Outline of a taxonomy for general Bildung

Deep learning in the anglophone tradition of curriculum studies and the Didaktik of north-west Europe

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Since 2001, when the accountability discourse in the field of education in Denmark took off, culminating in 2015 with the introduction of a goal-oriented curriculum for the Danish Folkeskole (primary and lower secondary education, henceforth K-10), there has been a new and remarkable interest in taxonomies of learning in this country. A range of publications were targeted at the educational research community as well as practitioners in education (Albrechtsen, 2019; Andersen, 2008; Brønd et al., 2015; Caeli and Andersen, 2015; Duch and Wachter Kjærgaard, 2015; Hansen, 2015; Hook, 2016; Jensen, 2015; B. Nielsen, 2013, 2015; B. L. Nielsen, 2009). These publications present, and make applicable by examples, all the well-known taxonomies, starting with Benjamin Bloom's six cognitive levels (Bloom, 1956) and the revised version of 2001 (Anderson et al., 2001), as well as the taxonomy of affective learning by David Krathwohl (Krathwohl, Bloom and Masia, 1970), John Biggs and Kevin Collis's SOLO taxonomy (1982), Robert Marzano's taxonomy for educational objectives (2001), and Elizabeth Simpson's taxonomy for psychomotor learning (1966). These taxonomies – understood as classification systems that frame the way in which learning goals or objectives are evaluated and subsequently measured as learning outcomes – were justified on the grounds that “they can make it visible to both students and teachers, exactly what needs to be *learned*” (Brønd et al., 2015, p. 6; my translation, original emphasis). They have furthermore been praised as especially helpful in conceptualising the progression of learning, and hence of teaching (Andersen, 2008; B. Nielsen, 2015), and the differentiation of teaching and learning as well as designing and evaluating learning tasks (B. Nielsen, 2013).

A search through the Danish research database reveals that in the last 20 years there has also been an increase in publications with the word *Bildung* (in Danish, *dannelse*) in the title. With few exceptions (e.g. Løvlie, Mortensen and Nordenbo, 2003), most of these are in Danish. In Denmark, there is not only a long tradition of inspiration from German educational theory but a *Bildung* discourse in its own right. The term, used broadly and in several different senses, constitutes a shared point of reference for different educational

schools, conceptions, and practices. For my purposes, it is not necessary to give a specific account of this discourse; I will just give a general characterisation that is also recognised outside the field. In her comparative conceptual analyses, Rebekka Horlacher states that in the Nordic countries, the concept of *Bildung* often serves as a catchphrase, and that its renewed use can be seen as a counter-movement to the accountability discourse (Horlacher, 2016, p. 1).

While all taxonomies stem from the anglophone educational context and thus enshrine a particular concept of teaching and learning, the idea of *Bildung* has its origin in German philosophy and educational theory and is committed to a different idea of teaching and learning. In the Danish context, however, a renewed interest in and application of taxonomies *and* a renewed interest in *Bildung* seem somehow to be coexisting in educational practice and theory. Is this an example of what Bjørg Brandtzæg Gundem meant when he stated that the “Nordic countries have perhaps been better able than others to live with and exploit both traditions”, “harnessing the potential that each of the traditions represents”, so that “the two radically different ways of thinking” could perhaps “complement each other” (Gundem, 2011, p. 91, my translation)? Or are there differences that cannot be neglected, complemented, or harmonised?

There are, in fact, both clear differences and much in common between the two approaches. On the one hand, taxonomies have mostly been developed and applied for the purpose of *evaluating* learning, while didactical models in *Bildung*-centred Didaktik, on the other hand, are focused on *preparation* for teaching relevant cultural content. Nevertheless, there seems to be a shared interest: taxonomies as well as models of Didaktik deal with the ‘content’ of teaching and learning. *Bildung*-centred Didaktik, on the one hand, aims *directly and concretely* at the preparation of content, identifying the educational substance (*Bildungsgehalt*), including the *why* of the content; it is little interested in evaluating the learning, as *Bildung* appears to be unmeasurable. Taxonomies, on the other hand, deal *indirectly and abstractly* with content by defining a specific set of forms of knowledge to be acquired. While the first approach refers mainly to the intended curriculum, the latter refers to the curriculum as evaluated/tested (Schubert, 2008). Does it make sense, we may ask, to prepare teaching content within the *Bildung* tradition, then evaluate learning outcomes by taxonomies from the other paradigm?

