

## **7 Six key questions for complex learning environments**

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## 7.1 Introduction

In this chapter I will develop a set of key questions that should in my view be focused on in complex learning environments. I will introduce a focus on new learning outcomes, new kinds of learning processes and a new instructional approach called process-oriented instruction. These interdependent outcomes, learning processes and instructional arrangements are summarized in a set of key questions. From the perspective of those principles I will look back at the cases in this book.

## 7.2 New learning outcomes

New learning outcomes as described by politicians, parents, teachers, and company representatives refer to outcomes that are *durable*, *flexible*, *functional*, *meaningful*, *generalizable* and *application-oriented* (see also ENGESTRÖM 1994; LODEWIJKS 1993). They should be *durable* in the sense that they remain over a long period of time. Instead of learning for today and tomorrow people should be learning for months, years or even a lifetime. Learning outcomes should be *flexible* in that they can be approached from different angles and perspectives instead of being rigidly tight to one perspective. Results of learning should be adaptable to new contexts and to changing contexts. This can only happen when there is deep understanding instead of rote learning. Flexibility relates to internal relational networks between knowledge elements that are approachable in an easy way. The *functionality* of learning outcomes refers to their "just in time, just in place" character: the results of learning should come to the fore at the right time and place. People should learn what they need at a certain time and place, not less not more (MELLANDER 1993). Learning outcomes should also be *meaningful*: real understanding of a few basic principles with far-reaching importance for understanding is more important than superficial understanding of many facts that become obsolete anyhow. Learning outcomes should be *generalizable* in the sense that they are not restricted to one context or situation but should also cover other contexts and situations. Finally, learning outcomes should be *application-*

*oriented*: people should know the possible applications and their conditions of use: when and where is application of the learning possible or necessary. Furthermore, new *kinds* of learning outcomes are needed. In my view the most important ones are: learning-, thinking-, collaboration- and regulation-skills. Where the previously described characteristics all relate to the transferability of rather traditional knowledge-oriented learning outcomes, these ones refer to skills that can be applied on information and on learning processes.

The key questions that summarize the current chapter are:

1. Are the intended outcomes of complex learning arrangements durable, flexible, functional, meaningful, generalizable and application-oriented?
2. Are thinking, learning, collaboration and regulation skills being taught?

### **7.3 New learning processes and strategies**

It seems self-evident to assume that new learning outcomes, ask for different and new kinds of learning processes and strategies. What are important new learning processes and strategies? In order to be able to discuss these, I need a distinction between three ways of learning.

#### **7.3.1 Three ways to learn**

In my view there are three different ways: guided learning, experiential learning and independent learning. They differ in many respects from each other and they produce slightly different kinds of understanding.

In *guided learning* a trainer or teacher takes all the relevant decisions and the learner can and should follow him or her. He decides about the goals of learning, the learning strategies, the way to measure learning outcomes and he takes care of feedback, judgment and rewards. The learners should commit themselves to the decisions made and should follow and obey the trainer or teacher.

In *experiential learning* it is not so much a leader or even a predetermined goal that controls the learning. Rather circumstances, personal motivation, other people, innovations, discoveries, experiments etc. determine what and

how one learns. There is not even an explicit set of learning goals, nor is there an explicit learning strategy. Instead, learning is a side effect of the activities one is undertaking without conscious awareness of the fact that one is learning. The outcomes of this kind of learning can become conscious afterwards, however.

In *independent learning* (REVANS 1982; CANDY 1992) there is a much more active and explicit role for learners and learning goals than in experiential learning. Learning is central and not a side-effect, but the learners themselves determine the goals of learning according to needs arising in their actions (at work or elsewhere). Learning is not pre-organized and pre-planned by an outsider or expert, nor is it depending on coincidental intrinsic motivations. It is self-organized and self-planned. Furthermore learners determine their own ways of self-testing. Reflection plays an important role in finding out what was learned and what should still be learned. Thus instead of letting the teachers or trainers decide about the learning goals, learning strategies and testing, these factors become not unplanned and unorganized as in tracking, but learners decide on their own, and they do this explicitly.

### **7.3.2 New learning processes and strategies**

I will discuss twelve characteristics of new kinds of learning *processes and strategies* as proposed in the literature.

The first group of six characteristics involves a shift towards independent learning and the second group towards experiential learning (see Table 1). The first shift from guided learning towards independent learning involves an increased activity of the learner in making decisions about learning independently. The shift from guided learning to experiential learning involves increased activity of the learner in a second sense of the term: undergoing important personal experiences, actively thinking, solving problems, finding out things, thinking about concrete cases and learning intrinsically.

