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# Towards process-oriented teaching for self-directed lifelong learning: a multidimensional perspective

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## Abstract

Self-directed learning is often embraced as an important educational goal, although for quite different reasons, from the improvement of school learning to the critical assessment of the claims of democracy. Most reasons imply that self-direction is important in learning throughout life. Therefore process-oriented teaching, which aims to foster self-directed lifelong learning, needs a broad and multidimensional theoretical basis. The important role of experiences in the social and cultural context, prior knowledge, and the emotional aspects of learning are highlighted, and related to self-directed learning in life. Important aspects of process-oriented teaching are summarized in four principles. A multidimensional approach to learning also provides a conceptual basis to teachers' learning. Developing a process-oriented approach in teaching presents a major challenge for teachers as well as for schools.

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## 1. Why teaching for self-directed, lifelong learning?

Self-directed learning is certainly not a new educational goal, but seems to get more attention again in many countries (Boekaerts, 1997). Self-directed learning is by no means a clear and well-defined concept. Authors from different traditions and positions have different ideas about the scope and meaning as well as about possible

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educational implications (Straka, 2000). While self-directed learning may be generally tied to the demand of 'lifelong learning', and lifelong learning may unanimously be stressed as a demand of modern society in the 'World Initiative on Lifelong Learning', a shared initiative of national and multinational business, educationalists and international organisations like UNESCO and the OECD (Stewart and Ball, 1995; Longworth and Davies, 1996), lifelong learning is in fact propagated for a variety of reasons (Bolhuis, 2000). The first, rather narrow, argument is what may be called an internal educational argument: students on the lower school levels (elementary and secondary school) should be prepared for the next educational levels (vocational and/or higher and adult education), where they need to study more independently. The assumption is that it is best to reach the highest possible level of education, to which the idea of lifelong learning adds the requirement of continuing educational participation throughout life. The focus here is on acquiring the skills that are helpful in the kind of learning that is organized in educational settings. The following arguments include learning outside educational settings.

A second group of arguments is mainly economic in nature, recognizing knowledge productivity as an important economic motor (Kessels, 1996). Business flourishes because of rapid technological changes. This is only effective when enough people are able to create new knowledge and others are at least able to catch up with the changes that are brought about by a change in knowledge. Although many educators do not like to focus on economic profits, it must be admitted that the production and use of new knowledge opens a broader perspective on learning and knowledge than is common in traditional education. It involves looking for new possibilities and learning as a way to deal with unknown situations rather than the appropriate application of objective facts (Boud, 2001). However, learning and knowledge tend to be framed rather unproblematically, without much reference to possible tensions, and problems of power and access.

Third, reasons for self-directed life-long learning are discussed referring to the changes in the broader context of society. The world is becoming a 'global village', with a worldwide economy, mobility and media. This global village implies a multi-cultural village, where people are confronted with others who have a different knowledge of the world: different beliefs, a different view and different habits in life. A confrontation with other 'truths' leads to the necessity of dealing with these truths. More critical authors who refer to the social context explicitly include the political dimension: the inequality related to socio-economic position, ethnicity and gender, and the economic and cultural struggles resulting from globalisation.

The question of what self-direction and life-long learning could and should mean in the social context leads to the fourth and most comprehensive argument: teaching for self-directed lifelong learning contributes to a truly democratic society (Bolhuis, 1996a; Darling-Hammond, 1996). Democracy can only function according to its principles if people have equal possibilities to inform themselves, solve problems, make well-considered choices and generally take part in the 'social construction of reality' (Berger and Luckmann, 1967). An important reason for the educational systems in democracies is to provide all citizens with equal possibilities to exert their democratic rights. Equal rights are a basic assumption of a democratic society. Thus, unequal

possibilities to exert these rights present a fundamental problem, and inequality of educational results is therefore a serious problem in any democracy. Teaching for self-directed learning is not a foolproof solution, but does present a promising approach to some of the problems.

In order to realize this promise, narrow interpretations of self-directed and lifelong learning are inadequate. Recent learning theory helps to broaden our concept of learning as it may go on throughout life, as ‘an aspect of all activity’ (Lave and Wenger, 1991). When schools help students to become self-directed lifelong learners they need to think of learning as extending far beyond educational participation. The learner’s ‘ownership’ of his or her own learning is basic in promoting self-directed learning. Teaching may help students to acquire the learning skills, attitudes and knowledge to empower this ownership. This is especially important for those students who have problems in developing self-direction on their own (Salema and Valente, 1996; Simons, 1997). This could be the case with less talented students, but differences between students also result from their background, the ‘social capital’ they are endowed with. Self-directed learning cannot be viewed as a self-contained, internally driven and individual pursuit, but involves the political and cultural context in which it takes part (Brookfield, 2000). The social dimension of learning, which will be discussed in the next section, reveals the paradoxical nature of learning: adapting to the social world as presented, and on the other hand critically reconstructing and reinventing (aspects, elements of) the social world.

