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ABSTRACT

In order to have a democratic society, equal rights to education are assumed. A democratic society needs citizens who are willing and able to commit themselves to lifelong learning--self-directed individual learning as well as collective learning. Learning in real life, although different for various people, can be seen as encompassing five steps: orienting or preparing, making strategic decisions, executing learning activities, evaluating, and regulating the process of preparing, deciding, executing, and evaluating. The steps are not necessarily linear, however. Learning in school, however, is other-directed, structured, unmotivated, and often does not prepare students for learning in life. In order to prepare students for active and self-directed learning in life, teaching needs to become oriented toward self-management in learning, domain-specific knowledge building, and self-confidence in learning. Control must be shifted from teachers to learners. In the Netherlands, two large-scale innovations are taking place in which secondary schools are expected to increase the opportunities for active learning by students: one in the lower classes concerning a basic curriculum and one in the upper classes--the school as a studyhouse. The goal of these movements is to create more process-oriented instruction directed towards active and self-directed learning. Implementation of such educational reforms means a change in role for teachers and more training and support for teachers to go from "survival" or "content concern" career stages to concerns with how students learn and general pedagogic guidance of children. (Contains 42 references.) (KC)

Towards active and selfdirected learning.

Preparing for lifelong learning, with reference to Dutch secondary education.

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Introduction

What kind of learning do we want to foster in schools? And how does this learning relate to democracy?
Equal rights are a basic assumption of a democratic society. Unequal possibilities to exert these rights therefore present a fundamental problem. Democracy cannot function according to its principles if people have unequal possibilities to inform themselves, solve problems, make well-considered choices and generally take part in the 'social construction of reality' (Berger & Luckmann, 1967). A democratic society asks for citizens who are willing and able to commit themselves to lifelong learning: selfdirected individual learning as well as collective learning. An important reason for the educational systems in democracies is to provide all citizens with equal possibilities to exert their democratic rights. However, unequality of results remain a stubborn problem.
Teaching for active and selfdirected learning is not a full-proof solution, but does present a promising approach to the problem. First, a basic point of view is the learner's 'ownership', c.q. responsibility for his or her own learning. Second, teaching for active and selfdirected learning seeks to scaffold the acquisition of learning skills and knowledge to empower this ownership. This is especially important for those students who have problems in developing selfdirection on their own.

This paper is written:
1 - to give a short outline of *learning in real life*, the kind of selfdirected learning we think of when talking about lifelong learning,
2 - to compare this learning with *learning in school*, that is the learning taking place in the average school today,
3 - to examine necessary changes *towards teaching for active and selfdirected learning*; making sure students are actively involved in learning is preparing the way for selfdirected learning;
4 - to inspect briefly government policy concerning active learning: the *Dutch secondary education reform* and
5 - to summarize some *Dutch research on active learning*.

1. Learning in real life

Adults set out to learn many things, although usually without calling these activities learning. Several researchers have been investigating the informal learning initiated by adults (Tough, 1971; 1979; 1982; overview in Candy, 1991). What does this learning look like? In this paper we will not discuss the implicit type of learning, resulting in tacit skills and knowledge, however important. We will focus on the self-initiated and self-regulated learning which is a normal way of managing problems and interests in daily life for adults and children as well.
Self-directed learning is not always succesfull. Many children and adults never learned - or perhaps even unlearned - how to manage learning in a productive manner; they did not learn to be 'good learners'. When they encounter problems they don't know how to handle them and may give up before reaching their goal. If we want to help our students to become good learners, we should first think about the question: what does good learning look like? What do succesfull learners do?
Some examples.
* As a parent you have a problem with one of your children.

* At work, you know your tasks will change thoroughly in the near future.
* You are interested in painting and you want to become more skilled in certain techniques.
* Doctors found out you are suffering from a chronic disease, so you want to know what this is going to mean for you.
* You want to buy a house, so you need to know more about possible neighbourhoods, house-agents, mortgages and other things.

Perhaps you do not think in terms of learning, but you are going to learn a lot while tackling the problem and striving for your goal. In each of these situations you may do different things. But looking at it from the perspective of learning we can discern the same five steps: (1) orienting or preparing, (2) taking strategic decisions, (3) executing learning activities, (4) evaluating and (5) regulating the process of preparing, deciding, executing and evaluating.

Orienting (preparing) is concerned with goal-setting and surveying the question how to get there. Goals are primarely life goals as mentioned in the examples. Learning goals come second and are derived from the life goals. Surveying includes searching memory for previous experience concerning these goals: what do I know already, or if I don't know what is my best guess? Do I know of anything similar? What are my questions or difficulties? Thinking about learning activities: how can I find out? Do I know other people who can help me? Where do I look for information? What kind of action can I try, can I experiment in some way to learn what to do? Realizing the conditions, e.g. how much time do I have available for this?

Taking strategic decisions implies deciding which goals to start with, what to do and in what order. While preparing activities was mainly informative and reflective, now decisions are made. Note that it is the learner who makes the decisions. These decisions are often provisional. The learner does not know all about ends and means in advance. Decisions are provisional in order to be able to adjust as soon as this seems better. The learner decides 'along the way' how to proceed, depending on what he or she finds out. Decisions are very important for the quality of the learning process. The chosen path of learning has to be an appropriate way to reach the goals. E.g. Vermunt (1992) concludes that learning results depend very much on the quality of the chosen learning activities.

