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Using pragmatism to develop didactics in Sweden

P.-O. Wickman

Abstract: This paper reviews how pragmatism has been adopted as a systematic grounding for didactics in Sweden. The approach is action-oriented and emphasises the communicative activities that occur in educational settings. Four methodological components are described: (1) the empirical method of inquiry, the notions of (2) selective traditions and (3) organising purposes, and (4) practical epistemology analysis. Together, these tools can be employed for planning, assessing and analysing the choices teachers make regarding methods and the content of teaching. They have been purposely developed to support teaching and learning in terms of the interactions encountered by teachers in exercising their profession. The units of analysis concern activities and how they are conducive to the purposes of lessons.

Keywords: Didactics · Pragmatism · Sweden

Die Entwicklung der Didaktik in Schweden mithilfe des Pragmatismus

Zusammenfassung: In diesem Papier wird dargestellt, wie der Pragmatismus als eine systematische Begründung für Didaktik in Schweden entwickelt wurde. Der Ansatz ist handlungsorientiert und betont die kommunikativen Aktivitäten, die in pädagogischen Settings auftreten. Vier methodische Komponenten werden beschrieben: 1) die empirische Methode der Untersuchung, die Begriffe 2) selektive Traditionen und 3) organisationale Zwecke sowie 4) praktische Erkenntnistheorie. Zusammen können diese Werkzeuge für die Planung, Bewertung und Analyse der Lehrerentscheidungen in Bezug auf Methoden und Inhalte der Lehre eingesetzt werden. Sie wurden entwickelt, um das Lehren und Lernen zu unterstützen in Bezug auf die Wechselwirkungen, denen Lehrer in der Ausübung ihres Berufes ausgesetzt sind. Die Einheiten der Analyse betreffen Aktivitäten und wie sie förderlich sind für die Zwecke des Unterrichts.

Schlüsselwörter: Didaktik · Pragmatismus · Schweden

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1 Introduction

In this paper I review how pragmatism has been adopted as a systematic grounding for didactics. This development has been led by Swedish researchers, and this review will therefore focus on their work. The approach is action-oriented and emphasises the communicative activities that occur in educational settings, and hence have close relationships to socioculturally-oriented educational research. Related theoretical starting points can also be found within some German traditions in didactics (Jank and Meyer 2003; Meyer 2011)[1] and also within some new tendencies in French comparative didactics (Ligozat 2011; Sensevy 2011; Wickman, in press). I will start by giving the background of the growth of didactics research into a professional science for teachers in Sweden, before reviewing how a pragmatist epistemology can be applied to didactics.

2 Didactics, a science of the teacher profession[2]

Compared to Germany, *Didactics* is a young academic field in Scandinavia. It is often described as either a sub-discipline of *pedagogy* (Kansanen et al. 2011)—which is typically termed *general didactics*[3]—or as a kind of inter-discipline of pedagogy and a subject discipline, commonly referred to as *subject specific didactics,*[4] and described as the bridge or intersection between a subject area (e.g. science) and pedagogy (Sjøberg 2000). Such a division looks back upon the *academic* mother disciplines of didactics in the 1980s, a time when the number of dissertations oriented to didactics started to increase. Today didactics has grown beyond this initial stage and become an independent academic discipline at many universities. To better see the recent expansion of didactics in Scandinavia, it is not only its growth out of the academic disciplines that needs to be appreciated, but even more so the origin of didactics in teacher education and the need for a profession-oriented academic discipline.[5]

Back in the 1970s, pedagogy was the only academic discipline common to all teacher education programmes. However, according to a long tradition secondary teachers also had a grade in additional academic disciplines depending on the school subjects to be taught. Apart from these academic disciplines all students also received courses in methodology.[6] However, this discipline, which was unique for teacher education, did not have academic status and hence it was not possible to include credit points from methodology courses in a bachelor's, master's or doctoral degree, only in a teaching degree. In the 1980s and 1990s doctoral dissertations with an orientation towards didactics typically defended within the discipline of pedagogy and exceptionally at a subject department (e.g. a mathematics or language department).

Often PhD students in didactics were former secondary school subject teachers, although occasionally primary teachers were also enrolled. Many of the PhD students were also teacher educators with positions in praxis-oriented methodology departments and were responsible for giving student teachers their basic skills in teaching their school subject. Didactics as subject-specific didactics grew out of the need of these teacher educators to give their teaching of methodology a systematic basis beyond single lessons based on theory and empirical scrutiny. In Sweden, this generally meant the transforma-

tion of the merely praxis-based discipline of methodology into various academic disciplines of subject-specific didactics. For example, in the 1990s some courses in science teaching methodology were reformed into science didactics courses, also introducing student teachers to science education research. Since the 1990s, all the methodology courses in pre-service teacher education have been replaced by academically qualifying subject-specific didactics courses, and subject-specific didactics degrees have been established in doctoral education as well.