Shift from guided learning towards independent learning	Shift from guided learning towards experiential learning
More active learning	More discovery-oriented learning
More cumulative learning	More contextual-learning
More constructive learning	More problem-oriented learning
More goal-directed learning	More case-based learning
More diagnostic learning	More social learning
More reflective learning	More intrinsically motivated learning

**Table 1: Overview of 12 kinds of new learning processes and strategies in relation to the three ways to learn.**

*Shifts towards independent learning*

SHUELL (1988) formulated the main characteristics of good learning: "... (constructive) learning is an active, constructive, cumulative and goal-directed process ... It is active in that the student must do certain things while processing incoming information in order to learn the material in a meaningful manner. It is constructive in that new information must be elaborated and related to other information in order for the student to retain simple information and to understand complex material. It is cumulative in that all new learning builds upon and/or utilizes the learner's prior knowledge in ways that determine what and how much is learned. It is goal-oriented in that learning is most likely to be successful if the learner is aware of the goal (at least in a general sense) toward which he or she is working and possesses expectations that are appropriate for attaining the desired outcome."(277-278).

Two further characteristics of new learning are, in my view, that it is diagnostic and reflective (SIMONS 1997). This means that learners should undertake activities like monitoring, self-testing and checking that help them diagnose and judge whether they are still pursuing the goal they had set. Since teachers and trainers can not look into the heads of the learners and are always at a certain distance to them, both physically and psychologically, learners better take care of their own monitoring and testing, at least partially. Moreover, it means that learners should be or become aware of their way of learning through reflection. By thinking about their (way of)

learning they acquire metacognitive knowledge that will help them to master future learning.

### *Shift towards experiential learning*

Some other characteristics of learning, involving the shift towards experiential learning and described in the recent literature, are that learning should become more discovery-oriented, contextual, problem-oriented, case-based, social, and intrinsically motivated. These shifts can be interpreted as shifts towards experiential learning.

Discovering knowledge and insights oneself, or learning in an inductive inquiry instead of deductive receptive way, brings, according to the literature, all kinds of positive effects, such as intrinsic motivation, durability, transfer etc. In my view, learners are discovering all the time. Learning is essentially inquiry learning.

Another characteristic of experiential learning is contextualization. Many instances of school learning are too much decontextualized and many improvements can and should be made as to the contextualization of school learning. Real life and connections with applications are important aspects of good learning.

Experiential learning should be problem-oriented and case-based. Problem orientation and organizing learning around cases clearly is good for contextualization and motivation. Problem orientation strengthens the connections between semantic and action representations. Cases connect episodic and semantic representations.

The position that experiential learning is social or even that only social constructions of reality are possible is strongly defended. More and more, learning is seen as a social process in which people interact with view of other people. This does not imply that these other people should be present during learning. People can also discuss and interact with themselves (with a virtual other) and be social in this way.

The last characteristic to be considered is intrinsic motivation. Experiential learning can have some connections with intrinsic motivation, but many times it will not. Convincing arguments were put forward by BROPHY

(1988). It is not the kind of motivation that comes out of the materials and the environment that is the most important, but the motivation to learn. This means being motivated to find out certain things, to have a desire for knowledge, to like learning and to keep on learning even if its relevance is not immediately clear or when it gets boring.

In my view new learning outcomes ask for both, a shift towards independent learning and towards experiential learning. If it would only be towards independent learning, the focus would be too much on the conscious, planned and pre-organized forms of learning. This is, in my view, very important and is needed for the new outcomes, but it would be too one-sided if it would not be complemented with a shift towards experiential learning, bringing in authentic contexts and implicit forms of learning. Although these two shifts are important, I would not skip all forms of guided learning. This can have important functions too. We need, in other words, a new balance between guided learning, independent learning and experiential learning.

The key questions arising from the discussion about three ways of learning and the new kinds of learning processes and strategies are:

1. Is there a shift of focus towards more experiential learning?
2. Is there a shift of focus towards more independent learning?

#### **7.4 Process-oriented instruction**

In my view the new learning outcomes wanted and the new kinds of learning processes and strategies ask for a new instructional approach, which I call process-oriented instruction. This is instruction focusing on the further development of processes of thinking, learning and self-regulation of learning and thinking *integrated* in regular domain-specific instruction. Thus, integrated learning means to think, integrated learning to learn, integrated learning means to collaborate, and integrated learning means to regulate learning and thinking. Process-oriented instruction not only focuses on the kinds of general skills mentioned, it also tries to gradually hand over responsibility for learning and teaching to the learner. The more

learning, thinking and regulation skills the learner acquires, the more freedom he gets to regulate his own learning and thinking.