Executing learning activities is doing what you decided to do. For instance. Find a book on painting techniques and start experimenting. Asking other people about their experience with this particular problem in child-raising, reflecting on their information and perhaps try their approach. Going to the library to look for information on mortgages, study what you find and discuss the matter with your partner. Driving around in some possible new neighbourhoods to get an impression what it would be like to live there. Following a course that your boss has recommended to be better prepared for new tasks. Getting involved in a patients' organization to learn from others who have more experience in living with this chronic disease. The examples are chosen to show that learning can be done by different activities. Learning activities can be grouped in the following categories (Bolhuis, 1995; 1996):

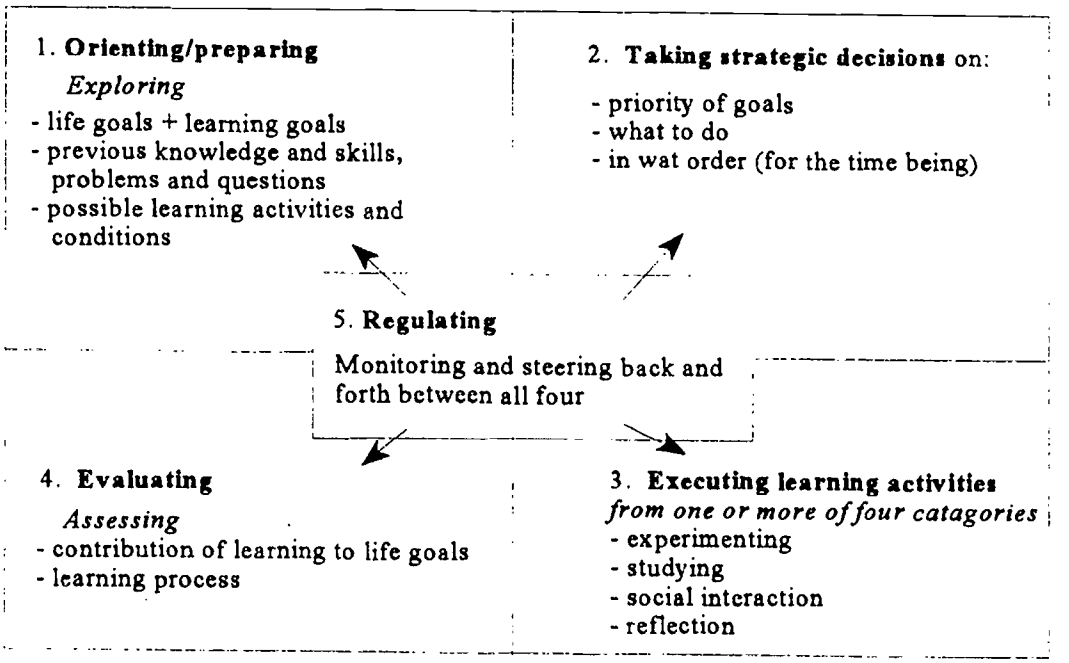
(a) experimenting or learning by doing;
(b) studying information given in media e.g. books;
(c) talking with other people and observing their way of doing things (social interaction); and
(d) reflecting on experience and information from media or other people and drawing conclusions on what to do (related to the goal) and/or how to learn more.

Evaluating refers to assessing the results of learning. Did I reach my goals? Do I know now what I need to know? Am I capable of doing what I wanted? Do I feel confident in deciding

about the new house, managing this problem with my child, making more beautiful paintings, meeting the demands of my job? The assessment is related to the real life goals that were set, not so much to the learning itself. Evaluating does not only take place 'at the end'. It may not always be so clear what the end is. Evaluating accompanies the process of learning in life. The learner evaluates progress frequently. When sufficiently satisfied with the results, he or she may stop this enterprise, perhaps for the time being.
Succesfull learners do not only evaluate the direct learning results; they also evaluate the learning process. They think about what is effective or ineffective and why. They compare their activities with what other people in the same situation do or report having done. If some activity does not have the expected result they will try something else. In short: they strive to improve their learning ability.

Regulating the process of preparing, deciding, executing activities and evaluating is going on throughout the process. It is a meta-activity of monitoring and steering the activities going on. Regulation is at the heart of the learning process. It is necessary to keep the process going and a decisive factor in the quality of the process. It involves e.g. considering that enough preparing has been done in order to decide on actions and to start execution. It also involves thinking back about the goals: is this still what I want, am I heading in the right direction, should I revise my goals? It involves deciding to evaluate results so far and to draw conclusions. It involves overcoming problems, seeking to keep up motivation, not giving up, taking new courage and energy from results.

Figure 1: Selfdirected learning



In this paper the different steps in self-directed learning have been discussed one by one. This does not mean that they are necessarily carried out in this order. In fact, there is no linear path. Once started, the learner usually goes back and forth between preparing, deciding, executing and evaluating. Also, the learner is connecting the different steps most of the time. E.g.

studying information and at the same time evaluating what this contributes to the goal and how it connects to previous skills and knowledge, ending with a decision to look for a supplementary learning activity.