This growth of subject-specific didactics saw it becoming defined by both the subject and the teacher profession, and less so by general didactics and discipline pedagogy. Its object of research tended to be about a specific subject area taught also when developing more general theoretical frameworks for learning and teaching because a teacher's main preoccupation in class is a specific content and how it can be taught. Hence, didactics was not just a question of the methodology of teaching a given content, but it also advanced a critical and constructive stance towards the content taught at school. This entailed a discussion about what the school subject is beyond its definition as an academic discipline. At the same time, the discussion about content in teaching necessitated theoretical advancements regarding how certain content can be learnt and taught. Teachers had difficulties understanding how general psychological or pedagogical theories of learning could be adapted for use in their classrooms when teaching certain students a specific content. All these changes and the unsolved problems resulted in the formation of subject-specific didactics fields as independent academic disciplines.

Didactics may be defined as answering to the questions "What content should be taught?" and "How should it be taught?". These questions define what a teacher faces when planning, carrying through and assessing the results of teaching. They concern the teachers' selection of content and methods in relation to specific students taught at a specific place and time. To support the choices of teachers in a systematic way, didactics research needs to make inquiries into the reasons for making certain selections of content and methods in relation to certain contexts. To emphasise this basis for rational and systematic choice, the question "Why?" is added: "Why this content?" and "Why these methods of teaching?". Sometimes additional questions like "For whom?", "When?" and so forth are added (e.g. Jank and Meyer 2003; Selander 2010), emphasising that choosing content and methods is always made in relation to certain students at a specific place and time.

The movement away from general didactics to subject-specific didactics may seem to encourage balkanisation of the teacher profession into a multitude of narrow research fields (cf. Seel 1999). However, subject-specific didactics of different disciplines should not be seen as disconnected, but as sharing a common interest in the teaching and learning of various kinds of content. Theories need to be developed that help teachers cope with students' learning of content and that, at the same time, can be generalised beyond a specific content. However, such theoretical generalisations cannot be made simply by rational deduction, but need to be transacted empirically as well as practically in relation to the new content. This then is a pragmatist argument for developing a content-dependent science of *comparative didactics* along French lines (Caillot 2007) instead of *general didactics*.

3 A pragmatist epistemology

A systematic inquiry needs a theory of knowledge to answer its questions. If we agree that the emphasis of didactic inquiry is on teachers' grounded choices of actions, an action-oriented epistemology is called for. Pragmatist epistemology is about knowing in action and about making sense of the consequences of actions in ways that help us proceed with our undertakings according to the purpose, for example when teaching for the learning of a certain content in the classroom. Knowledge is not ultimately a mental state of correctly understanding how language propositions correspond to the world. The American neo-pragmatist Rorty (1991, p 1) claimed that his epistemology did not "view knowledge as a matter of getting reality right, but as a matter of acquiring habits of action for coping with reality". Gaining knowledge thus means learning to successfully transform patterns of action in relation to situated consequences. The use of the term *situated* indicates that actions are not evaluated and judged by an isolated private mind, but always as part of already established social practices and institutions.[7]

One way to approach pragmatist epistemology is John Dewey's reasoning on inquiry as part of lived practice. Practices are part of communities and institutions where actions are carried out in habitual ways and so tend to produce certain often anticipated consequences (Dewey 1922). According to Dewey, inquiry springs from the need to improve the consequences of such practices (Dewey 1929/1958). Problematic consequences result in questions about alternative ways of acting. In teachers' professional practice these consequences and questions are didactical and concern the content and methods for teaching certain students. That problematic consequences occur as part of practice does not mean that the habits and customs of the practice can or should be exchanged on a wholesale basis. Instead, these habits are complex and indispensable ways of accomplishing the purposes of the practice. They should be seen as crucial knowledge of teachers and as starting points for piecemeal change. To use an often repeated metaphor: the ship needs to be rebuilt while sailing. Teachers need established routines to teach, and they need to be changed functionally in interaction with class through bit-by-bit revision (Wickman 2012).

At the core of this epistemology is Dewey's (1929/1958) *empirical method of inquiry*, which has many similarities with Schön's (1991) ideas on the reflective practitioner and with action research (Persson et al. 2011).[8] However, for Dewey this method was a basic scientific heuristic for improving any field of knowledge. The name of the method alludes to Dewey's critique of a purely rational philosophy and his plea for a more naturalist philosophy based *also* on the empirical consequences of philosophical ideas. It can be described in various ways, but here I will make an adaptation in three steps (cf. Wickman, in press).

The first step of the empirical method of inquiry entails reflecting on how certain habitual distinctions could be made otherwise and the consideration of the possible meliorating consequences that these changes may have for our purposes. This reflection is often based on theory or methodology imported from other practices, such as research or the practices of other teachers. We may, for example, consider replacing some established conceptual schemes, tools or methods of teaching with new ones to see how consequences change.

In the first step, reasons for new distinctions and possible consequences are rationally anticipated and evaluated using imagination and collective prior experience.