When arguing in favour of teaching for self-directed life-long learning it should be clear that education is not a neutral enterprise, and needs ethical discourse about its aims (Veugelers, 2000; Wardekker and Miedema, 1997). The change from an elite system to mass education in times of social, political and economic change is not just a quantitative matter, but poses fundamental questions (Esteve, 2000). One question is what self-direction and lifelong learning imply, considering democratic ideals and taking into account the social, political and economic context in which teachers and their students live.

The goal of this paper is first to investigate the contribution of recent learning theory to a deeper understanding of learning, keeping in mind that learning is a social phenomenon, with adaptive and socializing as well as creative and critical functions, conserving as well as reconstructing the world. It is important to consider the social context, prior knowledge, emotional aspects and self-direction in lifelong learning. Second, this multidimensional approach is discussed as the conceptual basis for process-oriented teaching, that is teaching to promote self-directed lifelong learning. Four broad principles of process-oriented teaching are summarized. Learning theory and a process-oriented approach also apply to teachers’ learning. Most important for schools and teachers is to realize in what ways they contribute to their students’ opportunities for lifelong, self-directed learning.

## **2. The experiential and social context of learning**

The context of learning draws attention to such topics as the domain-specificness and situatedness of learning, the importance of experiential learning and the social

characteristics of learning as well as knowledge. Studies of ‘situated cognition’ (Brown et al., 1989) and learning outside school (in the workplace, informal learning etc.) criticize school learning for being too far away from learning in real life (Resnick, 1987; Bolhuis, 2001). Engagement in a variety of real life learning activities is relevant, not mainly the processing of symbolic information. Notions like ‘situated cognition’ and ‘contextualizing’ stress the importance of real life knowledge in contrast to verbal and inert knowledge. Learning is context-bound, and involves hands-on manipulating, experiential learning and learning in social interaction in a socio-material situation (Hutchins, 1995) or community of practice (Lave and Wenger, 1991).

According to Candy (1991) the capacity for self-directed learning may have general components, but is also domain-specific and bound to the socio-material context. The ability to learn in one domain cannot simply be transplanted to another subject area. Knowledge domains have their own networks of meaning: problem statements, concepts and rules, expressed in a partly domain-specific language. The access to this knowledge is the main difference between experts and novices in a knowledge domain. An individual’s learning potential depends on expertise in the learning domain in three ways:

1. being knowledgeable of the problem statements and procedures of knowledge acquisition (i.e. knowing what and how to learn) in the domain;
2. having access to a relevant knowledge base to build on;
3. being motivated to learn in the domain; motivation to learn is domain-specific.

The development from novice to expert includes the development of these three interacting aspects: learning to learn, knowledge base and motivation. When competence in a domain increases, the learner begins to develop his or her own domain-related goals, chooses and employs more adequate strategies and shows increasing ability to operate independently. An expert does not only possess a vast amount of domain knowledge, but is also expected to contribute knowledge to the domain. The expert’s motivation comes from strong internal goals (Alexander, 1995).

Social, cultural and social-constructivist theory analyses the social context of the learning process and the social characteristics of knowledge: learning is regarded as a social process and knowledge as a social construction. Learning may be conceived of as participating in the social construction of reality (Berger and Luckman, 1967). Following this line, learning how to learn may be conceived of as learning how to participate in the social construction and reconstruction of reality. This view supports two important arguments in favour of lifelong learning that were mentioned in section 1: the rapid development of new knowledge (discarding the old knowledge) and the individual responsibility in a democratic society to take part in the legitimisation of knowledge.

Learning in a social context involves implicit as well as explicit learning processes. It refers to model-learning in a social context (Bandura, 1986; Vygotski, 1978), internalising the interpretations of ‘significant others’. This type of learning is often an implicit, tacit process (Polanyi, 1967). The learner internalises interpretations from

the social environment without conscious reflection. Whatever is learned seems self-evident. This is one reason why prior knowledge is resistant to change (section 3). Social learning also includes more explicit types of learning from and through interaction with others, e.g. through dialogue, brainstorming and discussion in which prior knowledge can be made explicit and restructured. When made explicit the effects of the hidden curriculum and other socialization can become subject of critical reflection.

The social context is also important in the acquisition of mental models of teaching, learning and knowledge. What ‘teaching’, ‘learning’ and ‘knowledge’ mean is learned by experience in the social context. ‘Significant others’ (teachers, parents, school mates) model what learning is. If, for example, students have come to see knowledge as factual ‘objective truth’, they will not be inclined to adopt a critical and constructive attitude towards learning (section 3).

Learning in most schools is still to a large extent individual learning. The cooperative learning movement stresses the importance and effectiveness of social learning (Slavin, 1991, 1995). By cooperative learning: 1) students have an opportunity to acquire social skills that are of great importance in life; 2) students’ self-esteem is promoted; 3) learning of students is enhanced by assuring all students’ active involvement; 4) students serve as a source of information and help for each other; they learn from each other by explaining and modelling solutions as well as by forcing reflection and discussion in the case of disagreement, causing cognitive conflict; 5) students’ independence and self-regulation in learning are fostered; 6) students experience the social construction and the social origin of knowledge. Of course these points are realised only if the cooperative learning is organised to do so. (Section 6.4).