2. Learning in school

How does learning 'in real life' compare to learning in school? Studies of 'situated cognition' (Brown, Collins & Duguid, 1989) and learning outside of school (in the workplace, informal learning etc.) have led several authors to criticize school learning for being too far away from learning in real life. Resnick (1987) points out that learning in school is stressing individual cognition, symbol manipulation, generalized learning and pure mentation - contrary to shared cognition, contextualized reasoning, situation-specific competencies and tool manipualation outside school. Some more points may be added (Bolhuis, 1995). First, knowledge in school is characterised by seperation in subjects, systematic structure, abstractness, suggesting completeness and it is consensual knowledge. This is contrary to the ill-structured, incomplete and non-consensual knowledge in daily life. Second, the artificial learning situation creates motivation problems. Third, the amount of knowledge and the characteristics of knowledge cause school learning to resort to reproductive learning.
We may recognize some of these points and find some more when looking at school learning from the point of view of figure 1. The several parts in figure 1 can be considered as 'learning functions': things that have to be done in order to realize learning (Shuell, 1988; Boekaerts & Simons, 1995). Does learning in school prepare students to fulfill these different 'learning functions' in an adequate way?

Preparing/orienting. In school learning the goalsetting is done by others (school administrators, teachers, authors of textbooks) and it is done out of sight of the learners. Another problem is that the goals of school learning are not so clearly related to goals in life. They are defined as learning goals without making explicit to students how these learning goals relate to real life situations and problems. This is one of the reasons why school learning often does not transfer to (learning) situations outside school (Van der Hoeven-van Doornum & Simons, 1994).
The same is usually true for exploring learning activities. Students are not expected to bother with choosing learning activities. This is taken care of by others, without much evidence to the student that there is anything to think about. Thereby students do not learn to develop criteria for choosing learning activities. Nor do they learn to explore the conditions for learning (such as time, money and material possibilities) by themselves.
How about exploring previous experience? Some teachers may encourage students to activate what they know about some subject and stimulate them to deduce questions. Most of the time, however, exploring prior knowledge does not get much attention and is restricted to referring to what was taught last time. It is clear from research that making explicit the existing concepts (thinking, mental models, habits) which are relevant to the topic is a prerequisite for learning. Without doing so the learning will often result in inert knowledge (Brown & Palinscar, 1989; Brandsford, Fraks, Vye & Sherwood, 1989) and/or distorted knowledge (Vosniadou, 1994; Bolhuis, 1995). Moreover students do not acquire the learning habit of scrutinizing and critically assessing their previous knowledge.

Taking strategic decisions. Again, taking decisions is done by others and without the learners having any evidence of a decision making process. Students are usually told what to do, by the

teacher or by the book (or whatever learning medium). Educational institutes are used to comprehensive and long term planning (curricula). All important decisions are made in advance. The content of learning is fixed and clear. There is a consensus about the content and about the correctness of what is to be learned. These characteristics are in contrast to the situation in 'real life learning' where we usually don't have an overview of what we need to know and where we are confronted with ill-structured domains of knowledge and disagreement about what is right or wrong. The demands of taking decisions about learning in real life are not dealt with in schools.

Executing learning activities. Indeed, students in school do execute learning activities. However, most learning activities in school belong to one category: (individual) studying. The choice of learning activities from other categories (like learning by doing, social interaction, reflection) is usually limited, which means students' experience with other learning activities in school is limited. Although school innovation movements have stressed the importance of experiential learning, cooperative learning and reflection (including critical thinking and problem solving strategies), teaching is still largely directed at transmitting verbal information to individual students.

Do students at least learn how to study verbal information very well? This depends on the way of teaching. A well-known problem is the reproductive, surface level studying which is learned in many schools. When teaching and assessment are focussing on memorizing, this is what students will do. Consequently students will develop learning strategies and a concept of learning which restrict learning to memorizing (Candy, 1991; Vermunt, 1992). For learning in life this way of learning has only little value. To manage learning in real life one needs a deep level strategy of studying, directed towards meaning and application. (See e.g. Hoeksema, 1995 about learning strategy in relation to career success of managers).

The focus on studying abstract information in school very easily results in verbal, isolated, inert knowledge. This is especially true if students do not acquire adequate study strategies, which include relating new knowledge to previous knowledge, thinking of concrete examples and applications of the given information, critical analysis (Vermunt 1992).

Evaluating. In school learning the results of learning are evaluated by teachers. They choose the way learning is assessed and tested. They decide on the criteria for satisfactory or dissatisfactory results, good or bad learning. Students adapt their learning to the kind of assessment they (have learned to) expect. As mentioned above, this too often evokes surface level, reproductive learning. In most schools students are not expected to develop their own standards for learning and consequently they do not learn to do so.

In 'real life' learning, evaluation is measured against the progress in reaching certain real life goals. Not the learning result as such, but the contribution of the learning to the goal is a proof of success. In school learning, the value of the learning result for a goal outside of school is not considered most of the time. Moreover, the assessment of learning is usually not concerned with the learning process. No attention is paid to the question whether students have learned how to learn better next time. The teacher does not do so, leave alone the students.

Regulating. Regulating is done by the school system and teachers. And a large part is done without the possibility for students to notice what is involved in regulating. The teacher has decided in advance and simply tells what is going to happen next. Students have no or only very limited possibilities to regulate their own learning.