In the second step the new distinctions are enacted in practice to see the actual consequences for our purposes and what we value. This step is necessary because consequences are highly contingent upon the new situation of use, and cannot be evaluated only from the rationally anticipated consequences in the first step (cf. Hamza and Wickman 2008). The new distinctions introduced are typically imported from another practice and need to be revised so they can be handled by the participants in ways conducive to the purpose. Pickering (1995) referred to this revision through practice as *mangling*. Mangling means that practitioners learn how to purposefully adjust old habits and new distinctions to contingent consequences. For example, academic concepts like "learning communities" may be introduced by researchers to meliorate teachers' practice. In this empirical step, practitioners learn to use and adapt the distinctions introduced through the consequences in relation to the practice they take part in.

In the third step, the consequences of the second step are taken back for rational reflection again. The new distinctions first introduced are now changed to better suit the purposes and values of the specific practice. Also our problems, purposes and values may need to be mangled in this step. These three steps can be repeated over again and as many times as seen necessary to adapt a certain conceptual scheme for aiding praxis. Consequences are judged according to how they support our undertakings in continuing according to purpose. When new distinctions are imported from other practices and are helpful for changing our habitual practices according to their purposes, we may say that the two practices and their purposes are made *continuous*.[9] This continuity is thus the ultimate epistemological criterion to judge if the empirical method has helped us in "acquiring habits for coping with reality". The criterion is not whether the concepts of the first practice correspond to the same objects, events and actions in both practices. It should be noted that purposes are done and shared in practice. They should not be understood as private intentions. In class, for instance, students need to do the purposes together with each other and with the teacher to be able to learn new habits to cope with reality. In this way, a purpose should be understood as a technical term of pragmatism that answers to Goffman's (1974, p. 25) central question that arises to make sense of a practice: "What is it that's going on here?"

These principles suggest how didactics research and practice can generalise methods beyond specific content and subjects. Whatever may be of use can be taken further in another practice as long as it can be adapted to suit our purposes. Hence, from an action-oriented pragmatist stance the systematic theories that didactics develop should not be understood as exact deductive systems that universally can predict the best way to teach. They can rather be seen as situated conceptual frameworks that can be used by teachers to cope with their daily choices (cf. Uljens 1997) and to meliorate practice according to certain values and purposes. Didactics gets its value for practice through its continual reflective integration with the action competence and routines of the teacher (Jank and Meyer 2003). Too general theories (i.e. without any specification with regard to the teaching of subject content) risk being useless to teachers, whereas too specific and detailed recommendations risk overseeing the contingent aspect of every teacher's situation and hence being of little use in developing teachers' actions beyond a specific lesson and situation.

In what follows I first illustrate how pragmatically-oriented research has been used to develop conceptual frameworks for choosing content. Next follows research on how pragmatism has been used to develop frameworks for reasoning about methods of teaching certain content and how they can also support teachers in monitoring and assessing the content students actually learn.

4 Choosing content

To answer the question about what content should be taught, research needs to situate subject content in the lives of students and in society at large. This means critically examining the potential content and the mutual relationship of the intended curriculum, the taught curriculum and the actual curriculum learnt by students (Cuban 1992). Moreover, learning does not just encompass subject content in the strict sense, that is, the current academic frontier of subject knowledge, but also the capacities of students to use and transform subject knowledge in various non-school settings and the attitudes and habits students develop by taking part in classroom teaching. Learning also means to be socialized into participation in various communities (Englund 1997; Wenger 1998).

Taking a critical stance on the school subject entails approaching education not merely as the training of work force or preparing students for higher education programmes, but also one of educating individuals with personal needs and as citizens of a democratic society. In Scandinavian countries, these curricular goals are usually discussed by using the German concepts of *Bildung* and *allgemeine Bildung* as opposed to *Ausbildung*.[10] Compulsory school, and to some extent also upper secondary school, is generally seen as primarily oriented to *allgemeine Bildung* rather than towards *Ausbildung*. *Allgemeine Bildung* in this sense involves discussions about what knowledge and competencies all citizens need. *Bildung*, on the other hand, does not mean merely becoming a well-informed citizen, but also developing good taste and building moral character and judgement in personal and societal matters (Wickman et al. 2012).

At the same time, the point of *Bildung* is under continuous discussion and critique from pluralist positions and from various groups of interest about the degree to which schools should channel students towards some pre-determined dispositions or if they should give students general action competence to make informed choices (Jensen and Schnack 1997; Sandell et al. 2005). The discussion also concerns whether the learning of academic factual knowledge is primary to application, or whether the value-laden context of use is primary to the learning of concepts and the evaluation of facts (Östman 1994; Wickman and Ligozat 2011). Lately, the American concept of *literacy* has tended to replace the concept *Bildung* in the Scandinavian debate, probably due to the dominating influence of Anglo-Saxon educational research and the emphasis of the international PISA study on literacy (Sjøberg 2000). Literacy, in this debate often refers to *allgemeine Bildung*, but also to its formal sense as relating to capacities of being able to read and write in specific genres and subjects (Liberg et al. 2011).