Self-regulation in school learning has been mainly interpreted as an individual activity (Winne, 1995). The message from social and cultural theory is that process-oriented instruction should include cooperative learning and learning-to-learn in social ways, while taking into account that learning happens implicitly (through model-learning) but may profit from making process and goals explicit through reflection and discussion. Self-directed learning also depends on domain-specific knowledge and may vary across communities of practice.

### **3. From prior knowledge to critical learning**

From a constructivist perspective, learning is an active, goal-oriented, cumulative and constructive activity (Shuell, 1988), in which prior knowledge plays an important role as it may hinder or facilitate further learning. A prerequisite for learning is to activate and make explicit prior concepts (mental models, habits) which are relevant to the topic and process of learning. (Bolhuis and Simons, 1999; Dochy, 1994; Dochy et al., 1999). Without doing so the learning will result in inert knowledge (Brown and Palinscar, 1989; Bransford et al., 1989), and lack transfer to other situations (McKeough et al., 1995). Conceptual change theory (e.g. Vosniadou (1994) makes it clear that prior knowledge may need radical change, when naive concepts based

on experience have to be exchanged for scientific concepts. Conditions for inducing conceptual change have been explored (Strike and Posner, 1985), and instructional strategies, aimed at activating prior-knowledge and conceptual change, have been designed and evaluated (Ali, 1990; Biemans, 1997; Kikas, 1998). Gradual withdrawal ('fading') of external control within each instructional step, based on the student's actual level of self-regulated learning, has been viewed as most effective (Biemans, 1997).

Prior knowledge also refers to concepts related to learning. Students' mental models of learning, intelligence and teaching influence the way students interpret and deal with school tasks (Vermunt, 1992; Simons, 1995). Substantial evidence has been accumulated showing that students' beliefs about learning are significantly related to their academic achievement (Lamon et al., 1993; Hofer and Pintrich, 1997). Students with a 'reproductive' or 'shallow' view interpret learning as a matter of paying attention, doing assigned work and memorizing. They tend to act accordingly, in any educational setting. Students with a 'meaning-oriented' or 'deep' view of learning tend to initiate higher order learning activities and to regulate their learning in accordance with their interpretation of learning as dependent on thinking and understanding. Chin et al. (1994) studied how students' mental models of intelligence influence their learning. They found a difference between students holding a static view of intelligence ('entity theory') who worry about their competence and consider failure as a proof of their incompetence and students holding a dynamic view ('incremental theory') who are oriented towards developing their capacity to solve the problem at hand. (This account is similar to the attribution theory of different motivational patterns; section 4). Students acquire their conceptions of teaching, learning and intelligence largely by experience in educational settings (Allan, 1996; Kember, 1997) and at home (Belenky et al., 1986). Changing to a new learning strategy may be conceived of as a case of conceptual change. The 'old' strategy keeps competing with the new strategy for some time. Even when students have learned better learning strategies, they may not always choose to use them. Only after a long time of practice and positive results, does the new strategy take over. (Kuhn et al., 1995; Pressley, 1995).

Today's focus on higher order and critical thinking also involves conceptual change (e.g. Bellanca & Fogarty, 1991; Halpern, 1996; Sternberg & Spear-Swerling, 1996). The main message is the encouragement of the same kind of thinking as is discussed in conceptual change theory. A difference is that critical thinking should not only be directed toward the learner's own preconceptions, but to conceptions offered by others as well. However, teaching critical thinking has been criticized for being purely cognitive and for stimulating a relativism that lacks any indication of 'good' and 'bad' (Veugelers, 2000).

Critical pedagogy takes critical thinking and conceptual change further to include the ends to which, and social context in which, learning is taking place. Reasoning is regarded as a socio-political practice (Veugelers, 2000). Critical theory situates learning in the socio-political context, analysing learning as part of power relations and strategies. Learning which goes on in socialization processes shapes the learner's identity. Critical learning theory clearly involves an emotional component of learn-

ing, which is not very important in critical thinking and conceptual change. The concept of knowledge as a social construction is crucial in critical theory. The production of knowledge is an expression of social power and inextricably connected with action in shaping the world. Power is expressed in the cultural meanings and in the imposition of these meanings as if they hold the only possible truth. Critical pedagogy seeks to promote critical reflection on these ‘truths’, challenging students to consider alternatives, and acting upon them. The concept of learning in critical theory includes both the internalisation of — oppressive — cultural meaning, transmitted and imposed by the most powerful, as well as critical, liberating, or transformational learning (Baumgartner, 2001). The critical part consists of both becoming conscious as well as action, ‘conscientização’ and ‘praxis’ in the words of Paulo Freire (1971). Critical theory inspired liberation movements (of women, gay people, different groups of coloured people). Although much debate goes on about the specificity of oppression on the basis of gender, race and class, and about the practical consequences and possibilities in education, it offers a perspective on learning that is of great importance in the multicultural global village of today (Doyle, 1996; Rahman, 1999; Scheurich and Young, 1997; Weiler, 1996).