In short: the school system and the teachers are taking over the 'learning functions'. They act

as if they can do the learning for their students. Teaching functions and learning functions are confused. The school system and the teachers perform the 'learning functions' instead of teaching the students how to learn. In the generally acknowledged shift of attention 'from teaching to learning' it is important not to continue to confuse teaching and learning. This asks for a critical note about the use of metaphors for self-directed learning like "educating oneself", "being one's own teacher" and the learner "performing instruction functions".
This type of metaphor has been used over and over, e.g. in studies of autodidaxy (Candy, 1991) and in recent literature on process-oriented instruction and active learning (see e.g. the special issue of the European Journal of Psychology of Education, December 1995). Although teacher and learner are equal in other respects, there is an important inequality in their competence as well as in their respective tasks and responsibility while teaching and learning. This inequality concerns the domainspecific knowledge (both content and process knowledge in a domain), in which the teacher is an expert and the learner is a novice, at least in comparison. It also concerns the teacher's qualification as a facilitator of learning. The tasks and responsibility of the teacher are to facilitate learning in the specific domain. The tasks and responsibility of the learner are to learn and profit from the teacher as an expert and facilitator of learning.

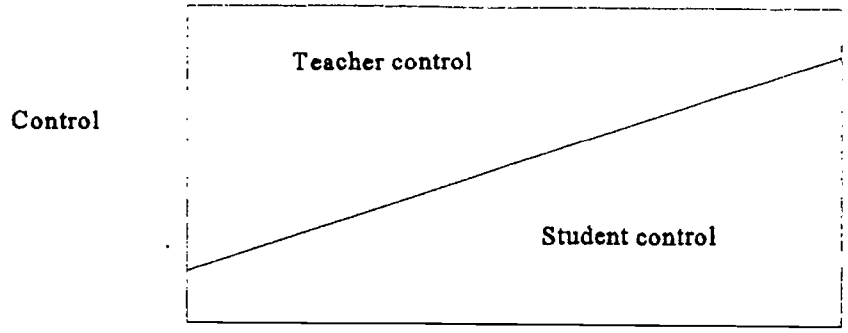
3. Towards teaching for active and self-directed learning

How can teachers shift from traditional teaching towards teaching for active and self-directed learning? The main point is: shifting from teacher-control to learner-control. In order to do so teaching needs to get oriented towards the three main facets of selfdirected learning (Candy, 1991):

1. selfmanagement in learning;
2. domainspecific knowledge building;
3. selfconfidence in learning.

These facets correspond to the three main instruction functions, distinguished by Vermunt & Simon (1995) in the observation scheme they devised to measure the effect of a train-the-trainer course in process-oriented instruction. The main instruction functions in their scheme concern (1) regulating: do trainers/teachers regulate everything on their own or do they gradually shift regulation to the students; (2) content: do trainers/teachers mainly 'transmit' content or do they pay attention to the process of knowledge building; and (3) do trainers/teachers create a safe but challenging learning climate?

The importance of shifting from teacher-control to learner-control has been advocated by many authors (Gibbons & Philips 1982; Millar, Morphet & Saddington, 1986; Candy, 1991; Boekaerts & Simons, 1995) and expressed in diagrams like figure 2. Control (regulating the learning process) is pictured as a continuum in which teachers gradually give up control in favor of the student.



Instructional strategies

Instructional strategies can be placed along the continuum of teacher versus student control. The continuum pictures both a dimension along which instructional treatments differ as well as a dimension characteristic of individual differences among learners (Snow, 1980). However, reality is not as smooth as this figure suggests. Self-control as a characteristic of an instructional strategy does not automatically result in self-control as a characteristic of the learner. Students with high selfmanagement capacity profit from instruction demanding a high degree of student control, but students with low selfmanagement capacity do not. The same thing is true the other way round: students with low selfmanagement capacity profit from explicit and direct instruction, with much teacher-control, while this type of instruction may even reduce the selfmanagement of high ability students (Vermunt, 1992; Volet, 1996).
However, student capacity is not just a fixed element to take into account. The point is to teach more **selfmanagement in learning**, as was illustrated in some classical experiments by Palinscar & Brown (1984), Scardamalia, Bereiter and Steinbeck (1984) and Schoenfeld (1985) (cf. Simons 1995).
This leads to two conclusions for teaching.
(1) Teaching should include self-management in learning.
(2) In doing so teaching has to take into account existing differences in selfmanagement capacity in students.

Teaching should move step by step in activating students to take control. This is expressed by Boekaerts & Simons (1995) in three types of teaching: (a) teacher regulated teaching, (b) teaching with shared regulation and (c) student regulated teaching. Teacher regulation refers to the traditional situation in which teachers perform as much themselves as they can and in fact take over the learning from the students. In shared regulation students are learning and practicing to regulate part of their learning, while teachers still regulate other parts. Student-regualation means students are regulating their own learning themselves. Of course, complete student-regulation is beyond teaching. The three types are only meant to characterise the two extremes and to point to the necessity of the bridging type of teaching in which regulation is shared and gradually taken over by the students. In each type of teaching the performance of teacher tasks (explaining and demonstrating, asking questions, giving assignments, providing feedback and evaluating) changes.

A gradual shift in teaching towards more student-responsibility moves from (a) 'making learning visible' to (b) 'activating students' to (c) self-regulation by students (Ebbens, 1994).