As a result of this discussion on the content of the school subject, various conceptual schemes have been developed to aid teachers' choice of content. In pragmatist-oriented research, these content-related rubrics have been developed by empirically studying so-

called *selective traditions* of different school subjects, that is, which habitual inclusions and exclusions of content are made among certain groups of educators. Williams (1973) originally used the concept of selective traditions to point out that educational choices are embedded in culture and already established praxis.[11] Although he based his argument on Marxist theory, the understanding of educational choices as basically institutional customs aligns well with pragmatist epistemology. For example, in a seminal study on selective traditions Östman (1995) used Australian (Fensham 1988) and North American (Roberts 1982) findings to study Swedish textbooks in science. The various historical grounds he found for selecting content for school science are now generally used for discussing the choice of content in science teacher education in relation to whether science is aimed at all students or just those who will choose a science career. The selective traditions Östman identified have also been very influential on formulations of the Swedish national curriculum.

Sandell et al. (2005) examined the selective traditions used in secondary environmental education and education for sustainable development. They identified three major traditions, the fact-based tradition, the normative tradition, and the pluralistic tradition. These traditions can be traced to curriculum reforms in the 1960s, 1980s, and 1990s respectively. The *fact-based tradition* sees environmental problems as being due to a lack of scientific and primarily ecological knowledge. Teachers within this tradition teach students the true scientific knowledge they need to understand how the environment functions. It is tacitly implied that students can identify and solve environmental problems as long as they have the ecological facts right. Teaching according to the *normative tradition* identifies environmental problems with people's life styles and values. Thematic units are taught where knowledge from various sciences apart from the natural sciences is applied to solve environmental problems. It is taken for granted that the environmental problems are uncontroversial scientific issues, which can be identified on purely scientific grounds. Students learn how they may change their life styles and values to serve the needs of the environment better. In the *pluralistic tradition,* environmental problems are taught as conflicts between people with different interests (Lundegård and Wickman 2007; Schnack 1998). They are approached as moral as well as political problems that need various sources of knowledge and also students' values and opinions to be solved. Education has a democratic emphasis and students are taught action competence in these matters. The nature of these three selective traditions is used in teacher education to help students see which possible content, aims and purposes there are for environmental education and education for sustainable development, and to support more grounded choices.

There is a close relationship between the questions "How?" and "What?" By teaching a certain way teachers include certain messages and exclude others and so they also privilege certain content instead of something else. Much of this content is value-laden as is evident from the selective traditions mentioned above. In science, one important message could be whether all students belong in science class or only those aiming for a science career. In environmental education it could concern democratic values and the values of various kinds of knowledge for decisions on important questions regarding the future. Dewey (1938/1997) already pointed out that often the more important lessons students learn are not the facts learnt in geography or history classes, but the lasting attitudes of likes and dislikes that students constitute. Dewey called the learning of these

enduring attitudes collateral learning (p. 48). Östman (1995) developed these ideas further by using the construct *companion meanings*. Roberts and Östman (1998, p. ix) have explained them as follows:

> Science textbooks, teachers, and classrooms teach a lot more than the scientific meaning of concepts, principles, laws and theories. Most of the extras are taught implicitly, often by what is *not* stated. Students are taught about power and authority, for example. They are taught what knowledge, and what kind of knowledge, is worth knowing and whether they can master it. They are taught how to regard themselves in relation to both natural and technologically devised objects and events, and with what demeanor to regard those very objects and events. All of these extras we call "companion meanings", …

Observation of companion meanings entails taking account of the fact that there are always aesthetic, normative and moral consequences for the choice of content and of methods that also concerns power and discursive relationships about who can speak and what is possible to say (Englund 1997). Characterising companion meanings systematically makes it possible for teachers to use them for reflection on the consequences of the content taught for the curriculum learnt by students.

Sund (2008) examined the companion meanings of the three selective traditions of environmental education. In interviews he found that teachers of the three selective traditions tended to systematically privilege certain companion meanings over others to different degrees (Sund and Wickman 2011a). These companion meanings concerned, for instance, messages about nature as an object or subject, about intergenerational and human solidarity and on students' democratic citizenship. Sund and Wickman (2011b) also interviewed students of the same teachers and found that they generally apprehended these companion meanings of their teachers, although they did not always agree.

Other studies have examined the selective traditions and companion meanings of, for example, inquiry-based learning and laboratory learning in science in secondary school (Gyllenpalm et al. 2010; Lidar et al. 2006; Lundqvist et al. 2009, 2012) and in physical education (Öhman 2010). However, all of these studies can be said to be examples of the first step of the empirical method, where practice is conceptually reflected on. More research is needed to find out how these conceptual schemes can be fruitfully used by teachers in practice to choose content purposefully and to what degree they need to be mangled both practically and theoretically to be of more general use to teachers in planning and assessing the content taught in relation to the content actually learnt by students. Further research is also needed to see the usefulness of studying the companion meanings and selective traditions of more school subjects.

