds', a term for how actors adjust a technology to meet their need or goals (Gasser, 1986). In the CSCW literature, however, 'workarounds' is mostly used as an indication of 'bad' design, and users' efforts to find their own ways tend to be ignored, at least in the research literature, as exemplified at length by Spinuzzi in his account for a 'user-as-victim-to-be-rescued-by-the-designer'- stereotype (Spinuzzi, 2003). Empirical studies as well as though everyday life shows, however, that people are very much capable of creating a working environment for whatever task they really want to accomplish. Or in the words of the designer Victor Papanek: '*All men are designers. All what we do, almost all the time, is design, for design is basic to all human activity. ...Design is the conscious and intuitive effort to impose meaningful order.*' (Papanek, 1984, p. 3-4). In the contexts of computers at the workplace, however, a great divide is often created between what some people want as a benefit and what other people experience as just another load of hard work, and many people do not feel themselves as the designers. This situation is causing a lot of learned helplessness and de-motivation, hence the call for more participative approaches (Bøving & Bødker, 2003), and the focus on how to avoid the 'learned helplessness' described by Norman as a consequence of bad interfaces and bad management of implementation (Norman, 1988). In looking for ways of restoring the motivation to exercise the human 'gene' for design, for creating meaningful workarounds, it seems necessary to also be aware of the need to restore self confidence and help technology

users to de-learn learned helplessness imposed on them by bad technology management and also to some extend by bad designs.

Accordingly, we have been looking into theories of self-determination and motivation theory within social psychology. Through this reading we have found the "informational feedback". In a chapter devoted to work situations Deci & Ryan (1985) point out three principles as constituting positive intervention: minimal sufficient control, informational feed back and acknowledging conflicting feelings, which they taken together call 'informational feed back'. They derive the concept from their research on self-determined and non-self-determined behavior, which emphasizes the issue of feedback (Deci & Ryan, 1985). In broad terms Deci & Ryan assume that motivation in the outset is non-self-determined and depending on information input from the environment. For example: Being introduced to a new ICT artifact by my employer by being told that from tomorrow I have to use it to accomplish my work, and being in a position of learned helplessness, I may start using it because I have to in order not to be sacked. But I do so in a trial and error fashion, without understanding the outcome of my effort. If on the other hand I am a self-motivated technology user I start to use the tool, patiently setting aside time for reading the manual and trying it out, because I am confident that at the end of the day I am going to benefit from using it, once I have learned how it works, and once I have created my own workarounds. Deci & Ryan present a model comprising five states of development in styles of regulation: non-regulation' -'external regulation'- 'introjected regulation' – 'regulation through identifications' – 'integrated regulations'. Seen from the point of view of support the most interesting state is 'external regulation'. Deci & Ryan describe this stage as a situation going from experiencing initiating events as pressure to perform accordingly and not experiencing a real sense of choice, to gradually getting more to grips with the control oneself. What they find pushes an individual in this direction is positive feed back, which they describe as 'informational'. An informational event is characterized by: *"a choice, in other words, the absence of unnecessary controls, so that one can experience a sense of self-determination. Second, there must be some type of effectance-relevant information via-a-vis one's performance on an optimally challenging activity. And finally, if the event somehow conflicts with a person's needs or feelings, this implicit conflict must be acknowledged"* (Deci & Ryan, 2000, p. 98). Furthermore Deci & Ryan stress relatedness to be an important part of informational feedback: *"The informational aspect of positive feedback affirms people's self-determined competence. The controlling aspect of positive feedback controls people's behavior by capitalizing on their need to be liked. When people want praise, praise can be used to pressure them toward specific outcome"* (ibid., p. 99).

Following Rogers (1995), who maintains that late adopters learn from experience and demonstration of early adopters, a logical way of organizing the development of self-motivation among adopters would be to support early majority by supporters and let late majority have access to early majority's way of working. This would be an application of already mentioned learning principle suggested by Vygotsky (1978) as 'the zone of proximal development'. Vygotsky maintains that people learn within a zone of proximal development, where more capable peers are a key factor for the learning to result in development, a higher level of accomplishment that is. We find that a supporter can be

seen as 'a more capable peer' in a joint endeavor to develop a current practice, along the lines suggested by Nardi (1993) with the term 'gardener' for people who as she expresses it 'has a green thumb' in integrating new technology in an organization. In the following empirical examples we will show examples of how this can take place and sum up on how informational feedback can look like in practice.