(a) 'Making learning visible ' refers to all the different steps that have to be taken in learning processes as pictured in figure 1 (instead of the school and teacher taking these steps out of sight of the students). The teacher makes learning visible by demonstrating (modelling) the learning process, e.g. showing how a learner asks himself questions about the learning process, what kind of decisions the learner takes, how a learner may test the learning results and process, how the learner goes back and forth, correcting mistakes and tackling problems.
(b) Activating students is the important phase in which teachers start sharing regulation. Students are urged to participate as much as possible, by asking questions, asking for alternatives, have students try themselves - together and on their own - , have students reflect on their experience and so on.
(c) To have students practice self-regulation in learning projects that are as close to real life learning as possible (Marzano, 1992).

It is important to take the full range of the learning process into this shift. The capacity for self-management in learning has been explained before in terms of regulating the learning process and being able to perform orientation, strategic decision making, learning activities and evaluation. (Figure 1). Not every part has to or can get attention all the time. Teachers may prefer to leave out some steps in the beginning. A good reason to do so is that it takes time and experience for students to learn to move towards more self-directed learning. Another reason is that teachers themselves have to learn to shift to teaching for selfdirected learning. Finally, teachers may object that in some respects school learning can hardly be made to resemble learning out of school. Teachers on their own cannot change the goal setting and demands of the school curriculum. In much school learning, teachers as well as students have no choice but to follow the curriculum. However, teachers do have the choice to start sharing regulation of the learning process with their students.

Domainspecific knowledge building plays an important role in self-directed learning. The importance of familiarity with the subject is often overlooked, as Candy points out (1991). Learning capacity is situation-specific and content-dependent. The ability to learn in one domain cannot simply be transplanted to another subject area. Knowledge domains have their own networks of meaning consisting of concepts and rules and expressed in a (partly) domain-specific language. The difference between experts and novices is the availability of (access to) this knowledge. Learning builds on existing knowledge. If there is very little prior knowledge the learner needs more assistance. Teachers are right in their belief that students who are unfamiliar with a subject need their assistance. The shift most teachers have to make is from focussing on content only to focussing also on the knowledge building process: the methods and procedures by which knowledge is constructed in this specific domain. In process-oriented instruction the object of instruction becomes a combination of content and process (de Jong, 1995; Volet, 1995).
Notions like 'situated cognition' and the nesessary 'contextualizing' of teaching may be taken to stress the importance of real life knowledge in contrast to verbal and inert knowledge. However, questions of generalisation and transfer are also important (Volet, 1995). Contextualizing should be followed by decontextualizing to induce transfer. This may be done by requiring students to apply knowledge and skills on a range of tasks and by inducing 'mindful reflection' on what was learned and on the application of knowledge and skills in new learning and problem solving situations.

Self-confidence in learning refers to the attitude towards learning. The affective dimensions of learning have been neglected in cognitive and constructivist research for some time. Recently the importance of the dimension is acknowledged (Simons, 1994) and supported by research (Boekaerts, 1995). Many different points of view have been taken to conceptualize and investigate affective dimensions of learning. Affective aspects of learning such as motivation, self-beliefs, perceptions may be connected to specific learning domains/situations or regarded as personal characteristic. Research may look into the influence of affective processes on learning as well as into affective results of learning (Verschaffel, 1995).

At least three points should be mentioned regarding self-confidence in learning (Bolhuis, 1995). First, selfconfidence is a general characteristic as well as domainspecific. Learners may be considered more or less self-confident generally, but the learner's selfconfidence is also likely to differ from one learning domain to another and from one way of learning to another one. Perceptions of the learning situation and of one's own competence in this situation follow from experience most of the time.

A second point concerns learning motivation. Learning motivation is related to the (life!) goals of learning and may differ according to the importance attached to the goal. Motivation is influenced by succes or failure expectations (Boekaerts & Simons, 1995). Learners differ in their tendency to attribute succes or failure in learning to causes beyond control or within control. Learners with a succes-oriented style prefer to attribute succes to their own efforts while attributing failure to external and temporary causes. Learners with a failure-oriented style tend to attribute succes to causes beyond control ('luck') and failure to their lack of competence or effort. These attribution patterns are acquired by learning processes inside and outside the school. Teachers may help students to develop a succesoriented style.

A third point of view is considering the willingness or ability to take risks and to tolerate discomfort, as real learning often comes from discomfort (Joyce, Weil & Showers, 1992). Students differing in tolerance of uncertainty react differently to learning situations which ask for selfdirected learning. Uncertainty-oriented students profit more, they persist longer, find more alternatives, are more critical and discuss their productions more intensely (Schmidt & Huber, 1995). Tolerance of uncertainty is also relevant for teachers themselves when they are expected to create the conditions for selfdirected learning (Sorrentino, 1995; Huber, 1995; Kempas, Wahl & Huber, 1995).

4. Dutch secondary education reform

In the Netherlands two large-scale innovations are taking place in which secondary schools are expected to increase the opportunities for active learning by students: one in the lower classes concerning a basic curriculum ("basisvorming") and one in the upper classes ("the school as a studyhouse"). The first reform came after a long history of political debate and educational experiments with a comprehensive type of secondary education. How to provide young people with optimal educational opportunities - as a nessesary demand of democracy - was the main point in the debate. The long history probably accounts, at least in part, for the lack of enthousiasm in (too) many schools at the start of the 'basic curriculum' reform.