5 Choosing ways to teach

Action, knowledge and learning are intimately intertwined. A practice does not mean aimless behavior, but an orientation stemming from purposes and with regard to content (including values). Starting from our purposes as well as from current practice, we should ask how they can be made to interact in such a way that they create learning progressions

for the students through teaching. *Learning progressions* can be defined as the pathways "by which children can bridge their starting point and the desired end point" (National Research Council [NRC] 2007, p. 214). By using the plural form "progressions", the NRC emphasised that there may be many trajectories along which progression occurs.

In a pragmatist understanding, learning progressions involve learning new habits and ways to act as part of a life, community and practice. The starting point is the purposeful action of participants as part of one practice and the reorganisation of that practice by the participants into another practice (Wickman and Ligozat 2011). We can base this idea on the steps of the empirical method. However, the focus here is not on the transformation of the teacher together with researchers, other teachers and their students, but the transformation of the learning students together with the teaching teacher(s). When teaching the students, the teacher should already be competent in both practices in relation to the content supposed to be learnt by the students, whereas to begin with the students are familiar only with one practice. When teaching, the teacher should be able to participate competently in both practices and so be able to support the progression of students from the first practice into the next.

To begin with, the teacher needs to construe two practices that seamlessly could make up one activity with adjoining purposes according to the following principles. The initial practice is characterised by a *proximate purpose*, which means that it has a purpose permitting students to use their language and relate to their experiences according to this purpose. Here experience should not be understood solely as students' prior experiences, but even more so as the experiences they acquire as part of this initial practice. If the proximate purpose works in this way to the students, it is said to give the students an *end in view*, that is, in the Goffman sense (1974) the students understand what is going on and can contribute constructively to the conclusion of the practice. The initial practice is also characterised by the fact that it has proximate purposes that can be improved by mastering the purposes of the second practice.

The second practice, towards which learning progression should strive, is characterised by an *ultimate purpose*. The teacher should be well versed in this activity with its ultimate purpose, which is a more general learning aim of the curriculum, beyond, but encompassing competencies of the proximate purpose. Together, the proximate and the ultimate purposes are called *organising purposes* because they can be used by the teacher to organise the teaching and learning of a lesson or a unit with their curricular aims.

The use of organising purposes can be illustrated by an authentic example of how a teacher uses the question of *why we have tyres on our cars* as a proximate purpose in a discussion with students that serves the ultimate purpose of teaching students about *how friction is related to motion* (Johansson and Wickman 2011). The planned proximate purpose of discussing why we have tyres on our cars can be seen to function as an end in view to students because they are able to use their language and experience to make contributions to this activity. They say things like "won't get anywhere", "get a grip", and "just move around" about why we have tyres, and then relate these usages of language to experiences from a previous experiment with a toy car with and without tyres and from driving in the winter with tyres with and without studs. When a proximate purpose works as an end in view, it gives students agency in the sense that they can judge themselves whether their actions and utterances are relevant and sufficient for the proximate purpose

or not. But as the students do not know yet how to use the concepts *friction* and *motion* to argue their case, the teacher is needed to slowly introduce these concepts to the students and make them see how they can be used (the ultimate purpose) not only for the proximate purpose, but also to understand how friction is useful to argue about motion more generally for various situations. In that sense, the transformation of the practice from the proximate to the ultimate purpose should be assessable by the teacher as augmented competence and agency in using the generic ultimate knowledge for the proximate purpose and vice versa.

The use of organising purposes for learning progressions can be related to the empirical method as follows (cf. Wickman, in press). The initial activity with a proximate purpose can be seen as a practice with which *students* are familiar. They know how to act according to this praxis and thus know what the purpose means in terms of what is relevant to say and do, although they do not have all the answers. It is important that the proximate purpose have this legitimacy for the students. Together, the teacher and the students can remind each other about relevant experiences using every-day language. The first step of the empirical method starts from this familiar practice. When it is clear that the proximate purpose of this practice works as an end in view to the students, the teacher introduces new concepts or skills from the curriculum (e.g. *friction* and *motion*) that can be used to discern new distinctions also in relation to the proximate purpose (e.g., why we have tyres on our cars). These new distinctions are used together with the students to see how they actually can be used to support the proximate purpose. These joint usages of distinctions are then in the third step brought back to the meanings of these generic distinctions themselves to see how students' language use is related to the more generic conceptual or action schemes. For example, when discussing why we have tyres on our cars there are only some experiences that concern how friction is related to motion. Certain experiences of students can be furthered by the ultimate purpose whereas others cannot be advanced in this way. Making such inclusions and exclusions is an important part of learning the continuity of the proximate and ultimate purposes. The reason we have tyres on our cars so as not to destroy the road and the rim of the wheel cannot be better understood by the conceptual relationship between friction and motion, whereas the use of studs to increase the friction in winter can. Thus both reasons need to be explicitly discussed with the students to help them see in what situations friction is useful. Similarly, students need to see how their every-day language (e.g. *sliding around*) is related to the scientific language usage.