3. How ICT-supporters support informal learning by giving informational feed back – case studies

The first examples are from a nursing aid school in the North Denmark. Here a group of teachers received funding from the Digital North Denmark[1] to experiment with ICT in their teaching in the years 2002-03. The aim of the project was to integrate ICT in the learning processes in order to improve the learning for the students and to give the students ICT-skills[2]. All students on the teachers' team (50) and all teachers (3) received a laptop and a palm pilot, and wireless network was installed in all teaching and working rooms at the school. The laptops were installed with Windows2000, an e-mail program, a calendar and an application for synchronization from Lotus Notes connecting the laptop to the palm. Lotus Quick Place was installed and was to be used as the shared virtual platform and infrastructure for the 50 students and their teachers. One of the teachers was functioning as a "pedagogical ICT-supporter". He knew and played a significant role in the learning of ICT for the learners/forced users (his colleagues and the students) and acted as a mediator between the technical it-department at the school and his fellow teachers and the students. It is observations of his work we here describe and analyze as examples of "informational feed back".

3.1. Making the work with ICT visible and collective

Although the pedagogical ICT-supporter, Kurt, knows about the software and hardware that the teachers and students are starting to use, he does not act out as an expert who solves the problems while students and colleagues watch or wait. On the contrary Kurt works by demonstration: he shows how he himself tries to come to understanding, and how he tries to solve problems, and he makes the work with the technology a joint effort: Kurt is sitting among a group of students. One of the students in the group has problems

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[1] http://www.detdigitalenordjylland.dk/en/welcome.htm: In 1999 the Danish Government designated the North Denmark to become a national IT lighthouse, which was part of the Danish Governments IT-strategy. In the years 2000-2003 the Ministry of Information Technology and Research invested DKK 170 mill. in the project. Adding to this came a regional co-financing from public and private enterprises of DKK 340 mill. The Project was named "The Digital North Denmark" and the overall goal was to explore the potentials of the network society for all citizens of North Denmark. 91 projects received funding during several project application rounds.

[2] A survey in nursing aid schools in Denmark has shown that over 50% of the students starting at the education have none ICT-qualifications and only a few have access to computers or Internet in their private homes. Adding to this the hospital service is in these years focusing intensively on implementation and use of ICT in many areas including nursing aid.

synchronizing data and Kurt tries to solve the problem, but not alone. He thinks aloud telling what he does, and he never talks about what "he" does but what "we" do. Sentences like

> "Now I open the synchronizer, good, and now I start it and now we take a look to see if it will synchronize and we see that it won't!"

> "I look at the locality Svenstrup, let us try to do that. If you run through this list together with me, can we do that?"

And Kurt does not provide the answers. He shows an experimenting attitude, uttering sentences like "that was strange", "now it says that it will call the server, that I cannot understand" or "let us try to see what the domino server says".

By making his work with the technology visible and collective Kurt spread this attitude to the students. While Kurt works on solving one of the students' problems with synchronizing, one of the other students in the group is working on moving data from one room in Quick Place to another. Her acting is quite similar to Kurt's. She talks aloud about what she is doing, and she talks about it as an experiment (an "idea"). Kurt does not interfere in her work, but encourage her to experiment by saying that she can "try it":

> Student 1: Now I know what I will do, no, I can make a new room from the old one and then move the data from there

> Kurt (to student 1): OK

> Student 1 (to Kurt): Then I won't have to put it all in our sidebar, then it will be moved directly to the new room if I make a new room from that one, right

> Student 2 (to student 1): Like we did in the beginning, right

> Kurt (to student 1): Are you moving it all

> Student 1 (to Kurt): I just got the idea

> Kurt (to student 1): You can TRY it

> Student 1 (to Kurt): Try! Of course it will work. How was it? Do I have to check it out before I can mess around with it?