In process-oriented instruction the processes and skills to be learned are *modeled*, both by teacher and by fellow-students. This means that the important thinking, learning and regulation skills are made public, by demonstrating and discussing them with each other on a regular basis. One of the main obstacles to learning to learn and think is that these processes are hidden and remain invisible. Research shows that younger students take these processes for granted. They don't realize that people have many different ways to approach tasks. Moreover, they tend to believe that their own way is the only possible way. This has to change if one wants to teach learning, thinking and regulation skills. Fellow-students sometimes form better and more convincing models of learning, thinking and regulation than teachers, because they are better identification models and because their way of thinking is perhaps less automated and unconscious.

Furthermore, in process-oriented instruction teachers should be *external monitors* of the learning, thinking and regulation activities of students temporarily. As long as students are unable to monitor themselves adequately, the teacher should take this role for them and keep an eye on their processes. Through observations and questions the teachers try to find out whether the processes are still on the right track, whether problems occur and whether students understand what they are doing.

Gradually, however, the teacher should withdraw monitoring and other kinds of teacher control when students are ready. This is called *scaffolding*: after scaffolds have been built they can become the bases for new scaffolds to reach a higher part of the house that is being built. When parts of the house are ready, scaffolds can be removed.

Moreover, the process-oriented teacher should become a *metacognitive guide* for the students. This means trying to make them aware of their way of learning, thinking and regulation. It is only when they have this kind of metacognitive awareness themselves that they can become self-regulators. Thus, the teachers' role is to help them develop this awareness.

Another role of teachers in process-oriented instruction is to organize *positive self-evaluation* by students. They should believe in themselves. They should believe that they could do it, because without this it is hard to learn and think independently. Orchestrating positive self-evaluation means to help students with goal setting: choosing goals that are reachable and still have a kind of challenge.

Of course, teachers should also provide for multiple opportunities to *practice* the various skills in various circumstances, getting lots of *feedback*, from fellow-students and from teachers. These practical applications should occur, preferably in authentic tasks: cases, simulations, real problems, in situation. First-hand experiences are very important.

Finally, students should be stimulated to *reflect* on their learning, thinking and regulation, both in action as well as on action. Reflection in action means reflecting during or immediately after task-execution, reflection on action means reflecting in a more general sense about one's actions in various circumstances.

The key questions resulting from process-oriented instruction are:

1. Is there conscious attention for the gradual increase of independence according to the sequence of independent work, strategic learning and self-directed learning?
2. Is there modeling, external monitoring, scaffolding, metacognitive guidance, attention for self-evaluation, practice of skills, feedback, reflection?

#### **7.4.1 Confronting the six questions with the cases in the book**

The six questions I have formulated above were:

1. Are the intended outcomes of the complex learning arrangement durable, flexible, functional, meaningful, generalizable and application-oriented?
2. Are thinking, learning, collaboration and regulation skills being taught?
3. Is there a shift of focus towards more experiential learning?
4. Is there a shift of focus towards more independent learning?

5. Is there conscious attention for the gradual increase of independence according to the sequence of independent work, strategic learning and self-directed learning?
6. Is there modeling, external monitoring, scaffolding, metacognitive guidance, attention for self-evaluation, practice of skills, feedback, reflection?

#### **7.4.2 Practice firms (GRAMLINGER & TRUMMER)**

When I look at the chapter by GRAMLINGER and TRUMMER about practice firms and try to confront their ideas with the six questions described above, there is one very clear answer, namely with respect to the third question: more experiential learning. Practice firms clearly enable experiential learning or as the authors call it, learning by doing. Moreover, the answers to questions 1 and 2 are rather clear. There is a lot of focus on new kinds of learning outcomes, like flexibility, transferability, mobility (30). Furthermore, the new kinds of skills are also in focus, especially collaboration, self-regulation and thinking skills. Learning skills remain rather implicit in the text, however. With respect to the other questions the answers are less clear. The authors plead for more independent and guided forms of learning (29) at the same time they are implying that this is missing in many practice firms now. It should be developed and the risks are that there is no time for it, nor for the planning of it. I found no evidence for any attention to a gradual increase of independence. This could be included in a practice firm, but I cannot see in the chapter whether this happens anywhere. Finally, the explicit process-oriented kinds of teaching learning, thinking, collaboration and regulation skills are not described. Is there modeling, external monitoring, metacognitive guidance (etc.) in the coaching? Is it there explicitly or is it depending on the coach?