#### **4. Emotional aspects of learning**

There is a growing recognition of the importance of emotional aspects in learning. The concept of ‘emotional intelligence’ (Salovey and Mayer, 1994) is drawing wide attention in the field of educators and other social professions like medicine (Goleman, 1995). Emotional intelligence refers to: 1) knowing one’s emotions (self-awareness); 2) managing emotions in an appropriate and constructive way; 3) motivating oneself: marshalling emotions in the service of a goal and emotional self-control (like delaying gratification and stifling impulsiveness); 4) recognizing emotions in others (empathy); 5) handling relationships. Emotional intelligence also applies to the learning process (Boekaerts, 1997). For example, in learning one needs to recognize and handle emotions, monitor emotions, motivate oneself and in learning with or from others one also needs to recognize and handle emotions of others and maintain relationships with them.

The relevance of emotions in learning is even wider: the contents of learning (subjects, domains), learning contexts and ways of learning get an emotional meaning during the learning process, influencing further learning, especially learning of similar content, in a similar context or in similar ways. Several concepts, from partly different research fields, are of special importance here: motivation and attribution, self-esteem and tolerance of uncertainty.

Motivation in school learning is often problematic because students are not involved in goal setting, while goal setting is an integral part of learning in life. Goal setting implies the personal commitment of the learner. The learning is rewarding because the learner is in the process of realizing his or her goals. School tends to promote motivation by extrinsic rewards, which in turn leads students away from goal-oriented motivation. Students acquire patterns of motivation that are not

directed toward learning goals. They may be motivated to fulfil tasks as they are told, because they like to be praised by the teacher, developing a dependency on praise. If students feel insecure they may not develop, or lose their task-motivation, because they feel a need to protect themselves (Boekaerts, 1997). Ego-defence and social dependence can be brought about when students are asked to do something for which they do not feel prepared. This may be the case with a too sudden implementation of self-regulated learning. A truly task-oriented interaction between teacher and students around cooperative problem-solving is important in fostering task-orientation in learning (Järvelä, 1996).

Attribution theory explains how students have learned to relate success and failure in learning to different factors, which provides them with a more productive or alternatively counter-productive motivational pattern in learning (Boekaerts and Simons, 1995). A successful pattern is to attribute success to one's own effort and competence (viewing competence as an acquired characteristic), while attributing failure to lack of effort or temporary causes. A failure-oriented attribution is to attribute success to 'good luck' and failure to one's own incompetence - viewed as a fixed characteristic. Such a negative attributional pattern in learning is an example of 'learned helplessness' (Seligman, 1991). A habit of failure-oriented attribution leads learners to get dominated by negative emotions, i.e. feeling powerless, negative expectancies, low self-esteem. Self-esteem is essential in learning. Students with self-confidence are more actively involved, they choose more effective learning strategies, show more persistence when problems arise and they tend to set themselves higher goals (Schunk, 1996).

Learning in life often comes from confusion, problems, the uneasy realization of lacking adequate skills and knowledge, from discomfort (Joyce et al., 1992). Learning means change and change implies risks. Learning therefore asks for the courage to take risks (Bolhuis, 1996b, 2001). At least temporarily the learner needs a certain amount of tolerance of uncertainty. However, people differ in their tolerance of uncertainty. People with a strong certainty orientation (a low tolerance of uncertainty) tend to stick to what they (believe to) know and do not like to investigate what is unknown to them. Uncertainty oriented people on the other hand feel challenged by new, contradictory information and unclear situations (Huber and Roth, 1999). Traditional school learning often reduces uncertainty for the students as much as possible. School structure and the curriculum organization tend to afford a kind of certainty (about what to do and when) that we seldom come across in life outside school. If school learning needs to foster self-direction in learning and prepare for lifelong learning, a larger amount of uncertainty is requested. Students need to get used to, and to cope with, uncertainty, ambiguity, indefinite questions and problems. This is an aspect of self-directed learning, as well as an educational goal in itself in an open and democratic society that is pluriform and multicultural (Huber and Sorrentino, 1996).

Assumptions in motivation theory concerning learning from cognitive conflict are modified by differences in tolerance of uncertainty (Huber and Roth, 1999). Students with a different level of tolerance of uncertainty react differently to the demands of cooperative and self-directed learning. Uncertainty-oriented students — i.e. with a



high tolerance of uncertainty — profit more from this type of learning situation, they persist longer, find more alternatives, are more critical and discuss their productions more intensely. Certainty-oriented students need more assistance in gradually building up a higher level of tolerance of uncertainty. Moreover, tolerance of uncertainty is relevant for teachers themselves when they are expected to create the conditions for cooperative and self-directed learning (Sorrentino, 1995; Huber and Roth, 1999).