> Kurt (to student 1): Yes

3.2. Opening discussions about the values of ICT

In the above section support work is not just about helping users with concrete problems in concrete software applications. Support is also diffusing an attitude towards technology, in the above by making an experiencing and experimenting attitude visible

and collective. Attitudes towards technology do, however, not just come along by walking around and being a good example in one's interaction with technology. Attitudes towards technology also mean meeting and opening discussions about the values of the technology in relation to the users' practice. Cooperation around the project is crucial. Discussions about the value of the technology are not buried in silence or force. On the contrary the supporter opens the discussions and supports them, showing that the integration and use of ICT is a joint project.

The following example is from an episode where students raised a discussion about the technology. The supporter, Kurt, is sitting with a group of students together with a trainee from the schools IT-department. They are going through the students' laptops trying to figure out why several of them have problems synchronizing. A student says:

> Student 1 (to Kurt): I must admit that I still cannot see the advantage of having these computers.
>
> Student 2 (to student 1 and Kurt): But it is a good thing to have, and now I hope that you have learned a lot, which the next class of students can benefit from
>
> Kurt (to student 1): I would like to know…
>
> Student 3 (to Kurt): I would like it to be better
>
> Kurt (to student 3): Try to say more about that
>
> Student 3 (to Kurt): I think it would have been better if the computers had been given to the assistants because the knowledge we can get from the computer it… but I am glad that we have gotten the computers to write on.

"Try to say something about that" Kurt replies on a student's critique. Kurt opens the discussion instead of making it silent, and he makes it a discussion not only between him and the student but also between all the students present.

The next examples are from a case study of two system administrators working collaboratively to support the ICT infrastructure of a small research and development company employing around 60 academics in Silicon Valley. The study was conducted 1995-96, before the burst of the dot-com bubble. The two people in the study maintained the ICT infrastructure, produced videos and taught the staff enough of critical computer skills to keep up with the demands on consultants selling knowledge work in the heart of Silicon Valley. Both had an academic degree and several years of experience from other companies plus 3-4 years of experience in this company. Both also had a personal professional network outside the organization, the systems administrator with technical support people and people in the software industry, and the video-maker with other video-makers, mostly freelancers. They maintained a quite high technical standard on a low budget. People at all levels in the organization frequently expressed gratitude for what they did.

3.3. Being a role model

Even the most responsive administrator can not all by herself make sure that the users in the organization who are in need of technical support, get what they need to produce the best possible products. Time would not allow her to support each and every user when needed. What can be done, and what the support people in this study did, is to always be attractive role models in their behavior, and thereby put up an umbrella of inspiration under which the users can experiment safely, and safeguard the experiments by being immediately accessible as fire fighters if something gets out of hand.

In an interview with both systems administrators they expressed the following viewpoints: "You try to make them feel good about whatever it is they try to learn. And give them the pros of a piece of software as opposed to the negatives, so you just try to make them feel good about what they are doing, and then hopefully it works out and then they go out and they learn and they come back and they can teach us actually! It happens. They actually learn something and they can say to you: You can do this, and then we go: oh I didn't know that, and so ... For instance a colleague taught herself Illustrator and you know now, when people want to learn Illustrator we just refer them to her."

3.4. Building on what is there

The Norwegian anthropologist, Fredrick Barth's, premiere advice to young anthropologists as to how to learn about a foreign culture, was to 'build on what is there' as opposed to approach the other with what you bring. To be so much in control of yourself, that you are able to really listen to begin with. The video maker expressed that attitude during in an interview:

'When I cooperate with people around editing, what we basically do: we take the analog videotape and digitize it. When they bring me the tape, then I automatically sit there and I am editing it in my head while I am looking at it. OK, so what I have the researcher do or who I am working with, they sit down and they identify the clips, they want to use, then I digitize them, put them on a track sheet to edit, and then at that point I have the person that I am dealing with come in and sit down and then we decide, you know, is this really the clip you wanna use, and what kind of transition you want to do, and then if we are gonna do voice overs or any sort of graphics, you know that we are going to put in between the clips, that's when we decide or that's when I have that person decide .... And then it is funny, because then after we do the video tape, they'll take it and they'll look at it for a few times and they'll look at it with other people and then they'll come back and say: You know what: maybe we can improve on it with this, and then I'll go: Yeah, that is true, we can cut that out and we can add this and do this in stead of that, so they are learning as well. ... I have given them sort of a guideline, in the sense that - actually mostly it is by repetition - if there has been one particular group that has done more than one video, then after the second time then they kind of get a sense of what I and the machine can do. .... [Then] it becomes more fun, because they are more knowledgeable and then they, we kind of feed each other, and then they'll come up with an idea and then I go: "oh yeah, that will be neat", and then "- plus we can do this on top of it" , and so it's a nice interaction there".

3.5. Being a role model by acknowledging users individuality

Acknowledging that users are individuals with individual personalities, that they deserve respect, but that the only one able to bridge between the users and the concern for the common good is the person who knows the needs on both sides as well as the actual options. These two sides: The professional pride in striving to get the best quality solutions at the cheapest prize and the professional pride in making users happy. What in this case made most ends meet was a consistent recycling behavior on the part of the supporters. The key was to make the preserving, storing and reusing fit together. To show people that expressed wishes are understood, remembered and if possible met, and to always fill up printers with paper when passing by, to always tidy up in the server room, to always keep boxes and paper when unpacking, so that stuff can be sent safely to repair, to enjoy unpacking, checking and nursing hardware as well as software, to always put on a happy face when asked for the same explanation over and over again, all goes together in the supporting attitude. Although this organization had its collectors and those who always need the hottest software, even these types seemed to accept to find their needs adjusted to the overall long term plan for expansion and to accept to get spare parts and to reuse products, if that solution actually met the need they had expressed. And those in the organization who were most reluctant to engage in and benefit from the IT wonder world were tempted and dragged and tempted again, but never forced against their will. By taking a position as "middle-men" the systems administrators did reverse the tendency that those who already are well off with equipment and service get more because they are able to express more advanced needs. By nursing and developing the most reluctant users and preventing the most anxious from eating up all the cake just for the sake of personal appetite they supported a balanced growth.

3.6. Informational feedback in practice - summing up

In sum informational feedback can be characterized as shown in the above examples where we have seen supporters

- Making work with ICT visible and collective
- Opening discussions about the value of ICT
- Being a role model by acknowledging user's individuality
- Building on what is there

And we have seen users becoming more confident and daring technologically due to the atmosphere created by these ICT-supporters.

4. Giving informational feedback requires organizational competence – more case studies

The above examples have illustrated how users may be helped to become self-motivated learners of new technology. However, support competence does not just require an ability to give informational feedback as we, applying Deci & Ryan's framework, have described the competence of motivating users to become self-regulated learners. ICT-support, or 'gardening' as we like to call it inspired by Nardi, – have to comprise nursing

and cultivating, activities drawing on the organizational competencies of the ICT-supporter: Knowing the garden, knowing what is precious in the garden, knowing how to make different plants grow together. In the following we present examples of how we have observed our IT-supporters' work, not just as motivation-work but also as an organizational balancing, as an integrated part of a target-working domain, and as a work where self-esteem is coming from seeing others grow.

4.1. Staying at the boarder between the technical practice and the users' practice

Support work takes place on the boarder between the technical problem solving (here: the hardware and software and the schools IT-department) and support of the tasks of the users (here: the students and the teachers). In case of Kurt, he is a teacher, but he is also the one who "knows a little bit more". He is the one to be called when they have problems with the technology: "have you seen Kurt" you can hear them say, when they have problems and he is out of sight. However, staying on the boarder also means that he is not a regular technician either. To the IT-department he is the teacher (not the technician) that they communicate with about the technological solutions and problems. He does not have password to the server and he is not located in their office.