The steps of the empirical method, where organising purposes are used, tend to change the purpose of the activity from dealing with the proximate purpose (why we have tyres on our cars, which also encompass for example economic and technical aspects) to the ultimate purpose (to what kind of situations are the concepts of friction and motion applicable). This can be repeated again in new cycles where earlier ultimate purposes may turn into proximate ones for further lessons (e.g., how can the concepts of friction and motion be applied to other situations). The important thing is that the proximate purposes work as ends in view to the students and that they can be made continuous with the ultimate purposes.

The teacher thus has an important role not only in matching organising purposes in planning the activities of the lesson, but also in assessing whether the proximate purposes function as ends in view to the students and whether the students can be seen to make

the experiences and everyday language of the proximate purposes continuous with the experiences and professional/scientific language of the ultimate purposes. Creating such continuity ad hoc on the spot during the lesson without planning specific activities with this aim may be too demanding for the teacher. Based on semiotics and Peirce pragmatism, Hubber et al. (2010) suggested interesting ways of planning for such continuity during a lesson that is possible to combine with the notion of organising purposes (Tytler et al., submitted). One example is where a teacher gave the students a lump of Plasticine (a clay-like material) to mould in order to introduce the concept of force. The teacher then asked the students to describe in their every-day words what they had done to their lump of Plasticine. These activities gave students proximate purposes that worked as ends in view. The teacher listed these words (e.g. *stretch*, *carve*, *twist*) on the board and through gestures represented the words and actions of the students concerning the lump of clay by categorising them as either *push* or *pull*. Eventually, the teacher told the students that force can be categorised as either push or pull. Together, these latter activities made it possible to support the continuity of the proximate purpose with the ultimate one in a planned way. In line with the empirical method, we are currently working with all these heuristic tools at Stockholm University and University of Gothenburg together with teams of lower secondary school teachers in advancing how they can be fruitfully used by teachers.

Organising purposes can be seen as an elaboration on the notion of *communities of practice* (Wenger 1998) in relation to more formal school learning. Instead of seeing the learner initially as a peripheral participant of one practice alone (the ultimate one), learning is seen as improved participation in two (or more) practices through the guidance of the teacher. In this way organising purposes for learning progression can be used as an operationalisation of Vygotsky's *proximal zone of development*. Vygotsky (1978) defined the proximal zone of development as "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (1978, p. 86). However, this experimental definition gives little support for teachers concerning how to accomplish it and more specifically how it could be made visible and assessed from students' moment by moment action in the classroom. Here the organising purposes affords such an operationalisation to the teachers where a functioning proximal zone of development can be seen to be established when a student uses the proximate purposes as an end in view, and where the student, with the support of the teacher, can be seen to establish continuity between the language use and experiences of the proximate purposes to those of the ultimate ones. Thus, to make progression visible it is important that the teacher does not establish this continuity alone, but that students actively produce the connections between language usages and experiences in a way that can be assessed continually by the teacher. To assist this work of the teacher, instruments for monitoring this continuity and direction of learning have been developed.

6 Monitoring and assessing the direction of learning

In a general sense, students always learn something from an educational situation; the problem is the direction learning takes (Lave 1996). This makes it necessary for the tea-

cher to make progressions visible during lessons. If we as teachers choose to assess just the final outcome, we will have no clue of what affected the outcome, and so have little idea of how to improve the lesson beyond trial and error. For this reason the methodology *practical epistemology analysis* (PEA) has been developed (Wickman 2004; Wickman and Östman 2002). Its purpose is to help the teacher or the researcher monitor how the ways of teaching facilitate students learning certain content. It can be used to trace learning in any of the steps of the empirical method. Practical epistemology analysis was developed to serve the specific needs of didactics and so of teachers. This means that students' learning is analysed from their talk and action, that is, through the media available to the teacher. PEA was also developed not to be restricted to just the cognitive aspects of learning, but also to the learning of values such as aesthetic and moral learning (Öhman and Östman 2007; Wickman 2006). For example, PEA has been used to examine the role that aesthetic experience plays in learning science and how learning science also means learning a certain taste in terms of expectations and distinctions in relation to consequences at science lessons (Arvola-Orlander and Wickman 2011; Jakobson and Wickman 2008; Lundegård 2008; Wickman 2006).