One thing is clear: learning taxonomies have not been influenced by the German idea of *Bildung*, and the theory of teaching and learning in *Bildung*-centred Didaktik has not applied these taxonomies. In this chapter, I will scrutinise Bloom’s cognitive levels and the SOLO taxonomy to pinpoint a few general issues in this kind of taxonomic thinking, then compare aspects of these with the forgotten content levels of *Bildung*-centred Didaktik, with the objective of investigating whether it may be possible to outline a different kind of taxonomy. On the way, I will touch on ‘deep learning’, an idea which

seems to have been conceived of in different ways. A taxonomy as the backdrop to a phenomenological foundation of learning, in the sense of categorical learning, may include other forms of knowledge besides those applied by the aforementioned taxonomies. Furthermore, a taxonomy assembled on the basis of Bildung-centred Didaktik, here in the sense of general education (*Allgemeinbildung*) in schools, would have to address levels for goal-content-complexes, as developed by Wolfgang Klafki and Martin Wagenschein in relation to exemplary teaching.

The reappearance of taxonomies in Denmark

In the light of the mutual influences between Didaktik and curriculum in the last 20 years (Terhart, 2012), the recent curriculum reform in Denmark is a complicated matter. In a country like Denmark, where the Bildung discourse is still predominant, the K–10 curriculum reform of 2015 looked like an importation of anglophone curriculum thinking. The focus on outcomes began in the mid-1990s; it was realised in the new curricula of 2001, “Klare Mål” (in English: Clear goals), reinforced and turned into binding goals in 2003–2006 in “Fælles Mål” (Common goals), revised in 2009 as “Fælles Mål 2009” (Common goals 2009), then further sharpened in 2015 in “Forenklede Fælles Mål” (Simplified common learning goals).¹ The framework for the 2015 curriculum introduced for the first time into Danish K–10 school the notion of a measurable competence goal, defined by a combination of knowledge goals and skills goals. Central for this chapter is that the framework contained curriculum guidelines that juxtaposed Bloom’s, Marzano’s, and the SOLO taxonomy, aligning them without explanation or comments. Furthermore, the guidelines advised the curriculum developers in each subject just to be consistent in their use of a taxonomy.

In a wider sense, the curriculum reform was explicitly intended to keep up with international tendencies, declaring a shift in paradigm. Content-oriented Didaktik was declared to be dead, and measurable learning goals to be the most important factor in improving teaching (Holm, 2014). Rather than learning something specific, students should *learn to learn* (Rasmussen, 2014). Consequently, the reform suggested a new but unexplained didactical model without the content category (Dorf, 2018, p. 125). Furthermore, the guidelines advised curriculum developers not to use the term ‘understanding’, because it was said to be too difficult to measure. Skovmand’s systematic analysis of the written curriculum has showed that terms like subject matter (*stoff*), enlightening knowledge (*kundskab*),² content, understanding, school, teaching, subject (*fag*), and purpose as well as Bildung, democracy, and citizenship had almost disappeared from 2009 to 2015. They were replaced by a terminology of ‘learning’ (Skovmand, 2016, p. 216ff.).

The curriculum reform of 2015 is said to have been inspired by the works of John Hattie, Andreas Helmke, and the so-called Ontario model (Rasmussen,

2015). Skovmand's study documents in detail how these sources were imported, translated, and twisted so as to fit with the educational policy and support the reform. However, none of these anglophone sources argued for a one-sided view of the interdependency of the teaching–learning complex in favour of 'learning' alone. None of them argued against content or understanding as highly relevant categories. On the contrary, referring to the SOLO taxonomy, Hattie and also Michael Fullan highlight *deep understanding*. Helmke stresses content, referring to Kurt Reusser and Franz Weinert (the latter three belong to the German-speaking community of empirical researchers). Neither Hattie nor Marzano argues for teaching predominantly steered by narrow goals (Skovmand, 2016, p. 179ff.).

Thus the 2015 curriculum reform *cannot* be primarily linked to the anglophone curriculum study tradition but rather to what Gert Biesta called "learnification" (Biesta, 2010) and additionally to an international trend towards accountability on economic and neoliberal grounds (Sivesind, 2013). It is against this backdrop that taxonomies have become revitalised in Denmark. In the following, I will briefly sum up some of the main critique exemplified by Bloom's taxonomy in order to recall the difficulties in applying such taxonomies.

Bloom's taxonomy and its use

It is astonishing how much Bloom's taxonomy has been discussed and is still put into practice despite the shortcomings that have been highlighted several times. First of all, and despite Bloom's intention to develop three taxonomies, a cognitive, an affective, and a psychomotor, only the cognitive version was widely used in practice. The cognitive version of the taxonomy distinguishes between knowledge and the five cognitive abilities: comprehension, application, analysis, synthesis, and evaluation (Bloom, 1956). Even though the original version has subsequently been revised (Anderson et al., 2001), it is still necessary to recall the critique.³

The first argument takes aim at the metaphor of knowledge as container. As criticised by Carl Bereiter and Marlene Scardamalia, this metaphor makes rational knowledge appear to be factual and descriptive knowledge, something to be remembered for school tasks (Bereiter and Scardamalia, 1998). Furthermore, critical theory will not accept such a concept of 'neutral' knowledge as something just to be learned and remembered (Paul, 1985). More importantly in the educational context, learning does not begin with knowledge as information. On the contrary, learning begins with the learner's preconceptions and involves several forms of knowledge has been especially underlined by phenomenological positions (e.g. Buck, 1989).