Kurt's way of staying on the boarder becomes apparent through his change of role in his interaction with students, colleagues and technicians. In interactions with the students and teachers he is the "more capable peer" who shows them how he works (experiments) with the technology, and he is the one who meets the critiques of the technology and the project as described above. In interaction with the technicians, however, he does not put himself up as the one who "knows a little bit more". On the contrary he acts as a teacher who knows nothing. When a technician visited the school to make an update of the QuickPlace Kurt's first answer to all his questions (about the server, firewall etc.) was "I don't know anything about that". This was a big puzzle to the observer who knew that he knew a lot, or at least "a little bit more". Observing Kurt working with technicians a pattern of behavior was seen repeated: Kurt shows the hardware and software to the technician as a way of handing over the problem and the authority of the technical work. In the sequence described above where a technician arrives to update the Quick Place they enter the server room together. Kurt points in the direction of the server and the firewall and says: "There is the server, it is yours and there is the firewall, it is yours"

By taking on this non-technician role he manages to build a bridge between the technicians and the users. Instead of answering the technician's questions with technical answers he responds with descriptions of practice: "We have a lot of problems with Lotus Notes right now that it cannot synchronize and run properly."

(Note again that it is not Kurt, or the students, who has the problems but "we" that have a lot of problems). Sometimes Kurt even defends the users against technician's prejudice against them. In another sequence where Kurt is describing a problem to a technician the technician comes with the following remark regarding the cause of the problem:

> Technician (to Kurt): It is probably because they [the students] have fiddled
> with the computers at home and…

> Kurt (to technician): NO they have not been fiddling with the computers
>
> Technician (to Kurt): not all of them but there are not problems with all of the computers so…
>
> Kurt (to technician): None of the students has been fiddling with the computers, none of them
>
> Technician (to Kurt): But something has happened

In this way Kurt does not just built a bridge to the technical practice when he is interacting with users showing them how to work with, understand and appreciate the technology. He also builds a bridge to the users' practice when he is interacting with technicians telling them about the problems that users ("we") have and removing prejudices against the users and their practice with the technology. Both bridges are built by acting out the role of the opposite practice.

4.2. Being an integrated part of organizational life

The following observation, from the Silicon Valley example shows how supporters are not just supporters but an integrated part of organizational life being able to interact with many different people and artifacts in many different situations, some of relevance to the job they are to solve, others of relevance to 'organizational life':

One of the researchers passes by, while the system administrator is sitting at the front desk repairing a crash on the receptionist's computer using her Norton desk doctor tool kit. Seeing this researcher makes the systems administrator remember that she has a message for her: "Oh, I just had a request from somebody about groupware and organizational learning. I referred him to you." They engage in a conversation that after a while turns to Lotus Notes. Together they develop an idea about how to really make functional integration between platforms over/via the web. The researcher leaves, and Norton has succeeded so far that the systems administrator feels inclined to do a little clean up of the desktop icons. It is a matter of aesthetics, but in the flow she gets rid of some big chunks of irrelevant software. Since the reason the machine crashed was basically overload the clean up has a functional aspect, too. It crosses her mind that partly the problem has risen because she did not do the best job when installing this machine. She does a reboot to see if the machine is OK. Now another colleague comes by. She has a problem with her name popping up on the receptionist's computer. While waiting for Norton, she talks with the receptionist who has returned from her meeting. The receptionist explains how the machine just went berserk, and she did a reboot, and a reboot and another reboot. The system administrator takes the opportunity to emphasize the importance of NEVER to do more than one reboot. ...

According to this fairly accurate account, the work with the disk doctor tool, the phone, and interaction between colleagues takes place simultaneously. The systems administrator restores a disk, does some teaching that should prevent further accidents, makes an appointment about conference-support, exchanges information about

forthcoming software investments, unpacks some new equipment, stores the wrappings and takes care of some paperwork in less than one hour.