## 5. Self-direction and the regulation of learning in lifelong learning

The concept of self-direction is used in quite different contexts, and especially claims to be central to adult education (Candy, 1991; Garrison, 1997; Merriam, 2001; Straka, 2000). Self-direction refers to being in command oneself, moving towards one's own goals. Promoting self-directed learning is under critique because it may deceptively seem to imply that self-direction is a purely individual pursuit, with no influences or constraints from the individual's (social, economic, political) position. It should therefore be noted that self-direction requires both the acquisition of relevant competence, and the position to assert self-direction. To direct also means to regulate (according to the Collins English Dictionary), thus the two concepts of self-direction and self-regulation are often used interchangeably. However, the focus on self-direction seems somewhat more on the goal-dimension, while regulation refers to the actual activities necessary to move to the goal. The concept of self-regulated learning is mainly studied in educational psychology. Today, most self-regulation theorists view learning as a multidimensional process involving cognitive and emotional, behavioural and contextual components (Zimmerman, 1998). Especially when connected to self-directed lifelong learning this presents a major challenge to school-teaching.

The following model (Figure 1) is proposed as a conceptual device to help distinguish the different components of learning in life (Bolhuis, 2000, 2001). All components are interrelated (arrows A–F), and each component is related to the social context (arrows I–IV). The model does not imply orderliness, time order or hierarchy of the components. Instead, learning jumps back and forth along all arrows. For example, although starting with goal setting seems reasonable, goal setting may also result from orientation (A), learning activity (E) or evaluation (D). Dealing with prior knowledge, the socio-material context as well as emotions and motivation are relevant and inter-related aspects of self-directed lifelong learning.

Each aspect of this model is now addressed in turn.

### 5.1. *Setting goals: life goals and learning goals*

Any kind of life situation, event or problem may lead to goal-driven action, which results in learning. Learning in life does not usually follow from setting learning goals, but follows from life goals. These may often be action goals. Goals may disappear when accomplished, or evolve as the living learning process goes on. Life goals are the driving force behind the activities that lead to learning. At school,

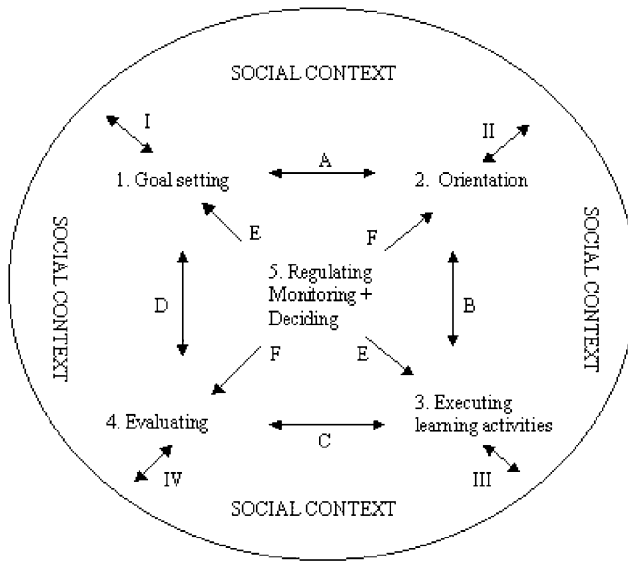


Fig. 1. Components in lifelong learning.

learning goals are often unclear to students and seem to have no clear relation to life goals. The worse part is that students are often not compelled to feel that these are their goals. Goals are the teacher's goals, the school's goals, society's goals. They are fixed and pre-determined, providing students with little or no chance of involvement. The learner's involvement in goal setting is a prerequisite to motivated and self-regulated learning however (Gredler, Schwartz, & Davis, 1996; Zimmerman, 1989; section 4).

### 5.2. *Orientation: mobilising and preparing for learning*

Orientation is mobilising prior knowledge and investigating possible routes to move towards the goal. Relevant prior knowledge concerns knowledge of the goal itself as well as strategic questions about how to proceed. Prior knowledge may have been gained in formal learning settings or outside school. Mobilising and critically investigating prior knowledge is essential in learning (section 3). Investigating possible routes involves searching for information, social and material resources, action opportunities and planning. These activities are a necessary part of self-regulated learning (Schunk and Zimmerman, 1998). At school, orientation is often restricted to asking about what was taught before, not necessarily the relevant prior knowledge, and the learning path has been decided upon and prepared already.

### 5.3. *Executing a variety of learning activities*

In lifelong learning, there is no demarcation line that separates learning from other activities. Rather learning flows from a variety of activities, for example, observing

how other people do something, discussing with others, asking someone, looking up information, trying something for oneself and learning from trial and error, reflecting upon all the previous activities. The mental activities by which we learn may be divided into four categories: 1) social interaction, 2) processing verbal and other symbolic information, 3) direct experience and 4) reflection. Learning in life usually combines activities from different categories and is always interwoven with the socio-material world (section 2). School learning tends to focus mainly on one type of activity, processing symbolic information. This dominance may contribute to the acquisition of inert verbal knowledge and a narrow mental model of learning (section 3). The importance of more real life learning activities is stressed by literature on ‘situated cognition’ (section 3) as well as by social and cultural theory (section 2) and literature on motivation and tolerance of uncertainty (section 4.)

