Metaphors of learning at work and the role of ICT

P.Robert-Jan Simons
Centre for ICT in education
Utrecht University

In the present article, we will argue that a non-educational perspective needs to be adopted to understand work-related learning complexity because such learning typically occurs implicitly via work activities and not as a result of formally organized learning programs or events. From an educational point of view, the distinction between guided, experiential and self-directed learning is an attractive one that is often used. These can be described as follows: For *guided learning*, a trainer or teacher makes all of the relevant decisions and the learner follows these. The trainer or teacher decides on the learning goals, the learning strategies, and how to measure learning outcomes. The trainer or teacher also provides evaluation, feedback, and rewards. The learner commits himself to the decisions made and follows the trainer or teacher. For *experiential learning*, it is not so much a teacher or trainer or even predetermined goals that control the learning, but circumstances, personal motives, the ideas of others, discoveries, experiments, and so forth. Learning is a side effect of the activities one undertakes, and an explicit set of learning goals simply does not exist. For *self-directed learning*, the learner plays an active and explicit role in the learning process and the determination of learning goals. Learning stands central and is not, thus, a side effect. Self-directed learning is also not pre-organized and pre-planned by a trainer, teacher or some other expert. Self-directed learning is self-organized and self-planned (Straka, 1997). And reflection plays an important role in finding out what was learned and what still needs to be learned. In other words, learners define their own goals and strategies. The capacity of the learner to manage the learning process is emphasized.

The three ways to learn are not very helpful in describing workplace learning, however: Doornbos, Bolhuis, & Simons (in press) found in research on work place learning:

a) That the percentages of occurrence for guided learning and self-directed learning were low;
b) That there was most of the time a mix of two or three ways, where learning became explicit only from time to time;
c) That there were many complex patterns and sequences;
d) That essential characteristics of learning were missing when the three ways to learn were taken as starting point, especially social and dynamic learning
e) That guidance was mostly informal and coincidental instead of formal and planned
f) That 79% of the learning was implicit and or social.

Re-analysing the data, the same authors found that it was, instead of distinguishing guided, self-directed and experiential learning, better to distinguish: a) deliberate vs spontaneous learning and b) kinds of developmental relatedness (learning alone, learning from others, learning with others).

Doornbos et al. claim that most researchers and practitioners looked too much from an educational perspective and tried to import educational thinking to the workplace, instead of looking at the essence of workplace learning in itself. Work-related learning is largely implicit and aimed at work- or person-related goals. Learning is part of belonging to and participating in a “real life” context involving emotions and the development of a professional identity. All kinds of interaction partners play a role but not necessarily a guiding role. While the educator represents authority in educational environments, access to learning and knowledge is largely equal at the workplace. Hierarchical relations characterize the social work context. Learning results in individual as well as shared understanding. Learning content consists of not only

"truths" but also messy problems and changing views. Whether prior or new learning actually constitutes improvement is often questionable.
Work-related learning can better be seen as an integrated process involving the interaction between workers and their environment and an internal process of inquisition, elaboration and construction leading to a learning result (adopted from Illeris, 2002).
Curiously, educational views described above also play a role at the workplace People take their school perspectives with them to the workplace. Educationalists take their views to the workplace, perhaps even without knowing, thereby neglecting: social learning, collective learning, implicit learning, and dynamic, unstable innovative learning. In this paper we try to escape from this "educationalism" in distinguishing various ways to learn at the workplace in non-educational ways,

Learning metaphors
Communication between educationalists, managers and worker / learners is often not optimal, because of these implicit educational views of the learning processes at the workplace, because of limited views of learning in general and because of lack of reflection on learning. As Säljö (1979) wrote a long time ago: "learning is taken for granted". What we need is a language to talk about learning in less educational ways, incorporating, implicit, social, collective and dynamic learning and describing different ways of learning besides the dominant "training" view (thinking that training is the solution for all learning problems). Only then can we architecture learning trajectories at the workplace.
A recent experience illustrates what happens. A large multinational decided to cut the budget for training (50%). Instead of the existing system of combining classroom sessions with homework assignments, on the job coaches with embedded e-learning, now e-learning alone should become the only system of learning. There are 2000 modules available, but people won't take them and the success rate of those who take the e-learning courses are only 10 %. Apparently the management could not think of anything else but to replace a well functioning training system with another less expensive one (e-learning). The modules were, however, mainly boring drill and practice, that has no connection to work or to other people. Nobody thought of other cheap ways of learning (learning on the job, coaching, communities of learning, self-directed learning, etc.). Couldn't we find ways to architecture learning trajectories, be it explicit or implicit ones, that escape from this obvious e-learning / training route? For instance changing work instead of bringing in educational approaches? Discussions and decisions about learning tend to be one-sided and simple, for one thing, because there is no good language of learning. Automatically, learning is connected to being trained (even in e-learning approaches) and the full variety of possible ways and individual differences are not taken into account.
Our aim was to describe and device instruments to test a language of learning distinguishing different ways to learn that can help people to communicate about learning and to escape from the automatic training route.
From the literature we deduced five metaphors (Sfard, 1997) of learning on the job: the Acquisition metaphor, the Participation metaphor, the Discovery metaphor, the Imitation metaphor and the Experimentation metaphor (Simons & Ruijters, 2003; in preparation).