The second reform started without much upheaval and - at least at the moment - much of the implementation is left to the schools themselves on condition that schools work together (networking). This approach is generally appreciated by school administrators and teachers. Of course this does not mean everybody is participating wholeheartedly. Resistance to change is a well known phenomenom in education and elsewhere. Besides, teaching for active and selfdirected learning indeed implies a fundamental change, which is not easily made. We will

get to some research done on this topic in the next section.
In the 1993-1994 school year all secondary schools in the Netherlands made a start with the basic curriculum reform in their first form. Schools can decide to cover the basic curriculum in two or three years. Characteristic of the philosophy behind this curriculum reform is the stronger focus on the acquisition of practical skills and on learning how to apply the acquired knowledge. New subjects were introduced and the existing subjects got partly reorganised. Another main point is the idea that all students should reach a certain minimum level in the different subjects. This is expressed in the new 'core objectives' and the tests to assess if students have reached these objectives. These objectives and tests are nation-wide. On the other hand, schools and teachers have considerable freedom in implementing this reform. The focus on practical skills and the application of knowledge demands new instructional methods and materials (Knoers, 1995; Wielemans, 1995).
The 'studyhouse' reform is concerned with the upper classes of general secondary education. Students in this type of education are preparing for higher education, either higher vocational or university education. Bad results in higher education, largely attributed to insufficient independent study skills, are an important motive for this reform. Another problem is the choice of subjects students are allowed to make at the moment. This causes deficiencies in their preparation for higher education. The curriculum will therefore be reorganized into a common part and four 'profiles' (culture & society, economy & society, nature & health, nature & technology). The most important point - in relation to the subject of active and selfdirected learning - is that schools should be turned into 'studyhouses'. A studyhouse is a place where students essentially prepare themselves as contrasted to 'being prepared' for studying in higher education.
Schools are encouraged to develop their own plans and ideas and share their ideas, plans and experience with other schools. Schools receive money from the government if they participate in networks and contribute to the development by making results available to other schools. Networks are created around several topics, e.g. active learning in certain subjects, gifted students, information-systems to keep track of students' progress, equipment for a studyhouse, classroom teaching for active learning (Veugelers & Zijlstra, 1995).

5. Some Dutch research on active learning

In recent years much research on (teaching for) active and self-directed learning has been done in European and other Western countries. Central theme of the 1995 conference of the European Association of Research on Learning and Instruction was 'Learning to learn and teaching how to learn'. The European Journal of Psychology of Education had a special issue on 'Process-oriented instruction: improving student' learning' (december 1995). Dutch research contributes to and takes part in this general interest (e.g. Vermunt, 1992 and 1994; De Jong, 1992; Simons, 1994 and 1995; Van Hout-Wolters, 1992; Ebbens, 1994). Although much is still left to be investigated, we already know a lot about many different aspects of active and self-directed learning. What is important now is how teachers turn to 'teaching how to learn'.

The Organisation of Economic Co-operation and Development (OECD) aimed for 'best practice' in the research project "Active learning for students and teachers" (1995). Teaching was observed in classrooms and teachers were interviewed about their own professional learning. The same observation protocol and interview questions were used by the participants from several countries. The main categories for observation and for the interview were the same: (1) involvement in setting goals (2) task structure: choice of tasks, cooperative learning,

etc. (3) assessing information: what sources, what access (4) process of work and learning: interaction between student - teacher, between students, individual work (5) outcomes of work: relation with purpose other than student learning (6) assessment of learning and learning process: by teacher and/or student(s), range, standards.
The Dutch OECD-study (Withagen & Simons, 1995) was rather small, involving four teachers and eight lessons in four schools. Three conclusions should be mentioned. First, it is not so easy to find 'best practice', a problem which was also encountered by researchers in other countries. Active learning does not take place all the time, even when teachers and schools invest a great deal in this. Second, teachers still take many decisions about their students' learning (goals, activities, information, testing) and take over activities that should be done by students if they are to practice active and selfdirected learning. Third, it is useful to distinguish between independent work and independent study. Independent work may be a phase in between traditional teaching and teaching for independent learning, on the condition that teachers are aware of the fact that independent work is not the ultimate goal.