The second argument criticises Bloom's subordination of knowledge to "a panoply of intellectual abilities and skills of doubtful teachability" (Bereiter and Scardamalia, 1998, p. 677). We see this kind of underestimation and

trivialisation of knowledge once again in conceptions such as “21st century skills”. According to Bereiter and Scardamalia, Bloom himself observed the problem at the time:

[S]tudents in higher-level test items could understand gravity, acceleration and friction . . . and yet be unable to explain the logic of Galileo’s experiment or to identify its unstated assumption”, rather than achieving the intended higher skill of “recognizing unstated assumptions.

(Bereiter and Scardamalia, 1998, p. 680)

The learning of such domain-independent skills is highly contested. Bereiter and Scardamalia, by contrast, build on the pattern-recognition concept of cognitive science and highlight a study by Lesgold and LaJoie in 1991 showing that experts differ from novices neither in intellectual abilities (such as problem-solving), nor in basic knowledge in the field, but in “their knowledge of the actual devices they worked with and on” (Bereiter and Scardamalia, 1998, p. 680). Generally speaking, pragmatic language theory and phenomenology would not separate knowledge from its actual use.

Third, there are a range of problems associated with using Bloom’s taxonomy as a framework for progression in curriculum thinking and for teaching and learning. For example, the detailed account of Bloom’s taxonomical terms in the Danish K–10 curriculum of 2015 shows severe inconsistencies, both for long-term progression within subjects and for cognitive levels between subjects (Skovmand, 2016, p. 87), so that it cannot easily form the basis for progression (Dorf, 2018, p. 125). Not even within a single teaching unit does it make sense to apply the taxonomic term ‘understanding’ and the fourth cognitive abilities as ascending levels. Bereiter and Scardamalia suggest that a better conception of such cognitive processes is that they “go on in concert at all levels” (Bereiter and Scardamalia, 1998, p. 684).

An interesting and recent example of the Bloom approach in use, and of the overestimation of high generic skills, is presented in a recent PhD thesis on history teaching. The dominant understanding of teaching history in Denmark aims at “historical thinking” and “historical consciousness”, specified by abilities such as “source criticism, contemporarisation and empathy”, in this way leading to a “chronocentric” view of history (Bjerre, 2019, p. 10). The study shows that students are forced by typical school tasks to contemporise and make judgements about historical events without having met “the historical foreign in itself” (p. 11). Inspired by the concept of *epoché* from phenomenology, the study suggests placing temporary brackets around the inevitable contemporarisation of historical events and letting students meet the historical foreign world on its own premises. Such an approach not only facilitates another world view, and consequently empathy, but represents a concrete urge to bring content and historical knowledge back together again (see Deng in this volume). In the

context of history teaching, Sam Wineburg went so far as to argue for “Turning Bloom’s taxonomy on its head” on the grounds that knowledge is not just the starting point but the purpose of teaching (2018, p. 81).

Using the example of Bloom’s original cognitive taxonomy, I have recalled a few critical issues with broader relevance – a narrow notion of knowledge, the overestimation of domain-independent cognitive abilities, and the constraints inherent in their use for progression of learning. In the next section I will briefly touch on other taxonomies that feature the term ‘deep understanding’.

Deep understanding

While Bloom and others have developed taxonomies that pursue *higher* levels of cognitive abilities, there is an increasing interest in *deep* learning. Influential programmes like the Partnership for 21st Century Learning, the William and Flora Hewlett Foundation, and the New Pedagogies for Deep Learning programme initiated by Michael Fullan present deep learning as generic skills or competencies, including analytic reasoning, critical thinking, learning to learn, ability to collaborate, and so forth. Such conceptions are typically based on a contestable assumption that knowledge changes rapidly and hence is less important, and on an overestimated belief in the transferability of generic skills.

Both the SOLO taxonomy and the taxonomy by Marzano use the notion of deep learning. The SOLO taxonomy,⁴ for example, is designed to move from the concrete to the abstract and to achieve higher complexity in reasoning. Students are to be brought to use deep-learning approaches rather than remaining with surface activities. The taxonomy builds a constructivist version of learning and seeks to differentiate levels of understanding from the point of view of learner activities (Biggs and Tang, 2007, p. 79). Biggs and Tang define surface-learning as not seeing the wood for the trees, that is, as (a lot of) unconnected information, but they underline that this is not to be confounded with remembering. Rather, surface-learning denotes students’ omitting strategies (sweeping things under the carpet, cutting corners, or doing ‘as if’) (p. 22). On the other hand, Biggs and Tang describe deep learning as an activity where students are joyfully engaged and focusing on “underlying meanings, of main ideas, themes, principles, or successful applications” – that is, understanding the big picture – while they “naturally try to learn the details” (p. 24).