#### *5.4. Evaluating process and results*

Evaluating learning in life is directed towards achieving life goals. Evaluating does not take place in the end, but is often diagnostic and leading to renewed orientation, other learning activities or a change in goal. It involves appreciating the expertise gained in relation to the pursued goal, and taking decisions on the criteria for evaluation. The learner decides on the reasons why s/he finds the gained knowledge and skills satisfactory, if only for the moment. At school, the teachers and administrators decide on the criteria and also decide whether the students have satisfied the criteria or not. Moreover criteria are usually related to the learning goals, but not to life goals. The assessment of school learning usually proceeds by verbal transmission and concerns individual learning. Self-regulation of learning as an educational goal requires responsibility on the part of the learner and different types of assessment, including cooperative learning (Slavin, 1995).

#### *5.5. Regulating: monitoring and decision-making*

In real life, we usually decide on the type of activities which we engage in, which does not imply that we have ‘free choice’. Force of circumstance and restricted possibilities usually limit choices. Nor does it mean no one else can help. It does mean, however, that the final responsibility is with the person involved. The learner decides on the importance of the goal, on mobilising prior knowledge and resources, on executing activities and on evaluating their achievement. Regulation is part of the executive activities (1–4) but also pertains to the process as a whole. Regulating consists of two related parts: monitoring the execution of the components and deciding to change focus from one component to another.

In school learning, most of the regulation is done by the teacher and school system. Moreover, this regulation is typically done out of sight of the students. They do not even need to be aware of the necessary regulating activities. Regulation of the process is largely invisible, just like many parts of the process — as discussed earlier. The way teachers and the school system regulate learning makes learning look like a neat, step-by-step procedure, from the beginning of the book to the end, from the

start of the programme to the exam. Learning processes in real life are much less predictable and straightforward. Goals evolve and so do the evaluation criteria. Resources are not always easily accessible or even available. Learning activities have to be actively pursued and need to be checked for usefulness and effectiveness.

Learning in life is not always successful. Many obstacles in the outside world may hinder successful learning. Successful learning may also be hindered by a strong uncertainty orientation, a negative attribution pattern (section 4) or unproductive learning habits. Many children and adults never learned — and perhaps even unlearned — to be good learners. When they encounter problems they do not know how to handle them, and may even give up trying (Candy, 1991). School learning should help students to become more successful, self-directed learners.

## 6. Principles of process-oriented teaching

The aim of process-oriented instruction is to foster and facilitate self-directed learning preparing for lifelong learning. Schunk and Zimmerman (1998) note that much initial research on self-regulated learning focused on a limited number of processes under highly experimental conditions. In recent years researchers have started to collaborate with practitioners to integrate self-regulatory instruction as part of the regular curriculum. Schunk and Zimmerman (1998) conclude that “although the results are promising, most of these instructional models are in the beginning phases of their development.” Several authors have listed principles of process-oriented instruction (Simons, 1989; Vermunt, 1994; Van der Hoeven and Simons (1994); Bolhuis (1996b). We grouped this advice under four main principles. A more detailed account of process-oriented teaching is published elsewhere (Bolhuis and Voeten, 2001). The four can be read in any order; each is important and linked to the others. Teachers are advised to:

1. move gradually to student regulation of the complete learning process;
2. focus on knowledge-building in the domain (subject-area);
3. pay attention to emotional aspects of learning;
4. treat learning process and results as social phenomena.

### 6.1. *Move gradually to student regulation of the complete learning process*

Competence in self-directed learning needs to be developed. Students need practice to learn how to be better learners. Therefore teaching should move gradually towards student regulation. A gradual shift from teacher-regulation to student-regulation has been advocated by many authors (overview in Candy, 1991; Boekaerts and Simons, 1995). However, self-control as a characteristic of an instructional strategy does not automatically result in self-control as a characteristic of the learner (Snow, 1980). Students differ in their learning skills and self-management capacity as well as in tolerance of uncertainty (section 4). Those with a high tolerance of uncertainty and well developed self-regulation skills profit from instruction

demanding a high degree of student control, but students with a low tolerance of uncertainty and lacking self-management capacity, do not. The latter students profit more from explicit and direct instruction, with much teacher-control, while this type of instruction may even reduce the self-management of high ability students (Volet, 1995). Teaching should provide students with constructive frictions, i.e. asking them to exercise just a little more regulation than they have already been able to exercise (Vermunt, 1992).

Traditional teaching tends to focus on the content (knowledge and/or skills), while process-oriented instruction also deals explicitly with the process of acquiring this content. The teacher models learning, showing how a learner gets on with the learning process by thinking aloud, e.g. mobilising and scrutinising prior knowledge, considering what to do next, checking results, going back to the question, restating goals, searching for information, reading text, asking others, etc. The teaching process goes from modelling, which is making learning visible, to activating students to participate and having them practise on their own. Practice is crucial (Zimmerman, 1998). Gradually students learn to practise self-regulation in projects that are as close to real life learning as possible (section 2). Students need to become aware of their learning approach and learn to consider the choices they make, but they also need to automatise productive learning habits (Marzano, 1992).