Just like the empirical method, PEA starts from the purposes of an educational practice and proceeds to study how 1) the *encounters* of the practice have consequences for the students in terms of 2) the *relations* they construe 3) between what *stands fast* 4) to fill *gaps*. An encounter is what can be seen to meet in a specific situation. What stands fast[12] are the actions and words that those taking part in the encounter use without hesitating about or questioning their meaning. What stands fast is used by the interlocutors to construe new relations about what meet in the encounter. Relations are said to fill gaps. When a gap is filled with a relation, the activity can continue. Sometimes gaps are noticed by those taking part in an encounter, although the gaps are not filled. Such gaps are said to linger. Lingering gaps have the effect that the activity stops or finds new directions to continue according to the purpose. PEA entails taking notice of how all of these piecemeal exchanges of meaning add up to the learning of new content through the change of discourse and the growth of purposeful habits in the classroom (Wickman and Östman 2002; Wickman 2004).

An example from an insect laboratory practical can be used as a brief illustration of how the technical terms of PEA are used (Wickman and Östman 2002, p. 607). The purpose of this practical was that the students would *make their own observations* of five different insect species *to see how they were built*. In one instance, two students were comparing a pinned bumblebee with a pinned beetle:

M: This one [a beetle] is bigger, isn't it, but has smaller eyes if you compare with the bumblebee.
L: Mmm [concurs]

In this situation we can see that the students noticed the gap concerning the purpose of how the insects were built. They can be seen to fill this gap with relations between the beetle ("this one") and the bumblebee and their relative sizes. We can thus say that this situation helped them to learn the relation according to purpose that their bumblebee has comparatively smaller eyes than another insect. In learning this, the students used

certain words that stood fast, that is, they used words like "smaller", "eyes", "this one" and "bumblebee" without asking each other what they meant. The words made sense in *this* situation. We can see that through the conversation encounters occurred between the two students (L answered "mmm" to what M said) and with the pinned beetle and the pinned bumblebee (M compared their pinned insects). It is evident from the comparison of the two insects that the encounter with the pinned insects allowed the students to learn the relation that the bumblebee has comparatively larger eyes than the beetle. A PEA in a similar way can be made of how the students habitually proceeded in all their encounters with the pinned insects, to see how such encounters can contribute to the learning of these students about insects. It was, for example, evident that although the meaning of "antenna" stood fast in encounters with textbook illustrations and with some pinned insects, they did not stand fast in making relations to other pinned insects (Wickman and Östman 2002). PEA can include any relationships, regardless of whether they include more conceptual content like in this example, or values such as for instance when two students during this lab practical also construe a relation between their bumblebee and being "so sweet" and "so lovely." This mini-analysis shows how PEA can be used to study the relation between how students are taught and what they are afforded to learn in relation to purpose.

In using organising purposes, PEA can be employed to examine whether proximate purposes function as ends in view and whether continuity is established between the proximate and ultimate purposes. When proximate purposes are working as ends in view, it should be visible from student talk and action in that students notice gaps and fill them with relations that have to do with the proximate purpose. Using the example with why we have tyres on our cars students should be seen to habitually relate to situations (encounters) where tyres make a difference to cars. Students should also be seen to make use of language that stand fast to them, namely, words that they do not need to ask the meaning of, but can use without hesitation for the proximate purpose.

However, in making the proximate and ultimate purposes continuous students in various encounters need to begin to relate the meanings of their customary word usage to the meanings of the new concepts, such as for example *friction* and *motion*, which will not stand fast in each and every encounter, but need to be questioned. The teacher is now critical in scaffolding the students in making new relations and monitoring the relations that are construed by the students and the words that stand fast to them in actual use in pursuing the ultimate purpose. Moreover, the fact that a word use stands fast to the students in a specific encounter does not mean it is used with desired consequences with regard to the ultimate purpose. Also the meanings (consequences in use) of well-known words may need to be questioned. One example from a chemistry class at the university illustrates this (Wickman 2006, p. 111), where students were to analyse the content of test tube solutions, among other things by using the colour of the solutions. Before the lab practical, the students in a humorous way asked the teacher if the colours of the solutions could be used for identification:

Eva: So they [the test tube solutions] are fully natural colours then?
Teacher: Yes. Some may be a little discoloured.
Anna: So you didn't put any dye in or anything?

Teacher: No, no, why would we do that?
Fatima: To make it nice.
Teacher: No, this is nature. It's nice the way it is.

Later, during the same practical, when examining one solution, students learned what it meant that a solution is discoloured and thus, although it had colour in an every-day sense of the word it did not have colour in the situated scientific sense that had consequences for carrying out the analyses of this practical. Here it was helpful for the purpose of the practical that the meaning of the word *colour* first did not stand fast to the students and was questioned by them.[13]

For more long-term change, the practical epistemologies of whole habits and customs can be analysed. PEA has been used in numerous studies to examine the relationship between teaching methods and subject content, companion meanings, and values learnt by the students (see Kelly et al. 2012).