This notion of deep learning shows interesting similarities with the conceptions of exemplary teaching and learning in German Didaktik since the 1950s (Graf, 2013). Facing an overloaded curriculum that leads to knowing a little about everything, a German curriculum movement claimed priority for the basic and relevant issues of the cultural heritage acquired through student activities on one exemplary matter (free and condensed paraphrase of the Tübinger Resolution in 1951). Martin Wagenschein’s conception of exemplary teaching and learning, in particular, pinpoints the epistemic passage, by way of the many-faceted example containing detailed information,

to the powerful underlying categorical concept that explains a wider range of phenomena. Wagenschein also uses the term ‘in depth-understanding’ – deep drilling and deepening, moving from the concrete to the abstract – in contrast to an overload of undigested knowledge in a step-by-step teaching manner (surface-learning) (cf. Wagenschein, 2000b, p. 165).

It is surprising that Bloom’s “higher” ability of “analysing” appears as “analytical reasoning” in the sense of a “deep” learning skill in the newer conceptions. There are other differences between the metaphors high/low and surface/deep. One may argue that ‘higher’ connotes achievement and the measurability of outcomes, while ‘deep’ learning may be thought together with time and with serious and persistent learning (Albrechtsen, 2019). But another argument may be that both metaphorical expressions are framed in the vertical dimension and hence in principle denote the same concept, just switching the perspective. The use of ‘high’ or ‘deep’ may just be a question of rhetorical context. Instead, the systematic issue as Wagenschein and others have framed it in relation to exemplary learning is rather vertical and horizontal learning as two forms of necessary learning: a deep exemplary learning and orientative learning, in mutual dependency.

There are several other differences between the SOLO taxonomy and the conception of exemplary teaching. From the perspective of well-roundedness, for example, the SOLO taxonomy is predominantly cognitive, while Wagenschein involves other forms of knowledge, such as animistic reasoning or folk theory, in the learning process and requires the development of a personal relation to the content. Furthermore, while the SOLO taxonomy seems to focus on the eloquence with which a student moves within a cognitive landscape with many interrelated concepts, Wagenschein strongly underlines the connection between disciplinary methods and teaching/learning methods in order to make students understand the *why* of the understanding.

Another issue is that the SOLO taxonomy, in common with some other taxonomies, is preoccupied with construing, carrying out, and evaluating school tasks or school test tasks. The difference between surface and deep learning is thus a question of whether the students are doing “the task properly” (Biggs and Tang, 2007, p. 22). Such a focus on school tasks inherits a tendency to limit knowledge to school knowledge, in the sense of knowledge that is mainly, sometimes only, valued in school. Such school knowledge may well improve the chances of school advancement but has little relevance in everyday life. Andreas Gruschka has raised a similar critique of the Didaktik encounter in Germany. Didactical models tend to perceive content as school knowledge that has little to do with understanding the world, which is the purpose of general Bildung (Gruschka, 2002). By contrast, in Wagenschein’s conception, the phenomenon as the object of understanding is at the beginning and centre of teaching and learning (Wagenschein, 1988). Uljens and Kullenberg in this volume deal with this question of how we may conceptualise the transition from a shared life-world as different individuals at the beginning of schooling

to a shared, common life-world, while yet becoming unique by the end of the educational process.

Finally, and against the backdrop of the preceding, the main reason why one should be cautious about applying the SOLO taxonomy in primary and secondary schools, where the main purpose is general *Bildung*, is because the taxonomy was developed in the context of the tertiary level, where eloquence in cognitive landscapes is more likely at stake. In times of generic educational conceptions, there is too little focus on the differences between the educational purposes of the three levels of education.

All in all, I have dealt with a range of critical issues attached to anglophone taxonomies: a narrow and predominantly cognitive notion of knowledge and learning restricted to school knowledge and tasks, the overestimation of generic abilities and their hierarchical progression, and a decoupling of content and educational purpose. Such taxonomies may be applied for purposes of evaluation but do not consider the human process of learning, beginning with pre-knowledge and with all the in-between steps. Hence, they are not suitable for the preparation of teaching and learning processes. Let me turn now to a further approach to deep understanding and forms of knowledge.