Five metaphors of learning
We developed after several iterations and pilots the following five descriptions of the metaphors:

- **Imitation**
  Not everyone learns in the same way and not everyone learns under the same conditions. Even the assumption that you can only learn in a peaceful and harmonious atmosphere

does not hold true for everyone. Learners who prefer Imitation learn well under pressure. They learn best in a hectic, relatively unpredictable and constantly changing work environment. They look for situations that will teach them something. They often have a talent for spotting an expert in a particular field and learn by example and good observation. They are very interested in tales concerning best practice and what works. It is probably obvious that these learners are not exactly keen on situations involving role-play and exercises. They will soon come to regard these as 'childish'. They prefer to learn in the real world (instead of a learning world) where they are challenged to perform and achieve in a complex environment. Part of the challenge here is to avoid mistakes or to turn a disadvantage into an advantage.

- **Participation**

  In the past, learning was often regarded as a solitary process. Increasingly, however, the social side of learning is being emphasized. You learn with and from each other. Knowledge is not an objective concept, everyone has their own interpretation of what it is, but by communicating with others you can arrive at a joint meaning.
  People who prefer 'Participation' learn by interacting and communicating. Interaction is essential for them. They need the cut and thrust of discussion to sharpen and clarify their ideas. You are forced to explain your thoughts, which, in turn, gives you feedback in the form or reactions and ideas from others. Win-win situations all around.
  Learning is easiest for these learners within a group where the members are interested in and trust each other. Support in the form of a team coach, someone who can guide the group process, can be useful. But members dividing tasks within the group themselves and rotating chairmanship are a good alternative.

- **Acquisition**

  Although many trainers and teachers are trying to find ways to bring theory and practice closer together and to escape the restraints of the classical system, there are people who really prefer this way of learning. They attach great importance to the transfer of knowledge and the learning of skills. They often learn well when goals are set and learning processes are defined. They like to be taught by 'experts', teachers who know their subject. After all, knowledge is objective and it is important to gain knowledge in an unsullied environment. Mistakes should be avoided. Making them is a sign of planning errors, sloppy preparation or inadequate knowledge. These learners know what they want to learn and target their learning to achieving a concrete result. Regular testing is part of this learning process. After all, knowledge can be measured. Examination results give a clear indication to what extent the results have been achieved.

- **Experimentation**

  Together with 'Acquisition', 'Experimentation' is perhaps the most well known learning preference. Time and time again, 'Experimentation' seeks to bring learning closer to the workplace, choosing forms like on-the-job training, work experience and role-play. The greatest concern is whether that what is learned can be applied in practice. For this reason, wherever possible, training is carried out in realistic situations; situations that reflect every-day practice as closely as possible. The core of this approach is that it is a 'learning situation'. This means that the environment must feel safe enough to dare making mistakes in. The environment should also be uncluttered enough not to detract learners from their primary goal. Moreover, it must be peaceful enough to allow learners to reflect on what they have learned. In short, learning in as Experimentation requires a peaceful, safe, not too complex, but realistic environment where learners have the freedom to experiment, ask questions and have the opportunity to reflect. Learning can be supervised by someone from the work environment or an experienced teacher. The important thing is to have someone who can simplify situations, point things out or can pass things on that will bring you a step

closer to your goal. With him, you can also discuss mistakes, because mistakes contain a wealth of information that help you learn.

- **Discovery**
  Learning as 'Discovery' is based on the premise that life and learning are synonymous. You don't just learn during a course, you are always learning. There is no such thing as not learning. Learning means finding your way through and understanding situations. Being conscious of this, teaches you a great deal about daily life and those unexpected evens that confront us all. An important prerequisite is a large degree of freedom. Learners that prefer 'Discovery' like to go their own way. This doesn't necessarily have to be the most efficient path, as long as it's the most interesting one. This learner searches for inspiration and meaning and finds these in his or her environment, friends and the people around him or her etc. Knowledge is what you yourself construct.
  The discovering learner doesn't really require their learning process to be supervised, but an inspirational 'teacher' or 'supervisor' will be taken seriously. These learners are often recognised by their creative drive and their urge to discover things for themselves. Initially, they can appear to be chaotic. But mistakes are all part of the game and keep you alert. If something takes too much time and effort you know you have to try another tack.