7 What qualities can be found in a pragmatist approach?

Pragmatism offers a systematic grounding for didactics research through the empirical method of inquiry, the notions of selective traditions and organising purposes, and through the practical epistemology analysis (PEA). All have been adopted and developed for didactics research explicitly based on pragmatism (Östman 1995; Wickman and Östman 2002; Sund 2008; Johansson and Wickman 2011; Wickman, in press).Together these tools can be employed for planning, assessing and analysing the choices of teachers regarding the methods and content of teaching. They were purposely developed to support teaching and learning in terms of the interactions encountered by teachers in exercising their profession. The units of analysis concern activities and how they are conducive to their continuation according to the purposes of lessons.

The concept of selective traditions presents an empirical way of approaching content with regard to what is included and excluded in the curriculum. Companion meanings emphasise that content is about much more than the academic subject content. The empirical method of inquiry emphasises the need for situating and mangling research results with teachers before they can be profitably used. The empirical method is also the basis for the notion of organising purposes, where students and teachers jointly mangle ultimate purposes with proximate ones that function as ends in view. Organising purposes allow us to operationalise the proximal zone of development in teacher terms. Together with the ideas referred to earlier about how to organise semiotic resources developed by Australian researchers, a less contingent way of making the organising purposes continuous seems to be afforded.

Practical epistemology analysis permits this proximal zone of development to be closely monitored from how language, action and experiences fill gaps with relations and make the organising purposes continuous. It makes it possible to study how certain organisations of classroom work support students' cognitive learning, learning of values and learning about themselves (Lundegård and Wickman 2009; Arvola-Orlander and Wickman 2011).

Research within this area has been carried out for more than a decade by numerous researchers. Still there are challenges to expand the approach to more school subjects. Research has been carried out within science education, mathematical education (Ligozat et al. 2011) education for sustainable development, physical education (Maivorsdotter and Quennerstedt, in press), and museum education (Piqueras et al. 2011). There is also a need to further mangle the various conceptual schemes in interaction with teachers to tailor them to their didactical fields of use. Moreover, most studies have focused on one or a few lessons. More long-term studies are needed to see how the habits and customs of teachers as well as of students can be changed in ways that are purposeful and according to values that can be embraced by both the participants and by members of institutions of which schools form a part. All these issues are central concerns for any systematic approach to a professional science of didactics.

Endnotes

1 In its systematic efforts, the pragmatist approach offered here also has parallels to Klafki's (1958) Didaktische Analyse.

2 Here I give this historical background to the development in Sweden of pragmatically-oriented didactics to emphasise its roots in teacher education and the needs of didactics as a science of the teacher profession. Inquiry starts in practice and not in the ideas as such. This school of didactics draws on the thinking of Ludwig Wittgenstein and John Dewey as well as on praxis-oriented sociocultural educational researchers such as e.g. Jean Lave, Roger Säljö and James Wertsch. Common to all of them is a situated, communicative and action-oriented approach, opposed to mentalism and representationalims. Swedish pragmatism has traditionally been a branch of educational philosophy or has given hands-on progressive suggestions for education. The research reviewed here should not be understood as educational philosophy nor as normative suggestions for teaching, but as constituting an empirical science of didactics. It draws especially on Dewey's pragmatism but, according to his ideas on inquiry, is revised in light of empirical results and their consequences for practice.

3 "Allmän didaktik" in Swedish, i.e. "Allgemeine Didaktik" in German.

4 Ämnesdidaktik" in Swedish, i.e. "Fachdidaktik" in German.

5 Here I describe the development of school didactics (Uljens 1997) and not didactics oriented towards tertiary education.

6 "Metodik" in Swedish.

7 Such action-oriented epistemologies are better known as practical epistemologies (Wickman 2004).

8 This version of inquiry is primarily based on the work of the later Dewey (1922 onwards), who came to emphasise reflection as integrated with change of action, habit and practice in light of consequences. In earlier works Dewey often used reflection synonymously with thinking and testing hypothesis in the light of consequences (e.g. Dewey, 1916/1966, Chap. 11). For example, in 1933 Dewey retitled his book "How we think" from 1910 to "How we think: a restatement of the relation of reflective thinking to the educative process" along these lines, changing his language into a more action-oriented one.

9 This criterion builds on Dewey's (1938/1997, p. 35) principle of continuity of experience (Wickman and Östman 2002).

10   *Bildung* is *bildning* in Swedish.

11   Meinert Meyer (2007) pointed out how educational content is culturally embedded and can have very old origins. In the 12th century, abbess Herrad von Landsberg gave an illustration of the seven liberal arts (grammar, rhetoric, dialectics, arithmetic, geometry, astronomy and music) in the form of a circle based on Plato and Aristotle. At the same time, she also included poets and magicians in the picture, although outside of the circle, to represent the excluded authors and their texts.

12   The notion of "stand fast" originates from Wittgenstein's (1969) work (see Wickman and Östman 2002).

13   This may be seen as a "deconstruction" and "reconstruction" of the concept of colour, if understood in a situated way. According to pragmatist epistemology, concepts gain their meaning in use through their consequences for practice. The concept colour here is changing its meaning in relation to this specific practice of chemistry, but not necessarily for other practices.

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