Understanding deep things

It occurs to me that we need another kind of taxonomy: one dealing with other forms of knowledge than those taxonomies that are preoccupied with evaluating school tasks and knowledge that only schools appreciate. Bereiter and Scardamalia represent a quite different approach. They define deep understanding of something as “understanding deep things about it” (Bereiter and Scardamalia, 1998, p. 684). Their broader approach to the notion of knowledge follows a connectionist approach and seeks to describe a well-rounded set of forms of knowledge leading towards a well-rounded person. Bereiter identifies six kinds of personal knowledge, without claiming a taxonomy of strictly separated forms of knowledge or an ascending logic:

- 1 Statable knowledge comprises all kinds of propositional knowledge (e.g. also playing a piece of music in a certain manner).
- 2 Implicit understanding represents experience-based, tacit knowledge in order to make predictions or react intuitively in everyday life.
- 3 Episodic knowledge is characterised by recalling experiences and episodes and adopting analogous reasoning.
- 4 Impressionistic knowledge is based on feelings and influences our actions in a tacit way within a particular field. In so far as this knowledge can be seen as including wisdom, moral sensibility, and connoisseurship, it can support creativities by taking risky choices, but can also contain strong prejudices.
- 5 According to Bereiter, skills have a cognitive (I know that I am able to analyse literacy) and a subcognitive dimension (doing the analysis).

- 6 Regulative or self-regulative knowledge is a kind of domain-independent metacognition that balances various considerations by means of regulative ideas such as truth, equity, the good, and so forth.

(Bereiter, 2002)

Bereiter did not himself do so, but these forms of knowledge seem to me an interesting point of departure for developing a taxonomy for teaching and learning. While the taxonomies discussed previously focus on the end result of the student's acquisition, they do not take into account the forms of knowledge that play a role before and during the process of acquisition. Implicit, episodic, and impressionistic knowledge not only play a role as the student's pre-knowledge (*Vorwissen*) or basis for preconceptions (*Vorverständnis*) but may during the learning process itself contribute to new impressionistic knowledge as a basis for new feelings applying to issues in the world. At this point there is once again a connection to exemplary teaching and the tradition of *Interessenbildung*, dating back to Herbart. Knowledge is not solely a school object that is has to be acquired as something external in a high/low, deep/surface metaphor; the knowledge-building process has to take its departure in and connect to a personal and life-world dimension on the part of the learner (see Uljens and Kullenberg, this volume). The task of teaching is not only to motivate students in a psychological way, but to reinvent the balance between the subjective and the objective each time. It seems to me that Bereiter's forms of knowledge are compatible with Wolfgang Klafki's theory of categorical Bildung, understood as a phenomenological conception of the learning process and his theory of the elemental (*Elementartheorie*).

Levels of categorical understanding

Categorical learning is a holistic epistemic act through categorical intuition (*Anschauung*) in which the subjective and the objective, the procedural and propositional, as well as past, present, and future, merge together and thus change the learner's world. In this Bildung-centred Didaktik, the purpose of a well-rounded education is not divided into parallel taxonomies. Categories are not exclusively cognitive or scientific concepts but can also be of an emotional, moral, or aesthetic, volatile, and practical kind (Klafki, 1964, p. 293f., 2000, 2007a).

Categorical learning also contains an understanding of deep learning: it is based on the notions of the elemental and the fundamental (see also Deng in this volume). Klafki reveals, "While scrutinizing the question of general education it has been a surprising experience to me to discover a layering of content and goals" (Klafki, 2007b, p. 75, my translation). In influential textbooks in Didaktik, unfortunately, the elemental, the fundamental, and the exemplary are placed on the same level (e.g. Jank and Meyer, 2002, p. 219; Meyer and Meyer, 2007, p. 31). That is why I call attention at this point to Klafki's explicit presentation in his dissertation of three levels (*Stufen, Schichten, or Ebenen*),

inspired by both Erich Weniger and Theodor Litt: the historical-elemental, the categorical-elemental, and the fundamental-elemental (Graf, 2013, p. 155ff.; Klafki, 1964, p. 327). Each of these levels is then a level of categorical Bildung.

The “historical-elemental” is a level of categorical insight related to content that is subject to some degree of historical change. It covers matters (*Gegenstand*) of relevance, including actual phenomena, situations, and tasks in the present time that will persist for some time and affect both the young and the adult world (Klafki, 1964, p. 388). Klafki mentions as examples historical-political issues such as the East–West confrontation in the Cold War period of his time, changing social forms in society, and issues of economy and technology, as well as such issues as hygiene, nutrition, forms of living, and basic oral and written forms in society. It is evident that forms of communication are changing quite rapidly under the new technological circumstances, and that teaching ICT today is very different from just a few years ago.

Even though all the levels must be conceived as categorical learning, Klafki calls the second level “the categorical-elemental”. At first sight this is a little misleading, but it makes sense when insights on this level are defined as categorical preconditions for the further epistemic encounter of concrete phenomena on the historical-elemental level. Klafki himself mentions here basic conceptual knowledge (the concept of number, state, and civilised development); the concept of cause/effect; values such as truth, freedom, justice, and altruism; and ideas, structures, types, and basic human motives. While the historical-elemental can change more rapidly, these kinds of knowledge are more stable concepts, methods, experiences, capabilities, values, and so forth, yet not ahistorical. Furthermore, categorical insights on this level inherit a domain-specific or discipline-specific validity, though not without the possibility of a more generic value.