It is obvious that process-oriented instruction, directed towards active and selfdirected learning, is far from the normal situation in schools (Withagen & Simons 1995; Ebbens 1994). Research makes clear that shifting towards process-oriented instruction is a very complex move for teachers and the school system - and perhaps society at large. The complexity may be illustrated by the long lists of design principles of process-oriented instruction: sixteen by Vermunt (1994), twenty-two by Van der Hoeven-van Doornum and Simons (1994).
The complexity also implies that teachers need support in their professional development towards process-oriented instruction. If teachers are only told they should move to self-directed learning by students, they might adopt a laissez-faire approach, consequently get frustrated with the results and go back to their traditional teaching. A 'scaffolded' approach is nessecary to move gradually to learner-responsiblity (Lamberigts, 1995).
The learning process of the teacher involves teaching skills as well as the (implicit) opinions, thinking and feeling of teachers. A teacher may learn technical skills, but his or her frame of reference and especially the mental models of teaching and learning (Vermunt, 1995) need to be in agreement. If this is not the case, the teacher will not be motivated to practice the skills (Ebbens, 1994).
A change in role may imply a change in identity for (part of the) teachers. A lack of tolerance of uncertainty (c.q.certainty-orientation) in teachers is most likely causing problems in shifting towars process-oriented teaching (Sorrentino 1995; Huber 1995; Kempas, Wahl & Huber 1995).
Process-oriented instruction asks for rather complex teaching skills, which are based on more general skills for effective teaching. The career of teachers has been pictured more than once going from 'survival' in the beginning to content-concern, followed by concerns about how students le rn and sometimes broadened in a concern with general pedagogic guidance of students (e.g. Ebbens 1994). The professional development (learning) of teachers should get structural support to prevent getting stuck in 'survival' or 'content-concern'.
Teaching and the learning of teachers is strongly influenced by school culture (Ebbens 1994). Learning is, in the broadest sense, taking part in the social construction of reality (Candy 1991). The professional development of teachers takes place within the school culture. Therefore schoolwide endorsement of the professional development of teachers towards teaching for active and selfdirected learning is necessary. In fact, society at large needs to support active learning in schools, because of the necessary curriculum changes.

Most important, society needs to support active and selfdirected learning out of school for citizens to make full use of their democratic rights and to contribute to a democratic society.

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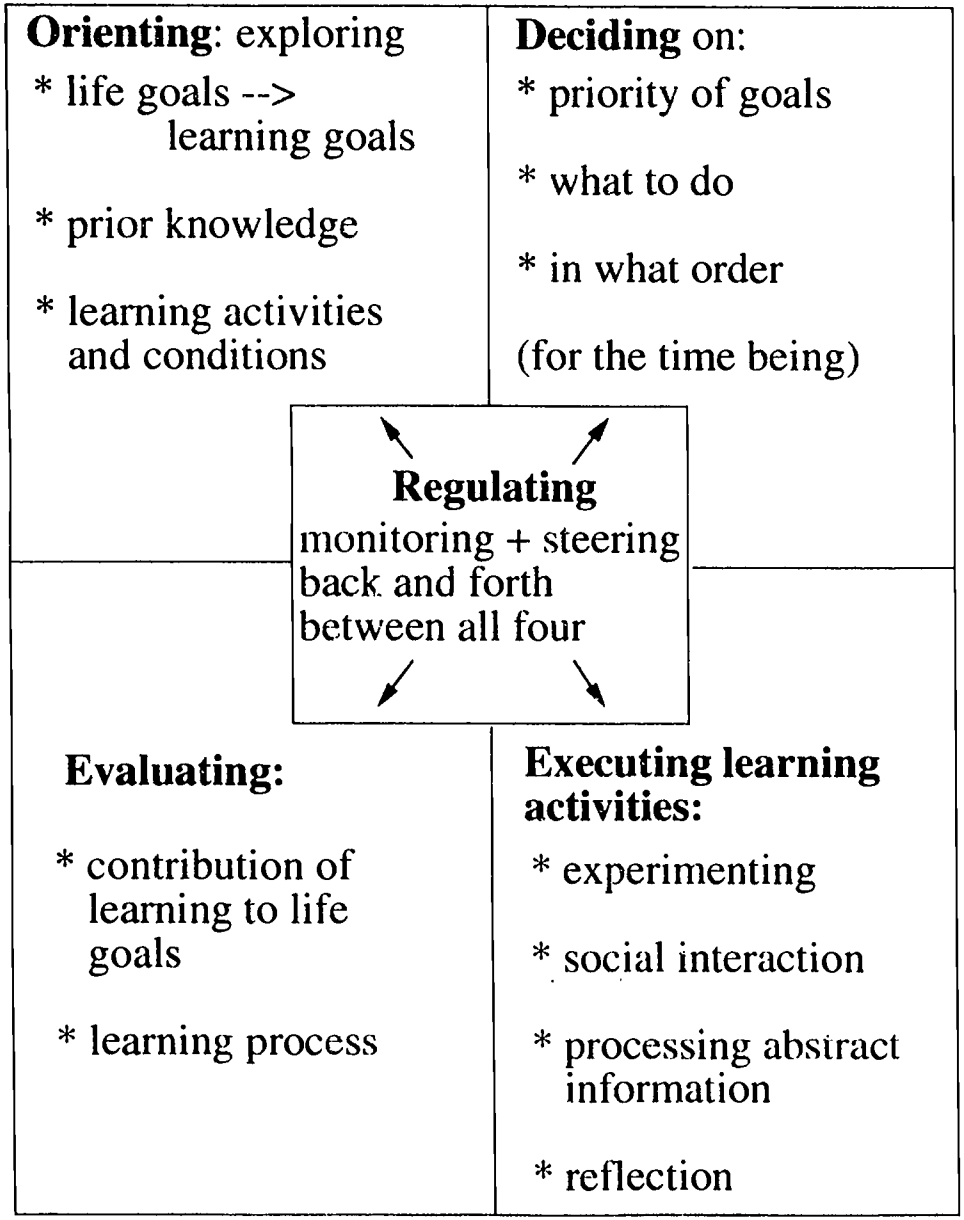
Self-directed learning process