4.3. Building self esteem as a gardener

Being a supporter also means – like every type of job – being able to build self-esteem. In our studies of supporters we have, however, found it difficult to see how this is done. Primarily because it took us some time to understand that self esteem is often build through the growing of others. The following is an example of this:

Finishing off products, in terms of layout and final editing, is always last-minute-and-should-have-been-done yesterday stuff, and the necessary extra time for learning is usually not built into such time frames. Even in this organization, those in charge of the administration, lay-outing, and the finishing off products tend to feel that the researchers do not take these parts of the work seriously enough. But unlike most organizations, people here believed that pointing to these issues may bring about change for the better. For instance, the administration staff decided on an arrangement, a one-day workshop called "Take your researcher to work". The agenda was "to increase our awareness of what it takes to get a job done." The format was that the administration staff would put the researchers to work with some of the stuff usually taken care of by them to give the researchers hands-on experience and thereby to develop a shared understanding. Still the recognition the supporters got for all their effort seemed scarce. Seeing the supporters with a smile say good bye and good luck to researchers who went off to a client with a presentation that was the result of maybe several days of intense cooperation between researcher and support person looked like the happy parent watching kids performing at the prom in costumes homemade with great effort. A certain "back stage professionalism" was displayed here, and the supporters said that they liked to work back stage, "to be behind the camera, not in front if it". But as a career trajectory? More thorough observation did, however, reveal networks of peers outside the organizations where our IT-supporters worked. Conversations between the technical supporters and their peers outside the organization took place where they boosted of some of their accomplishments. They, too, had an audience, a peer group from whom to get competition and admiration.

4.4. Caring rationality and communication skills - Summing up

The above examples shows how support competence is not just about being able to motivate adopters to become self regulated learners. Support competence is also an organizational matter: A competence of being able to stay on the boarder between technical troubleshooting and domain specific problem solving, drawing in and integrating these two realms by complementary feedback. Being the less capable in the communication with the technical side and the more capable with the domain side, or vice versa depending of situation, and only being competitive towards oneself and towards supporters in the same situation. The competition being about the creation of a well cultivated garden of ICT users, reusing and recycling the technology in economically responsible ways. In all displaying a delicate combination of caring rationality and communication skills. And we have seen that preserving self-esteem and increasing professionalism of this sort is depending on recognition and freedom granted

by the organizational context. The organizational environment must allow the supporter to unfold his or her gardening skills.

But our findings also raise the issue of what kind of professional training is needed for acquiring these skills. Caring rationality and communication skills in combination may not be found in many curricula, but should be taken as a challenge to education planners in study programs both within computer science and in all the mixes of computer science and business or computer science and humanities, that have grown out of computer science in resent years. IT-supporters are constantly in the position of having to learn to use new tools. And learning to understand the ICT infrastructure sufficiently to improve the quality of one's accomplishments requires a capacity for self-regulated learning, since you never know when you are going to need to do what, where – ICT adoption is inherently a matter of practical, in situ, problem solving.

5. Conclusion, problems, and perspectives for further research

In this paper we have presented findings from two case studies on how ICT-supporters work. We have demonstrated that a defining quality of the way the supporters in our studies work is both their ability to motivate users to become self-regulated learners which we have called "informational feedback", and we have demonstrated their ability to apply a caring rationality and communication skills in ways that create a safe environment for learners to experiment and to build confidence as self regulated learners which we have called "organizational competencies". We suggest that the combination of motivating by way of informational feedback and caring by way of organizational competence are important aspects of what might be described as a "workplace ICT-pedagogy" or metaphorically speaking a "gardening competence" the hallmark of which is the simultaneous care for both plants and the garden.

In the introduction we argued that there is a great need for and a lot to gain from turning the vast majority of adopters into motivated, self-regulated learners, and in section 3 and 4 we suggested a way this could be done. We have, however, also identified as a problem the professional visibility and esteem that any professional needs. It is hard to get professional recognition solely by being caring, listening and safeguarding. Also the ICT-supporters need nursing to become and to stay self-motivated.. Hence, ICT-support is something that must be given prudent thought both by management in the work place and by educational planners.

The findings reported are but interpretations of ethnographic fieldwork. In order to serve as a foundation for broader recognition at the workplace among ICT-supporters and management, the profile of this pedagogical competence must be further researched. But we find the idea of a re-conceptualization of ICT-support work in industry and society at large promising for the sake of public computer literacy in general, but also for work place democracy.

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