The third and ‘deepest’ level is the “fundamental-elemental”, or just “the fundamental”. Here, Klafki identifies a category of experience which, like the other levels, merges an objective and a subjective dimension during the epistemic act (Klafki, 1964, p. 332). In Klafki’s early writings, the objective dimension refers to a well-rounded range of cultural-societal “forces” (*Lebensmächte als Bildungsmächte*), including the state, the Church, working and civil life, science/truth, art/aesthetics, and social/moral codes. The reference to Schleiermacher indicates that these could be understood as praxeological domains of general practice, as in Dietrich Benner’s theory of education (Benner, 2010, p. 19ff.). The subjective epistemic dimension in these intergenerational forms of practice is the spirit, ethos, or attitude of the respective domain or discipline. The acquaintance with such fundamental categories of experience forms and pre-structures new experiences within and across the domains. Finally, it is important to underline that, from a phenomenological perspective, the fundamental has to be understood in terms of bodily grounded experiences. ‘Deep’ therefore means something beyond abstract, multi-leveled, relational, conceptual clusters like in the SOLO taxonomy or, simply, cognition and metacognition as the core of Marzano’s approach.

I think these three levels of deep understanding from Klafki's theory of the elemental still deserve to be a point of departure in establishing a taxonomy for Bildung-oriented teaching and learning. Furthermore, Klafki developed a draft of how the different school subjects can be differentiated through this level-content-matrix (Graf, 2013, p. 152; Klafki, 1964). Here ends the contribution of general didactics, and subject didactics may take over.

Unfortunately, Klafki, in his later work, did not explicitly relate the following issues to the levels of his theory of the elemental. But in my opinion, they can. First, the East–West problem, the epoch-typical key issue (*epochaltypisches Schlüsselproblem*) in his later work, Klafki already mentions as part of the historical-elemental in his earlier work. His catalogue of epoch-typical key issues may be understood on the historical-elemental level (Klafki, 2007b, p. 56ff.). This does not exclude that teaching key issues involves learning instrumental knowledge and skills, and may also lead to categorical-elemental insights (e.g. the conceptual roots or basic structures of an issue) and to fundamental experiences (e.g. the experience of being shaped by history and history-making).

Second, Klafki's catalogue of dimensions of meaning (*Sinndimensionen*) as a basic framework for a well-rounded educational approach in his late work is nothing else than a general framework for the level of the fundamental. The most recent of these comprises six central dimensions of experience: pragmatic everyday life, democratic action, productive/receptive aesthetics, understanding basic concepts of culture and science, ethics, and broad bodily experience (Klafki, 2007a, p. 22).

And third, Klafki considers the question and status of basic instrumental knowledge and skills, also called secondary 'virtues', such as reading, writing, accurate observation, self-discipline, and technical skills. These, he argues, should not be presented as neutral learning for its own sake, but functionally integrated into example-based teaching. In that sense, the secondary virtues appear to be an implicit fourth level of the elemental in his theory. This kind of knowledge and skills is usually the lowest level in the taxonomies discussed earlier.

Other than in these taxonomies, the content sensitivity of Klafki's levels supports a different approach to curriculum development and to teaching and learning. The levels differentiate between lasting knowledge and areas of more changeable content. This somehow forgotten issue is important, because there is pressure on schools either to overrate generic skills or to constantly take up newly arising content (for a critique of this in natural science, see e.g. Sjöberg, 2005). The introduction of ICT in the name of the (economic) future is one example of the pressure on changing content in schools. Students are supposed to learn all kinds of specific software as if this was the most important thing in the world, even though these rapidly disappear again. This overestimation of the future over the past – which, paradoxically, also shows an inordinate belief in the transfer of learning – Bereiter calls a futuristic education (Bereiter, 2002, p. 220). The move from very simple and ephemeral ICT knowledge and skills some decades ago to the present call for more basic technological

understanding (e.g. computational thinking) would be an interesting analytical case in the light of Klafki’s theory of the elemental. Much of this content would be on the level of secondary virtues and the historical–elemental, while for a long period the teaching of ICT failed to reach the levels of the categorical–elemental and fundamental insight.

Deep learning as exemplary learning is part of Klafki’s theory; but it is most fully elaborated in Wagenschein’s approach.