Although the answers to some of my questions are negative or unclear, this does not mean that these aspects could not be developed or could not be included in the practice firm. There are even very good possibilities for this. Perhaps they even get a lot of attention in practice. However, in the chapter this is not treated.

### **7.4.3 Practical learning arrangements (MULDER)**

MULDER describes a model of increasing complexity of practice-oriented learning arrangements in vocational education. In her chapter one finds a lot of attention for the new kinds of learning outcomes needed, especially the application-orientation and the functionality of learning outcomes. There are also many answers to question 2. The practical learning arrangements focus on learning to learn and life long learning skills, problem solving skills and regulation skills. There is somewhat less attention for collaboration skills. The practical arrangements provide for opportunities for experiential learning in complex problems that are authentic and real (question 3). The focus seems, however, to be more on the planned and organized forms of learning than on pure learning by doing, because there is guided learning at the beginning that continues later as self-directed learning. Learning from experience is there, but less explicitly than for instance in the practice firms. Therefore, the focus seems to be more on guided learning and independent learning than on experiential learning as such (question 4). The main emphasis of the study is on the gradual decrease of guidance, content complexity and environmental complexity (question 5). The ideas developed by MULDER would, in my view, form valuable extensions and additions for the other cases too. I found little evidence for explicit attention for process-oriented instruction principles. Perhaps there is implicitly modeling by the coaches? Perhaps there is implicitly external monitoring of learning and thinking skills? From the chapter, this remains unclear.

### **7.4.4 Technical action-oriented education (RIEDL)**

RIEDL describes an elaborate system of action-oriented instruction with attention for complex problems, integration of disciplines, cooperative and communicative learning, systematic action processes, internal differentiation, self-direction and freedom for students and new ways of testing with teachers who are predominantly coaching instead of lecturing. I saw a lot of emphasis on new kinds of learning outcomes: especially flexibility and application orientation. There is, however, in this concept, as I could see from

the descriptions, less attention for the development of the new kinds of skills of learning, thinking, self-regulation and collaboration (question 2). It seems as if these skills are expected to grow on their own when the learning environment asks for them through complex problems, cooperative learning arrangements, integration of disciplines, room for self-regulation and coaching. The emphasis in the chapter seems to be both on guided and independent learning (question 4) and on the experiential learning (question 3) that occurs in authentic and realistic working environments and builds on intrinsic motivation. I did not find much attention for the gradual increase of independence. Process orientation is predominantly implicit.

#### **7.4.5 Didactical innovations (KREMER & SLOANE)**

KREMER and SLOANE focus on the development of action competence (Handlungskompetenz) through new ways of collaboration between schools and organizations. In a learning field (Lernfeld) activity fields are described from which both, learning arrangements and applications in practice are described and developed. In organizing these new ways to collaborate, micro-, meso and macrodidactical didactics play a role with an important role not only for the teachers and the practitioners, but also for the scientific researchers. In relation to my six questions there is especially a lot of attention for the first one: action competence as a new kind of learning outcome with much more application orientation, functionality and flexibility. There is not so much attention for the new kinds of skills. The whole endeavor seems to be oriented towards new combinations of guided and experiential learning (question 3), but less so on independent learning (question 4). I found no attention for the gradual increase of independence nor process-oriented instructional approaches. Inside the many preparatory and evaluation meetings of teachers, practitioners and scientists, these topics may play a role implicitly or explicitly.

#### **7.5 Conclusions**

The six questions could be answered for the four chapters, although in some cases there was a lack of information. Perhaps there is attention for

the principles behind the questions, that are just not described in the chapters. Perhaps there is just less attention for some of the questions. When we look at the summarized scores in Table 1, it is clear that new kinds of learning outcomes and experiential learning get the most attention. Process-oriented issues were not addressed so much in the chapters.

	New kinds of outcomes	New skills	Experiential learning	Independent learning	Gradual increase of independence	Process-oriented instruction
Practice firms (GRAMLINGER & TRUMMER)	+	+	++	0	-	-
Practical learning arrangements (MULDER)	++	++	0	+	++	-
Technical Action oriented education (RIEDL)	++	0	+	++	0	-
Didactical innovations (KREMER & SLOANE)	++	-	++	0	-	-

**Table 2: How much attention was there for the six questions in the four cases?**

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