## *6.2. Focus on knowledge-building in the domain*

Process-oriented instruction has to deal with the tension between content (context, situatedness) on the one hand and process (general strategy, transfer) on the other hand. Although learning is conceptualised as contextual and content-bound, teaching also aims at transferable content knowledge and learning skills. The main point in the focus on knowledge-building is to overcome this tension. According to Hattie et al. (1996) “the further the extent of transfer, the more conditional knowledge and the deeper the content of knowledge required”. First, process-oriented teaching encourages students to mobilise and critically assess their prior knowledge, both on content and process. Prior knowledge may be (partially) unconscious and based on experience outside school. It is usually knowledge that seems self-evident to the owner. Mobilising and critical assessment therefore needs explicit attention in the learning process. Learning can either build upon prior knowledge or need to restructure and replace it, depending on the nature of the relevant prior knowledge. The teacher stimulates students to ask themselves questions about the subject, to pronounce ideas, discover assumptions, reflect on the why of these beliefs and compare their own beliefs with others’ and formal knowledge.

Second, the teacher’s task as an expert is to make the domain more accessible to the student, i.e. to introduce the student to the typical problem statements, the procedures of knowledge acquisition, the material surroundings, cultural artefacts (instruments) and social relations of the domain (Candy, 1991; Hutchins, 1995). Each domain knows a variety of learning activities appropriate to what needs to be learned, including learning-by-doing and learning-by-experience. Schön (1987) points out that education tends to mistake professional knowledge for the application of symbol

learning. However, professional expertise is to a large extent ‘knowledge-in-action’, and grows by ‘reflection-in-action’.

Third, for specific knowledge and skills to be useful in different situations (transfer) the learner should recognise the general aspects. The teacher helps students to discover the applicability of their strategic knowledge and skills, by ‘mindful reflection’, discussing similarities and differences and the how, why and when of strategy-use (Kuhn et al., 1995; Veenman, 1998). Transfer is never copying, but always demands a creative jump between what is known and what is new. Near transfer implies only a small step. Far transfer is a truly creative act. Process-oriented teaching promotes transfer by requiring students to practise in multiple contexts, with a range of tasks, with different teachers and by provoking mindful reflection (Volet, 1995).

Teaching in order to facilitate students to become more expert in a domain requires attention to all components of the learning process. Compared to novices, experts are more fully engaged in the learning process: setting high goals for themselves, mobilising and evaluating their prior knowledge, engaging in all kinds of learning activities, evaluating their learning process and results, monitoring the whole process and taking decisions on further action (section 5). Students should increasingly be asked to do all these things.

### *6.3. Pay attention to emotional aspects of learning*

Teaching needs to deal with the emotional aspects of learning, as discussed in section 4. Learning can be very nice and interesting, but also difficult and demanding, sometimes even threatening. It makes no sense for teachers to tell students that their subject is so interesting and important and that learning is worthwhile. Instead, teachers should show students that learning is worthwhile, even when it is difficult. Taking pleasure in solving a difficult problem and in carrying on when things get difficult can be modelled. Setting a learning goal (how to solve certain problems) rather than a performance goal (solving a certain problem) leads to higher motivation, and higher achievement (Schunk, 1996).

Positive feedback is another way to make students feel learning is worth the trouble. Feedback should foster the task-orientation of students, and therefore needs to be task-oriented rather than directed toward the person of the student. The latter would easily make students either self-defensive or dependent on praise. Positive attribution patterns are influenced by the kind of feedback teachers give. In process-oriented instruction it is especially important to link improved performance with strategy use (Hattie et al., 1996).

Self-direction also depends on ‘emotional intelligence’, which teachers can help students to develop (Goleman, 1995). The teacher may do so by helping students to recognise and name emotions, discussing in what way emotions influence what is going on and how to handle this. The learning content, process and situation are continuously coloured by emotion, influenced by the interaction between students and between teacher and student(s). Establishing positive relations in the classroom and teaching students to do so helps students develop their emotional intelligence.

Controlling one's emotions when necessary is part of emotional intelligence. Self-directed learning requires meta-affective regulation, including perseverance when learning is difficult, concentration, and rewarding oneself.

Students differ in their certainty-orientation. To prepare for self-directed learning in life, all students have to learn to deal with uncertainty. The teacher may gradually move to more open and larger assignments, perhaps giving students some choice to accommodate differences between students. The teacher may give positive feedback with regard to taking the uncertain steps in the learning process. Moreover, the teacher may model tolerance of uncertainty in discussions on the nature of knowledge and knowledge acquisition, which brings us to the fourth main principle.