Wagenschein’s forms of knowledge

Wagenschein, who was working with the didactics of physics and mathematics, is a well-known exponent of the idea of exemplary teaching (Wagenschein, 2000a, 2000b). Exemplary teaching can be characterised as a slow, Socratic enterprise dealing with tricky phenomena (examples) in a manner which makes all basic (methodological) steps of understanding visible to all. It could be described as a kind of problem- and inquiry-based teaching. Wagenschein bases his educational reasoning on the notion of becoming (*das Werden*, see also Uljens and Kullenberg in this volume) and the principle of genetics (*genetisches Prinzip*): the becoming of the student as a disciplinary thinker, and the becoming of the subject within the student. Wagenschein’s research approach is to theorise concrete teaching, rather than develop a theory. The development of his taxonomy of knowledge is based on the teaching of Galileo’s law of free fall and the Pythagorean theorem. He suggests six levels, divided into two blocks and an additional level (Table 4.1): local knowledge (A), that is, example-based knowledge with restricted general validity; and exemplary knowledge (B), that is, knowledge with general validity within a domain divided into disciplinary methods. The sixth level is systematic knowledge. Like Klafki, Wagenschein labels this last level ‘the fundamental’. In this case it means to experience and

Table 4.1 Forms of knowledge

Wagenschein’s levels of knowledge		Law of free fall
A: Local knowledge	I: Solely propositional (remembering)	‘S (length) equals t ² (time squared)’
	II: Solely technical (applying)	Calculate length
	III: Insight (understanding)	Understanding Galileo’s experiment
B: Exemplary knowledge (transfer to the subject)	IV: Subject specific methods	Learning to experiment
	V: New neighbouring subject matters	Developing the theory of mechanics
Transfer to the whole world	VI: (Categorical) considerations on the basis of philosophy of science	What is a scientific experiment? Physics as a partial understanding of the world

Source: Wagenschein (1970, p. 414), my adapted translation

understand the epistemic approach that made natural science possible as an *aspect* of understanding the world.

Concerning the previous issue – the relation between school knowledge and understanding of the world – Wagenschein construes his ‘taxonomy’ as a path from the students’ pre-disciplinary knowledge to the becoming of disciplinary understanding and ability (levels III to V) and finally, on level VI, a kind of distancing from the discipline by seeing it in relation to other disciplines and to the life-world. In this respect, Wagenschein refers to Simone Weil’s concept of *enracinement* (Weil, 1949): rooting in the sense of deep learning.

When we look at the first two levels, there are obvious similarities between Wagenschein and Bloom. But the phrasing ‘solely’ indicates that Wagenschein aspired to conceive of these only as secondary and less important levels. His entry into teaching would be the students’ actual preconception of the phenomenon at hand, not what should have been learned in the previous lesson. More important are the similarities with Klafki: level III would be the category of the historical-elemental, because the teaching and experience of Galileo’s historical experiment of 1604 would not be the most up-to-date version of the free fall. It was an insight of the time, based not on free fall but on an inclined plane and without the knowledge of gravity on earth. One might claim that we should teach the most updated scientific version right away. Reconstructing the experiment in teaching with its old-fashioned measuring of time by a pendulum and other low-tech means would involve learning ephemeral insights and skills, but would form the basis of secondary virtues (measuring time and length, accuracy, approximation, and so forth) and the historical insight of $s=vt$ (level III). This experienced insight given in the experiment, and the relation between the route of the bullet and time, are a pre-stage of the categorical-elemental (a natural law). In exemplary teaching, this Galileo example represents an educational opportunity to learn the basics of a scientific method (level IV) as a methodological categorical insight and as the basis of the systematics of physics (free fall and gravity at level V). These categorical abilities and insights, once again, are epistemic preconditions for new exemplary teaching, for example, Newton’s classical mechanics, in order to widen the systematic basis of the discipline. In this way, Wagenschein tries to capture the process of *becoming*, that is, how physics evolves in the student from the concrete experience of the phenomenon of free fall. And finally, the same Galileo example is the opportunity to acquire fundamental insight (level VI) in a double sense. On the one hand, for Wagenschein, teaching should make it possible to experience what physics is about (questioning nature); and, on the other, it should make it clear, through the previously mentioned distancing, what the limits of physics are.

Outline of a taxonomy for general Bildung

Finally, by aggregating Bereiter’s broad notion of knowledge with Klafki and Wagenschein’s levels, I present here a kind of condensed ‘taxonomy’ for general

Bildung (see Table 4.2). General Bildung here means the contribution of basic schooling to the possibility of Self-Bildung towards a shared world.

From Wagenschein, and from Gruschka's critique, we learned that general education consists of a path from phenomena in the world that have not yet been unfolded by subject knowledge (in SOLO's terms, prestructural and unis-structural) to local and historically bound categories connected to the example at hand (in SOLO, multistructural). This is what I call *example knowledge*, which is rich, confusing, and requires investigating action involving information processing and other secondary skills. Phenomena in the world are complicated, and it is not yet clear what the most important information and approaches are. The didactical enterprise, then, is to help the student to see – for Sünkel, to articulate (Sünkel, 1996) – both the trees and the forest: that is, to gain conceptual and methodological insights tied to the phenomenon. From here, that path may lead to other examples to test or deepen the provisory insights, or it may deepen the original example or phenomenon in order to gain exemplary methodological or systematic insights (that is, categories on Klafki's level of categorical-elemental). Such categories have, as I have shown, a certain historical stability without being ahistorical, and they are therefore powerful preconditions for new learning, besides being a vehicle for cultural mediation between generations. In other words, either within the same example or in connection with new examples, local categories may be lifted onto a higher level of generalizability, as expressed by the term 'exemplary'. These levels of methodological and systematic categories expand the learner's experience with and of the subject (for SOLO, the relational and extended abstract). To fulfil the purpose of general education, Wagenschein suggests deepening one's experience with the subject on the fundamental level, yet at the same time distancing oneself from the subject once again in order to move towards a well-rounded world view. Here we are talking about fundamental exemplarity. Once you have experiences and have reflected on the power of agreeing or not agreeing on the agenda of a meeting, you have a bit of tacit, impressionistic, statable, and regulative knowledge of 'the political'.