Table 1 characterizes these five metaphors with some key words

Learning by ..	Key words
Imitation	Role models, best-practice, real-life, pressure, implicit learning
Participation	Dialogue, with others, collaboration, discourse, trust, enculturation, communities of practice
Acquisition	Objective facts, transmission, knowledge, from experts, theories
Experimentation	Safe environment, practising, skills, attitudes, simulations, explicit learning, role playing
Discovery	Meaning, deep understanding, inspiration, self regulation, knowledge creation

Table 1: five metaphors in key words

Fifteen components in which the metaphors could differ were deduced from the literature and practice: a) situations in which one learns; b) relations with others c) dealing with mistakes e) the role of emotions; f) acquiring knowledge g) guidance; h) allergies; i)preferences in training; j) who determines learning; k) how to organize it; l) what is annoying; m) what makes you think; n) reaction to unknown situations; o) kinds of knowledge; p) what makes you think. For each of these components the metaphors have differences.
Emotions related to learning are, for instance, inspiration and curiosity (discovery); safety and trust (experimentation and participation); clarity and certainty (acquisition); stress and work pressure (imitation). Allergies are for instance boredom (imitation),people who withdraw from collaboration (participation), lack of knowledge (acquisition), acting without feeling competent (experimentation) and lack of room for initiatives (discovery). Dealing with mistakes varies as follows: I learn a lot from my mistakes (experimentation), mistakes keep me alert (discovery), I try to prevent mistakes through a good preparation (acquisition), I do not learn a lot from mistakes (imitation).

The metaphors and technology at the workplace

When applying these metaphors to the use of technology at the work place one needs to distinguish several roles of technology. Here we will distinguish four roles:
Learning to work with ICT
Learning as working with ICT (implicitly)
Learning deliberately with ICT
Learning through the design of ICT

Learning to work with ICT concerns explicit acquisition of skills and knowledge needed for the integration of technological tools (ICT) in the daily work: how can we learn to use these tools in adequate and innovative ways. An example would be learning word text processing skills. It is explicit learning of ICT-related knowledge, attitudes and skills. *Learning as working with ICT* (implicitly) refers to implicit learning: people learn a lot about ICT and about their work in general while working with it. While e-mailing with a foreign friend , one may learn (implicitly) about the culture of this foreigner and about the function of e-mail. Working is the foreground and learning a side effect of this working. *Learning deliberately with ICT* concerns purposeful learning with ICT. Here ICT is the tool for learning. Sometimes this is called e-learning. An example is learning a course with the help of an electronic learning environment. Another example is joining a community of learners in order to learn about safety issues. Finally there is *learning through the design of ICT*: while designing ICT people learn about ICT, but also about the world and their work, for instance by making a website about a certain topic or by developing new software.

We now try to relate these four roles of technology to the five metaphors of learning discerned above.

1. **Learning to work with ICT**

The following are examples of five ways to learn to work with ICT:

Participation:	Just let people with similar interests work together in using ICT and help each other
Imitation:	The (virtual or f2f) looking over the shoulder assistant
Acquisition:	E-learning modules presenting the theory
Experimentation:	Deliberate practice: purposeful trying to practice certain ICT skills on the job (see Erickson, Krampe, and Tesch-Romer (1993)
Discovery:	Finding out on your own how computers work (with some help of manuals and colleagues)

2. **Learning as working with ICT**

For learning as working with ICT the following are examples:

Participation:	Communities of practice (implicit social learning); Videotaped practices
Imitation:	the Shell mentoring approach (see shell.live_wire.uk/ mentor): Access to examples and role models from outside the department

Acquisition:	Traditional knowledge management: archiving and restructuring existing information
Experimentation:	Peer- 360 degree- and supervisor feedback in an e-hrd-environment Competence based approaches
Discovery:	Problem solving, design, research, decision making, meaning construction through ICT; change laboratories

3. Learning deliberately with ICT

The examples for learning deliberately with ICT are:

Participation:	Learning communities (learning at the foreground): blended learning
Imitation:	Learning from best practice sites, worked out examples, role models, talking heads
Acquisition:	Traditional e-learning modules; on-line tutorials
Experimentation:	Learning to learn in learning communities; Virtual action learning; Electronic portfolio's
Discovery:	Active training approaches in e-learning: problem solving, design, research, decision making and meaning construction within e-learning

4. Learning through the design of ICT

Finally, here are some examples for learning trough the design of ICT:

Participation:	Moderating a discussion forum
Imitation :	Designing a best practice site for others
Acquisition :	Designing a knowledge base or an e-learning module
Experimentation:	Designing games, simulations, role playing, publications, teaching modules for others
Discovery:	Weblogging to reflect upon your new ideas (see Efimova, 2004)

Conclusion

Our aim in this article was to device a language of learning that helps to escape from automatic educational thinking when designing workplace learning trajectories. The five metaphors of learning that were the result of this endeavour, were applied to four kinds of roles of technology and ICT in work place learning. The examples presented are only a fist step and perhaps too general. For every concrete context the metaphors may offer different options, that hopefully broaden the scope of the designers of learning trajectories.

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