#### *6.4. Treat learning process and results as social phenomena*

The school and classroom are a social learning environment. They still are, even if teachers do not consciously use them as such. Only the learning results may not be what we like. For example, students may learn to be aggressive, to bully, to keep aside when things happen that they know are wrong, to behave selfishly. These may all be ways to survive in a social environment where the participants have not learned more positive ways to live together. Teaching social skills is an educational goal in itself. Moreover, process-oriented teaching includes skills for social learning, like being able and willing to observe and learn from other people's actions, to ask others for advice and information, to understand (information from) other people's point of view, to relate one's own position to that of others, and to work productively together. Teaching social skills needs to be sensitive to the social relations as established and to work from the actual situation, gradually moving from simple to more complex social activity. Social learning refers to learning where the learner uses the social environment to learn from. Cooperative learning, where all partners involved are learning from and with each other, needs to be learned as well. To promote cooperative learning, the teacher should ensure positive interdependence in the group, give clear instructions on how to cooperate, give feedback on the cooperative process and reward cooperation (Abrami, 1995; Joyce et al., 1992; Slavin, 1995).

Perhaps the most difficult part is to treat knowledge as a social construction. School is traditionally an institution for the socialization of the young, implying that schools should transmit society's accepted knowledge to young people. Today a simple view of knowledge as 'truth' does not hold any longer. The development of new knowledge, and discarding the old, is a matter of concern for many people. Moreover, the production of knowledge is in many ways dominated by the most powerful in society. Democracy is built on an equal participation of all members of society in constructing the social world. This requires that all involved participate in thinking, discussing and deciding on what shall be accepted as legitimate knowledge in all kinds of situations (section 1). Today's schools should not just make sure young people start sharing society's knowledge, but help them take responsibility in the critical assessment, change and growth of accepted knowledge. Teachers may help students to experience learning as participating in the social construction of reality, by means of cooperative learning assignments and in classroom discussions.

To foster this kind of involvement however, schools need to realize how, as an institution they take part in the construction and reconstruction of reality. Schools and teachers need to be aware of the complexity of the pedagogical encounter and to realize how power within the pedagogical relation may lead to manipulation. Promoting critical thinking should go beyond leading to the ‘correct’ answers that the teacher had in mind (Weiler, 1996).

## **7. A multidimensional approach of teachers’ learning and change**

Shifting to process-oriented instruction, which fosters self-directed learning in students, is a quite demanding change. The multidimensional approach as discussed in section 2–5 is also relevant to teachers’ learning. The teacher’s learning process is context-bound and integrated in the community of practice of the school (section 2). The social construction of reality in schools plays an important part in sticking to traditional teaching as well as it may play an important role in changing teaching practice. Critical reflection on assumptions, goals and values in the institutional context should be an essential part of teachers’ collaborative learning and the school’s culture (Zeichner and Liston, 1996). Group and organizational transformational learning can be fostered by strategies such as action learning and collaborative inquiry, both involving action and reflection (Baumgartner, 2001).

Changing practice and thinking which has been functional for many years, is not easy. Prior knowledge, including habits, is resistant to change (section 3). The teachers’ learning process may require conceptual change, or even transformational learning. A lot of experience has contributed to the practical knowledge of teachers. Experiential learning and critical thinking (reflection) need to be intertwined to foster further learning and change. Emotional aspects are crucial in this process; the teacher’s identity is involved (section 4). Teachers with a high tolerance of uncertainty probably find process-oriented teaching challenging, while certainty-oriented teachers will tend to stick to what they know and believe to be effective (Huber and Roth, 1999).

Lifelong learning goes on while teaching, sometimes successful and sometimes frustrated, going the wrong way or stopped (section 5). Teachers set goals, depending on what they encounter and consider worthwhile. In order to learn they need to engage actively in a constructive, goal-oriented process in which the teacher–learner is taking control him/herself, monitoring and deciding on further action, participating in collaborative action and reflection in a school culture that is supportive of critical inquiry and action.

## **8. Conclusion**

Although education seems to embrace self-directed learning as an important educational goal, adopting this goal cannot be done without reflecting on the tensions between the authority that the school exerts as a societal institute, and the values



and goals that the school wants to pursue. Self-direction can be an educational goal for a variety of reasons. Different perspectives in learning theory help to understand the complexities of learning as it goes on throughout life. Process-oriented teaching, aiming to foster and facilitate self-directed lifelong learning among students, can be usefully supported by the integration of several perspectives in learning theory. A multidimensional basis for conceptualising and implementing process-oriented teaching includes studies of learning in the social and cultural context, the influences of prior knowledge, the importance of emotional aspects, and the self-regulation of learning.

Process-oriented teaching involves four main principles. One is helping students to gradually acquire the competences to regulate all components in learning. The second is stimulating the knowledge-building process necessary to gain domain expertise. The third principle refers to the attention to emotional aspects of learning, including fostering motivation and a positive pattern of attribution, as well as helping students to enlarge their tolerance of uncertainty. Fourth, schools and teachers need to treat the learning process and results as social phenomena. This means teaching social skills and cooperative learning, as well as stimulating students' collaborative and critical inquiry into knowledge as a social construction of reality.

The multidimensional approach to learning applies not only to students, but to teachers' learning as well. Teaching is not just an individual activity but a social practice with a complex power structure. If preparing for self-directed lifelong learning is accepted as an important educational goal based on democratic ideals, the challenge is a fundamental issue.

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