In line with this, I suggest a taxonomy of knowledge consisting of six levels: four main levels with two bifurcations into sub-levels:

The levels are an attempt to identify different categorical levels, combined with some kind of a teaching and learning progression connected to the learning experience of the content by example. Most of Bereiter's forms of knowledge are in play in the first and last levels, in the beginning (level 1) and on the fundamental level, while there is a more explicit focus on specific forms in levels 2 to 5.

Although it is difficult to separate the subject methods from the subjects' conceptual elements, and although they belong together, I differentiate in line with Wagenschein between the methodological-elemental and the conceptual-elemental. In order to understand this approach, it is important to recognise the subject/method/object triad (Litt, 1954, p. 60). The same distinction is repeated on the next level, and there is also a pragmatic reason for this. While

Table 4.2 Outline of a taxonomy for general Bildung

<i>Progression by Wagenschein</i>	<i>New taxonomic levels</i>	<i>Bereiter's forms of knowledge</i>	<i>Exemplary teaching</i>
Phenomena before subject knowledge	1) Example knowledge	All forms of knowledge	Wealth of information and secondary virtues connected to the example
Into the subject	2) Methodological-elemental	All, but focus on skills including a subcognitive dimension	Associating from example to example
Deeper into the subject	3) Conceptual-elemental 4) Methodological-exemplary 5) Systematic-exemplary	All, but focus on stable knowledge Skills and regulative knowledge Stable knowledge in a broad sense and regulative knowledge	Categories connected to the example Analysing from example to example
Deeper into the subject and out again	6) Fundamental-exemplary	All, but focus on regulative and self-regulative as well as impressionistic and implicit/tacit knowledge	Generalised categories (explainable by examples) Metacognitive categories bound to experiences

the subject methodological issues are well known in the teaching of natural science, in teaching humanities, cultural or social sciences there is too little attention to the subject specific methods that lead to new understanding so that students will be able to follow their own experience of the epistemic enterprise of the phenomenon at hand.

In the light of the widespread use of anglophone taxonomies, I seek to call attention to the potential of Bildung-centred Didaktik to offer an outline of levels for (deep) understanding, and thus of a wider conception of forms of knowledge. I have tried in this chapter to sketch out some of the possibilities for developing these levels and connecting them with Bereiter's forms of knowledge. Whether it will be possible on these grounds to establish a taxonomy for general Bildung that is also suited to the evaluation and eventually the assessment of learning in the categorical sense is something that will require further investigation and argumentation within general didactics, as well as concretisation and testing by the various subject didactics.

Notes

- 1 Since the national breakthrough in the critique of this curricula rationale (e.g. Skovmand, 2016), there have been revisions (2018) moderating the K–10 curriculum and turning the mandatory goals once again into guiding goals.
- 2 A specific term in the Danish school tradition connoting general knowledge, insight, responsibility. More than information and facts: a kind of enlightening knowledge.
- 3 The revised version of the taxonomy of 2001 differentiates between a dimension of knowledge and a dimension of cognitive process. The notion of knowledge is much broader, and consists of remembering factual, conceptual, procedural, and metacognitive knowledge (Anderson et al., 2001). The cognitive processes are now expressed in verbs instead of nouns, but still form an ascending hierarchy. The new sequence goes: remembering, understanding, applying, analysing, evaluating, and creating. There are still reasons for readdressing the critique of Bloom's original version. First, it is still one of the most frequently presented and emphasised taxonomies, overshadowing the revised version. Second, the original taxonomy is still in use, at least in Denmark. Here, it is not only foundational in the 2015 curriculum but common in everyday didactical practice. Third and most important, the narrow understanding of knowledge as basic knowing-by-heart knowledge is being re-actualised by several educational forces. In Denmark, these are back-to-basic movements and a certain version of canon thinking (cf. Graf, 2006).
- 4 John Hattie estimates this taxonomy because of its satisfying inter-rater validity in evaluations of learning. Furthermore, he suggests that surface learning is connected to the unistructural and multistructural level, and that deep learning occurs when students achieve the relational and extended abstract level (Hattie and Brown, 2004, p. 17).

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