LEARNING

in daily life ⟷ **in school**

learning process

1. social learning	1. individual learning
2. situation-specific, contextualized	2. symbol learning, generalized
3. meaningful	3. reproductive
4. self-directed	4. decided on and directed by others

nature of knowledge

1. ill-structured	1. systematic, structured
2. incomplete	2. complete
3. non-consensul	3. consensual ("right")

motivation

problems:	derived from:
1. learning goals, set by others and unclear	1. life-goals (necessity and/or pleasure)
2. learning "by order"	2. self-directedness
3. learning style prescribed	3. own learning style

Teaching

I self-regulated learning:

shifting from teacher to student control

1. making learning visible (content + process)
2. activating students
3. self-regulation by students

II domainspecific knowledge building:

content	contextualizing + decontextualizing
process	cognitive apprenticeship

III selfconfidence: modelling, expectations and feedback concerning students'

1. perceptions of own competence
2. attribution of succes and failure
3. tolerance of uncertainty

Teaching for self-directed learning

content	*what* domain knowledge + skills
process	*how* this content is learned

E.g. orienting, exploring

* life and learning goals

  - *which* goals
  - *how* to explore these

* prior knowledge

  - *which* knowledge is relevant
  - *how* to explore this question

* learning activities

  - *which* learning activities possible
  - *how* to find out which are adequate

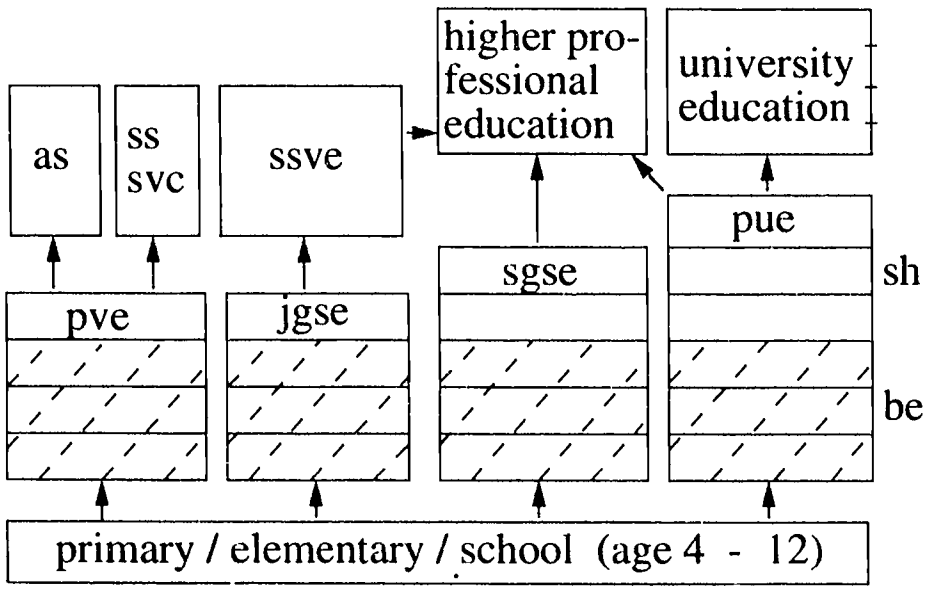
* learning conditions

  - *which* conditions (time, resources)
  - *how* do you know/decide

Dutch Education System

pve pre-vocational education
jgse junior general secondary education
sgse senior general secondary education
pue pre university education

as apprenticeship system
sssvc short senior secondary vocational courses
ssve senior secondary vocational education



be basic education (core curriculum)
sh study house

Dutch secondary education reform

I basic secondary education

national core curriculum goals

- practical skills
- application of knowledge
- social skills

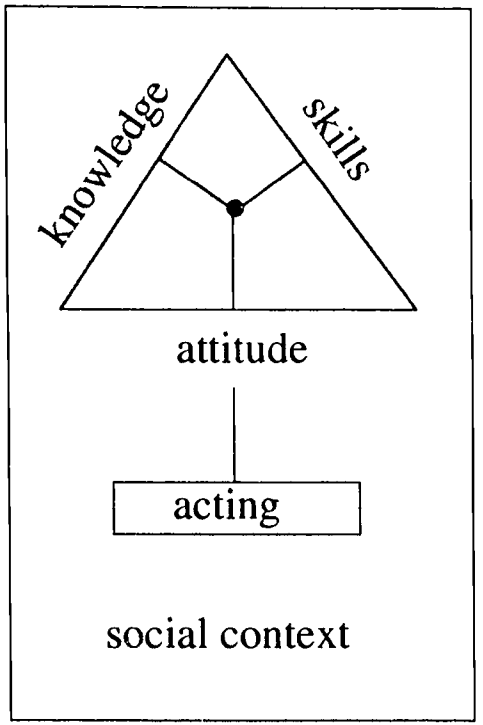
II studyhouse in senior general secondary education

goal:

independent learning by students

- building on basic secondary education
- improving motivation
- preparing better for higher education

Learning by teachers



knowledge of
- learning & teaching
- domain:
  content & process

skills in
process-oriented
teaching

attitude
- tolerance of
  uncertainly
- identity
- expectations of
  students

social context:

- school culture concerning esp.
  professional development & teaching
- society